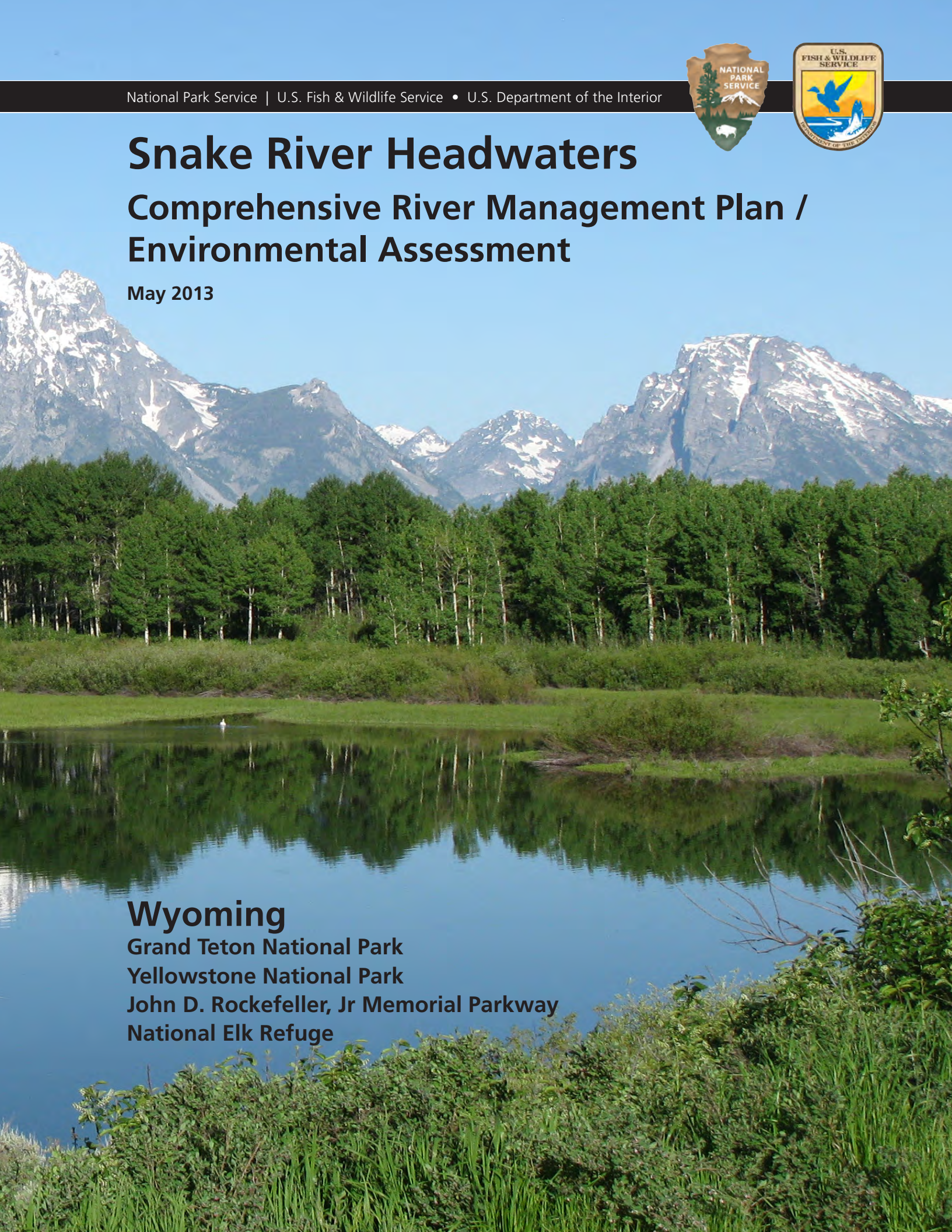
National Park Service | U.S. Fish & Wildlife Service • U.S. Department of the Interior

Snake River Headwaters

Comprehensive River Management Plan / Environmental Assessment

May 2013



Wyoming

Grand Teton National Park
Yellowstone National Park
John D. Rockefeller, Jr Memorial Parkway
National Elk Refuge

Cover Photo

Oxbow Bend, Grand Teton National Park

Snake River Headwaters
Comprehensive River Management Plan / Environmental Assessment
Grand Teton National Park, Yellowstone National Park, John D. Rockefeller, Jr. Memorial Parkway and National Elk Refuge

On March 30, 2009, passage of the Craig Thomas Snake Headwaters Legacy Act of 2008 added 414 miles of rivers and streams of the Snake River Headwaters to the national wild and scenic rivers system.[1] The purpose of this designation is to protect the free-flowing character, water quality, and outstandingly remarkable values for the benefit and enjoyment of present and future generations.

The Snake River Headwaters is unique in that it encompasses an entire watershed rather than just one river. It includes 13 rivers and 25 separate river segments. These rivers flow through an iconic landscape of stunning canyons, open meadows, broad vistas, striking mountains, glacial lakes, and sage flats. These landscapes provide spectacular undeveloped settings that create a distinctive sense of place and offer world-class recreational opportunities within the largest intact ecosystem in the contiguous United States.

These rivers flow across National Park Service, U.S. Forest Service, and U.S. Fish and Wildlife Service lands, as well as a small portion of state and private lands. Due to the sheer size of this wild and scenic river designation, the National Park Service and Bridger-Teton National Forest have developed separate but concurrent management plans for river segments within or along their respective administrative boundaries.

This comprehensive river management plan establishes the overall management direction for designated wild and scenic river segments within Grand Teton and Yellowstone national parks, John D. Rockefeller, Jr. Memorial Parkway, and the National Elk Refuge. The plan addresses resource protection, development of lands and facilities, user capacities, and other management practices necessary to achieve desired resource conditions.

The document examines three alternatives for guiding the preservation, management, and use of designated wild and scenic rivers. It also analyzes the impacts of implementing the alternatives. **Alternative A** is the "no-action" alternative, which describes the continuation of current management to provide a basis for comparing the other alternatives. **Alternative B** focuses on enhancements to visitor experience and increased access and development for a diversity of river-based recreational activities. Under **alternative C**, the headwaters would be managed as a more primitive, undeveloped, natural setting with modest improvements to enhance resource conditions and visitor experience.

The key impacts of implementing these alternatives are summarized in table 8 and are described in detail in "Chapter 5: Environmental Consequences."

This *Snake River Headwaters Comprehensive River Management Plan / Environmental Assessment* has been distributed to other agencies and interested organizations and individuals for their review and comment. The public comment period will last for a minimum of 30 days after the document is published and distributed. Readers are encouraged to submit their comments on this plan. See the "How to Comment on this Plan" discussion on the next page for further information.

---

[1] Total river miles differ from the amounts described in the Craig Thomas Snake Headwaters Legacy Act of 2008 due to more accurate calculations from GIS mapping data.

HOW TO COMMENT ON THIS PLAN

Comments are welcome and will be accepted for a minimum of 30 days after this plan is published and distributed. Commenters are encouraged to use the Internet, if possible. Please submit only one set of comments. Comments may be submitted by any one of the following methods:

Mail:

Grand Teton National Park
PO Drawer 170
Moose, WY 83012-0170

Online:

http://parkplanning.nps.gov/snakeriver

Hand Delivery:

Written and/or verbal comments may be made at public meetings. The dates, times, and locations of public meetings will be announced in the media following release of this document.

Before including your address, telephone number, e-mail address, or other personal information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. Although you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

CONTENTS

CHAPTER 1: INTRODUCTION

OVERVIEW OF THE WILD AND SCENIC RIVER DESIGNATION 3

BACKGROUND FOR THE PLANNING EFFORT 7

Purpose of the Plan 7

Wild and Scenic Rivers Act 7

Craig Thomas Snake Headwaters Legacy Act of 2008 8

Key Components of the Plan 9

Compliance with National Environmental Policy Act, National Historic Preservation Act, and Other Mandates 11

Next Steps 12

Foundation for Wild and Scenic River Planning and Management 13

Planning Issues and Opportunities 21

Relationship of this Plan to Other Planning Efforts 23

CHAPTER 2: DEVELOPMENT OF THE ALTERNATIVES

INTRODUCTION 29

Overview 29

Goal Statements 29

River Classifications 31

Boundary Delineation 31

How the Alternatives Were Developed 44

The Planning Framework 44

Three-tiered Planning Approach 44

User Capacity 46

Monitoring Guidelines 51

ENVIRONMENTALLY PREFERABLE ALTERNATIVE 53

Consistency of the Alternatives with the National Environmental Policy Act 54

IDENTIFICATION OF THE PREFERRED ALTERNATIVE 57

ALTERNATIVES CONSIDERED BUT DISMISSED FROM DETAILED EVALUATION 58

Introduction 58

Existing Restrictions Contribute to the Protection of Values for which Rivers Were Designated 59

Conclusion 60

CHAPTER 3: THE ALTERNATIVES

INTRODUCTION 63

Overview 63

Three Tiers of the Alternatives 63

ALTERNATIVE MANAGEMENT CONCEPTS 64

Alternative A (No Action) 64

Alternative B 64
Alternative C (Preferred) 64
HEADWATERS-WIDE MANAGEMENT STRATEGIES 69
Alternative A (No Action) 69
Alternatives B and C (Common to Both Action Alternatives) 71
MITIGATION MEASURES COMMON TO ALL ACTION ALTERNATIVES 96
Natural Resources 96
Cultural Resources 98
Visitor Use and Experience 99
Sustainable Development 100
Health and Safety 100
STAFFING AND COST ESTIMATES 101
RIVER SEGMENT MANAGEMENT STRATEGIES 107
Kinds of Use 107
Amount of Use 107
Lewis River (wild segment, Yellowstone National Park) 108
Lewis River (scenic segment, Yellowstone National Park) 110
Snake River (wild segment, Yellowstone National Park) 112
Snake River (wild segment, John D. Rockefeller, Jr. Memorial Parkway) 114
Snake River (scenic segment, Grand Teton National Park) 117
Pacific Creek (scenic segment, Grand Teton National Park) 121
Buffalo Fork (scenic segment, Grand Teton National Park) 123
Gros Ventre River (scenic segment, National Elk Refuge and Grand Teton National Park) 125
RIVER ACCESS POINTS MANAGEMENT STRATEGIES 131
SUMMARY OF KEY DIFFERENCES AND IMPACTS AMONG THE ALTERNATIVES 153
SUMMARY OF THE KINDS AND AMOUNTS OF VISITOR USE AND ASSOCIATED INDICATORS AND STANDARDS OF QUALITY TO ENSURE PROTECTION OF RIVER VALUES FROM VISITOR USE IMPACTS 163
Summary Rationale for User Capacity in Alternative B 163
Summary Rationale for User Capacity in Alternative C 163
SUMMARY OF IMPACTS OF THE ALTERNATIVES 173
CHAPTER 4: THE AFFECTED ENVIRONMENT
INTRODUCTION 177
Overview 177
Climate Change 178
IMPACT TOPICS INCLUDED FOR DETAILED ANALYSIS 180
Natural Resources 180
Cultural Resources 189
Visitor Use and Experience 201

Visual Resources (Scenery and Viewshed) 222
Park and Refuge Operations 224
Social and Economic Environment 230
IMPACT TOPICS CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS 244
Wetlands 244
Night Skies 244
Wilderness 244
Air Quality 245
Prime and Unique Farmlands 245
Natural or Depletable Resources Requirements and Conservation Potential 246
Energy Requirements and Conservation Potential 246
Carbon Footprint 246
Environmental Justice 246
Museum Collections 247
Indian Trust Resources 247
CHAPTER 5: ENVIRONMENTAL CONSEQUENCES
INTRODUCTION 251
Overview 251
Methods and Assumptions for Analyzing Impacts 251
Cumulative Impacts 252
NATURAL RESOURCES 255
Introduction 255
Water-related Resources 255
Vegetation (including Floodplains), Wildlife, and Fish 282
Threatened and Endangered Species 311
Soils 321
CULTURAL RESOURCES 339
Introduction 339
Cultural Resources Survey for Future Implementation of this Comprehensive River Management Plan 339
Impacts on Cultural Resources 340
VISITOR USE AND EXPERIENCE 349
Introduction 349
Alternative A (No Action) 350
Alternative B 355
Alternative C (Preferred) 361
VISUAL RESOURCES 369
Introduction 369
Methods and Assumptions for Analyzing Impacts 369

Alternative A—No-Action 369
Alternative B 371
Alternative C (NPS PReferred) 372
PARK OPERATIONS 374
Introduction 374
Alternative A (No Action) 374
Alternative B 375
Alternative C (Preferred) 376
SOCIOECONOMICS 378
Introduction 378
Alternative A (No Action) 379
Alternative B 382
Alternative C (Preferred) 384
CHAPTER 6: CONSULTATION AND COORDINATION
PUBLIC INVOLVEMENT 389
CONSULTATION AND COORDINATION WITH OTHER AGENCIES, OFFICES, AND ASSOCIATED TRIBES 392
Consultation with U.S. Fish and Wildlife Service and Wyoming Game and Fish Department 392
Consultation with Traditionally Associated Tribes 392
Section 106 Consultation with Wyoming State Historic Preservation Office 393
List of Agencies, Organizations, and Individuals Receiving a Copy of this Document 393
APPENDIXES, REFERENCES, PREPARERS, AND INDEX
APPENDIX A: CRAIG THOMAS SNAKE HEADWATERS LEGACY ACT OF 2008 397
APPENDIX B: DEPENDENCY OF RIVER VALUES ON IN-STREAM FLOWS 405
APPENDIX C: CONSULTATION LETTERS 411
REFERENCES 431
PREPARERS 439

MAPS

Map 1. Snake River Headwaters: Designated Wild and Scenic River Segments 5
Map 2. Snake River Headwaters: NPS Designated Wild and Scenic River Segments 35
Map 3. Lewis River, Wild Segment 37
Map 4. Lewis River, Scenic Segment 38
Map 5. Snake River, Wild Segment 39
Map 6. Pacific Creek and Buffalo Fork, Scenic Segments 41
Map 7. Snake River, Scenic Segment 42
Map 8. Gros Ventre River, Scenic Segment 43
Map 9. River Access Points Strategies 133
Map 10. Alternatives—Flagg Canyon 135
Map 11. Alternatives—Flagg Ranch 137

Map 12. Alternatives—Jackson Lake Dam 139
Map 13. Alternatives—Cattleman's Bridge 141
Map 14. Alternatives—Oxbow Bend Overlooks 143
Map 15. Alternatives—Pacific Creek Landing 145
Map 16. Alternatives—Deadman's Bar 147
Map 17. Alternatives—Schwabacher Landing 149
Map 18. Alternatives—Moose Landing 151

TABLES

Table 1. ORV Categories by River Segment 15
Table 2. Summary of Acres and Miles by River Segment 34
Table 3. Staffing and Cost Estimates for Full Implementation of the Alternatives 102
Table 4. Alternative Staffing Levels by Park and Division 102
Table 5. Summary of Key Differences among the Alternatives—Headwaters-wide Strategies 157
Table 6. Summary of Key Differences among the Alternatives By River Segments—Types and Levels of Development 161
Table 7. Summary of Key Differences Among the Alternatives by River Segments—User Capacity Components 165
Table 8. Summary of Impacts of the Alternatives 173
Table 9. Impact Topics 177
Table 10. List of Federally Threatened, Endangered, and Candidate Species in the Snake River Headwaters in Grand Teton and Yellowstone National Parks and the National Elk Refuge 186
Table 11. 2008 Visitor Study Sampling Locations within Grand Teton National Park 203
Table 12. River User Survey Collection Totals 203
Table 13. Number of Trips on the Snake River within Grand Teton National Park 205
Table 14. Number of Groups Encountered while on the River 208
Table 15. Maximum Camping Limits in Yellowstone National Park Wild Segment of the Snake River 214
Table 16. Concessioner Daily and Monthly Quotas for the Scenic Snake River Segment 217
Table 17. Daily and Monthly Limits on Commercial Fishing Trips 217
Table 18. Population Trends and Projections 233
Table 19. Primary Employers in 2006 for Teton County, Wyoming 235
Table 20. Compensation of Employees by Industry Sector in 2003 for Teton County, Wyoming 235
Table 21. Recreational Visitors at Grand Teton National Park for 2006–2010 237
Table 22. Recreational Visitors at Yellowstone National Park for 2006–2010 241
Table 23. Summary of Federally Listed Species Determinations for the Preferred Alternative 322

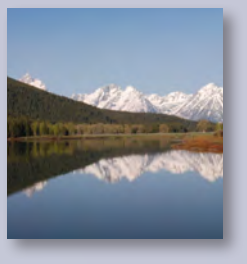
FIGURES

Figure 1. Boundary Delineation: Example from the Snake River Headwaters 33
Figure 2. Snake River Headwaters Planning Framework 45
Figure 3. Three-tiered Planning Approach 46
Figure 4. River-related Activity Participation Levels at Snake River Headwaters 202
Figure 5. Concessioner-guided Floating and Fishing Visitor Counts from 2007–2011 on the Snake River within Grand Teton National Park and John D. Rockefeller, Jr. Memorial Parkway 202
Figure 6. Level of Crowding Experienced on the Scenic Segment of the Snake River 208
Figure 7. Experiences Related to Other Visitor Interactions on Scenic Segments of the Snake River 209

Figure 8. Importance of Seeing Fewer People during Trip on the Scenic Segment of Snake River 209
Figure 9. Concessioner Fish and Float Visitors by Section of the Scenic Snake River Segment 216
Figure 10. Average Monthly Recreational Visitors at Grand Teton National Park for 2006–2010 238
Figure 11. Average Seasonal Distribution of Recreational Visitors at Grand Teton National Park for 2006–2010 238
Figure 12. Jobs Related to Grand Teton National Park for 2005–2009 239
Figure 13. Average Monthly Recreational Visitors at Yellowstone National Park for 2006–2010 241
Figure 14. Average Seasonal Distribution of Recreational Visitors at Yellowstone National Park for 2006–2010 242
Figure 15. Jobs Related to Yellowstone National Park for 2005–2009 242

Introduction

1



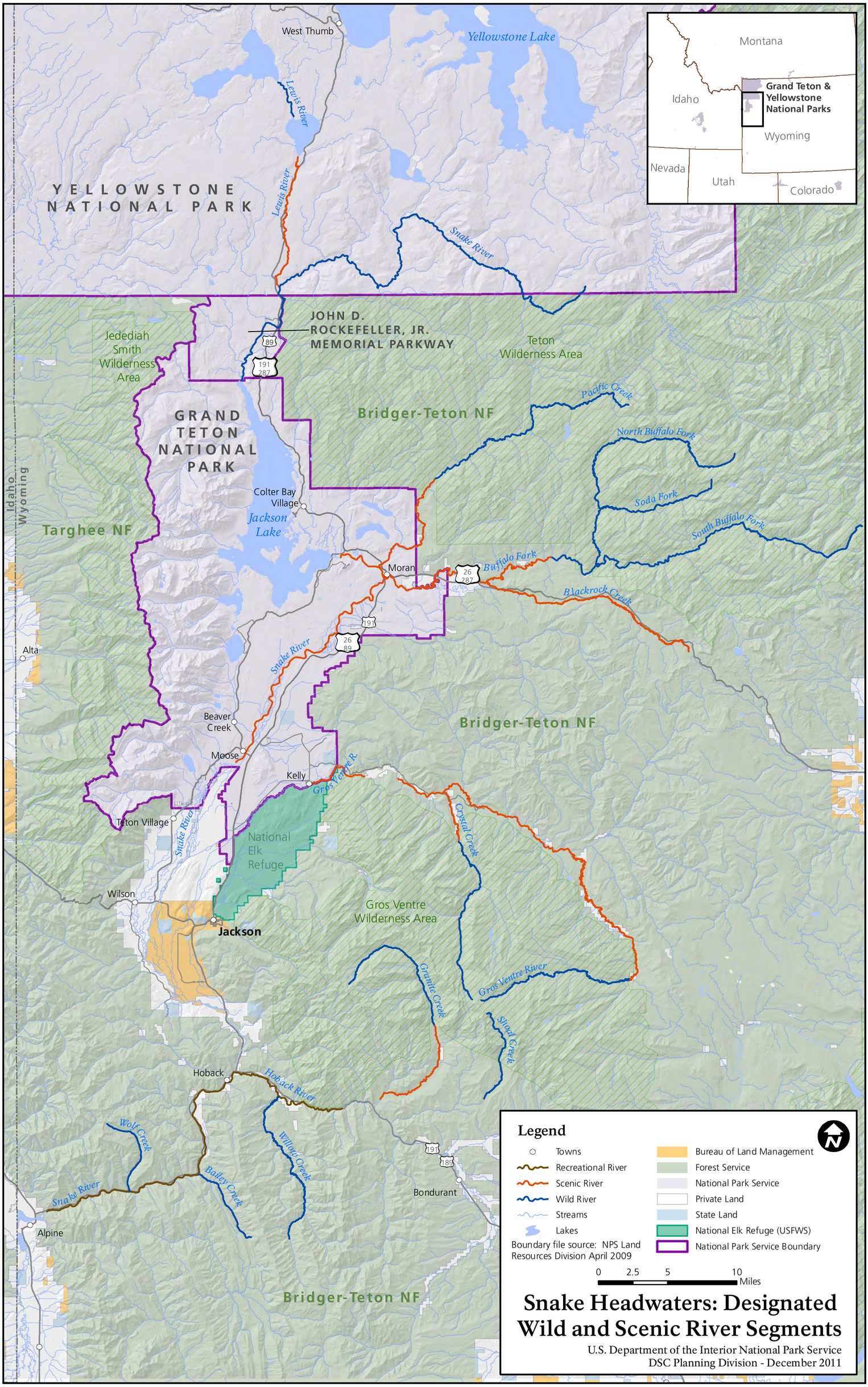
OVERVIEW OF THE WILD AND SCENIC RIVER DESIGNATION

The Snake River Headwaters was designated a national wild and scenic river in 2009 to protect its free-flowing character, water quality, and its outstandingly remarkable values for the benefit and enjoyment of present and future generations. Through this planning effort, the National Park Service (NPS) has considered what long-term, comprehensive guidance would best protect and enhance the 99 miles of designated river segments within and along the boundary of Grand Teton and Yellowstone national parks and John D. Rockefeller, Jr. Memorial Parkway.[2] In coordination with the U.S. Fish and Wildlife Service (USFWS), the plan also includes a portion of the Gros Ventre River, which is a tributary of the Snake River and serves as the boundary between Grand Teton National Park and the National Elk Refuge.

The Snake River Headwaters flow through an iconic landscape of stunning canyons, open meadows, broad vistas, striking mountains, glacial lakes, and sage flats. Dramatic geologic processes have shaped the scenery—from the volcanic Yellowstone Plateau to the fault/block uplift of the dramatic Teton Range. These landscapes provide spectacular settings undeveloped by humans that create a distinctive sense of place and offer world-class recreational opportunities within the largest intact ecosystem in the contiguous United States. The rivers and associated habitats are critical to the sustainability of a full complement of native plants, wildlife, and aquatic species. In addition to the abundant natural resources, the cultural resources of these rivers reflect thousands of years of diverse people, cultures, and uses, which continue to carry cultural significance to American Indian tribes and others. These elements combine to offer a landscape character throughout the Snake River Headwaters that is unforgettable on a scale that draws visitors worldwide.

The wild and scenic river designation of the Snake River Headwaters is unique in that it encompasses an entire watershed rather than just one river. It includes 13 rivers and 25 separate river segments, totaling 414 miles. These rivers flow across National Park Service, U.S. Forest Service (USFS), and U.S. Fish and Wildlife Service lands, as well as a small portion of state and private lands. Due to the sheer size of this wild and scenic river designation, a collaborative planning approach is vital. To ensure the timely completion of this planning effort, the National Park Service and Bridger-Teton National Forest have developed separate but concurrent management plans for river segments within or along their respective administrative boundaries. Wyoming Game and Fish Department is also assisting with both planning efforts. Every step in developing these plans has been completed cooperatively to guarantee a seamless and comprehensive management approach for the Snake River Headwaters designation.

[2] Total river miles differ from the amounts described in the Craig Thomas Snake Headwaters Legacy Act of 2008 due to more accurate calculations from GIS mapping data.


Montana
Idaho
Grand Teton & Yellowstone National Parks
Wyoming
Nevada
Utah
Colorado
West Thumb
Yellowstone Lake
Lewis River
YELLOWSTONE NATIONAL PARK
Snake River
JOHN D. ROCKEFELLER, JR. MEMORIAL PARKWAY
Jedediah Smith Wilderness Area
Teton Wilderness Area
Bridger-Teton NF
Pacific Creek
North Buffalo Fork
GRAND TETON NATIONAL PARK
Soda Fork
South Buffalo Fork
Idaho
Wyoming
Colter Bay Village
Jackson Lake
Targhee NF
Moran
Buffalo Fork
Blackrock Creek
Alta
Beaver Creek
Moose
Kelly
Gros Ventre R.
Teton Village
National Elk Refuge
Crystal Creek
Wilson
Jackson
Gros Ventre Wilderness Area
Granite Creek
Gros Ventre River
Sheep Creek
Hoback
Hoback River
Wolf Creek
Willow Creek
Bailey Creek
Bondurant
Alpine
Legend
Towns
Recreational River
Scenic River
Wild River
Streams
Lakes
Boundary file source: NPS Land Resources Division April 2009
Bureau of Land Management
Forest Service
National Park Service
Private Land
State Land
National Elk Refuge (USFWS)
National Park Service Boundary
0 2.5 5 10 Miles
Snake Headwaters: Designated Wild and Scenic River Segments
U.S. Department of the Interior National Park Service
DSC Planning Division - December 2011

BACKGROUND FOR THE PLANNING EFFORT

PURPOSE OF THE PLAN

The purpose of the *Snake River Headwaters Comprehensive River Management Plan / Environmental Assessment* for Grand Teton and Yellowstone national parks, John D. Rockefeller, Jr. Memorial Parkway, and the National Elk Refuge is to protect and enhance the outstandingly remarkable values, free-flowing condition, and water quality for the designated wild and scenic river, leaving it unimpaired for future generations.

The need for the plan is rooted in the Wild and Scenic Rivers Act (WRSA). The act requires comprehensive planning for designated rivers to provide for the protection of the free-flowing character, water quality, and outstandingly remarkable values (ORVs) of rivers. The act directs that the plan shall address "resource protection, development of lands and facilities, user capacities, and other management practices necessary or desirable to achieve the purposes of this act." To meet this and other specific requirements of the act (addressed in detail in chapters 2 and 3), the National Park Service *Snake River Headwaters Comprehensive River Management Plan / Environmental Assessment*

- documents river boundaries and segment classifications (as wild, scenic, or recreational)
- provides a clear process for protection of the free-flowing condition of the river in keeping with section 7 of the Wild and Scenic Rivers Act
- clearly describes the river's outstandingly remarkable values, which are the river-related or river-dependent, and unique, rare, or exemplary characteristics that make a river eligible for inclusion in the national wild and scenic rivers system
- establishes a management program in the river corridors that protects the outstandingly remarkable values, free-flowing condition, and water quality of the river
- determines the appropriate types and levels of development within the river corridors
- addresses user capacity, establishing the kinds and amounts of visitor use that is appropriate in the river corridors consistent with park mandates

WILD AND SCENIC RIVERS ACT

Our nation's rivers have always served as arteries of commerce and industry. The nation's rivers have facilitated economic development—serving as navigational channels; providing drinking water, hydroelectric power, irrigation water for croplands; and carrying waste products. Additionally, much development has occurred in floodplains. Due to these changes, the inevitable flooding in these floodplains has led to major public works projects to prevent or mitigate flood damage through diversion, channelization, and construction of dams and levees. Many miles of river and associated natural values have been lost or changed forever.

By the 1960s, sufficient concern developed over the seemingly inexorable loss of free-flowing rivers, causing Congress to intervene. The national wild and scenic rivers system was established in 1968 by the Wild and Scenic Rivers Act. The act was intended by Congress to balance the existing policy of building dams on rivers for water supply, power, and other benefits with a new policy of protecting the free-flowing condition and outstandingly remarkable values of selected rivers for the benefit and enjoyment of

present and future generations. Section 1(b) of the act states,

> It is hereby declared to be the policy of the United States that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations. The Congress declares that the established national policy of dam and other construction at appropriate sections of the rivers of the United States needs to be complemented by a policy that would preserve other selected rivers or sections thereof in their free-flowing condition to protect the water quality of such rivers and to fulfill other vital national conservation purposes.

The heart of river protection and the essence of the act is protection of free-flowing condition. The act is notable for safeguarding the special character of these rivers, while also recognizing the potential for their appropriate use and development. It encourages river management to cross political boundaries and promote public participation in developing goals for river protection. Currently, there are more than 203 free-flowing rivers and streams representing approximately 12,600 miles of protected waters in the national wild and scenic rivers system. Rivers and streams included in this system are classified according to one or more of the following categories:

1. *Wild river areas*—Rivers or segments of rivers that are free of impoundments and generally inaccessible, except by trail (no roads), with watersheds or shorelines essentially primitive and waters unpolluted. Wild river areas represent vestiges of primitive North America.

2. *Scenic river areas*—Rivers or segments of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped; scenic river areas are accessible in places by roads.

3. *Recreational river areas*—Rivers or segments of rivers readily accessible by road or railroad, that may have some development along their shorelines, and may have undergone some impoundment or diversion in the past.

The Snake River Headwaters includes all three classifications; however, river segments within the three national park system units and the National Elk Refuge are only classified as *wild* and *scenic* river areas. None are classified as *recreational*.

More information about the Wild and Scenic Rivers Act is available at http://rivers.gov/.

CRAIG THOMAS SNAKE HEADWATERS LEGACY ACT OF 2008

On March 30, 2009, President Obama signed the Omnibus Public Land Management Act of 2009, as Public Law 111-11. Title V, subtitle A, section 5002 of the act amends the Wild and Scenic Rivers Act to add approximately 388 miles of rivers and streams of the Snake River Headwaters to the national wild and scenic rivers system. The National Park Service and U.S. Fish and Wildlife Service administer 111 miles of designated river segments; the remaining

portions are within the adjacent Bridger-Teton National Forest.[3]

The passage of this act reflects the leadership and collaborative approach of late Senator Craig Thomas who worked for five years with a group of outfitters, conservationists, small business owners, sportsmen, and other river users to protect the Snake River Headwaters. The historic river protection legislation was named Craig Thomas Snake Headwaters Legacy Act in his honor (appendix A).

As stated in the Omnibus Public Land Management Act, the designated river segments are described in the following text. Most mileages are from the amounts described in the Snake Headwaters Legacy Act. A summary of more accurate river miles by segment is provided in table 2 in chapter 2, which are based on more precise calculations from geographic information system (GIS) mapping data.

Buffalo Fork of the Snake River

The portion of Buffalo Fork of the Snake River consisting of the 7.7-mile segment from the upstream boundary of Grand Teton National Park to its confluence with the Snake River—designated as a scenic river.

Gros Ventre River

The portion of the Gros Ventre River consisting of the 3.3-mile segment flowing across the south boundary of Grand Teton National Park to Highlands Drive Loop Bridge—designated as a scenic river.

Lewis River

The portions of the Lewis River consisting of the 5-mile segment from Shoshone Lake to Lewis Lake—designated as a wild river—and the 12-mile segment from the outlet of Lewis Lake to its confluence with the Snake River—designated as a scenic river.

Pacific Creek

The portion of Pacific Creek consisting of the 11-mile segment from the east boundary of Grand Teton National Park to its confluence with the Snake River—designated as a scenic river (river segment miles were calculated to be 4.3 miles, according to GIS calculations provided in table 2).

Snake River

The portions of the Snake River consisting of the 47-mile segment from its source to Jackson Lake—designated as a wild river—and the 24.8-mile segment from 1 mile downstream of Jackson Lake Dam to 1 mile downstream of the Teton Park Road bridge at Moose, Wyoming—designated as a scenic river.

KEY COMPONENTS OF THE PLAN

Key components of this plan are based on guidance developed by the Interagency Wild and Scenic Rivers Council (2012). More information about wild and scenic river management can be found on the council's website at www.rivers.gov.

Outstandingly Remarkable Values—Foundation for Wild and Scenic River Planning

This comprehensive river management plan defines the outstandingly remarkable values for the Snake River Headwaters, as well as for

[3] River miles described throughout this plan differ from the amounts described in the Craig Thomas Snake Headwaters Legacy Act of 2008 due to more accurate calculations from GIS mapping data.

each designated river segment within Grand Teton and Yellowstone national parks, John D. Rockefeller, Jr. National Parkway, and National Elk Refuge, so these values can be protected and enhanced according to the mandate of the Wild and Scenic Rivers Act. The free-flowing condition and water quality of the Snake River Headwaters support the integrity of these outstandingly remarkable values and are key components of the planning effort. The National Park Service, in collaboration with the U.S. Forest Service, U.S. Fish and Wildlife Service, and Wyoming Game and Fish Department, has developed a set of ORV statements for the plan, which are presented later in this chapter. These ORV statements reflect careful attention to input that was solicited during public scoping for this planning effort.

Goals for Protecting River Values

This comprehensive river management plan describes goals for protecting and enhancing the free-flowing condition, water quality, and outstandingly remarkable values of the river. These goals include desired conditions for natural and cultural resources, visitor experience, access, and future development to be achieved and maintained for each designated river segment.

Boundary Delineation

This comprehensive river management plan establishes river corridor boundaries to protect the free-flowing condition, water quality, and outstandingly remarkable values for which the river segments were designated. The corridor width can include up to 320 acres/mile, which works out to an average of 0.25 mile from the banks on both sides of the river. However, boundaries can be wider or narrower than the 0.25 mile average in places, as long as the 320 acres/mile limit is not exceeded over the entire length of the segment. Boundaries are measured from the ordinary high water mark. The area of any islands within the designated corridor does not count against the acreage limitation.

Development of Lands and Facilities

This comprehensive river management plan determines the appropriate types and levels of development (e.g., trails and boat launches) for each designated river segment. These management decisions are based primarily on each segment classification—wild or scenic. Any developments would be designed and constructed to ensure the free-flowing condition, water quality, and outstandingly remarkable values of the river are not adversely impacted.

User Capacity

This comprehensive management plan addresses user capacity, which includes the type and amount of recreation use a river area can sustain without adverse impacts on outstandingly remarkable values, water quality, and the free-flowing character of the river area; the quality of visitor experience; and public health and safety. Therefore, this plan identifies the appropriate activities and associated visitor use levels, while continuing to protect and enhance the values for which the rivers were included in the national wild and scenic rivers system. The plan also includes indicators, standards, and adaptive management strategies that will guide ongoing management of visitor use and capacity within the river corridor.

Evaluation of Water Resource Projects

Section 7 of the Wild and Scenic Rivers Act directs federal agencies to evaluate federally assisted water resources projects to ensure existing conditions of designated river values (i.e., free-flowing condition, water quality, and outstandingly remarkable values) are not diminished. This comprehensive river

management plan formalizes the evaluation procedures for this purpose.

In-stream Flows

The Omnibus Public Land Management Act, which designated waterways of the Snake River Headwaters as a wild and scenic river, sets the priority date (March 19, 2009) for quantification of wild and scenic river water rights. Valid, existing water rights in Idaho and Wyoming are unaffected by this act including storage, management, and release of water from Jackson Lake; all interstate water compacts in existence as of March 19, 2009 (including full development of any apportionment made in accordance with the compact), and water rights held by the United States. The Secretary of the Interior (or his designee) is required to apply for reserved water rights in each segment in accordance with the procedural requirements of the laws of the State of Wyoming.

Monitoring Strategy

The Wild and Scenic Rivers Act requires that the outstandingly remarkable values of the Snake River Headwaters be protected and enhanced. It is, therefore, important to periodically "check in" on the status of river value conditions to find out if they are being protected and enhanced. The *Interagency Guidelines* (USDI 1982) state, "studies will be made during preparation of the management plan and periodically thereafter to determine the quantity and mixture of recreation and other public use which can be permitted without adverse impact on the resource values of the river area." Accordingly, this comprehensive river management plan includes a program of monitoring and ongoing study to ensure visitor and other public use does not unacceptably impact river values over time.

COMPLIANCE WITH NATIONAL ENVIRONMENTAL POLICY ACT, NATIONAL HISTORIC PRESERVATION ACT, AND OTHER MANDATES

National Environmental Policy Act

Pursuant to section 102(2) (C) of the National Environmental Policy Act of 1969, as amended (42 *United States Code* (USC) 4341 et seq.) (NEPA), the National Park Service has prepared an environmental assessment identifying and evaluating three alternatives for this comprehensive river management plan. Regulations governing NEPA compliance are set by the President's Council on Environmental Quality (CEQ) (40 *Code of Federal Regulations* (CFR) parts 1500–1508). CEQ regulations establish requirements and the process for agencies to fulfill their obligations under the National Environmental Policy Act. This environmental assessment documents compliance with two fundamental NEPA requirements: (1) to make careful, complete, and analytical study of the impacts of any proposal, and alternatives to that proposal, if it has the potential to affect the human environment, well before decisions are made; and (2) to be diligent in involving any interested or affected members of the public in the planning process.

Compliance with National Historic Preservation Act of 1966 (16 USC 470) (NHPA) is integrated into the NEPA compliance process using NHPA criteria for analysis of impacts on cultural resources (see below). The NEPA process is also used to coordinate compliance with other federal laws and regulations applicable to the decisions to be made as part of this plan, including, but not limited to,

- Clean Water Act (33 USC 1251 et seq.)
- Clean Air Act, as amended (42 USC 7401 et seq.)
- Endangered Species Act (16 USC 1531 et seq.)

- Architectural Barriers Act (42 USC 4151 et seq.)
- Americans with Disabilities Act (42 USC 12101 et seq.)
- Executive Order 11593, "Protection and Enhancement of the Cultural Environment"
- Executive Order 11988, "Floodplain Management"
- Executive Order 11990, "Protection of Wetlands"
- Archaeological Resources Protection Act (16 USC 470aa et seq.)
- Native American Graves Protection and Repatriation Act (25 USC 3001 et seq.)
- American Indian Religious Freedom Act (42 USC 1996)
- Executive Order 13007, "Indian Sacred Sites"

National Historic Preservation Act

Section 106 of National Historic Preservation Act directs federal agencies to take into account the effect of any undertaking (a federally funded or assisted project) on historic properties. A *historic property* is any district, building, structure, site, or object (including resources considered by American Indians to have cultural and religious significance) that is eligible for listing in the National Register of Historic Places (NRHP) because the property is significant at the national, state, or local level in U.S. history, architecture, archeology, engineering, or culture. Section 106 provides the Advisory Council on Historic Preservation (ACHP), the Wyoming State Historic Preservation Office (SHPO), and federally recognized American Indian tribes an opportunity to comment on assessment of effects by the undertaking. In this document, the undertaking is the implementation of the actions outlined in this plan's selected alternative.

The National Park Service has developed a nationwide programmatic agreement with the National Conference of State Historic Preservation Officers for compliance with section 106 of the National historic Preservation Act, which provides two paths for section 106 compliance: a streamlined review for qualifying actions, and standard review for all other actions. In order to use the streamlined review, projects must meet three specified criteria, including the requirement that all cultural resources have previously been identified and that the park has determined that the activities or undertakings would result in no adverse effects to historic properties.

NEXT STEPS

After distribution of the *Snake River Headwaters Comprehensive River Management Plan / Environmental Assessment,* there will be a 60-day public review and comment period, after which the NPS planning team will evaluate comments from other federal, state, and local agencies; organizations; businesses; and individuals regarding the plan. If appropriate, changes would then be incorporated into a finding of no significant impact (FONSI), which documents the NPS selected alternative for implementation. In addition, the finding of no significant impact would include any necessary errata sheet(s) for factual changes required in the document, as well as responses to substantive comments by agencies, organizations, or the public. Once the finding of no significant impact is signed by the NPS regional director, and following a 30-day waiting period, the plan can then be implemented. If a finding of no significant impact is found not to be appropriate, the National Park Service would then publish a notice of intent to prepare an environmental impact statement in the *Federal Register*.

Implementation of the Plan

The approval of this plan does not guarantee that the funding and staffing needed to implement the plan would be forthcoming. The implementation of the approved plan would depend on future funding, and it could be affected by factors such as changes in NPS staffing, visitor use patterns, and unanticipated environmental changes. Full implementation could take many years. Once the plan has been approved, additional feasibility studies and more detailed planning, environmental documentation, and consultations would be completed, as appropriate, before certain actions in the selected alternative can be carried out.

FOUNDATION FOR WILD AND SCENIC RIVER PLANNING AND MANAGEMENT

The foundation for preparing a comprehensive river management plan is to clearly articulate free-flowing condition, water quality, and outstandingly remarkable values of designated rivers, so that these values can be protected and enhanced in accordance with the mandate of the Wild and Scenic Rivers Act.

Free-flowing Condition

According to the Wild and Scenic Rivers Act, *free flowing* is defined as "flowing in a natural condition without impoundment, diversion, straightening, riprapping, or other modification of the waterway." However, the act states that "the existence of low dams, diversion works, and other minor structures at the time any river is proposed for inclusion in the national wild and scenic rivers system shall not automatically bar its consideration for such inclusion provided that this shall not be construed to authorize, intend, or encourage future construction of such structures within components of the National Wild and Scenic Rivers System."

The Snake River Headwaters is a high quality snowmelt-dominated watershed. The headwaters contain diverse, abundant native species and natural communities; extensive, intact, and interconnected habitats; high water quality; and natural unconfined channel morphology. The headwaters contain a number of U.S. Geological Survey (USGS) stream gauges that provide flow data for monitoring its free-flowing condition. Peak flows generally occur in late May and early June. Low flows generally begin in October below Jackson Lake and in September above the dam and on tributary streams.

The Snake River below Jackson Lake is influenced by Jackson Lake Dam operations. Jackson Lake is a natural lake augmented by the dam, which was originally constructed in 1907 and raised in 1917. The dam is operated by the Bureau of Reclamation (BOR) and provides water to Idaho in order to meet obligations for the Snake River Compact between Idaho and Wyoming. The Bureau of Reclamation cooperatively works with the National Park Service to provide spring-release flushing flows in May/June. Constant flows between 1,500–2,100 cubic feet per second (cfs) are released from July to September. Recent studies show that tributaries below the dam mitigate the dam's effects related to hydrology and geomorphology on the Snake River.

Within Grand Teton National Park, John D. Rockefeller, Jr. Memorial Parkway, and the National Elk Refuge, the Snake River and its tributaries contain a number of minor channel modifications (such as boat ramps, streambank stabilizations, bridges, and culverts). These human-made features generally do not impede the free-flowing character of the river system. The Lewis and Snake rivers within Yellowstone National Park have no channel modifications, with the exception of a single bridge over the Lewis River. Any new modifications can only be approved if they would not adversely affect the river system's free-flowing condition,

water quality, or outstandingly remarkable values.

Water Quality

All of the rivers and streams within the Snake River Headwaters have been designated by the U.S. Environmental Protection Agency (EPA) and the State of Wyoming as outstanding natural resource waters, where no water quality degradation is allowed. A review of available chemical and biotic data and additional USGS studies confirmed that water quality is excellent. Yellowstone National Park began geothermal monitoring in the mid-1980s, and this program yielded long-term baseline water quality data. The NPS Inventory and Monitoring (I&M) Network established several additional long-term water quality monitoring stations in the Snake River Headwaters in 2006, which indicate that water quality remains excellent and continues to meet or exceed EPA and state standards.

Natural geologic and geothermal forces, as well as artificial changes in stream flow caused by Jackson Lake Dam operations, can affect water quality of the Snake River Headwaters. These and other natural and human influences can cause changes in temperature, dissolved oxygen, and other water quality characteristics. Ongoing monitoring provides opportunities to study these influences on the natural features, systems, and processes of the Snake River Headwaters.

Outstandingly Remarkable Values

Outstandingly remarkable values are defined by the Wild and Scenic Rivers Act as the characteristics that make a river worthy of special protection. The Interagency Wild and Scenic Rivers Coordinating Council has issued criteria for identifying and defining these values—the values must be river-related and they must be rare, unique, or exemplary in a regional or national context. Staff from the National Park Service, in collaboration with the U.S. Forest Service, U.S. Fish and Wildlife Service, and Wyoming Game and Fish Department, used these criteria to develop the following set of broad ORV statements for the entire Snake River Headwaters and for individually designated river segments within or along the boundary of Grand Teton and Yellowstone national parks, John D. Rockefeller, Jr. Memorial Parkway, and the National Elk Refuge.

The National Park Service and U.S. Fish and Wildlife Service concluded that the Snake River Headwaters contains the following set of outstandingly remarkable values: scenic, recreational, cultural, ecological/wildlife, fish, and geologic. An evaluation process based on criteria for each outstandingly remarkable value was used to determine which river segments contain these different outstandingly remarkable values. In cases where outstandingly remarkable values were not identified for particular river segments, their associated river-related values are considered similar to the many other rivers in the Greater Yellowstone Ecosystem, and therefore, they are not considered rare, unique, or exemplary in a regional context.

The broad ORV statements that follow were developed in collaboration with the U.S. Forest Service for the entire Snake River Headwaters; however, the statements vary slightly between the two plans in order to highlight the resource values contained within the administrative boundaries of each agency.

The following matrix (table 1) summarizes the evaluation results and provides organization to the statements that follow.

TABLE 1. ORV CATEGORIES BY RIVER SEGMENT

RIVER SEGMENT (from north to south)	ORV CATEGORY					
	Scenic	Recreational	Cultural	Ecological/ Wildlife	Fish	Geologic
Lewis River (wild segment)		•	•			•
Lewis River (scenic segment)	•	•	•	•	•	•
Snake River (wild segment)	•	•	•	•	•	•
Snake River (scenic segment)	•	•	•	•	•	•
Pacific Creek (scenic segment)	•			•	•	
Buffalo Fork (scenic segment)	•			•	•	
Gros Ventre River (scenic segment)			•	•	•	

Scenic Values

The Snake River Headwaters flow through an iconic landscape dominated by Yellowstone Plateau and Teton Range. These landscapes create a sense of place that provides spectacular settings undeveloped by humans. The river and its tributaries create unparalleled scenery with diverse opportunities for viewing the river that can be dramatic and subtle. Seasonal and climatic variations of vegetation, combined with water features, clean air, and landforms, create diverse and ever-changing landscapes. These elements combine to offer a landscape character that is unique and unforgettable on a scale that draws visitors from all over the world.

Lewis River (scenic segment). The dramatic Lewis Canyon is the result of two different lava flows converging near the edge of the Yellowstone Caldera to create a unique sweeping view of the edge of the plateau. A thousand feet of relief draws the eye to a continuous cascade in a narrow gorge that empties into the braided channel at the bottom. Aspens, willows, and lodgepole pines create a kaleidoscope that changes with the seasons. Lewis River Falls is an easily accessible example of the waterfalls found in the region.

Snake River (wild segment). The natural condition and wild character of the area is a vestige of primitive North America. It includes hot springs along the banks that create unique vistas. The river travels through

sheer canyon walls carved by cataclysmic volcanic flows to the protected inlet of Jackson Lake, which harbors abundant wildlife and waterfowl.

Snake River (scenic segment). The Snake River below Jackson Lake Dam provides a number of exemplary and unique scenic features including braided river channels, diverse wildlife, and vegetation at Oxbow Bend, numerous side channels, and the river in the foreground of the Teton Range. This segment of the river contains the historically iconic view from the Snake River overlook, which was popularized by Ansel Adams, the renowned American photographer and environmentalist; distinct views recognized around the world at Oxbow Bend; Schwabacher Landing where beaver ponds reflect views of the Grand Teton framed by cottonwood stands; and views of historic Menor's Ferry with the Teton Range looming in the background.

Pacific Creek (scenic segment). Pacific Creek offers unique framed views of the Snake River and Teton Range through groves of cottonwood trees that are many shades of green in spring; gold, amber, and red in autumn; and frost-coated during the winter—interspersed with stands of conifers.

Buffalo Fork (scenic segment). As it flows through current and former ranchlands to its confluence with the main channel of the Snake River, Buffalo Fork offers unique views of the Teton Range framed between low-lying hills and unparalleled views of American bison, elk, moose, pronghorn, wolves, and waterfowl.

Recreational Values

The majority of the Snake River Headwaters offers world-class recreational opportunities and visitor experiences within a largely pristine ecosystem of clean air, clean water, natural soundscapes, spectacular landscapes, and high quality wildlife and fish habitat. This setting provides visitors with exceptional opportunities to participate in recreational activities within the largest intact ecosystem in the contiguous United States. The river offers activities such as boating, fishing, wildlife viewing, photography, and camping—opportunities for recreation and experiencing solitude in a setting that provides a connection to the natural landscape for a broad variety of users. The river and its tributaries are set within one of the most dramatic landscapes within the United States—from stunning canyons, open meadows, and broad vistas to striking mountains, glacial lakes, and sage flats.

Lewis River (wild segment). The Lewis River provides unique access to Shoshone Lake, the largest natural lake in the contiguous United States without road access. Hikers and horseback riders enjoy traveling the backcountry route along the river. The fishing in the channel can be exemplary, particularly during the fall run of brown trout, which attracts anglers from the region and beyond. This segment is unique in that it is the only river within Yellowstone National Park where boats are allowed. This activity has occurred historically without interruption to allow visitors to transport their boats to Shoshone Lake.

Lewis River (scenic segment). Lewis River Falls is a prominent feature along this segment, easily accessed by the main park road. It is popular for sightseeing and photography, while the river below is enjoyed by anglers. The Lewis River Canyon provides an awe-inspiring experience for thousands of road-bound visitors. The opportunity to view a truly wild river that is substantially free from the effects of modern human activities is a quality integral to visitor enjoyment of the river. The canyon also presents a dramatic view of erosion of the volcanic Yellowstone Plateau by the Lewis River.

Snake River (wild segment). From the headwaters of the Snake River northeast of Fox Park in Yellowstone National Park to the South Entrance of Yellowstone, this river corridor offers exemplary opportunities for

extended backcountry hiking, horse pack trips, and trout fishing. The Snake River Hot Springs is along the river and provides an opportunity to soak in waters warmed by these natural hot springs. As one of the most remote areas in the contiguous United States, wilderness character is one of the most notable characteristics of the upper Snake River. Below the South Entrance, the Snake River enters a narrow canyon that offers, for a short season, some of the only whitewater boating available in John D. Rockefeller, Jr. Memorial Parkway and Grand Teton National Park. The segment of the river between the bridge at Flagg Ranch and Jackson Lake offers a unique opportunity to camp and boat in a wilderness setting.

Snake River (scenic segment). This segment is enjoyed by arguably the most visitors of any segment of the Snake River Headwaters within the parks and parkway. Different segments of the river, accessed by four developed access points, offer boating for a wide variety of skill levels and boat types. These boating trips offer a unique opportunity to view the majestic Teton Range, as well as the varieties of wildlife that frequent the river corridor. Fishing for the Snake River fine-spotted cutthroat trout is a unique opportunity and offers the same views of the landscape. Since the days of Ansel Adams, photographers have been drawn to this river segment to capture the juxtaposition of the Snake River flowing below the Teton Range. Easy access provides exceptional opportunities for wildlife viewing and photography, which is one of Grand Teton National Park's signature activities.

Cultural Values

The continuum of human use along the Snake River Headwaters encompasses thousands of years of diverse people, cultures, and uses. Throughout the centuries, cultures flourished along these rivers because they provided a corridor for travel through rugged terrain and sustenance for travelers. American Indian use included travel routes, resource procurement, and seasonal camps; early European American use included exploration, fur trapping, and settlement; historical and ongoing activities include tourism, dude ranching, public lands management, and conservation activities. This continuum of human use is reflected in archeological sites, historic buildings, and cultural landscapes along the river corridors. The abundant natural and cultural resources of these rivers continue to carry cultural significance to American Indian tribes and others to this day.

Lewis River (wild segment). The Lewis River may have served as a major transportation corridor for the many nomadic native peoples who traveled the corridor for more than 12,000 years. Archeological sites along Lewis River and other tributaries of the Snake River are known to represent the Birch Creek culture, identified along the Salmon River in Idaho. These sites indicate considerable human use from 10,000–7,000 years ago. Obsidian from Yellowstone was identified in sites outside the park, indicating these people traveled to the region using the Lewis River and its resources. Archeological evidence on this portion of the Lewis River is regionally significant and possibly nationally significant.

Lewis River (scenic segment). Regionally significant and possibly nationally significant archeological sites along this segment of the Lewis River represent 12,000 years of use as a travel route. Early trails are associated with trappers (e.g., Osborne Russell and Jim Bridger), U.S. cavalry who first administered the park, and tourists from late 19th century through today.

Snake River (wild segment). Archeological sites that may be found along this segment would likely indicate that seasonal hunting, fishing, and camping by native peoples occurred for the past 12,000 years. Captain Barlow, exploring after the 1871 Hayden Survey, traced the river to its source and left behind several place names, including Mount Hancock and Barlow Peak—features visible

from various spots along the river corridor. The Fox Creek cabin, a national register-eligible backcountry patrol cabin in Yellowstone National Park, is within the river corridor and is associated with early historic (as well as current) park administration. Patrol cabins were constructed along early trails and in proximity to rivers to facilitate U.S. Army or ranger forays into the park wilderness to conduct various resource surveys and protection patrols. Near the Snake River / Lewis River confluence is the regionally significant South Entrance Historic District, which contains several national register-listed buildings associated with early and present park administration. These facilities were positioned approximately 0.25 mile west of the Snake River to assure its protection and provide easy access to water.

Snake River (scenic segment). Prehistoric archeological campsites along the banks of the river below Jackson Lake indicate seasonal use, especially near the confluence of tributaries (Pacific Creek and Buffalo Fork). As with the upstream segment, the Snake River was a major travel route used by American Indian tribes. Archeological resources on this portion of the Snake River are considered nationally significant. Beginning in the first quarter of the 19th century, fur traders gained access to the valley via former game trails along the river, which were used previously by seasonal American Indian occupants of the area. Twentieth-century homesteaders, dude ranchers, and conservationists took advantage of the river's scenic and recreational attributes, as well as a strategic location to establish ranches and homesteads. National register-listed sites, such as Bar BC Dude Ranch, Menor's Ferry river crossing, 4 Lazy F Dude Ranch, and Murie Ranch, sprang up along the Snake River and now stand as vestiges of the historic development along the river.

Gros Ventre River (scenic segment). Nationally significant archeological sites representing prehistoric human use—believed to be for seasonal hunting, fishing, and trapping areas, and travel routes to the Snake River and Yellowstone headwaters—can be found along the Gros Ventre River. This river served as a travel corridor connecting Jackson Hole Valley to the Wind River Mountains and the Upper Green River Valley via Trapper's Point, a national register-listed archeological site dating back more than 6,000 years.

Ecological/Wildlife Values

The Snake River Headwaters occurs within the largest intact ecosystem in the contiguous United States where natural processes such as fire, flooding, plant succession, wildlife migration, and predator-prey dynamics shape the landscape and its biota. A full complement of native plant and wildlife species is exhibited, significant at a regional and national scale. Plant species diversity is high with numerous distinct riparian plant communities, including species assemblages that are unique to the region. Several nationally important wildlife populations depend on these riparian environments, including the Jackson elk herd (the largest in the world), grizzly bear and gray wolf populations of the Yellowstone ecosystem (the southernmost populations in North America), the tri-state trumpeter swan population (the largest in the contiguous United States), and recovered bald eagle and peregrine falcon populations. No nonnative mammals, reptiles, or amphibians are known to use the river corridors. Four of North America's largest carnivores (grizzly and black bears, wolves, and cougars) freely interact with seven native ungulates (mule and white-tailed deer, moose, bison, elk, pronghorn, and bighorn sheep) in a dynamic system rivaled by few places on earth. The diversity and abundance of wildlife in this assemblage is recognized worldwide and is the primary reason people visit these parks. All of the native wildlife is part of self-sustaining populations, and the river courses and associated habitats are critical to this sustainability.

Lewis River (scenic segment). This segment flows through the Lewis River Canyon—a remote, rugged, and undeveloped stretch of river that is rarely used by visitors. River characteristics and processes are unaltered and support healthy wildlife and fish populations. As a result of long-standing limitations and visitor use management, the canyon acts as a refugia for a diverse assemblage of species as well as important habitat connectivity with the Snake River downstream.

Snake River (wild segment). The upper Snake River is one of the most remote areas in the contiguous United States and the most pristine of the Snake River Headwaters because of limited human use. With elevations ranging between 6,000 and 10,000 feet, the diversity of plant communities and wildlife within this river corridor is high. This remote river segment provides a migration pathway key to ecosystem connectivity and wildlife refugia. Megafauna, such as bears and wolves seeking habitat security, are abundant in this segment, enhancing an already world-class assemblage of wildlife. A number of thermal features are also present, which influence the assemblage of plants and invertebrates in the immediate area. This remote, pristine environment offers exceptional opportunities for scientific research.

Snake River (scenic segment). This segment of the Snake River is unique in the Greater Yellowstone Ecosystem due to its low topography, broad floodplain forest, numerous small wetlands, and for much of its length, sagebrush grassland. A blue spruce/narrowleaf cottonwood riparian forest finds its best expression in this reach. These plant communities in turn provide distinct habitat characteristics not found in other areas in the intermountain west, supporting an exceptionally high diversity of wildlife. The area is designated by the state as crucial moose winter range, and is highly productive spring, summer, and fall habitat for deer, elk, bison, and moose. The corridor provides a regionally important travel corridor for riparian-dependent species and those preferring cover. While the river's natural flows have been altered by the Jackson Lake Dam operations, fluvial and ecological processes quickly recover downstream. This provides an exceptional opportunity to study these processes and their influence on vegetation succession in this braided river corridor.

Pacific Creek (scenic segment). This segment of Pacific Creek represents an intact ecological community with an uncommonly rich assemblage of plant and wildlife communities. The riparian corridor abounds with a diversity of wildlife, especially elk, grizzlies, and wolves. In winter, moose are relatively abundant in the area. The wildlife trails along the shore of the creek attest to its importance as a movement corridor linking the Teton Wilderness and the Snake River Headwaters with the lower Snake River drainage.

Buffalo Fork (scenic segment). The ecological and wildlife values of this segment are similar to the lower Snake River and are therefore regionally significant. This significance is especially evident near the Buffalo Fork confluence with the Snake River, where moose, beaver, osprey, and other species are common.

Gros Ventre River (scenic segment). This segment traverses a narrow canyon. The steep cliffs carved by the river and adjacent steep south-facing slopes provide unique plant communities and wildlife values. The riparian habitats serve as important winter and transitional ranges for ungulates and the slow-moving river segments provide habitat for a diversity of bird species. Because of the concentration of ungulates, carnivores are also attracted to the river corridor. The river is an important wildlife migration corridor linking the upper Gros Ventre River and adjacent highlands with the Snake River drainage.

Fish Values

The Snake River Headwaters provide a unique fishery for the Yellowstone and Snake River fine-spotted cutthroat trout, which are both nationally significant. The headwaters also contain a diverse community of other native aquatic species including regionally significant populations of northern leatherside chub, bluehead sucker, and western pearlshell mussel. Spawning, rearing, and adult habitats are characterized by excellent water quality, high connectivity between the mainstem of the Snake River and its tributaries, few natural or human-made barriers, and a diverse and abundant macroinvertebrate community supporting naturally reproducing and genetically pure populations of native fish.

Lewis River (scenic segment). The lower reach of the Lewis River below the waterfalls contains the nationally significant Yellowstone and Snake River fine-spotted cutthroat trout.

Snake River (wild segment). This segment contains the Yellowstone and Snake River fine-spotted cutthroat trout and western pearlshell mussel—all nationally significant species of concern. It contains nine native species of the Snake River Headwaters and nine historically present species of the Greater Yellowstone Ecosystem. There is a variety of high quality habitat types typical of the ecosystem. Fish constitute an outstandingly remarkable value due to the presence of cutthroat trout and other native species, high species diversity, and natural reproduction of native species.

Snake River (scenic segment). This segment contains the Snake River fine-spotted cutthroat trout, a nationally significant species, and the bluehead sucker, a regionally significant species. It contains 10 native species of the Snake River Headwaters. Below Pacific Creek, there is excellent habitat that is regionally and nationally significant. The reach above Pacific Creek contains a variety of high quality habitat types typical of the ecosystem. Fish constitute an outstandingly remarkable value due to the presence of cutthroat trout and other native species, high species diversity, and natural reproduction of native species.

Pacific Creek (scenic segment). This segment contains the Snake River fine-spotted cutthroat trout, a nationally significant species of concern, and the northern leatherside chub, a regionally significant species. It contains 10 native species of the Snake River Headwaters. There is a variety of high quality habitat types typical of the ecosystem. Fish constitute an outstandingly remarkable value due to the presence of the cutthroat trout, high species diversity, natural reproduction of native species, and high quality habitat.

Buffalo Fork (scenic segment). This segment contains the Snake River fine-spotted cutthroat trout, a nationally significant species, and the bluehead sucker, a regionally significant species. It contains eight native species of the Snake River Headwaters. There is a variety of high quality habitat types typical of the ecosystem. Fish constitute an outstandingly remarkable value due to the presence of the cutthroat trout and high species diversity.

Gros Ventre River (scenic segment). This segment contains the Snake River fine-spotted cutthroat trout, a nationally significant species, and the bluehead sucker, a regionally significant species. It contains seven native species of the Snake River Headwaters. Natural reproduction exists, and there is a variety of high quality habitat types typical of this ecosystem. Fish constitute an outstandingly remarkable value due to the presence of the cutthroat trout and high species diversity.

Geologic Values

Snake River Headwaters lies within a seismically and geomorphically active zone where dynamic geologic processes continue

to shape the landscape—unique features include geothermal springs, landslides, debris flows, and exposed geologic layering. In addition, Snake River is a textbook example of a naturally braided river system that transports high sediment loads. This action creates a diverse landscape and supports vegetation communities critical to the ecological health of the river.

Lewis River (wild segment). This segment contains a regionally unique, low-gradient reach between Shoshone and Lewis lakes. Shoshone Lake reduces the intensity of peak flows, resulting in the transport of smaller-sized gravels. Most of the pools on the channel are formed by woody debris. Geology is considered an outstandingly remarkable value due to the unique geomorphology between Shoshone and Lewis lakes that includes lava flows and tuffs.

Lewis River (scenic segment). This segment contains a regionally significant example of the convergence of two different volcanic tuff and lava flows, which form Lewis Canyon. Geology is considered an outstandingly remarkable value due to the presence of exemplary lava flows, volcanic tuff, and the dramatic canyon.

Snake River (wild segment). This segment contains a diversity of channel types that transport substantial amounts of sediment, which is considered to be regionally significant. The segment contains four hydrothermal systems (Huckleberry, Snake River, Heart River, and one unnamed hot spring) that are considered nationally significant. This segment contains a number of debris flows that are regionally significant. Geology is considered an outstandingly remarkable value due to the diversity of channel types, sediment transport, the number of hydrothermal systems, and debris flows resulting from an active fault system.

Snake River (scenic segment). This segment contains a textbook example of one of the longest continuous and naturally braided river systems in the contiguous United States. This dynamic system transports a high bed load (gravels) and has a diversity of fluvial features including side channels and floodplains, which create correspondingly diverse landscapes and habitats within the river corridor. These geomorphically active surfaces support vegetation communities critical to the ecological health of the river. There are a few landslides and debris flows typical of the Greater Yellowstone Ecosystem. Geology is considered an outstandingly remarkable value due to the presence of naturally braided, geomorphically active river channels.

PLANNING ISSUES AND OPPORTUNITIES

Planning issues define opportunities, conflicts, or problems regarding the use or management of public lands—in this case, designated wild and scenic river segments of the Snake River Headwaters. The public; NPS staff; local, state, and federal agencies; and organizations identified several planning issues during scoping (early information gathering). These issues generally involve protection of significant resources, public access and opportunities, development, and use. Climate change has also been included in this section because it is an emerging, long-term issue.

The following section describes the issues that were identified during scoping, as well as the opportunities to address these issues as part of the planning effort.

Kinds and Amounts of Recreational Use

A wide range of recreational activities and experiences was identified during scoping as important to visitors of the Snake River Headwaters area, including angling, boating, swimming, hiking, walking, backpacking, snowboarding, cross-country skiing;

photography, wildlife viewing, climbing, camping, horseback riding, hunting wildlife, and edible plant gathering.

Of these recreational activities and experiences, public comments mainly centered on river-related activities–there was no consensus as to how recreation on the river should be managed. Some people encouraged opening more sections of the river to boating/paddling/floating, whereas others urged public land managers to close or keep closed certain river segments. Several commenters also requested that overnight camping be permitted on the Snake River in addition to areas that already allow camping. Other comments addressed amounts of use generally and supported current use levels or lower use levels and some specifically suggested permitting systems.

This plan explores different options for providing a range of recreational use opportunities along the river corridors, including the preservation of traditional uses; exploring additional uses; reducing uses; modifying existing recreational use opportunities and/or use limitations. This plan also determines the kinds and amounts of use for the river consistent with the protection and enhancement of river values. All options would ensure the protection and enhancement of river values while avoiding conflicts and crowding among visitors.

Types and Levels of Development

Several comments emphasized the types and levels of development within the river corridor should be *appropriate* (i.e., appropriate facilities should be placed at appropriate locations, consistent with the needs of users and the setting in which the facilities are situated). In some cases, upgrading or enhancing existing boat ramps was recommended to handle the volume of current use. One comment noted that riverbank stabilization and other developments should not adversely affect free-flowing condition or associated resource values of the rivers. Several specific developments were also identified as facilities that are not appropriate, and many comments stated generally that no new facilities or other developments were necessary.

This plan determines what types of facilities are needed and where they should be sited within the river corridors, including access. It also determines which areas should be free of developments. It evaluates the compatibility of existing and/or new developments with the need to protect and enhance river values and determines appropriate management strategies to achieve river management goals.

Free-flowing Condition and In-stream Flows

During the scoping period, several comments were received regarding how the plan should address free-flowing condition and in-stream flows. Suggestions included quantifying the federal reserved water right associated with the designation, completing an in-stream flow plan with agency partners, increasing flows and diverting water back to the main channel, reclaiming unused irrigation structures, and reducing modifications to the bed and banks of designated river segments. It was recognized in the comments that free-flowing condition is important to fish. One comment also noted that per the Craig Thomas Snake Headwaters Legacy Act, no actions in this plan should affect the management and operation of Jackson Lake Dam.

This plan determines appropriate strategies to protect and enhance free-flowing conditions, including ways to address existing impediments to free-flowing conditions along the bed and banks of designated river segments. The plan also describes which river values are dependent on in-stream flows to provide the basis for filing for a future federal reserved water right. This plan determines appropriate partnership opportunities with the Bureau of Reclamation and other agencies,

organizations, and individuals to achieve river management goals.

Water Quality

Many comments received during scoping emphasized that water quality, including temperature, should be protected and enhanced. Air quality, mining, cattle grazing, and snowmobiling were all identified through various comments as having an influence on water quality.

This plan addresses factors that have the potential to affect the water quality of designated river segments, in particular ongoing visitor and administrative uses and existing infrastructure. Management strategies include ways to protect and enhance water quality and mitigate for existing and/or potential impacts.

Natural Resources

Natural resources-related comments that were consistently mentioned during scoping include emphasis on native species; removal of nonnative species, especially aquatic invasive species; migration/migratory corridors; and protection and restoration of critical habitats, including winter habitats, nesting habitats, aquatic habitats, and foraging habitats. Specific native fish and wildlife species that were mentioned as important to the river corridor included Yellowstone cutthroat trout, Snake River fine-spotted cutthroat trout, beaver, pronghorn, moose, river otter, bald eagles, and ospreys; plant species that were mentioned included willows, musk thistle, and knapweed.

This plan determines appropriate management strategies to protect and enhance natural resources within the river corridors, particularly the maintenance and restoration of native species and their habitats and the ecological processes that sustain them. This plan explores ways to mitigate human-caused impacts on river-related natural resources.

Cultural Resources

Comments identified cultural resources that should be maintained, restored, enhanced, and/or protected including historic trails used by American Indians, fur trappers, and others; historic buildings within the designated river corridors; and archeological sites.

This plan explores ways to protect and improve the education and interpretation of cultural resources within the river corridors, especially sites that preserve the history of human use of the river segments, and explores ways to mitigate human-caused impacts on cultural resources.

Climate Change

Several comments called for the plan to consider the effects of climate change. Some comments were more specific, noting that monitoring the effects of climate change on flows, water temperatures, and invasive species was important. One comment suggested that this plan be “the model of addressing climate change for river management in the 21st century.”

This plan describes potential climate change influences on river-related values and determines appropriate management strategies to reduce the impacts of climate change.

RELATIONSHIP OF THIS PLAN TO OTHER PLANNING EFFORTS

The following is a list of other planning efforts that have a relationship to this plan:

Snake River Management Plan (1997)

In 1997, Grand Teton National Park completed a river management plan that addressed values, issues, and trends for the 25-mile segment of the Snake River from Jackson Lake Dam to the southernmost boundary of Grand Teton National Park. Some of the decisions made in the 1997 plan included development and implementation of various monitoring programs, determination of the level of maintenance needed at launch sites, establishment and accommodation of various uses and permitting guidelines, and enhancement of parking areas and visitor access in several locations. This new Snake River Headwaters plan would replace the 1997 plan; however, it includes components of that plan that are still relevant.

Jackson Hole Airport Extension Plan (2010)

In 2010, the National Park Service prepared the Jackson Hole Airport Agreement Extension and Environmental Impact Statement (EIS) concerning the terms of the Jackson Hole Airport agreement with the U.S. Department of the Interior (USDI). The Final Jackson Hole Airport Agreement Extension and the terms of the EIS record of decision provide the conditions necessary for Jackson Hole Airport to continue providing scheduled commercial passenger service within Grand Teton National Park until 2033. The decision would also strengthen the requirements of the airport board to work in good faith to further reduce and mitigate the effects of the airport on Grand Teton National Park, which may benefit wild and scenic river values along the mainstem of the Snake River upstream from the airport.

Historic Properties Management Plan: Grand Teton National Park (ongoing)

The U.S. Fish and Wildlife Service and National Park Service are developing this plan with Grand Teton National Park and are currently preparing a comprehensive plan for management of park historic properties. This plan would provide general management guidance and also site-specific treatment planning for several properties within the designated wild and scenic river corridors, including 4 Lazy F Dude Ranch, Bar BC Dude Ranch, and Snake River Land Company offices and residence. Although the actions of this plan have not yet been determined, they would be consistent with the provisions of the Wild and Scenic Rivers Act and further the preservation and maintenance of park cultural resources.

Bridger-Teton National Forest Comprehensive River Management Plan (ongoing)

The Bridger-Teton National Forest is developing a separate but concurrent management plan for river segments within their administrative boundaries. Every step in developing these plans was completed cooperatively to guarantee a seamless and comprehensive management approach for the entire Snake River Headwaters area.

Replace Moose Wastewater System and Address Critical Water System Deficiencies Environmental Assessment (2012)

The *Replace Moose Wastewater System and Address Critical Water System Deficiencies Environmental Assessment* is currently underway with a decision document due in July 2012. The project replaces or upgrades most components of the existing water supply system in Moose and Beaver Creek and the wastewater system in Moose. This

project includes replacing the water transmission pipeline that conveys water by gravity from the Taggart tank to the Beaver Creek administrative area, and then to Moose; installing a new water pipeline from Moose to the 4 Lazy F Dude Ranch to provide potable water and fire protection water in this NRHP district; and demolishing the existing wastewater treatment facility in Moose, which is approximately 200 feet from the wild and scenic Snake River, and replacing it with a modern treatment plant constructed at a site approximately 950 feet from the Snake River and outside the 500-year floodplain.

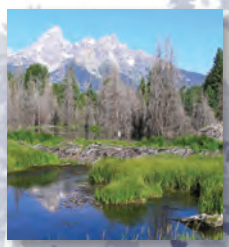
Moose Headquarters Rehabilitation—Site Work Environmental Assessment (2010)

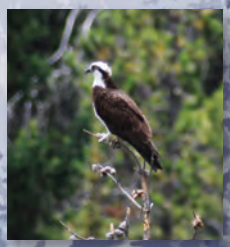
In 2010, the park completed the *Moose Headquarters Rehabilitation Site Work Environmental Assessment*. The site plan associated with this project included converting a portion of the Moose maintenance building to the new Moose park headquarters; segregating incompatible uses throughout the site; providing for safer and more efficient pedestrian and vehicular traffic; improving the interpretive experience for visitors; reducing the area's built environment; and resolving stormwater management deficiencies to protect vital water resources. The plan identified a new parking area for concessioner clients with an associated picnic/waiting area and restroom facilities adjacent to Moose Landing. This area is designed to improve separation of vehicles and pedestrians and to discourage pedestrians from crossing into vehicular traffic. A comprehensive sign program will be installed throughout the Moose headquarters area to communicate pedestrian and vehicular traffic patterns and segregate use areas.

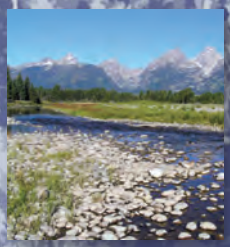
A new universally accessible interpretive trail will be added to provide pedestrians a designated walkway to return to their vehicles after leaving Moose Landing. This trail will also provide visitor access between the Craig Thomas and Discovery Visitor Center and Menor's Ferry Historic District. Signs will be installed to notify users to stay on the trail, aid visitors in getting to their destination, and provide interpretive information. Redundant ancillary social trails will be restored to native vegetation, as appropriate.

Development of the Alternatives

2







INTRODUCTION

OVERVIEW

The Craig Thomas Snake Headwaters Legacy Act requires that a comprehensive river management plan be developed for the newly designated wild and scenic river segments. Because there are different approaches to managing these river segments, the planning team investigated a full range of reasonable management alternatives. NEPA and NPS policies require that park managers consider a full range of reasonable alternatives, including a no-action alternative and an environmentally preferred alternative, before choosing a preferred alternative. The alternatives must be consistent with the Wild and Scenic Rivers Act, the NPS Organic Act of 1916, the National Wildlife Refuge System Improvement Act, and the enabling legislation for each park unit and the National Elk Refuge. The alternatives must reflect a full range of stakeholder interests and fully consider the potential for environmental impacts.

This chapter describes how these alternatives were developed and identifies the environmentally preferable alternative and the alternative preferred by the National Park Service. This chapter also includes an alternative considered but eliminated from detailed evaluation.

In addition to the "Foundation for Wild and Scenic River Planning and Management" section presented in chapter 1, this chapter includes the following management components that have been incorporated as part of the action alternatives. These management components form the building blocks from which the alternative management strategies have been developed:

- goal statements
- river classifications
- boundary delineation

This chapter also describes the requirements and process used to develop user capacity in managing the designated wild and scenic river, including indicators and standards and appropriate kinds and amounts of visitor use. The process used to develop the plan's overall monitoring framework is also included.

GOAL STATEMENTS

The over-arching purpose of the *Snake River Headwaters Comprehensive River Management Plan/ Environmental Assessment* for Grand Teton and Yellowstone national parks, John D. Rockefeller Jr. Memorial Parkway, and the National Elk Refuge is to protect and enhance the outstandingly remarkable values, free-flowing condition, and water quality for the designated wild and scenic rivers, leaving them unimpaired for future generations. More specifically, the goals and desired future conditions of this plan include

Goal 1. Promote the headwaters' natural hydrological processes, channel form and function, and ability to shape the landscape. Reduce impediments to free-flowing conditions; ensure sufficient flows to protect and enhance outstandingly remarkable values; and ensure the maintenance of water quality at the highest possible level.

- **Desired Conditions**—Hydrologic features and processes, including free-flowing condition, reflect a natural river/stream ecosystem. Designated river segments remain unhindered to promote and enhance outstandingly remarkable values. Physical, chemical, and hydrological properties of the rivers reflect natural water quality conditions, which meet or exceed all applicable water quality

standards. The Snake River Headwaters continues to meet criteria for *outstanding resource waters*, as defined by the State of Wyoming.

Goal 2. Protect and enhance the natural function, diversity, complexity, and resiliency of the headwaters' riparian areas, wetlands, floodplains, and adjacent uplands.

- **Desired Conditions**—Ecological integrity and processes, including natural changes and disturbances, remain unimpeded. Fundamental physical and biological processes, as well as individual species, features, and plant and animal communities function at natural levels of diversity and complexity with little human disturbance. Ecosystems, habitats, and native species impacted by human activities are restored to natural abundances, diversities, and distributions. Sensitive habitats and dynamic areas prone to natural disturbances are void of future development.

Goal 3. Protect and enhance cultural resources as important links to the human history of the river corridor, including historical and archeological sites, cultural landscapes, and ethnographic resources.

- **Desired Conditions**—The integrity of cultural, historical, archeological, and ethnographic resources is safeguarded to preserve significant attributes and uses that contribute to historical significance. Natural and built features of the cultural landscape and the concerns of traditionally associated peoples are considered in the treatment of these cultural resources. Treatments are based on sound preservation practices that enable long-term preservation of historic features, qualities, and materials. Resources that hold particular meaning to the human history of the headwaters or with traditionally associated people and groups are fully understood and managed in a sensitive manner and interpreted where appropriate.

Goal 4. Provide a diversity of opportunities and settings for visitors of varying abilities to experience, learn about, and have a direct connection with the rivers and their associated values. Such opportunities must be consistent with the values that caused the rivers to be designated.

- **Desired Conditions**—Visitors continue to have opportunities for enjoyment that are uniquely suited to the natural and cultural resources found in the Snake River Headwaters and are consistent with the values for which the rivers were designated. These opportunities help visitors understand and appreciate the significance of the headwaters and its resources and to develop a personal stewardship ethic. Visitor opportunities preserve the integrity of the surroundings; respect ecological processes; protect natural, cultural, and scenic resources and park values; and provide a high quality and a rewarding visitor experience. To the extent feasible, park programs, services, and facilities are accessible to and usable by all people, including those with disabilities. The types and levels of visitor use within designated river segments do not result in degradation of the values and purposes for which the wild and scenic river was established. Existing restrictions imposed under NPS and USFWS authorities to protect park and refuge resources remain in effect.

Goal 5. Establish appropriate land uses and associated developments, consistent with each river segment classification, that support

the protection and enhancement of river values.

- **Desired Conditions**—All land uses and developments are harmonious with river resources, compatible with natural processes, and aesthetically pleasing. Land uses, developments, and operations are sustainable, energy efficient, cost-effective, and practical to the maximum degree possible. Intrinsically important scenic vistas and scenic features are not diminished by development and continue to provide opportunities for visitors to understand, appreciate, and forge personal connections with the rivers.

RIVER CLASSIFICATIONS

Wild and scenic rivers are classified as *wild*, *scenic*, or *recreational*. This terminology has caused frequent confusion because wild rivers are not necessarily fast-moving whitewater rivers, scenic rivers may not be noted for scenic values, and recreational rivers may not receive heavy public use. The labels actually refer to the degree of development along the river. The definitions of wild, scenic, and recreational from the law are

> *Wild river areas*—Those rivers or segments of rivers that are free of impoundments and generally inaccessible, except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These river segments represent vestiges of primitive America.
>
> *Scenic river areas*—Those rivers or segments of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.
>
> *Recreational river areas*—Those rivers or segments of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

Designated rivers are often referred to as "wild and scenic rivers" without regard to actual classification. This is acceptable when speaking in general, but the specific legal classification is an important distinction as it has a direct effect on how the river is administered and whether certain activities on federally owned land within the boundaries are permissible. Regardless of classification, each designated river is administered with the goal of nondegradation and enhancement of the values that caused it to be designated.

The seven designated river segments included as part of this planning effort are classified as either wild or scenic; none is classified as recreational. As described in the Craig Thomas Snake Headwaters Legacy Act, the upper Lewis River between Lewis and Shoshone Lake and the upper Snake River from its origin to Jackson Lake are classified as wild. The lower segment of the Lewis River, the Snake River below Jackson Lake, Pacific Creek, Buffalo Fork, and the Gros Ventre River are classified as scenic. The management strategies described throughout this chapter have been developed to ensure all developments, uses, and management activities are consistent with these river classifications.

BOUNDARY DELINEATION

Establishing a boundary for a newly designated wild and scenic river is an important step in delineating the area that would receive the greatest effort in resource protection. Boundaries are based on the location of outstandingly remarkable values. The Wild and Scenic Rivers Act provides guidance on delineating the boundary. It

states that a river corridor cannot exceed an average of 320 acres/mile, or an average of 0.25 mile from the ordinary high water mark on each side of the river. Land below the ordinary high water (such as islands) does not count against the acreage limitation.

Where private lands are involved, the boundary marks the area within which the National Park Service and U.S. Fish and Wildlife Service would focus work with local communities and landowners in developing effective strategies for protection. The boundary also defines the area in which these two agencies have land acquisition authority. Existing land ownership, whether federal or nonfederal, cannot be used as a factor in determining the boundary.

Landowners are often concerned about which lands would be included, in part due to a fear of government land acquisition and regulation. The Wild and Scenic Rivers Act does permit fee acquisition of up to an average of 100 acres/mile and easement acquisition on any land within the boundary from willing landowners. However, the federal government cannot condemn private lands within designated wild and scenic river corridors that have more that 50% federal ownership—which is the case for all designated segments within the Snake River Headwaters. Furthermore, the Wild and Scenic Rivers Act does not provide the federal administering agency the authority to regulate nonfederal lands.

As a practical matter in delineating the boundary, easily identifiable features, such as physical features (canyon rims, roads), may be used so the boundary can be more easily identified on the landscape or accurately described legally. These boundaries must conform closely to the identified river values for each river segment.

The river corridor boundary for the Snake River Headwaters was created using GIS technology by first delineating the active river channel. The active river channel was delineated via digitizing of high-resolution aerial imagery collected in 2009. To establish the river corridor boundary, the active channel was then buffered to 0.25 mile. The 0.25-mile buffer was subsequently modified to follow the high water mark only if that mark was clear on high-resolution aerial imagery. The boundary was further modified to include areas only within national park boundaries and within the National Elk Refuge. Finally, the river corridors were evaluated to ensure that all of the identified outstandingly remarkable values are encompassed within their delineated boundary. Figure 1 illustrates an example of the boundary delineation for a segment of the Snake River corridor.

The preceding factors were used to delineate the boundary of the wild and scenic river designation, and are reflected in the maps presented in this plan for each river segment. Table 2 provides a summary of miles and acres by river segment. The total river miles by segment differs from the amounts described in the Craig Thomas Snake Headwaters Legacy Act; this is because more accurate calculations from GIS mapping data have been obtained.

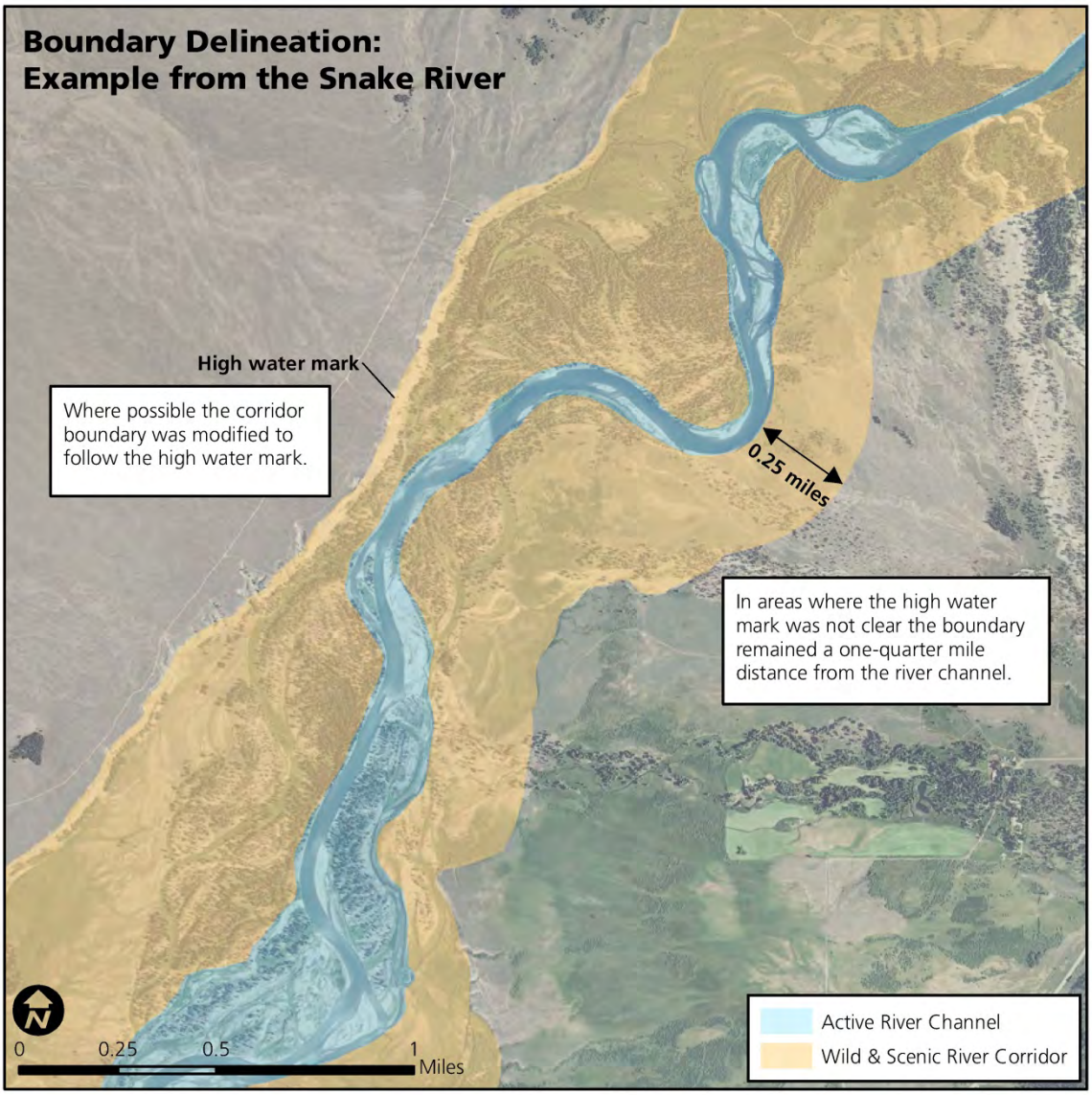
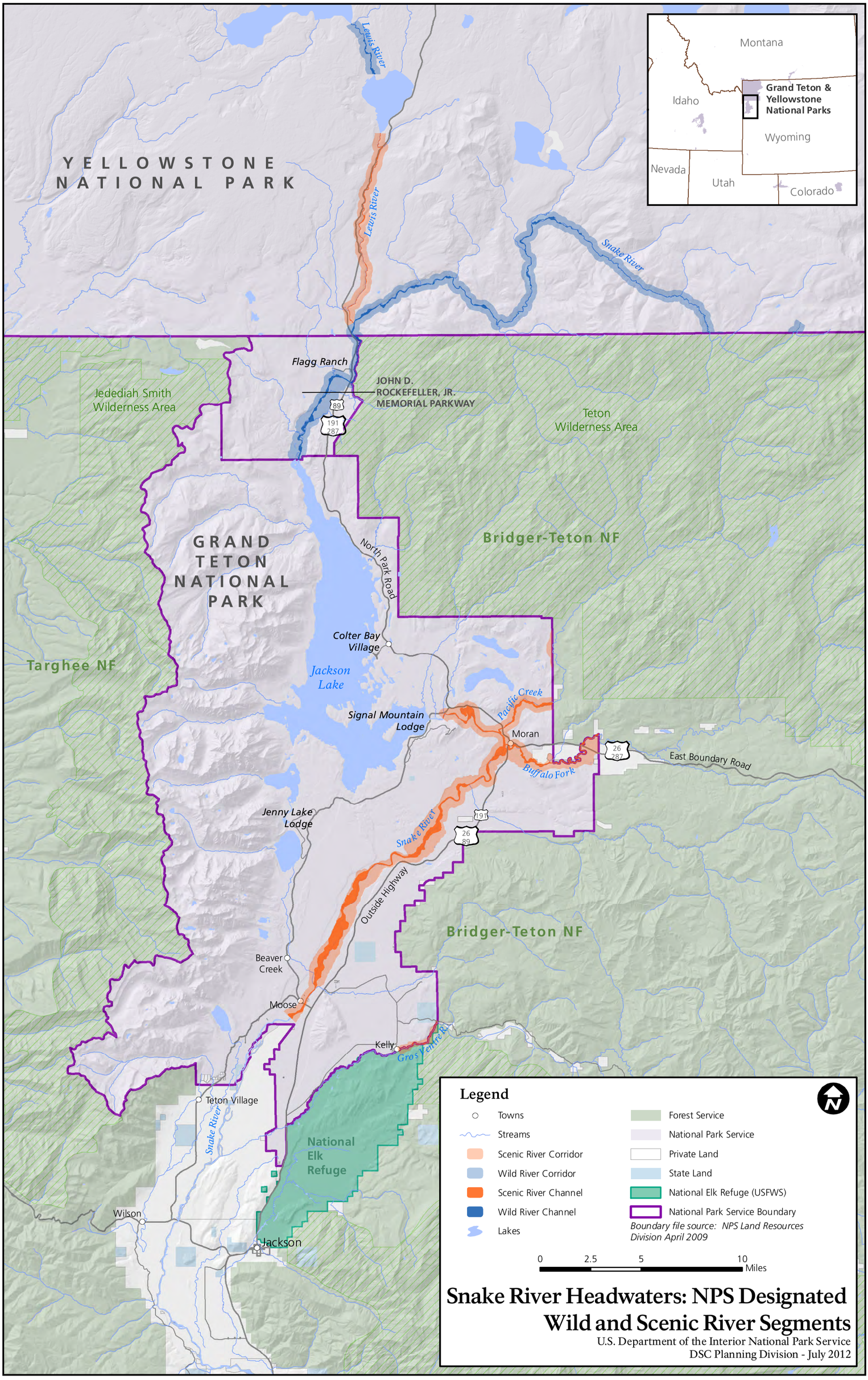


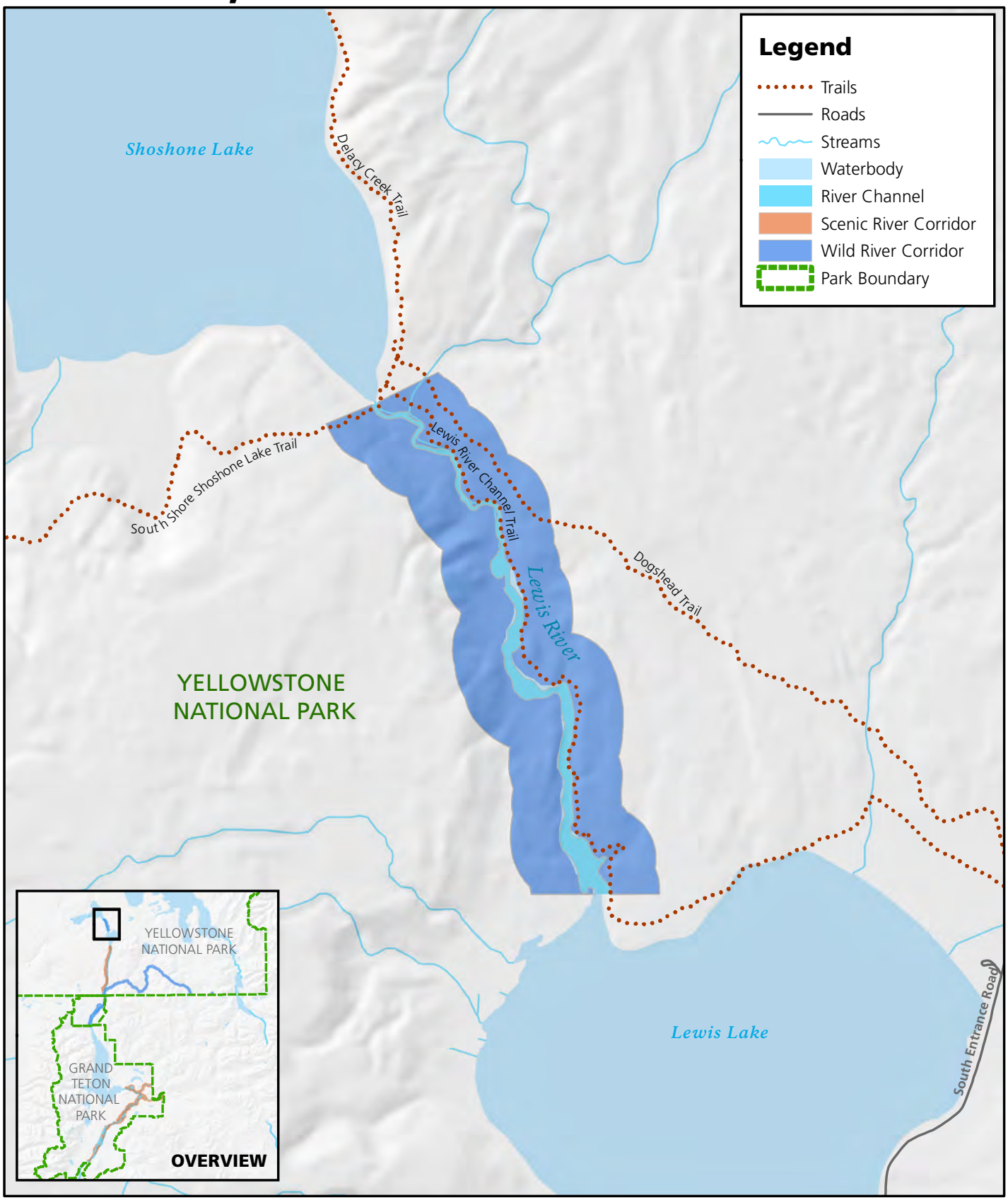
FIGURE 1. BOUNDARY DELINEATION: EXAMPLE FROM THE SNAKE RIVER HEADWATERS

TABLE 2. SUMMARY OF ACRES AND MILES BY RIVER SEGMENT

	River Corridor Acres Excluding Active River Channel (buffer only)	**River Corridor Acres Including Active River Channel** (river and buffer)	**River Miles**
Lewis River (wild)	1,023	1,123	3.3
Lewis River (scenic)	3,484	3,687	11.5
Snake River (wild)	12,562	13,797	42.0
Snake River (scenic)	7,818	10,886	26.6
Pacific Creek (scenic)	1,401	1,651	4.3
Buffalo Fork (scenic)	1,882	2,229	8.1
Gros Ventre River (scenic)	459	506	2.8
Total	**28,629**	**33,879**	**98.6**


YELLOWSTONE NATIONAL PARK
Lewis River
Snake River
Montana
Idaho
Grand Teton & Yellowstone National Parks
Wyoming
Nevada
Utah
Colorado
Flagg Ranch
JOHN D. ROCKEFELLER, JR. MEMORIAL PARKWAY
Jedediah Smith Wilderness Area
Teton Wilderness Area
Bridger-Teton NF
GRAND TETON NATIONAL PARK
North Park Road
Colter Bay Village
Jackson Lake
Targhee NF
Signal Mountain Lodge
Pacific Creek
Moran
East Boundary Road
Buffalo Fork
Jenny Lake Lodge
Outside Highway
Beaver Creek
Moose
Kelly
Gros Ventre R.
Teton Village
National Elk Refuge
Wilson
Jackson
Legend
Towns
Streams
Scenic River Corridor
Wild River Corridor
Scenic River Channel
Wild River Channel
Lakes
Forest Service
National Park Service
Private Land
State Land
National Elk Refuge (USFWS)
National Park Service Boundary
Boundary file source: NPS Land Resources Division April 2009
0 2.5 5 10 Miles
Snake River Headwaters: NPS Designated Wild and Scenic River Segments
U.S. Department of the Interior National Park Service
DSC Planning Division - July 2012

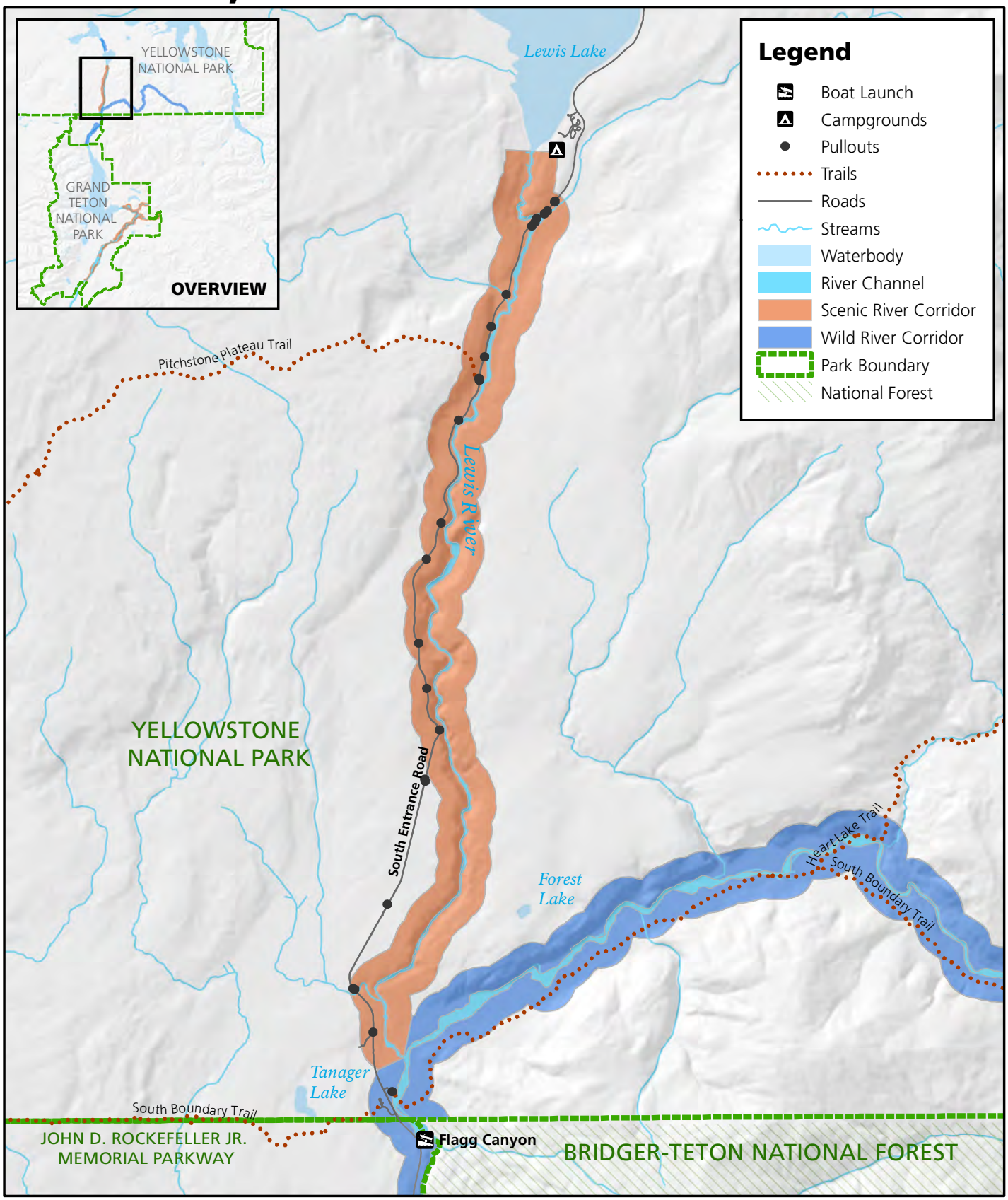
Snake River Headwaters: NPS Segments
Lewis River, Wild



0 0.5 1 2 Miles

U.S. Department of the Interior National Park Service
DSC Planning Division - July 2012

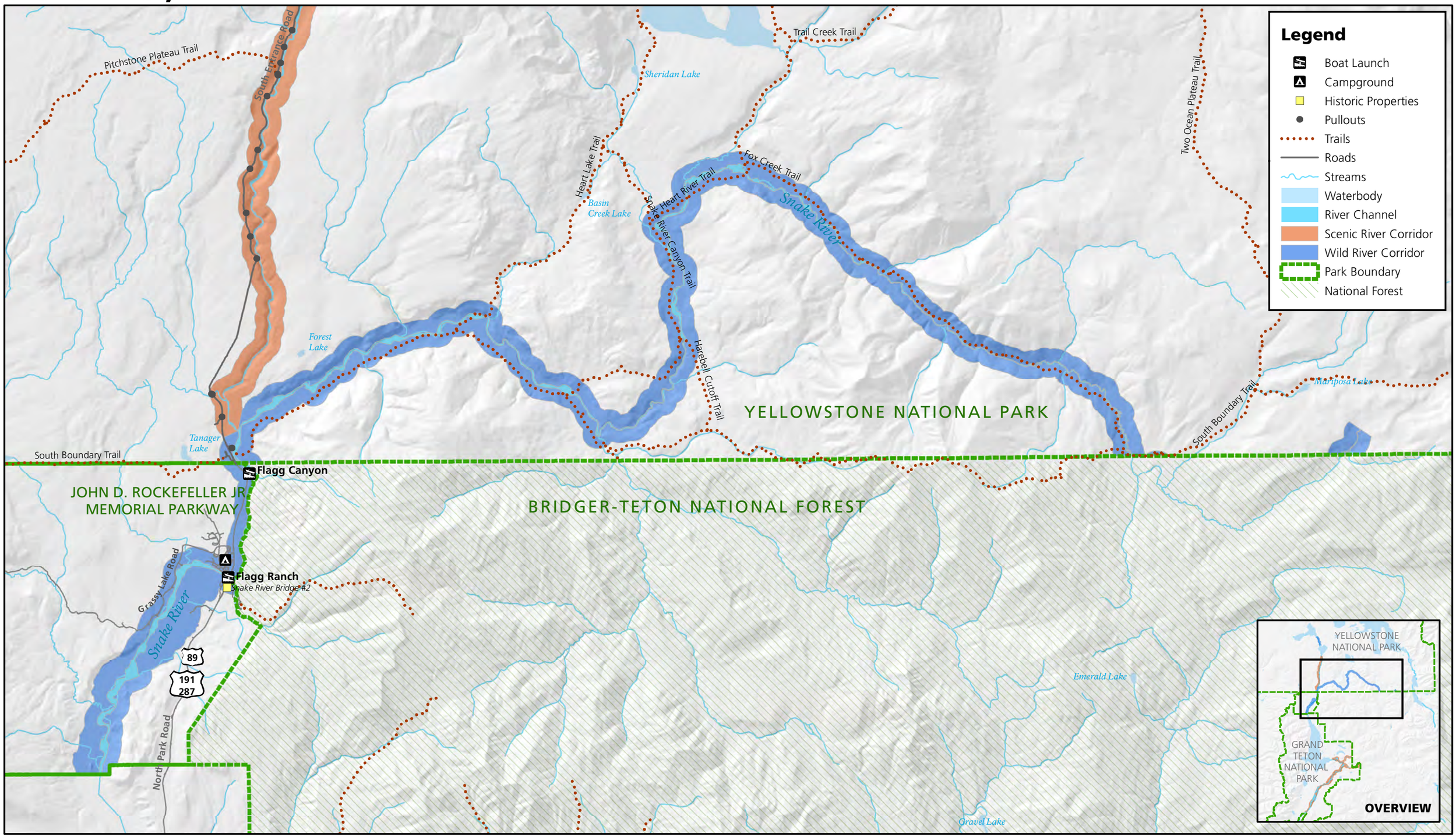
Snake River Headwaters: NPS Segments
Lewis River, Scenic



0 0.5 1 2 Miles

U.S. Department of the Interior National Park Service
DSC Planning Division - July 2012

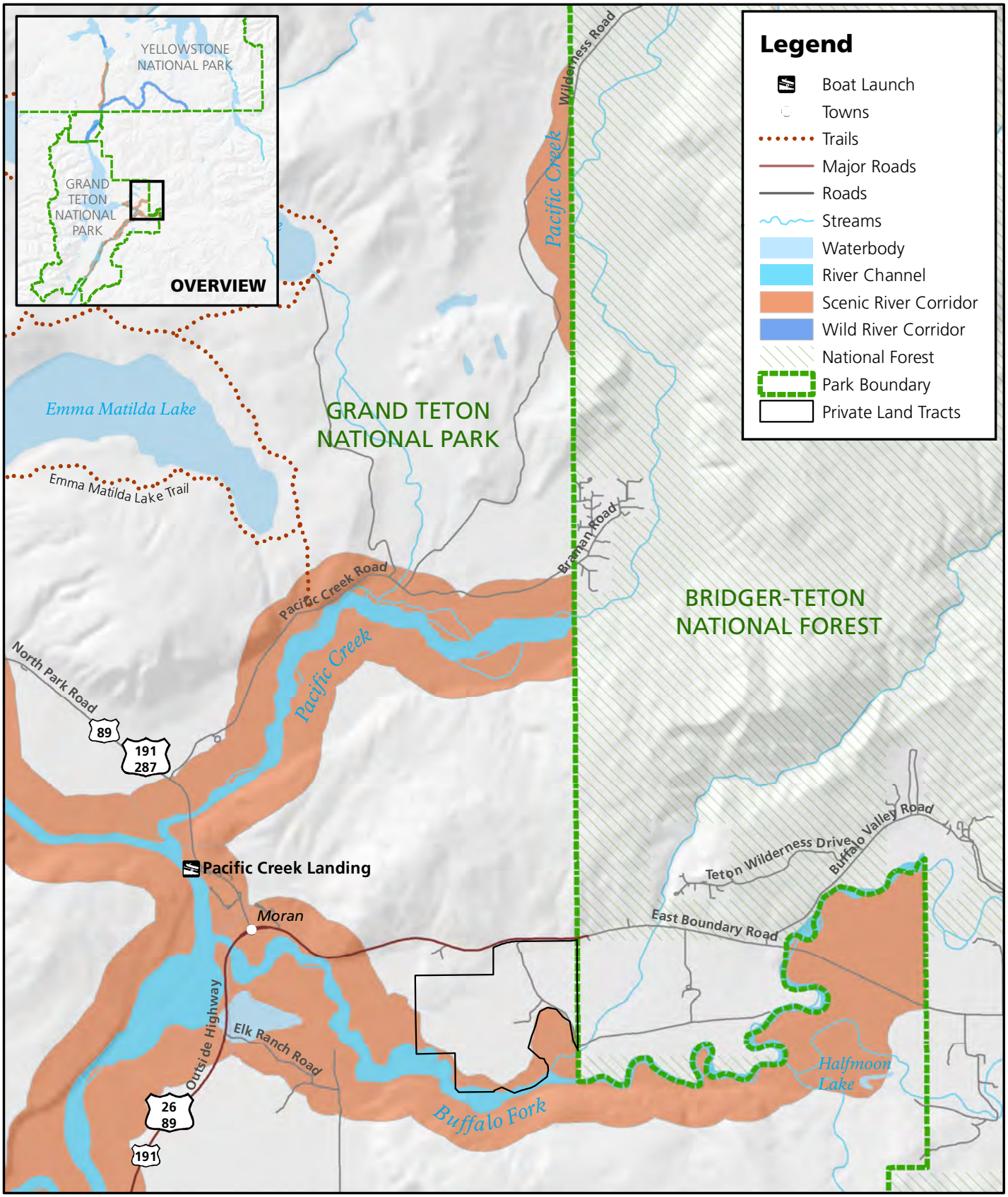
Snake River Headwaters: NPS Segments
Snake River, Wild



0 1 2 4 Miles

U.S. Department of the Interior National Park Service
DSC Planning Division - July 2012

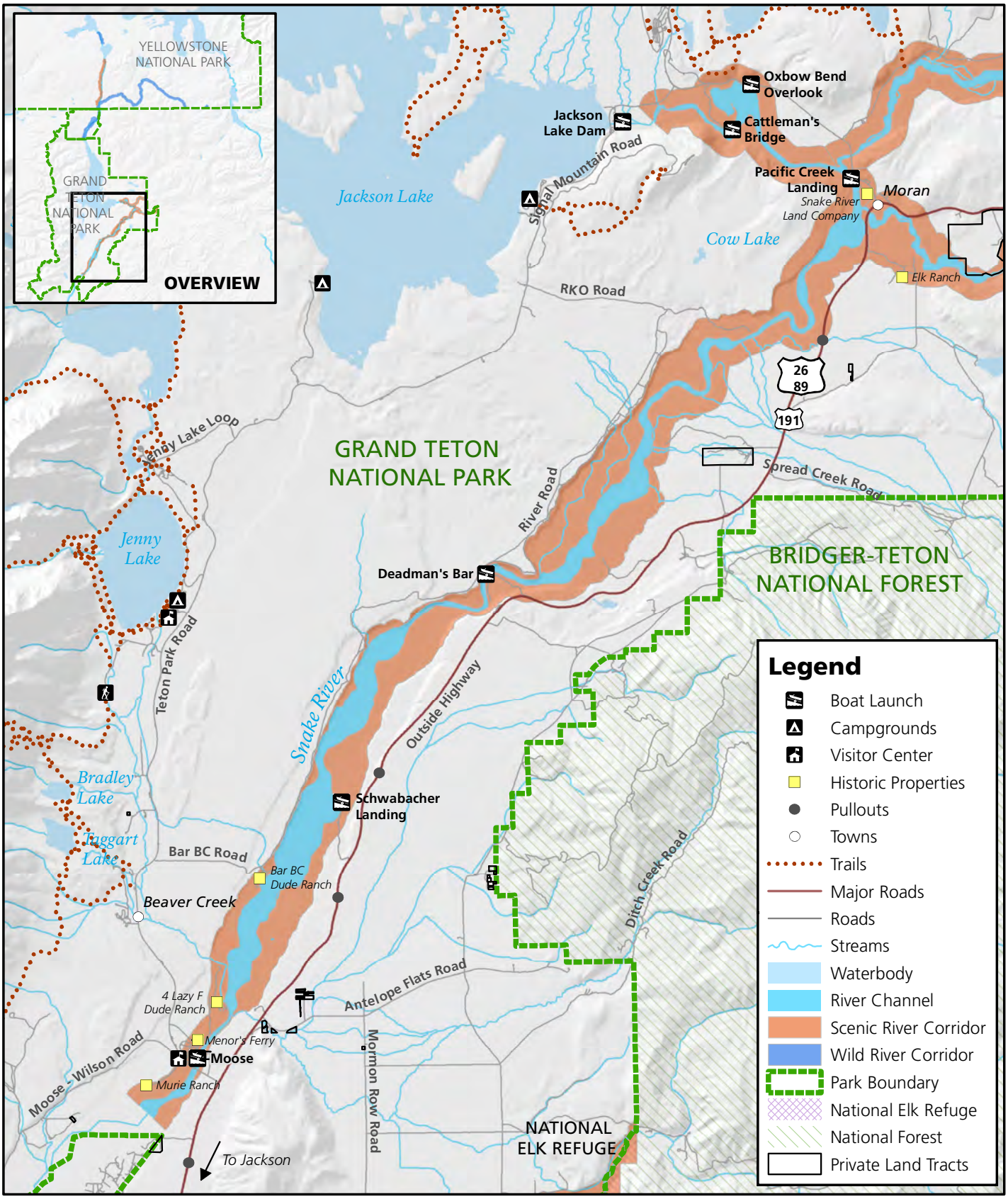
Snake River Headwaters: NPS Segments Pacific Creek and Buffalo Fork



0 0.5 1 2 Miles

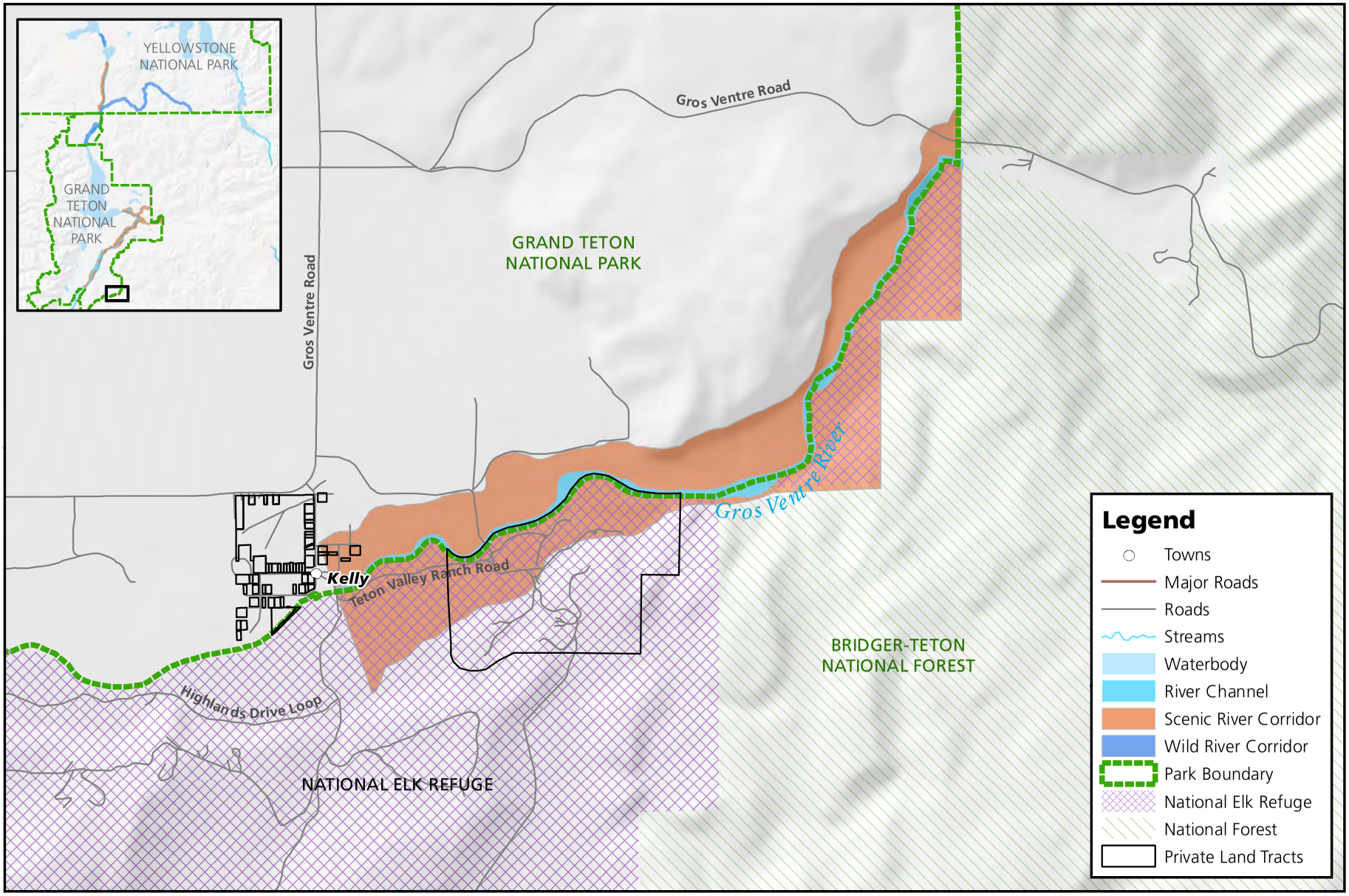
U.S. Department of the Interior National Park Service
DSC Planning Division - July 2012

Snake River Headwaters: NPS Segments
Snake River, Scenic



U.S. Department of the Interior National Park Service
DSC Planning Division - July 2012

Snake River Headwaters: NPS/USFWS Segment
Gros Ventre River, Scenic



0 0.25 0.5 1 Miles

U.S. Department of the Interior National Park Service
DSC Planning Division - March 2012

HOW THE ALTERNATIVES WERE DEVELOPED

The planning team developed a set of preliminary alternatives during two three-day workshops, held at Grand Teton National Park in February and April 2011. Staff from Grand Teton and Yellowstone national parks, the National Elk Refuge, Bridger-Teton National Forest, and Wyoming Game and Fish Department participated in both workshops.

Input received during public scoping was fundamental to developing the range of alternatives; public comments were referred to extensively throughout the workshops. Scoping comments were also used to develop the planning issue and opportunity statements presented in chapter 1. An important aspect of the alternatives is to address these issues within the context of the Wild and Scenic Rivers Act.

After the workshops, the alternatives were further developed and refined through a series of meetings and conference calls, as well as researching comparable river systems and conducting a comprehensive visitor use survey on the Snake River during summer 2011. The final set of alternatives presented in this chapter represent a broad range of ideas designed to best achieve the purpose of the plan—to protect and enhance the river values that make the Snake River Headwaters worthy of inclusion in the national wild and scenic rivers system.

THE PLANNING FRAMEWORK

Figure 2 illustrates the planning framework that resulted from this iterative process. It shows that the action alternatives tier directly off the purpose of the plan, public input received during scoping, and management goals. The framework shows that a majority of proposed management strategies are common to both alternatives B and C. This is because these broad-based strategies do not lend themselves to varying by alternative and no opposing public comments regarding these topics were received during scoping.

The framework also illustrates the no-action alternative. Because the no-action alternative represents continuation of current management without a comprehensive river management plan, it is not linked to the purpose of the plan, scoping, or the plan's management goals. The "Alternatives Considered but Dismissed" box is only linked to scoping because it represents a proposal that was received during the initial public input process, yet was dismissed from further evaluation.

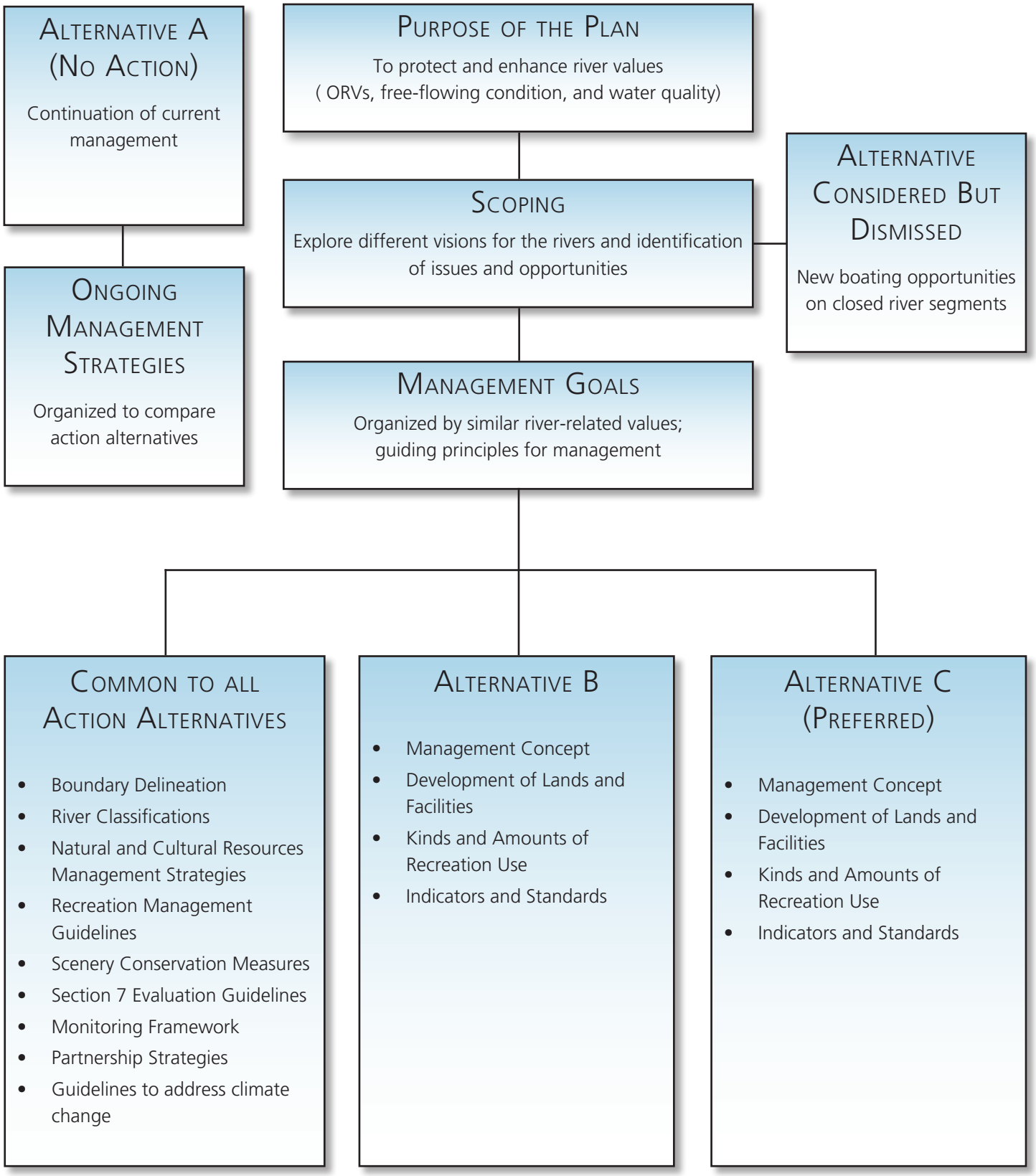
THREE-TIERED PLANNING APPROACH

Due to the complexity of developing a comprehensive management plan for multiple rivers within three national park system units and a national wildlife refuge, the planning team created a simple approach to organizing the alternatives.

The alternatives have been organized into three distinct levels or tiers. The first includes broad-based management strategies that would be applied across the entire NPS- and USFWS-managed wild and scenic river designation. These are referred to as headwaters-wide strategies. These comprehensive strategies vary by the no-action alternative (A) and those strategies that are common to both action alternatives (B and C).

The second tier of this planning approach includes river-segment management strategies for each of the seven designated wild and scenic river segments. These strategies vary by types and levels of development and kinds and amounts of recreation use for each of the three alternatives (A, B, and C).

Figure 2. Snake River Headwaters Planning Framework



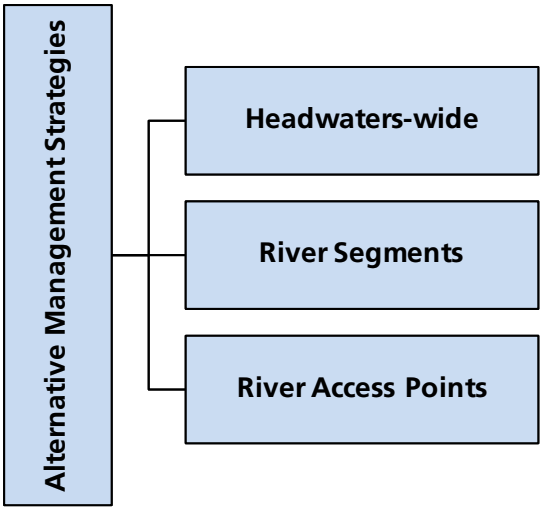


FIGURE 3. THREE-TIERED PLANNING APPROACH

The third tier of management strategies is specific to river access points. They vary by the types and levels of development for nine river access points along the Snake River for each of the three alternatives (A, B, and C). Figure 3 shows this three-tiered planning approach and organizes the alternatives presented in chapter 3.

USER CAPACITY

The National Park Service and U.S. Fish and Wildlife Service are required to address user capacities in comprehensive river management plans to protect the river values including outstandingly remarkable values, free-flowing condition, and water quality. Due to the importance of user capacity in managing wild and scenic rivers, this section lays out the requirements and process used to determine indicators and standards and appropriate kinds and amounts of visitor use. Alternative strategies to provide for and manage visitor use opportunities are presented in chapter 3.

Requirements of the Wild and Scenic Rivers Act and Implementing Guidelines. The Wild and Scenic Rivers Act ensures public access and enjoyment of designated rivers. It also provides that such use should not degrade the values for which such rivers were included in the national wild and scenic rivers system. Accordingly, the act and national wild and scenic rivers system; *Final Revised Guidelines for Eligibility, Classification and Management of River Areas* (secretarial guidelines for wild and scenic rivers) include provisions for addressing user capacity and managing visitor use of designated rivers:

1968 Wild and Scenic Rivers Act (Public Law 90-542 Section 3(d)(1) as amended in 1986— "The [comprehensive management] plan shall address resource protection, development of lands and facilities, user capacities, and other management practices necessary or desirable to achieve the purpose of this act." The Wild and Scenic Rivers Act requires the National Park Service to protect river values while allowing for recreational and other public use that does not "substantially interfere" with the enjoyment

of river values. To achieve this goal, the act requires all comprehensive river management plans to address user capacity.

1982 Interagency Guidelines on the Wild and Scenic Rivers Act—The Secretaries' guidelines define "carrying capacity" in the context of a management plan to mean "the quantity and mixture of recreation and other public use which can be permitted without adverse impact on the resource values of the river area." (Note that the Wild and Scenic Rivers Act and the guidelines use the terms "carrying capacity" and "user capacity" interchangeably.) Specific excerpts from the guidelines related to addressing user capacity are as follows:

- **Management Plans:** Will state the kinds and amounts of public use that the river can sustain without impact to the values for which it was designated.

- **Carrying Capacity:** Studies would be made during preparation of the management plan and periodically thereafter to determine the quantity and mixture of recreation and other public uses, which can be permitted without adverse impact on resource values of the river area. Management of the river area can then be planned accordingly.

- **Public Use and Access:** Public use would be regulated and distributed where necessary to protect and enhance (by allowing natural recovery where resources have been damaged) the resource values of the river area. Public use may be controlled by limiting public access to the river, by issuing permits, or by other means available to the managing agency through its general statutory authorities.

- **Basic Facilities:** The managing agency may provide basic facilities to absorb user impacts on the resource. Wild river areas would contain only the basic minimum facilities in keeping with the "essentially primitive" nature of the area. If facilities, such as restrooms and refuse containers, were necessary they would generally be sited at access points or at a sufficient distance from the riverbank to minimize their intrusive impact. In scenic and recreational river areas, simple comfort and convenience facilities such as restrooms, shelters, fireplaces, picnic tables, and refuse containers are appropriate. These, when placed within the river area, would be judiciously positioned to protect the values of popular areas from the impacts of public use.

- **Major Facilities:** Major public use facilities, such as developed campgrounds, major visitor centers, and administrative headquarters, would, where feasible, be placed outside the river area. If such facilities are necessary to provide for public use and/or to protect the river resource, and placement outside the river area is infeasible, such facilities may be positioned within the river area provided they do not have an adverse effect on the values for which the river area was designated.

U.S. Court of Appeals for the Ninth Circuit Ruling on the Merced River Lawsuit 2008. In addition to the Wild and Scenic Rivers Act and Interagency Guidelines, the ruling by the court of appeals in the previous Merced River Plan lawsuit provided further guidance related to the user capacity requirements of comprehensive river management plans. In March 2008, the court of appeals provided a judgment stating,

> The plain meaning of the phrase 'address . . . user capacities,' is simply that the CMP must *deal with*

> *or discuss the maximum number of people that can be received at a WSRS.* [Emphasis added in ruling.]
>
> The NPS shall adopt specific limits on user capacity consistent with both the WSRA and the instructions of the Interagency Guidelines that such limits describe *an actual level of visitor use that will not adversely impact the Merced's ORVs.* [Emphasis added in ruling.]

A settlement agreement was reached in the Merced litigation in which parties agreed to specific terms. Included in this settlement was the agreement that the National Park Service would cooperate with user capacity experts in the new planning effort and that these experts would be engaged in all planning elements.

User Capacity Process. Addressing user capacity is an integral part of the overall comprehensive river planning process (Haas 2002). As part of this planning process several steps are used to determine the appropriate kinds and amounts of visitor use the Snake River Headwaters can receive while protecting the river's outstandingly remarkable values, water quality, and free-flowing condition.

1. Identify the kinds of visitor use desired and appropriate to the Snake River corridor.
2. Analyze river values and related constraints and establish management thresholds.
3. Identify visitor use management indicators and establish standards of quality.
4. Identify strategies and tools needed to provide for and effectively manage visitor use opportunities along the river.
5. Deal with or discuss the maximum amount of visitor use that can be received.
6. Monitor and conduct ongoing studies to ensure that river values remain protected while providing visitor use opportunities over time.

The following describes each of the user capacity process steps in more detail:

Step 1. Identify Proposed Kinds of Visitor Use—A range of visitor recreational activities desired for and potentially appropriate to the river corridor is identified. These kinds of visitor use must be compatible with the protection and enhancement of river values. Generally, identification of desired and appropriate activities began in the initial public scoping phase of the plan and continued through the planning process. Recreational activities that are river-related and or river dependent and rare, unique, or exemplary are contained in the statement of recreational outstandingly remarkable values for each river segment.

Step 2. Analyze River Values and Constraints—The overall user capacity of each alternative is driven by the consideration of river values, as described above, along with the associated constraints these values may have on the kinds and amounts of visitor use that may be provided. For example, wetlands, floodplains, archeological site data, and other information are analyzed collectively to understand where and at what levels visitor use of the river corridor may be appropriate. More specific examples of these constraints follow:

- **Resource constraints** include water quality, sensitive riparian areas, rare and endangered plant species, archeological and historic sites, and topography and land constraints, among others.
- **Social constraints** include visitor encounters along trails and at attraction sites, traffic volumes and associated congestion, parking availability, and entrance station wait

times; visitor perceptions of crowding and noise.

- **Operational constraints** include water demand and treatment, employee housing, transportation requirements, facility maintenance, and fiscal constraints.

Step 3. Identify Visitor Use Management Indicators and Establish Standards of Quality—This step in the process involves identifying key indicator variables that provide feedback on the extent to which visitor use affects river values and visitor experience. Standards represent the minimum acceptable condition of these indicator variables (not a degraded condition). Indicators and standards are an important feedback mechanism that informs decisions about what kinds and amounts of visitor use can be provided in the river corridor without adverse impact to other values and visitor experience. Indicators and standards may vary across river segments, depending on the nature of use and the values in the segment. Similarly, indicators and standards may vary across plan alternatives as different desired conditions are proposed.

Step 4. Identify Management Strategies and Tools for Visitor Use—Managing visitor use and user capacity is inherently complex and requires various strategies and tools to appropriately address the diversity of issues that may arise. A multifaceted approach is consistent with the guidance provided by the U.S. Court of Appeals for the Ninth Circuit interpretation of the WRSA user capacity mandate where the court of appeals clarified that, "WSRA does not mandate one particular approach to user capacity." In a river environment as diverse and dynamic as the Snake River, no one strategy or tool can be employed to address all issues. Rather, a suite of management strategies and tools is the most effective approach.

Effectively managing the kinds and amounts of visitor use specified in this plan would require a thoughtful approach—prescribing a series of management strategies and tools, adapting their application, and adjusting action as conditions and the understanding of them changes over time. Many of these strategies and tools would vary across alternatives and be implemented upon completion of the plan. In addition, many of these strategies would be implemented if needed in response to changing conditions to ensure that standards are maintained and river values are protected and enhanced. Implementation of some of these management strategies in the future may require additional compliance and public involvement. The following section provides further discussion on the specific categories of tools proposed in this plan.

- **Visitor Education and Interpretation:** Visitor education and interpretation is an important indirect management tool used to protect resources and provide positive visitor experience. For example, signs with messages informing visitors of sensitive resource areas are commonly used to improve visitor understanding of sensitive resources to prevent them from being trampled by the unknowing visitor. Visitor education and interpretation programs are a key component of providing visitor experience opportunities while protecting river values.

- **Site Management and Manipulation:** A variety of site management actions may be used to administer the kinds and amounts of visitor use that can be accommodated while protecting river values. Specific site management actions may include moving infrastructure away from sensitive areas such as floodplains, rare plant habitat, and cultural sites. For example, consolidating parking areas could divert adverse impacts away from scenic vista points, cultural resources, and sensitive vegetation.

- **Use Regulation:** A number of regulations are currently, and would continue to be, used to manage visitor use and user capacity. Regulations exist on both the kinds and amounts of use. Examples of regulations include fishing license requirements, boat checks for aquatic invasive species, and group size limits.

- **Deterrence and Enforcement:** Deterrence and enforcement is typically used in association with regulations governing visitor use behavior and activities. For example, there are strict regulations on food storage in the parks to prevent impacts associated with wildlife obtaining human food. Should an individual be found to be noncompliant with these regulations, they may receive a citation and fine. Deterrence and enforcement are considered among the most "heavy-handed" of management tools and are typically employed when less obtrusive tools such as education and interpretation cannot by themselves address the situation.

- **Use Rationing and Allocation:** Use rationing refers to the act of limiting the number of users to an area by time and/or location, while allocation refers to the portioning of the limited number among various user groups. There are a variety of management strategies that can be used for rationing and allocation, including (1) implementing reservation systems, (2) limiting access using a first-come, first-served system, (3) implementing a lottery system, (4) implementing a merit or eligibility system, or (5) charging fees.

Step 5. Deal with or Discuss the Maximum Amounts of Visitor Use—In keeping with the U.S. Court of Appeals for the Ninth Circuit decision concerning the Merced River, the Snake River plan would also "deal with or discuss" the maximum number of people that can be received in the river corridor. Considering the condition of river values and related issues, opportunities, and constraints, the maximum amount of visitor use that can be received is estimated based on management objectives and related strategies and tools identified for each planning alternative. Maximum use levels may vary by alternative as each has a different prescription of site development and management actions that would accommodate varying kinds and amounts of use.

Use levels can be estimated and articulated in a variety of ways depending on the nature of the use in a particular segment. For example, overnight use can be stated as the total maximum capacity of lodging, camping, and backcountry permits. Day use can be stated as the number of people per day or people at one time. Each plan alternative would have an estimate of maximum use levels. Where use levels pose concerns for river protection, more investment was made to determine the appropriate use levels. Generally, these instances rely on quantitative scientific data. Where river values are not being impacted by use levels, the same degree of investment in decisions about capacities was not necessary. In these instances, use estimates may rely more on professional judgment and it is anticipated that these use levels may need to be adjusted from time to time. In both cases, the best available data and information are used to estimate visitor use levels that may be accommodated in each alternative without adverse impacts on river values.

Step 6. Monitor and Conduct Ongoing Studies of Visitor Use—Regardless of the kinds and amounts of use specified in a plan, some degree of impact can, and would likely occur over time (Cole 1990; Cole and Stankey 1997; Leung and Marion 2000; Hammit and Cole 1998; Cole et al. 2005; Manning 2010; McCool et al. 2007). It is therefore important to monitor resource and visitor experience conditions to ensure that impacts are not

trending toward a minimally acceptable condition and continue to be protective of the river's outstandingly remarkable values, water quality, and free-flowing condition.

This is consistent with Interagency Guidelines for wild and scenic rivers, which state, "studies will be made during preparation of the management plan and periodically thereafter to determine the quantity and mixture of recreation and other public use which can be permitted without adverse impact on the resource values of the river area (USDI 1982)." Ongoing monitoring efforts help ensure that the kinds and amounts of visitor use and other public use allowed in the plan do not degrade river values.

Finally, visitor use monitoring and related studies are only a subset of the broader program of monitoring and study that takes place to understand ecological, cultural, and visitor experience conditions along the river corridor (see headwaters-wide management strategies in chapter 3).

MONITORING GUIDELINES

While the Wild and Scenic Rivers Act does not explicitly require monitoring for designated rivers, monitoring is acknowledged as an important aspect of protecting and enhancing a river's free-flowing condition, water quality, and outstandingly remarkable values. In its technical paper on management responsibilities, the Interagency Wild and Scenic Rivers Coordinating Council acknowledges

> To achieve a nondegradation standard, the river management agency must document baseline resource conditions and monitor changes to these conditions (IWSRCC 2002).

Based on previous planning efforts such as the 1997 Grand Teton National Park Snake River Management Plan in addition to the management objectives identified above, the *Snake River Headwaters Comprehensive River Management Plan / Environmental Assessment* proposes a number of management actions that would address, correct, mitigate, restore, and/or protect river values. Multiple programs are in place—both within the national park system units and in partnership—to monitor conditions and inform management actions. Research studies are conducted periodically to attempt to answer specific questions related to a particular resource or issue.

Monitoring is the periodic and ongoing measurement of specific variables related to a resource or experiential condition. These programs achieve a dual purpose: (1) to proactively keep track of conditions and trends, and (2) to assess the effectiveness of various management actions. As a result, the program of monitoring and ongoing studies as part of this comprehensive river management plan would allow park managers to ensure that river values are protected and enhanced.

Regarding the kinds and amounts of recreational use specified in this plan, some degree of impact can, and likely would, occur over time (Cole 1990; Cole and Stankey 1997; Hammit and Cole 1998; Cole et al. 2005; Manning 2010; McCool et al. 2007). It is therefore important to monitor resources and visitor experience conditions to be sure that conditions remain protective of the river's outstandingly remarkable values, water quality, and free-flowing condition. This is consistent with the Interagency Guidelines for wild and scenic rivers (USDI 1982) that state,

> . . . studies will be made during preparation of the management plan and periodically thereafter to determine the quantity and mixture of recreation and other public use, which can be permitted without adverse impact on the resource values of the river area.

This suggests that ongoing monitoring efforts are essential to ensure that the appropriate kinds and amounts of visitor and other public use identified in the *Snake River Headwaters Comprehensive River Management Plan* continue without an impact on river values. Monitoring provides a key tool for managers to measure progress toward achieving the objectives articulated in the plan and helps prevent unwanted impacts on at-risk resource values and visitor experience. As such, it serves as an important proactive part of the feedback loop in an adaptive management process.

Resource management activities are always taking place in a national park, and adjustments to management activities occur on a regular basis. Because the Snake River Headwaters is a diverse and dynamic natural system, it is imperative that managers are able to respond to monitoring and other information by adapting their strategies and tools to effectively address issues that may arise. This adaptive management approach provides managers with the necessary flexibility to adapt to changing, and often uncertain, conditions. A USDI technical guide (USDI 2007) describes adaptive management as

> [a decision process that] promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management action and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process.

In adapting and making adjustments, managers may employ a variety of management strategies and tools. The specific strategies and tools applied might require additional planning and compliance with the National Environmental Policy Act.

Both monitoring and research studies require a collaborative and interdisciplinary approach among park personnel, park partners, other federal and state agencies, and nonprofit and volunteer groups. The park staff monitors many resources and values as part of parkwide management. Monitoring for the goals associated with each river value would be coordinated as appropriate within the broader monitoring programs within the park.

Monitoring guidelines for each of the river values identified for the Snake River Headwaters are presented in chapter 3. These guidelines are intended to help park managers monitor the condition of the free-flowing condition, water quality, and outstandingly remarkable values of the designated rivers.

ENVIRONMENTALLY PREFERABLE ALTERNATIVE

As defined in the CEQ's "Forty Most Asked Questions" (Q6a), the environmentally preferable alternative is defined as ". . . the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources." It should be noted that there is no requirement that the environmentally preferred alternative and the preferred alternative be the same.

All three alternatives maintain a balance between resource preservation and protection and visitor use in compliance with the Wild and Scenic Rivers Act. Compared to alternative A, action alternatives B and C have similar beneficial and adverse impacts because both alternatives have improvements in parking, traffic flow, river access and visitor facilities, enhanced wild and scenic river interpretation, and increased monitoring required for visitor and resource protection.

Although alternative A would sustain the river corridor, increased adverse impacts on natural and cultural resources would occur due to the current lack of systematic monitoring of resource conditions. By comparison, both alternatives B and C implement a visitor use and resource monitoring program of the headwaters' free-flowing condition, water quality, and outstandingly remarkable values. Where existing development is not compatible with the classification of the segment, the action alternatives would strive to redesign, relocate, or remove facilities to be more compatible with the river's classification over time. Both action alternatives would ensure that types and levels of development are designed to allow appropriate kinds and amounts of recreation use while protecting river values. Boat launches, access roads, and parking lots would be improved as necessary to prevent sedimentation of designated rivers. Under alternative B, relocation of the Pacific Creek Landing launch site would result in major, localized, long-term, adverse impacts on natural resources. Maintaining this launch site in its current location and implementing other site improvements under alternative C would better protect natural resources in this area.

Alternatives B and C protect the free-flowing condition and water quality of the designated wild and scenic rivers through monitoring and evaluating water resource projects to ensure consistency with the wild and scenic river designation. The action alternatives use closures to prevent visitor use impacts on wildlife or to sensitive geothermal features, and by establishing thresholds that would indicate minimally acceptable levels of human disturbance. To prevent social trails and related bank erosion issues along the river, alternatives B and C improve signing and wayfinding, promote Leave No Trace principles, delineate parking areas with fencing or other barriers, and designate and delineate river access points. The implementation of a more formal review process for projects covered by section 7 of the Wild and Scenic Rivers Act would provide guidance for park staff regarding projects affecting the river.

While alternative A includes ongoing headwaters-wide management strategies for the designated wild and scenic river, action alternatives B and C emphasize further collaboration with neighboring federal and state agencies to better manage the Snake River Headwaters across boundaries through scientific research, monitoring, and resource management activities. Interagency collaboration would better prevent the introduction and spread of invasive aquatic and terrestrial species within and adjacent to the designated wild and scenic river corridors. The National Park Service and U.S. Fish and Wildlife Service would also work

with private landowners regarding property within the wild and scenic river designation to achieve common goals for managing the river.

Alternatives B and C would better protect the cultural resources within the headwaters through increased monitoring of archeological resources, historic structures, and cultural landscapes. Alternatives B and C increase interpretive and educational messaging concerning the protection of cultural river values and develop a collaborative interagency prehistoric and historic resources study of the Snake River Headwaters. These actions would enhance visitor awareness and community stewardship of important natural and cultural resources while minimizing visitor use-related resource impacts.

Alternatives B and C also better protect the headwaters' iconic scenic landscape by designing, siting, and constructing facilities and recreation sites to avoid or minimize visual intrusion to scenery and visibility. The use of signs would either be reduced or involve placing them in areas that reduce visual impacts on scenery. Consistent with section 10 of the Wild and Scenic Rivers Act, under the action alternatives, vegetation and natural materials would be used to screen and blend new or existing structures with the natural landscape to improve riparian habitat, protect river values and scenery, and enhance the natural appearance of the developed areas.

Although the beneficial and adverse impacts of alternatives B and C are somewhat similar, alternative C would have lower visitor use levels and thus would have fewer associated visitor-caused impacts than alternative B. While both alternatives are protective of natural and cultural resources, alternative C emphasizes unobtrusive interpretive opportunities and more primitive, resource-related recreational experiences in undeveloped natural settings. Visitor activities would occur under alternative C, but through the visitor use management and monitoring framework, visitor types and amounts of use would adapt to changing natural conditions such as rebraiding river channels, fluctuating water levels, seasons, or protection of sensitive habitats and nesting areas. For these reasons, alternative C, which is the preferred alternative, is the environmentally preferable alternative.

CONSISTENCY OF THE ALTERNATIVES WITH THE NATIONAL ENVIRONMENTAL POLICY ACT

The National Environmental Policy Act requires an analysis of how each alternative meets or achieves the purposes of the act, as stated in section 101(b). Each alternative analyzed in a NEPA document must be assessed as to how it meets the following purposes:

1. fulfill the responsibilities of each generation as trustee of the environment for succeeding generations
2. assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings
3. attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences
4. preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment that supports diversity and variety of individual choice
5. achieve a balance between population and resource use that would permit high standards of living and a wide sharing of life's amenities
6. enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources

The Council on Environmental Quality has promulgated regulations for federal agencies' implementation of the National Environmental Policy Act (40 CFR 1500–1508). Section 1500.2 states that federal agencies shall, to the fullest extent possible, interpret and administer the policies, regulations, and public laws of the United States in accordance with the policies set forth in the act (sections 101[b] and 102[1]); therefore, other acts and policies are referenced, where applicable, in the following discussion.

Criterion 1. Fulfill the Responsibilities of Each Generation as Trustee of the Environment for Succeeding Generations

Each alternative meets this criterion, although the action alternatives (alternatives B and C) provide enhanced stewardship of headwaters resources in comparison with the no-action alternative, which lacks a systematic monitoring framework for resource conditions and visitor use impacts.

Criterion 2. Assure for All Americans Safe, Healthful, Productive, and Aesthetically and Culturally Pleasing Surroundings

All of the alternatives strive to provide for safe, healthful, productive, and aesthetically and culturally pleasing surroundings. In comparison with the no-action alternative, the ability of the National Park Service and U.S. Fish and Wildlife Service to achieve this objective would be enhanced under alternatives B and C by incorporating environmentally compatible visitor activities and development using a visitor use management and monitoring framework. This framework uses indictors and standards for resource protection and user capacity.

Criterion 3. Attain the Widest Range of Beneficial Uses of the Environment without Degradation, Risk to Health or Safety, or Other Undesirable and Unintended Consequences

Action alternatives B and C promote a wide range of beneficial uses of the environment, allowing visitors an appropriate range of river-oriented recreation and enjoyment, varying by river classification, without degradation of natural and cultural resources or otherwise incurring undesirable and unintended consequences. Compared with alternative B, alternative C provides the greatest emphasis on the protection and enhancement of river values as visitor uses would adapt to changing natural conditions. While allowing a range of visitor uses, environmental education and awareness would be promoted by focusing on sustainable recreational and operational practices and native species would receive management emphasis. Under alternative C, existing infrastructure within the river corridor, including key river access nodes, would be consolidated by removing, relocating, and/or redesigning poorly sited and/or less sustainable facilities and infrastructure in order to improve resource conditions.

Criterion 4. Preserve Important Historic, Cultural, and Natural Aspects of Our National Heritage and Maintain, Wherever Possible, an Environment that Supports Diversity and Variety of Individual Choice

Action alternatives B and C include enhanced protection of significant cultural and natural resources, including important scenic landscapes, views, and vistas. Both alternatives support a variety of self-directed visitor activities coupled with a systematic monitoring framework to ensure that the condition of important resources is

protected. Both alternatives B and C include coordination with partner agencies to develop a prehistoric and historic resources study specific to the history of the human occupation and use of the Snake River Headwaters. This study would aid cultural resources managers in the development of interpretive and educational tools, which would in turn promote stewardship and visitor etiquette for the historic, cultural, and natural values of the wild and scenic corridor. Preservation of cultural resources would be accomplished using techniques that are sensitive to the river and its landscape.

Criterion 5. Achieve a Balance between Population and Resource Use that Will Permit High Standards of Living and a Wide Sharing of Life's Amenities

Although both alternatives B and C would provide enhanced opportunities for visitors to access and experience the headwaters, alternative C best achieves a balance between providing a wide range of visitor uses while also providing a high level of environmental protection of natural and cultural resources. By offering enhanced visitor connections with the natural world, alternative C emphasizes resource-related recreational experiences that would adapt to changing natural conditions such as rebraiding river channels, fluctuating water levels, seasons, or protections for sensitive habitats and nesting areas. This approach for integrating resource protection with visitor use under alternative C best supports national environmental policy goals.

Criterion 6. Enhance the Quality of Renewable Resources and Approach the Maximum Attainable Recycling of Depletable Resources

Action alternatives B and C incorporate measures to ensure that park operations are conducted in an environmentally responsible and sustainable manner. Under both alternatives, new developments would only be considered to benefit resources while existing infrastructure within the river corridor, including key river access nodes, would be consolidated by removing, relocating, and/or redesigning poorly sited and/or less sustainable facilities and infrastructure. Park staff would demonstrate environmental leadership in facility design and operation.

IDENTIFICATION OF THE PREFERRED ALTERNATIVE

Identification of the preferred alternative involved evaluating the alternatives using an objective analysis process called "choosing by advantages" (CBA). This process included a three-day workshop in which 22 staff members representing multiple divisions of Grand Teton and Yellowstone national parks, the National Elk Refuge, and Wyoming Game and Fish Department worked together to develop the preferred alternative. Through this process, the planning team identified and compared the relative advantages of each alternative according to a set of factors. These factors were selected based on the benefits or advantages of each alternative to fulfill the purpose of the plan, while addressing the planning issues identified in chapter 1. The traditional factors used by the National Park Service in the CBA process were modified to reflect the wild and scenic river designation and the outstandingly remarkable values identified for the Snake River Headwaters. CBA factors considered in evaluating the alternatives include the following:

Factor 1. Protects natural resources, free-flowing condition, and water quality. This factor includes the ecological/wildlife, fish, and geologic outstandingly remarkable values.

Factor 2. Protects cultural resources, especially fundamental resources and values. This factor includes the cultural outstandingly remarkable value.

Factor 3. Provides a diversity of opportunities and settings for visitors to experience, learn about, and have a connection with the rivers including healthy, safe, and accessible visits. This factor includes the recreational outstandingly remarkable value.

Factor 4. Establishes appropriate land uses and associated developments, consistent with each river segment's classification and protection of river values, includes the scenic outstandingly remarkable value.

Factor 5. Improves efficiency, reliability, and sustainability of park operations. This factor includes healthy, safe, and accessible working conditions.

Factor 6. Provides other benefits to the National Park Service, U.S. Fish and Wildlife Service, and partners.

Decisions made during the CBA process were based on the importance of advantages between the alternatives. This involved the identification of the attributes or characteristics of each alternative relative to the factors, a determination of the advantages for each alternative for each factor, and then weighing the importance of each advantage. The relationship between the advantages and costs of each alternative was also established. This information was used to identify the alternative that provides the National Park Service, U.S. Fish and Wildlife Service and the public the greatest advantage for the most reasonable cost.

The results of the CBA process identified alternative C as the agency's preferred alternative. This alternative provides the best combination of strategies to protect the designated wild and scenic rivers' unique natural and cultural resources and recreational values, while improving the operational effectiveness and sustainability. It also provides other benefits to the National Park Service and partners through collaborative planning and management. Ultimately, the significant advantage to natural resources of alternative C was one of the largest determining factors in identifying it as the preferred management alternative.

ALTERNATIVE CONSIDERED BUT DISMISSED FROM DETAILED EVALUATION

INTRODUCTION

During public scoping for this planning effort, an alternative was suggested by boating advocacy groups to allow nonmotorized boating on designated wild and scenic river segments where this activity is currently prohibited. These include the Snake River and lower Lewis River segments in Yellowstone National Park; the Pacific Creek and Buffalo Fork segments in Grand Teton National Park; and the Gros Ventre River segment along the boundary between Grand Teton National Park and the USFWS National Elk Refuge.

The National Park Service and U.S. Fish and Wildlife Service eliminated this alternative from detailed evaluation because it conflicts with long-standing parkwide and refuge-wide management and regulations established under the general statutory authorities of the National Park Service and U.S. Fish and Wildlife Service, and these long-standing restrictions protect and contribute to the values for which these particular rivers were designated; thus, eliminating these restrictions would be inconsistent with the purpose of this planning effort. The following describes each of these reasons in turn.

Conflicts with Existing Regulations

Grand Teton and Yellowstone national parks and the National Elk Refuge have been managed under long-standing parkwide and refuge-wide regulations that prohibit boating on both undesignated and designated wild and scenic river segments.

- 36 CFR 7.13(d)(4ii) Yellowstone National Park
  - Vessels are prohibited on park rivers and streams (as differentiated from lakes and lagoons), except on the channel between Lewis Lake and Shoshone Lake, which is open only to hand-propelled vessels.
- 36 CFR 7.22(e)(2-3) Grand Teton National Park
  - (e) Vessels. (2) Hand-propelled vessels may be used on Jackson, Jenny, Phelps, Emma Matilda, Two Ocean, Taggart, Bradley, Bearpaw, Leigh, and String lakes and on the Snake River, except within 1,000 feet of the downstream face of Jackson Lake Dam. All other waters are closed to boating. (3) Sailboats may be used only on Jackson Lake.
- 50 CFR 25.21(a) National Elk Refuge
  - (a) Except as provided below, all areas included in the National Wildlife Refuge System are closed to public access until and unless we open the area for a use or uses in accordance with the National Wildlife Refuge System Administration Act of 1966 (16 USC 668dd-668ee), the Refuge Recreation Act of 1962 (16 USC 460k-460k-4) and this subchapter C. See 50 CFR 36 for details on use and access restrictions and the public participation and closure process established for Alaska national wildlife refuges. We may open an area by regulation, individual permit, or public notice, in accordance with section 25.31 of this subchapter.

The Wild and Scenic Rivers Act does not preempt more protective measures but instead is intended to enhance what is already protected. Section 10(c) of the Wild and Scenic Rivers Act states the following:

> The lands involved shall be subject to the provisions of the chapter and the Acts under which the national park system or national wildlife system, as the case may be, is administered, and in the case of conflict between the provisions of this chapter and such Acts, the more restrictive provisions shall apply (16 USC 1281[c]).

The intent of the act and of a river designation is thus to enhance existing protection—it should in no way alter preexisting restrictions imposed under NPS or USFWS authorities to protect park or refuge resources, nor do any other provisions of the Wild and Scenic Rivers Act or the Craig Thomas Snake Headwaters Legacy Act suggest that previously prohibited forms of boating should be allowed on newly designated wild and scenic rivers. Moreover, Congress determined these rivers to be worthy of inclusion in the national wild and scenic rivers system with the existing boating closures already in place.

Whether river segments are currently open or closed to boating has been determined over many years under a variety of authorities, policies, and planning processes independent of the WRSA planning process. Reevaluating the existing regulations and restrictions would require significant review and potential revision of existing policies and plans, as well as additional planning and other processes well outside the intent of the Wild and Scenic Rivers Act and the river designations. It thus does not meet the purpose and need for this planning effort and is beyond its scope.

EXISTING RESTRICTIONS CONTRIBUTE TO THE PROTECTION OF VALUES FOR WHICH RIVERS WERE DESIGNATED

The Wild and Scenic Rivers Act provides that uses allowed on a designated river must be consistent with the protection and enhancement of the values that caused it to be designated. Section 10(a) provides

> Each component of the national wild and scenic rivers system shall be administered in such manner as to protect and enhance the values which caused it to be included in said system without, insofar as is consistent therewith, limiting other uses that do not substantially interfere with public use and enjoyment of these values. In such administration primary emphasis shall be given to protecting its esthetic, scenic, historic, archeological, and scientific features. Management plans for any such component may establish varying degrees of intensity for its protection and development, based on the special attributes of the area (16 USC 1281[a]).

For these rivers, the long-standing boating restrictions described above have protected and contributed to the values for which the rivers were designated. Removing these restrictions and allowing new boating would not only be contrary to the more restrictive existing park and refuge management requirements, but also the direction provided in section 10(c) (as explained in the previous section).

Substantial boating opportunities already exist throughout the Snake River Headwaters and therefore the public interest at large is currently being served. At this time, 351 miles of the total 410 miles (86%) of designated wild and scenic rivers within the entire Snake River Headwaters are open to nonmotorized boating. As such, these remaining 14% of rivers provide an opportunity to experience

solitude and the wild nature and scenery of these areas without the sights or sounds that recreational watercraft would present. These values contributed to the designation of these portions of the rivers and must be protected. While boating advocates commented that allowing these activities would expand their opportunities, other members of the public requested that recreational uses remain the same so as not to affect the natural setting and scenic qualities of these river segments.

Recreational Boating would Conflict with the Mission of the National Elk Refuge and National Wildlife Refuge System

The U.S. Fish and Wildlife Service eliminated this alternative from detailed evaluation because this new boating use would conflict with the "wildlife first" mandate of the national wildlife refuge system (NWRS). The National Wildlife Refuge System Improvement Act of 1997 (16 USC 668dd, 668ee) establishes a hierarchy of refuge use priorities and requires secondary uses to be compatible with primary refuge purpose and the conservation mission of the national wildlife refuge system. Nonmotorized boating is not considered a wildlife-dependent use and is not listed among the six priority public uses named in the act, and it would conflict with National Elk Refuge purpose and the NWRS mission.

The National Elk Refuge was established in 1912 as a "winter game (elk) reserve" (37 Stat. 293, 16 USC 673), and the following year Congress designated the area as "a winter elk refuge" (37 Stat. 847). In 1927, the refuge was expanded to provide "for the grazing of, and as a refuge for, American elk and other big game animals" (44 Stat. 1246, 16 USC 673a). This river corridor is a heavily used ungulate winter range, a spring and fall migration corridor for elk and bison, and vital year-round habitat for moose; therefore, it is a priority for management as wildlife habitat over nonwildlife-dependent recreational uses. Under authority 50 CFR 25.21, the National Elk Refuge will continue to maintain the existing boating closure within the Gros Ventre River corridor for the benefit of priority wildlife species.

CONCLUSION

For the reasons described above, the National Park Service and U.S. Fish and Wildlife Service have eliminated this alternative from detailed evaluation because it conflicts with existing regulations and resource management requirements, it is outside the scope of this planning effort, and it conflicts with the mission of the National Elk Refuge.

The Alternatives

3

INTRODUCTION

OVERVIEW

This chapter describes three alternatives for managing the newly designated wild and scenic river segments. Alternative A, also referred to as the no-action alternative, represents continuation of current management. Alternative B emphasizes visitor experience and increased access and developments for a diversity of recreational activities. Alternative C focuses on a more primitive, undeveloped natural setting with modest improvements to enhance resource conditions and visitor experience. Alternative C has been identified as the preferred alternative.

This chapter also includes mitigation measures and staffing and cost estimates. A series of summary tables can be found at the end of this chapter, which provide a comparison of the differences between the alternatives. The impacts of each alternative are summarized in table 8 from the information presented in "Chapter 5: Environmental Consequences"—pursuant to the National Environmental Policy Act.

THREE TIERS OF THE ALTERNATIVES

Due to the complexity of developing a comprehensive management plan for multiple river segments within three national park system units and a national wildlife refuge, the planning team created a simple three-tiered approach to organizing the alternatives. The first tier includes broad-based management strategies that would be applied across the entire NPS- and USFWS-managed wild and scenic river designation. These are referred to as headwaters-wide strategies. The second tier includes management strategies for each of the seven designated wild and scenic river segments. These strategies vary by types and levels of development and kinds and amounts of recreation use for each of the three alternatives. The third tier is specific to river access points. These vary by the types and levels of development for nine river access points along the Snake River. Figure 3 illustrates how the alternatives are organized in this chapter using the three-tiered approach.

ALTERNATIVE MANAGEMENT CONCEPTS

The following describes the management concepts for each of the three alternatives. These concepts describe different overarching approaches to managing the designated wild and scenic river segments. They are intended to be a general rule of thumb to show distinctions between the range of alternatives. However, not all strategies presented in the alternatives are perfectly aligned with these concepts. This is true for the headwaters-wide management strategies, select river segment management strategies, and select river access points (e.g., Flagg Canyon, Flagg Ranch, and Oxbow Bend). The National Park Service and U.S. Fish and Wildlife Service determined that these particular strategies provide a practical approach to wild and scenic river management that do not lend them to varying by alternative. Furthermore, the "protect and enhance" mandate of the Wild and Scenic Rivers Act narrows the range of possible management options that can be considered in a comprehensive river management plan.

ALTERNATIVE A (NO ACTION)

The no-action alternative represents continuation of current management strategies for designated portions of wild and scenic rivers within and along the boundary of Grand Teton and Yellowstone national parks, John D Rockefeller, Jr. Memorial Parkway, and the National Elk Refuge. Under this alternative, these river segments would continue to be managed without a comprehensive river management plan. The Snake River scenic segment between Jackson Lake Dam and Moose would continue to be managed in accordance with the park's existing Snake River management plan (NPS 2007). Park managers would continue to maintain a balance between resource preservation and visitor use in compliance with the Wild and Scenic Rivers Act.

This alternative reflects current management practices related to natural and cultural resources management, scenery conservation, kinds and amounts of recreation use, and types and levels of development. The primary purpose of describing the no-action alternative is to provide a baseline against which to compare the other management alternatives (alternatives B and C).

ALTERNATIVE B

Under this alternative, environmentally and operationally sustainable developments would facilitate recreational experiences within the river corridors. Development would be consistent with providing new or improved access and facilities for a diversity of river-based recreational activities. Visitor connections with natural, cultural, and scenic elements would be enhanced through interpretation and education to improve appreciation of park resources and values. In general, use levels may be higher than current conditions under this alternative. Park administrative activities would focus on protecting natural and cultural resources and river-based recreational values in a manner consistent with the Wild and Scenic Rivers Act and the Craig Thomas Snake Headwaters Legacy Act.

ALTERNATIVE C (PREFERRED)

Visitor connections with the natural world would be emphasized through unobtrusive interpretive opportunities and more primitive, resource-related recreational experiences in undeveloped natural settings. Recreational activities would be consistent with the protection and enhancement of river values. Visitor uses would adapt to changing natural conditions such as rebraiding river channels, fluctuating water levels, seasons, or

protections for sensitive habitats and nesting areas. In general, use levels would be similar to or lower than current conditions under this alternative. Park administrative activities would focus on protecting natural and cultural resources and river-based recreational values in a manner consistent with the Wild and Scenic Rivers Act and the Craig Thomas Snake Headwaters Legacy Act of 2008.

Environmental education and awareness would be promoted by focusing on sustainable recreational and operational practices. Native species would receive management emphasis. Preservation of cultural resources would be accomplished using techniques to avoid adverse effects.

Infrastructure within the river corridor, including key river access nodes, would be consolidated by removing, relocating, and/or redesigning poorly sited and/or less sustainable facilities and infrastructure. New developments and facilities would only be considered in order to benefit resources.

Headwaters-wide

HEADWATERS-WIDE MANAGEMENT STRATEGIES

The first tier of this comprehensive river management plan includes headwaters-wide management strategies that would be applied across the entire wild and scenic river designation (administered by either the National Park Service or U.S. Fish and Wildlife Service). These comprehensive strategies vary by the no-action alternative (A) and those strategies that are common to both action alternatives (B and C).

ALTERNATIVE A (NO ACTION)

Alternative A includes the following ongoing headwaters-wide management strategies for the designated wild and scenic river.

Natural Resource Management Strategies

Free-flowing Condition.

- Continue to evaluate water resource projects to ensure consistency with the wild and scenic river designation (see section 7 evaluation guidelines).

Water Quality.

- Continue periodic water quality monitoring to ensure water quality remains in good condition.
- Continue to mitigate the effects of snow storage and stormwater runoff at developed areas to avoid impacts on water quality of designated wild and scenic rivers.

Ecological/Wildlife.

- Continue to encourage appropriate human behavior toward bears to visitors within the designated wild and scenic river corridors, including food storage requirements and visitor education to minimize conflicts (mainly with the use of signs along roads, at launches, and posted in restrooms).
- Continue to implement seasonal visitor use closures for nesting bird species such as bald eagles and peregrine falcons. These include, but are not limited to, nesting sites at Cattleman's Bridge, Triangle X cook site, and on the Gros Ventre River.
- Continue to implement winter closures along the Snake River bottom from Moose north to Moran Junction and along Buffalo Fork from December 15 to April 1, to avoid disturbance of wildlife.
- Continue treatment of nonnative invasive plant species (tamarisk/salt cedar, perennial pepperweed, musk thistle, bull thistle, Canada thistle, hound's-tongue, cheatgrass).
- Continue the annual Two Ocean and Heart Lake area bear closures and travel restrictions in Yellowstone National Park.

Fish.

- Continue to coordinate with the Wyoming Game and Fish Department, as appropriate, on aquatic invasive species inspections of boats entering park waters to prevent the introduction and spread of nonnative plants and animals.
- Continue to coordinate with the Wyoming Game and Fish Department, as appropriate, to conduct periodic fisheries monitoring and creel surveys.

- Continue to implement seasonal fishing closures to protect spawning fish within Grand Teton National Park, John D. Rockefeller, Jr. Memorial Parkway, and the National Elk Refuge. Continue to implement parkwide fishing regulations and permits within Yellowstone National Park.

Geologic.

- Continue to maintain parkwide geothermal area closures within Yellowstone National Park.

Cultural Resources Management Strategies.

- In compliance with section 106 of the National Historic Preservation Act, cultural resources inventories would continue to occur prior to all infrastructure improvements and other projects involving construction or ground disturbance. National register-eligible cultural resources would be avoided and protected during subsequent planned projects.
- Continue to provide limited interpretation of select cultural resources within designated wild and scenic river corridors.
- Continue to periodically monitor and record the condition of cultural resources within the river corridors. Proposed actions to manage and protect cultural resources would require separate analyses and compliance requirements on a case-by-case basis.
- Historic structures and cultural landscapes would be restored, maintained, or managed as outlined in the parks' historic properties management plans (in development for Grand Teton National Park). Ongoing preservation and maintenance activities would employ techniques that are sensitive to the river and its landscape to protect natural ecosystem processes and wilderness values where appropriate. All treatments of archeological resources, historic structures, cultural landscapes, or ethnographic resources shall be planned in consultation with the Wyoming State Historic Preservation Office and other consulting groups. All restoration or rehabilitation activities to historic structures or cultural landscapes would be planned and conducted in accordance with NPS *Management Policies 2006*, "Chapter 5: Cultural Resources," and following the guidelines in *The Secretary of the Interior's Standards and Guidelines for the Treatment of Historic Properties* (NPS 1995).
- Ethnographic resources, including those involving American Indian traditional cultural uses, would continue to be managed in consultation with associated tribes.

Scenery Conservation Measures.

- Continue the protection of scenic views within the river corridors by not placing structures and other intrusions within scenic viewsheds. Continue maintenance of select scenic vistas when conditions warrant (i.e., vegetation pruning).

Partnership Strategies.

- Continue to partner with federal and state agencies to monitor water quality and other biological indicators. Some partnership efforts are underway to collaborate on managing the Greater Yellowstone Ecosystem, yet there is little emphasis on managing Snake River Headwaters across agency boundaries.

ALTERNATIVES B AND C (COMMON TO BOTH ACTION ALTERNATIVES)

The following headwaters-wide management strategies are common to both action alternatives. These strategies provide a practical approach to wild and scenic river management that do not lend them to varying by alternative; the National Park Service did not receive opposing public comments regarding these topics during scoping. Furthermore, the "protect and enhance" mandate of the Wild and Scenic Rivers Act narrows the range of possible broad-based management options that can be considered in a comprehensive river management plan. These management topics include

- natural resource management strategies
- cultural resources management strategies
- scenery conservation measures
- partnership strategies
- development guidelines
- recreation management guidelines
- section 7 evaluation guidelines
- guidelines to address climate change
- user capacity indicators
- monitoring guidelines

Natural Resources Management Strategies

The exceptional and relatively intact natural resources and natural processes of the Snake River Headwaters include the necessary free-flowing condition, very good water quality, and several identified outstandingly remarkable values (ecological/wildlife, fish, and geologic). When combined with other outstandingly remarkable values in the basin, these natural resources and values collectively make the headwaters worthy of protection under the Wild and Scenic Rivers Act. The following sets of management strategies would be implemented under all action alternatives and are designed to protect and enhance the free-flowing condition, water quality, and respective outstandingly remarkable values.

- Review and adjust maintenance activities (e.g., road sanding, culvert cleaning, and boat launch maintenance) as needed to ensure impacts on wild and scenic river values are minimized.
- Coordinate wild and scenic river management activities across all park/refuge divisions to ensure an integrated, interdisciplinary management approach.
- Collaborate with other federal agencies; tribal, state, and local governments; neighboring landowners; nongovernmental and private sector organizations; and all other concerned parties on resource management issues, scientific research, and monitoring. (See the monitoring section for more information about natural resource-related indicators.)

Free-flowing Condition.

- Continue to evaluate water resource projects to ensure consistency with the wild and scenic river designation (see section 7 evaluation guidelines).
- Apply for the quantification of water rights reserved by each designated river segment in accordance with the procedural requirements under Wyoming state law. See appendix B for a description of the dependency of river values on in-stream flows, which provides the basis for filing for future water rights after approval of this plan.
- When river channels migrate against roads, seek solutions that allow the continuation of natural river processes.

- When feasible, modify bridges, culverts, riprap, and other developments that impede the free-flowing condition of designated wild and scenic river segments.
- Apply sustainable design practices to any new NPS or USFWS infrastructure that could potentially affect the free-flowing condition to ensure the infrastructure does not degrade this river value.
- Commit to working with public and private partners (e.g., highway departments, private landowners) to raise awareness of what it takes to meet free-flowing condition standards of the Wild and Scenic Rivers Act.

Water Quality.

- Continue periodic monitoring to ensure high water quality.
- Continue to mitigate the effects of snow storage and stormwater runoff at developed areas to avoid changes to water quality of designated wild and scenic river segments. Modify boat launches, access roads, and parking lots as necessary to prevent sedimentation of designated river segments.

Ecological/Wildlife.

- Continue to encourage appropriate human behavior toward bears to visitors within the designated wild and scenic river corridors, including food storage requirements and visitor education to minimize conflicts (mainly with the use of signs along roads, at launches, and posted in restrooms).
- Continue to implement winter closures along the Snake River bottom from Moose north to Moran Junction and along Buffalo Fork from December 15 to April 1, to avoid disturbance of wildlife.
- Continue to implement seasonal visitor use closures for nesting bird species such as bald eagles and peregrine falcons. These include, but are not limited to, nesting sites at Cattleman's Bridge, Triangle X cook site, and on the Gros Ventre River. Use area closures for other resource protection purposes as necessary.
- Identify species of concern and coordinate monitoring and protection activities between park units and other federal and state agencies.
- Establish thresholds that would indicate minimally acceptable levels of human disturbance (e.g., abandonment of historic eagle and osprey nest sites, increased number of grizzly bear encounters, or decreased observations of certain species).
- Promote Leave No Trace principles by educating visitors about how to enjoy river-related resources without negatively affecting these resources (e.g., social trailing along rivers can destabilize riparian vegetation and lead to bank erosion and degrade water quality.
- Coordinate with other federal and state agencies to manage and prevent the introduction and spread of invasive aquatic and terrestrial species within and adjacent to the designated wild and scenic river corridors. Consider the use of herbicide with an approved pesticide use permit, as well as the manual control of noxious weeds.
- Accommodate wildlife and fish passage with road crossings, culverts, and other similar techniques.
- Continue the annual Two Ocean and Heart Lake area bear closures and travel restrictions in Yellowstone National Park.

Fish.

- Continue to coordinate with the Wyoming Game and Fish Department, as appropriate, on aquatic invasive species inspections of boats entering park waters to prevent the introduction and spread of nonnative plants and animals (e.g., New Zealand mud snails).
- Continue to coordinate with the Wyoming Game and Fish Department, as appropriate, to conduct periodic fisheries monitoring and creel surveys.
- Continue to implement seasonal fishing closures to protect spawning fish within Grand Teton National Park, John D. Rockefeller, Jr. Memorial Parkway, and the National Elk Refuge. Continue to implement parkwide fishing regulations and permits within Yellowstone National Park.
- Identify aquatic species of concern and coordinate monitoring and protection activities between park/refuge units and other federal and state agencies.

Geologic.

- Use closures to prohibit swimming in geothermal features to protect sensitive resources within Grand Teton National Park and John D. Rockefeller, Jr. Memorial Parkway. Continue to maintain parkwide geothermal area closures within Yellowstone National Park.

Cultural Resources Management Strategies

Cultural resources that express the human history of the Snake River Headwaters, including historical and archeological sites, cultural landscapes, and ethnographic resources, are collectively identified as an ORV worthy of protection under the Wild and Scenic Rivers Act. To ensure the protection and enhancement of cultural ORVs, the following measures would be implemented under all action alternatives to enhance cultural ORVs as well as protect all cultural resources within the river corridor.

- In compliance with section 106 of the National Historic Preservation Act, cultural resources inventories would continue to occur prior to all infrastructure improvements and other projects involving construction or ground disturbance. National register-eligible cultural resources would be avoided and protected during subsequent planned projects.

- Continue to periodically monitor and record the condition of cultural resources within the river corridor. Proposed actions to manage and protect cultural resources would require separate analyses and compliance requirements on a case-by-case basis.

- Historic structures and cultural landscapes would continue to be maintained to retain these resources' current levels of integrity to the maximum extent possible. Ongoing preservation and maintenance activities would employ techniques that are sensitive to the river and its landscape to protect natural ecosystem processes and wilderness values where appropriate. All treatments of archeological resources, historic structures, cultural landscapes, or ethnographic resources shall be planned in consultation with the Wyoming State Historic Preservation Office and other consulting groups. All restoration or rehabilitation activities to historic structures or cultural landscapes would be planned and

conducted in accordance with NPS *Management Policies 2006*, Chapter 5: Cultural Resources, and following *The Secretary of the Interior's Standards and Guidelines for the Treatment of Historic Properties* (NPS 1995).

- Ethnographic resources, including those involving American Indian traditional cultural uses, would continue to be managed in consultation with associated tribes.

- Coordinate with partner agencies to develop a prehistoric and historic resources study specific to the history of the human occupation and use of the entire Snake River Headwaters. This understanding of the "big picture" of human use and settlement on the Snake River Headwaters would best aid cultural resources managers in the development of interpretive and educational tools.

- In support of ongoing efforts to inventory and document designated river segments that have not been previously surveyed, seek permission to conduct cultural resources inventories on nonfederal inholdings within the wild and scenic boundary. Inventories of and monitoring cultural sites would be carried out on nonfederal land only with landowner permission or as specified in landowner agreements. Such agreements with landowners would define the appropriate methods of survey and any follow-up activities such as monitoring that might occur. The agency would seek agreements with landowners to develop appropriate strategies for protecting identified cultural resources.

- Expand existing interpretation and education programs to include the historic significance of the river corridor, the history of human use of the river segments, and the outstandingly remarkable cultural values associated with the Snake River Headwaters. The goal of this expanded program would encourage understanding and appreciation of historical and archeological sites, cultural landscapes, and ethnographic resources.

- On-site interpretation of the history and cultural values of the wild and scenic corridor would be emphasized in river segments classified as scenic, including easily accessible historic sites such as the Bar BC Dude Ranch and 4 Lazy F Dude Ranch. On-site interpretation could include ranger-led interpretive programs, wayside exhibits, or signs. Cultural resources within river segments classified as wild would be interpreted at an off-site location to maintain the undeveloped character of these river corridors. Interpretive materials would be enhanced by information available in the historic resource survey.

Recreation Management Strategies

The following recreation management strategies would be implemented under all action alternatives:

- Develop interpretive and educational messaging for the Snake River Headwaters overall related to the Wild and Scenic Rivers Act and the protection of river values in partnership with the U.S. Forest Service and U.S. Fish and Wildlife Service.
- In general, provide a range of visitor experience opportunities.
- Continue periodic checks of boats for aquatic invasive species.

- Continue state and park fishing and hunting regulations where appropriate.
- Improve launch and river access points (locations and specific improvements vary by alternative).
- Use area closures to prevent visitor use impacts on wildlife such as nesting bird species.
- Improve signing and wayfinding where needed.
- Delineate parking areas with fencing or other barriers to avoid impacts on soils and vegetation.
- Designate and delineate river access points to prevent spread of social trails and related bank erosion issues along the river.
- Educate visitors on Leave No Trace ethics to minimize resource impacts.
- Continue food storage and bear safety programs.
- Implement a visitor use management and monitoring program using indicators and standards of quality to effectively manage the kinds and amounts of visitor use specified in the alternatives. The following management tools would be adaptively used to maintain visitor use levels and protect resource conditions and the quality of visitor experience:
  - **Visitor Education and Interpretation.** Visitor education and interpretation would be used as an important indirect management tool to protect resources and provide a positive visitor experience. For example, signs with messages informing visitors of sensitive resource areas would be used to improve understanding about sensitive resources, helping to prevent impacts by the unknowing visitor.
  - **Site Management and Manipulation.** A variety of site management actions may be used to administer the kinds and amounts of visitor use that can be accommodated while protecting river values. Specific site management actions may include moving infrastructure away from sensitive areas such as floodplains, rare plant habitat, and cultural sites. For example, consolidating parking areas could divert adverse impacts away from scenic vista points, cultural resources, and sensitive vegetation.
  - **Use Regulation.** A number of regulations are currently, and would continue to be, used to manage visitor use and user capacity. Regulations exist on both the kinds and amounts of use. Examples of regulations include fishing license requirements, boat checks for aquatic invasive species, and group size limits.
  - **Deterrence and Enforcement.** Deterrence and enforcement would be used in association with regulations governing visitor use behavior and activities. For example, there are strict regulations on food storage in the parks to prevent impacts associated with wildlife accessing human food. Should an individual be noncompliant with these regulations they may receive a citation and fine. Deterrence and enforcement are considered among the most "heavy handed" of management tools and are typically employed when less obtrusive tools such as education and interpretation cannot by themselves address the situation.

- **Use Rationing and Allocation.** Use rationing refers to the act of limiting the number of users to an area by time and/or location, while allocation refers to the portioning of the limited number among various user groups. There are a variety of management strategies that could be used for rationing and allocation, including: (1) implementing reservation systems, (2) limiting access using a first-come, first-served system, (3) implementing a lottery system, (4) implementing a merit or eligibility system, or (5) charging fees.

Scenery Conservation Measures

The unparalleled scenery of the Snake River Headwaters has been identified as an outstandingly remarkable value—an important characteristic that makes this river system worthy of protection under the Wild and Scenic Rivers Act. To ensure the protection of this iconic scenic landscape, the following set of scenery conservation measures would be implemented under all action alternatives:

- Continue the protection of scenic views within the river corridors by not placing structures and other intrusions within scenic viewsheds.
- Evaluate the compatibility of existing and any newly proposed developments to protect scenic river values. Facilities would be designed, sited, and constructed to avoid or minimize visual intrusion.
- Minimize the use of signs within the designated river corridors. When signs are necessary, maintain a consistent sign theme and position them in areas that minimize visual impacts.
- Use vegetation treatments to screen and blend structures with the natural landscape.
- Design and maintain developed and dispersed recreation sites to reduce visibility from designated rivers.
- Emphasize the use of natural materials (e.g., vegetation, rocks, and wood) for erosion control and riverbank stabilization efforts to maintain the natural appearance of the river corridor. Structures would be designed to minimize visual intrusions to the maximum extent possible, consistent with section 7 of the Wild and Scenic Rivers Act.
- Where appropriate, use facilities such as designated trails, boardwalks, and directional fencing to route people away from sensitive natural and cultural resources, while permitting access to important viewpoints.
- Maintain historic vistas and other remarkable views to the extent possible (i.e., vegetation pruning) to allow visitors the opportunity to experience a variety of scenic settings without disrupting the integrity of the natural ecosystem. Where possible, allow these viewpoints to be dynamic and subject to change due to natural processes (i.e., geologic, hydrologic, and vegetation changes).

Partnership Strategies

What makes the Snake River Headwaters especially complex is that it encompasses an entire watershed, rather than just one river. Over 400 miles of designated wild and scenic rivers flow across NPS, USFS, and USFWS lands, as well as a small portion of state and private lands. Due to the sheer size of this wild and scenic river designation,

collaboration is vital for protection and management.

In the same spirit of collaboration that led to the designation of the Snake River Headwaters, the National Park Service and U.S. Fish and Wildlife Service would explore a broader base of partnerships with federal and state agencies, communities, private landowners, and interested citizens throughout the implementation of this comprehensive river management plan. The following set of strategies has been developed to promote this partnership approach. The National Park Service and U.S. Fish and Wildlife Service may seek opportunities to create other partnerships to help protect and enhance river values throughout the Snake River Headwaters.

- The National Park Service and the U.S. Forest Service have worked collaboratively developing separate yet concurrent management plans for the Snake River Headwaters. Collaboration with Bridger-Teton National Forest would continue in order to ensure the most seamless management possible for designated river segments. When consistent management is not possible on river segments that cross agency boundaries (e.g., different allowable uses), the National Park Service would coordinate with the U.S. Forest Service to develop joint management solutions.

- The National Park Service has worked closely with the U.S. Fish and Wildlife Service to develop this plan, which includes joint management guidance for a portion of the Gros Ventre River. This designated river segment serves as the boundary between Grand Teton National Park and the National Elk Refuge. The National Park Service would continue to partner with the U.S. Fish and Wildlife Service on managing the Gros Ventre River throughout the implementation of this plan.

- The Bureau of Reclamation manages Jackson Lake Dam. As stated in the Craig Thomas Snake Headwaters Legacy Act, the storage and release of water from the dam is not affected by the wild and scenic river designation. When compatible with meeting all water rights requirements, the National Park Service would collaborate with the Bureau of Reclamation to the extent possible to mimic natural flow regimes on the Snake River below Jackson Lake (e.g., spring freshets—floods from heavy rains, or snowmelt).

- The State of Wyoming has been a formal cooperator on the development of this comprehensive river management plan. The National Park Service would continue to collaborate with the State of Wyoming, including the Wyoming Game and Fish Department and the Wyoming Department of Environmental Quality, on the implementation of this plan. As appropriate, the National Park Service would seek their technical assistance and input in monitoring and managing for terrestrial and aquatic species, water quality, in-stream flows, and other biological conditions. The National Park Service would also continue to work closely with the Wyoming State Engineer's Office to file for a water right for designated wild and scenic river segments as required in the Craig Thomas Snake Headwaters Legacy Act.

- The National Park Service would work with private landowners with property within the wild and scenic river designation to achieve common goals for managing the river. The wild

and scenic river designation does not affect private property rights; however, projects occurring within the riverbed and banks may be subject to evaluation under the Wild and Scenic Rivers Act.

Development Guidelines

The types and levels of development for each river segment should be sustainable and consistent with each segment's classification. Where existing development is not compatible with the classification of the segment, the parks would strive to redesign, relocate, or remove facilities to be more compatible with the river's classification over time. Both of the action alternatives would ensure types and levels of development are designed to allow appropriate kinds and amounts of recreation use while protecting river values. The following set of development guidelines would be implemented under all action alternatives:

- The compatibility of any newly proposed developments (or redesign of existing developments) would be evaluated to ensure they protect river values and natural river processes. Facilities would be designed, sited, and constructed to ensure compatibility with each river segment classification.

- Developed recreation sites near the river would be monitored to determine if negative effects to river values (such as vegetation trampling, streambank erosion, or soil compaction) could be reduced or eliminated through adaptive management.

- Vegetation treatments would be used to screen and blend new or existing structures with the natural landscape to improve riparian habitat, protect river values, and enhance the natural appearance of the developed areas.

- Erosion control and riverbank stabilization efforts would emphasize the use of natural materials. Structures would be designed to minimize impact to natural river processes and free-flowing condition to the maximum extent possible. Any erosion control or riverbank stabilization efforts would be evaluated to ensure consistency with section 7 of the Wild and Scenic Rivers Act.

- Existing and proposed facilities described in this plan within each river corridor would be properly maintained. Activities would include routine maintenance and repairs of nonhistoric structures, facilities, utilities, grounds and trails; replacement of signs, displays, kiosks, etc.; replacement of minor structures and facilities with little or no change in location, capacity, or appearance; repair, resurfacing, striping, installation of traffic control devices, repair/replacement of guardrails, etc., on existing roads; trail maintenance and repair; and landscaping and landscape maintenance in previously disturbed or developed areas.

Section 7 Evaluation Guidelines for Water Resource Projects

Section 7 is a key provision of the Wild and Scenic Rivers Act directing federal agencies to protect designated rivers from the harmful effects of water resources projects. It requires evaluation of federally assisted (or federally permitted) water resources projects by the river-administering agency—in this case, the National Park Service and U.S. Fish and Wildlife Service—to determine if a project should proceed or not. The administering agency may also require modifications to a

project in order to eliminate any direct and adverse impacts.

A water resources project under section 7 of the act is defined as any dam,[4] water conduit, reservoir, powerhouse, transmission line, or other project works under the Federal Power Act, or other construction of developments that would affect the free-flowing characteristics of a wild and scenic river. In addition to projects licensed by the Federal Power Commission, water resources projects may also include water diversion projects, fisheries habitat and watershed restoration or enhancement projects, bridges and other roadway construction or reconstruction projects, riverbank stabilization projects, channelization projects, levee construction; recreation facilities, such as boat ramps and fishing piers, and activities that require a section 404 permit from the U.S. Army Corps of Engineers (USACE).

The degree of analysis required under section 7 directly relates to the magnitude and complexity of a proposed project. Less complex projects may require a brief review to evaluate the effects and to support a determination. However every determination must be based on the best available science, professional judgment, and be consistent with the Wild and Scenic Rivers Act and agency policies.

The following evaluation procedures have been adapted from the Interagency Wild and Scenic Rivers Council (2004) and would be used by the National Park Service and U.S. Fish and Wildlife Service when evaluating proposed projects to make a section 7 determination. The following steps also provide useful information for those interested in seeking approval of a proposed water resource project.

[4] As stated in the Craig Thomas Snake Headwaters Legacy Act, the wild and scenic river designation does not affect the storage, management, and release of water from Jackson Lake Dam.

Step 1. Define the proposed activity. Describe the proposed activity in terms of the

- project proponent(s)
- purpose and need for the project
- geographic location of the project (include a map)
- duration of the proposed activities
- magnitude and extent of the proposed activities
- relationship to past and future management activities

Step 2. Describe how the proposed activity would directly alter in-channel conditions. Address the magnitude and spatial extent of any potential effects, giving special attention to changes in features that would affect the outstandingly remarkable values. Describe

- the position of the proposed activity relative to the streambed and streambanks
- any likely changes in
  - active channel location
  - channel geometry (cross-sectional shape, width/depth characteristics)
  - channel slope (rate or nature of vertical drop)
  - channel form (straight, meandering, or braided)
  - relevant water quality parameters (turbidity, temperature, nutrient availability)
  - navigation of the river

Step 3. Describe how the proposed activity would directly alter riparian and floodplain conditions. Address the magnitude and spatial extent of any potential effects, giving special attention to changes in features that would affect the outstandingly remarkable values. Describe

- the position of the proposed activity relative to the riparian area and floodplain
- any likely resulting changes in
  - vegetation composition, age structure, quantity, or vigor
  - relevant soil properties such as compaction or percent bare ground
  - relevant floodplain properties such as width, roughness, bank stability
  - susceptibility to erosion

Step 4. Describe how the proposed activity would directly alter upland conditions. Address the magnitude and spatial extent of any potential effects, giving special attention to changes in features that would affect the outstandingly remarkable values. Describe

- the position of the proposed activity relative to the uplands
- any likely changes in
  - vegetation composition, age structure, quantity, or vigor
  - relevant soil properties such as compaction or percent bare ground
  - relevant hydrologic properties such as drainage patterns or the character of surface and subsurface flows
- potential changes in upland conditions that would influence archeological, cultural, or other identified significant resource values

Step 5. Evaluate and describe how specific changes in on-site conditions would alter existing hydrologic and biologic processes. Evaluate potential changes by quantifying, qualifying, and/or modeling the likely effects of the proposed activity on

- the ability of the channel to change course, reoccupy former segments, or inundate its floodplain
- streambank erosion potential, sediment routing and deposition, or debris loading
- the amount or timing of flow in the channel
- existing flow patterns
- surface and subsurface flow characteristics
- flood storage (detention storage)
- aggradation/degradation of the channel
- biological processes such as
  - reproduction, vigor, growth and/or succession of streamside vegetation
  - nutrient cycling
  - fish spawning and/or rearing success
  - riparian dependent avian species needs
  - amphibian/mollusk needs
  - species composition (diversity)

Step 6. Estimate the magnitude and spatial extent of potential off-site changes. Address potential off-site or indirect effects of the proposed activity, acknowledging any uncertainties.

- Consider and document
  - changes that influence other parts of the river system
  - the range of circumstances under which off-site changes might occur (for example, as may be related to flow frequency)
  - the likelihood that predicted changes would be realized
- Specify processes involved, such as water and sediment, and the movement of nutrients

Step 7. Define the duration of effects of the proposed project. Define and document the duration of effects to in-channel conditions, riparian and floodplain conditions, upland conditions, hydrologic and biologic processes, and off-site changes.

Step 8. Evaluate and describe potential impacts on outstandingly remarkable values that may not be addressed in steps 2–7. Using a comprehensive perspective, assess and describe any other possible effects to outstandingly remarkable values that may not be captured by the evaluations conducted in the previous specific analysis steps.

Step 9. Compare project analyses to management goals. Based on the analysis, identify and document project effects on the achievement of management goals relative to free-flow condition, water quality, outstandingly remarkable values, and the river's wild and scenic classification.

Step 10. Make the section 7 determination. Based on the analysis, document

- the effects of the proposed activity on the river's free-flowing conditions, including identification of any proposed measures to minimize those effects
- the effects of the proposed activity on the river's water quality, including identification of any proposed measures to minimize those effects
- any effects on the outstandingly remarkable values, including identification of any proposed measures to minimize those effects
- the responsible official should make a conclusion as to whether the project as proposed would result in "direct and adverse effects" to the values for which the river was designated as a wild and scenic river

Guidelines to Address Climate Change

Climate change has the potential to adversely affect the future resource conditions of the Snake River Headwaters. As global and regional climates continue to change, a management approach that enhances the protection and resilience of climate-sensitive resources is becoming increasingly important. The following outlines such an approach, one that adapts to our growing understanding of climate change influences and the effectiveness of management to contend with them.

Climate change science is a rapidly advancing field and new information is continually being collected and released, yet the full extent of climate change impacts on resource conditions is unknown. As such, park managers and policymakers have not determined the most effective response mechanisms for minimizing impacts and adapting to change. Because of this, the following proposed management strategies do not provide definitive solutions or directions; rather they provide science- and scholarship-based management principles to consider when implementing the broader management direction of this comprehensive river management plan.

The NPS Climate Change Response Program intends to prepare the agency and its parks for the anticipated management needs that result from climate change. To help parks cope with the uncertainty in future climate conditions, this program serves to help park managers determine the extent to which they can and should act to protect the current resources of the parks while allowing park ecosystems to adapt to new conditions. Efforts of the NPS Climate Change Response Program focus on the following strategies that have been adapted for use by the parks and refuge in managing the Snake River Headwaters. For more information, please visit: http://nature.nps.gov/climatechange.

Science.

- Conduct scientific research and vulnerability assessments necessary to support adaptation, mitigation, and communication efforts.
- Collaborate with scientific agencies and institutions to meet the specific needs of management as it confronts the challenges of climate change.
- Learn from and apply the best available climate change science.

Mitigation.

- Reduce the carbon footprint of the parks and refuge.
- Promote energy efficient practices, such as alternative transportation.
- Enhance carbon sequestration as one of many ecosystem services.
- Integrate mitigation into all day-to-day business practices and planning efforts.

Adaptation.

- Develop the adaptive capacity for managing natural and cultural resources and infrastructure under a changing climate.
- Inventory resources at risk and conduct vulnerability assessments.
- Prioritize and implement actions, and monitor the results.
- Explore scenarios, associated risks, and possible management options.
- Integrate climate change impacts into facilities management.

Communication.

- Provide effective communication about climate change and impacts on the public.
- Train park staff and managers in the science of climate change and decision tools for coping with change.
- Lead by example.

With the guidance of the above strategies, the following management approaches to address climate change would be used throughout the implementation of this plan. Many of these specific management approaches are adapted from the article, "Some Guidelines for Helping Natural Resources Adapt to Climate Change" (Baron et al. 2008). Further elaboration and adaption of these are anticipated as implementation of the plan proceeds.

- Identify key natural and cultural resources and processes that are at risk from climate change; establish baseline conditions for these resources, identify their thresholds, and monitor for change. Increase reliance on adaptive management to minimize risks.

- Restore key ecosystem features and processes, and protect cultural resources to increase their resilience to climate change.

- Use best management practices to reduce human-caused stresses (e.g., park infrastructure and visitor-related disturbances) that hinder the ability of species or ecosystems to withstand climatic events.

- Form partnerships with other resource management entities to maintain regional habitat connectivity and refugia that allow species dependent on park/refuge resources to better adapt to changing conditions.

- Reduce or mitigate greenhouse gas emissions associated with park operations and visitor use, such as

alternative transportation options (e.g., shuttles and low-emission vehicles) and biofuels and other renewable energy sources for visitor center, administrative buildings, and campgrounds.

- Use fragile environments within the designated river corridors as an opportunity to educate visitors about the effects of climate change on the resources they enjoy. Inspire visitors to take action through leadership and education. Manage park and refuge facilities and infrastructure (e.g., historic structure and boat launches) in a way that prepares for and adapts to the effects of climate change.

User Capacity Indicators, Standards, and Management Strategies

The following indicators and standards would be used to evaluate how visitor use affects river values (including recreational value). In addition, management strategies are identified that would be implemented as needed in response to changing conditions to ensure that standards are maintained and river values are protected and enhanced. Many of these strategies are currently being implemented within the river corridor to varying degrees. If additional strategies are needed given changing conditions, the National Park Service will evaluate whether those strategies require additional compliance and public involvement. Indicators, standards, and management strategies are important components to addressing and managing user capacity within the river corridor. Existing monitoring protocols would be carried forward and adjusted where appropriate. Monitoring protocols for new indicators would be developed during implementation of this plan. Please refer to chapter 2 for more information on the full requirements and the process used to address user capacity.

Water Quality.

- **Indicator.** The indicator for water quality within Snake River Headwaters is the change in mean levels of water quality constituents below the baseline level. Water quality is the combined chemical, physical, and biologic condition of a body of water. According to the U.S. Environmental Protection Agency, water quality is important to keep in mind both for the function of aquatic life forms and for human recreational use. A recent study by the University of Idaho (2008) of visitors to Grand Teton National Park indicated that 87% of respondents felt that that clean water was an important component of their experience in the park. The Clean Water Act of 1977 and the Water Quality Act of 1987 authorize the U.S. Environmental Protection Agency to regulate water quality standards. Water quality can be evaluated through sets of water quality criteria. One such criterion, which is influenced by human activity and therefore visitor use, is the level of fecal coliform contamination indicative of *Escherichia coli* (*E. coli*) concentration. Additional water quality indicators, such as the level of dissolved nutrients, temperature, pH, and conductivity, would also be monitored within this segment.

- **Standard.** The standard for water quality within Snake River Headwaters permits no more than a 1% to 5% change (depending on river segments) in mean levels of constituents below baseline level. Water quality would be monitored by physically collecting water samples and performing laboratory analyses using existing protocols, and observing the incidence of animal and improperly disposed of human waste in, and immediately adjacent to, the flowing stream.

- **Management Strategies.** Management strategies would include visitor education on low impact practices such as Leave No Trace, particularly regarding the topics of proper disposal of refuse and human waste. Other management strategies may include site management to reduce erosion around access points and use areas, temporary closures of an area, and other visitor use regulations related to contaminants that may be entering the river corridor.

Invasive Species.

Invasive Plant Species—

- **Indicator.** The indicator for invasive plant species would be the presence of new species or expansion of areas inhabited by invasive plant species. Visitor use can inadvertently facilitate the spread of nonnative plant species into an environment and alter ecosystem health. Invasive species could be introduced in several ways, including automobiles, boats, fishing gear, and clothing. Additionally, visitor impacts that may degrade habitat, such as social trails, allow greater intrusion from invasive plant species.

- **Standard.** Standards for monitoring invasive plant species indicate that no new species or expansion of areas inhabited by these species would be tolerated. The presence of invasive plant species would be monitored using existing protocols within the river segments and surrounding environment.

- **Management Strategies.** Educational messaging and interpretation such as Leave No Trace would be applied to improve visitor understanding and prevent invasive plant species transport. Increased enforcement of compliance with these regulations would be implemented, as needed.

Aquatic Invasive Species—

- **Indicator.** The indicator for aquatic invasive species would be the presence of new species or expansion of areas inhabited by aquatic invasive species. Visitor use can inadvertently facilitate the spread of nonnative species into an environment and alter ecosystem health. Invasive species could be introduced in several ways, including automobiles, boats, fishing gear, and clothing.

- **Standard.** Standards for monitoring aquatic invasive species indicate that no new species or expansion of areas inhabited by these species would be tolerated. The presence of invasive species would be monitored using existing protocols within river segments and the surrounding environment.

- **Management Strategies.** Educational messaging and interpretation such as Leave No Trace would be applied to improve visitor understanding and prevent invasive species transport. Additionally, direct management actions, including boat checks for aquatic invasive species, have been implemented in the past and would continue to be employed within the river corridor. Increased enforcement of compliance with these regulations would be implemented, as needed.

Resource Condition.

Social Trails—

- **Indicator.** The indicator for social trails is the increase in social trails by river segment. Social (visitor created) trails, those deviating from maintained dirt or paved trails, impact resources and visitor experience. Social trails can lead to impacts on areas adjacent to the trail such as erosion, compaction of soils, loss of vegetation, and the creation of disturbed areas enabling intrusion from invasive species. Soil erosion can adversely affect water quality by increasing turbidity. In addition to these impacts, social trails have a negative impact on the scenic or visual quality of an area due to vegetation loss. These trails are defined as ones that "visitors have created to access streams, scenic attraction features, camping features or other features . . . or that simply parallel the main trail" (Leung and Marion 2000). Social trails occur where more than one visitor has visibly deviated from the maintained trail and in the process trampled more than 50% of existing vegetation.

- **Standard.** Standards vary for each river segment and allow no more than a 5% increase in social trails to ensure minimal impacts over time. Monitoring the number of social trails would allow park/refuge staff to ensure that the resources adjacent to designated trails are not being adversely impacted.

- **Management Strategies.** Indirect management in the form of educational messaging and interpretation is frequently applied to areas with social trails to encourage visitors to stay on designated paths and trails. Alternatively, direct management actions such as improving marking or delineation of trails through the use of signs, natural borders, or other techniques may also be used. Also, increased enforcement and temporary or permanent closure of areas may be needed. These strategies would be followed by restoration projects to improve resource conditions, as well as discourage further use of existing social trails by visitors.

Vegetation Impacts—

- **Indicator.** The indicator to assess vegetation impacts is the percentage of vegetation loss per visitor use site. Vegetation impacts caused by visitor use can occur intentionally and unintentionally, depending on the knowledge, attitudes, and ensuing behavior of visitors. Management concerns within the Snake River Headwaters include vegetation impacts resulting from trampling at both designated and undesignated use sites, which creates vegetation loss, increasing the potential for erosion.

- **Standard.** Standards pertaining to vegetation loss require that there should be no more than 2% to 5% loss per site, depending on the river segment. This standard requires regularly monitoring and assessing vegetation loss at attraction sites.

- **Management Strategies.** Indirect management in the form of educational messaging and interpretation, such as Leave No Trace, is frequently applied to areas with sensitive or already damaged vegetation. Alternatively, direct management actions such as improving marking or delineation of boundaries around designated use areas within attraction sites through

the use of signs, natural borders, or other techniques may also be used. If needed, the amount of use in an area may be reduced or temporary or permanent closures of areas may be needed to allow vegetation to recover. These strategies should be followed by restoration projects to improve resource conditions.

Geological Formation Impacts—

- **Indicator.** The indicator for impacts on geological formations is the number of incidents of human modification of hot spring sites within Snake River Headwaters. Visitor use impacts on geologic formations include both intended and unintended effects that occur during human visitation; these particular resources are nonrenewable and irreplaceable. Damage, which includes vandalism and impacts on hot spring features within Snake River Headwaters are an important indicator to preserve resource and social conditions.

- **Standard.** Standards pertaining to hot springs features require that there should be no incidents of human modification at any hot springs sites within the Snake River Headwaters. Monitoring would follow existing monitoring protocol and would be targeted to areas that are likely to receive higher levels of use.

- **Management Strategies.** Indirect management in the form of educational messaging and interpretation, such as Leave No Trace, is frequently applied to areas with hot springs features. Through a greater understanding of the vulnerability of hot springs to visitor use impacts, both intentional and unintentional, visitor use impacts can be minimized. Alternatively, direct management actions such as temporary or permanent closures of an area, redirecting trails and use away from hot springs, and increased enforcement may be implemented if necessary.

Presence of Wildlife and Fish—

- **Indicator.** The indicators for presence of wildlife and fish vary by river segment. All of the indicators relate to assessment of wildlife and fish presence and occupancy within the different river segments. Critically important species such as grizzly and black bears, wolves, cougars, moose, bison, elk, deer, pronghorn, bighorn sheep, ospreys, and Yellowstone and Snake River fine-spotted cutthroat trout are found within the headwaters of the Snake River. Several of these species, such as the Snake River fine-spotted cutthroat trout or the peregrine falcon, provide opportunities to monitor their presence as indicators. See table 7 for segment-specific indicators related to fish and nesting birds.

- **Standard:** Standards pertaining to wildlife presence and occupancy vary depending on the river segment, target species, and alternative. For example, within the scenic segment of Buffalo Fork, presence or absence of invasive species signifies the standard. Within the scenic segment of the Snake River, the standard is set at maintaining a 10-year average or greater population of the Snake River fine-spotted cutthroat trout. All standards are designed to minimize visitor disturbance to wildlife populations. Monitoring efforts for these indicators and standards also vary by species and river segment, but all require scheduled sampling. For example, within the scenic segment of the Snake River, monitoring

population levels of Snake River fine-spotted cutthroat trout requires four sampling efforts to determine a 10-year average.

- **Management Strategies.** Management strategies include visitor education such as Leave No Trace, to discourage visitors from having intentional or unintentional contact with wildlife. This includes education to discourage visitors from approaching, harassing, or feeding wildlife. Other strategies may include occasional closures to sensitive habitat locations, relocations of visitor use activities, reduction of use levels in sensitive habitat areas, and enforcement of appropriate fishing licensing, as well as size and catch limit requirements for anglers.

Crowding.

- **Indicator.** The indicators of crowding vary depending on river segment and alternative, but generally address the number of encounters with other boats on the river, and wait times to put-in or take-out at launch sites. Crowding is one of the most frequently studied topics related to visitor use (Manning 1999) and has been evaluated extensively to better understand user capacity. Crowding is defined as "the negative and subjective evaluation of a use level" (Manning 1999). Crowding may occur when use levels increase to the point where it interferes with a visitor's chosen activities and intentions (Manning 2010).

  Standards. Standards for these indicators vary by river segment and alternative, but require that visitors should experience no more than 5 to 15 group encounters for 80% to 90% of the sampled time, and no more than 10% to 20% of visitor groups would wait more than 30 to 45 minutes at put-in or take-out locations. Monitoring efforts for these crowding-related indicators vary by river segment and alternative, but all require scheduled sampling of visitor perceptions and observation of use levels within the river corridor.

- **Management Strategies.** Management efforts could include informing visitors about times of peak use in hopes of redistributing use to off-peak times. In addition, if crowding becomes a significant concern, management strategies may include regulating use levels through permitting and/or modifying infrastructure like boat launches, parking facilities, and trail segments to better distribute use and reduce incidences of crowding and conflict.

Monitoring Guidelines

The following guidelines have been developed for each of the river values identified for the Snake River Headwaters. These monitoring guidelines are intended to help park managers monitor the free-flowing condition, water quality, and outstandingly remarkable values of the designated rivers. The following tables include general monitoring guidelines. For specific guidelines related to the kinds and amounts of visitor use, see table 7.

Monitoring Guidelines for Free-flowing Condition
Key aspects
The Snake River Headwaters is a high quality snowmelt-dominated watershed. The headwaters contain diverse, abundant native species and natural communities; extensive, intact, and interconnected habitats; high water quality; and natural unconfined channel morphology.
Goal
Promote the natural hydrological processes of the rivers, channel form and function, and ability to shape the landscape. Reduce impediments to free-flowing conditions.
Rationale for adopting monitoring protocols
▪ Ongoing monitoring provides opportunities to study the influence of hydrological changes on the natural features, systems, and processes of the Snake River Headwaters.
Past and ongoing monitoring strategies
▪ The Bureau of Reclamation cooperatively works with the National Park Service to provide spring-release flushing flows in May/June and monitors release flows year-round. ▪ Monitoring efforts indicate that tributaries below the dam mitigate the dam's effects related to the hydrology and geomorphology of the Snake River. ▪ Any new modifications (such as boat ramps, streambank stabilization, bridges, or culverts) can only be approved if they would not adversely affect the river system's free-flowing condition.
Future monitoring objectives
▪ The National Park Service and U.S. Fish and Wildlife Service would cooperatively develop an in-stream flow monitoring program with partner agencies to determine necessary minimum flows. ▪ Annual field observations would be performed by personnel. ▪ The National Park Service and U.S. Fish and Wildlife Service would continue and possibly enhance the current ongoing monitoring programs in place by park staff and partners.

[Note: For specific guidelines related to the kinds and amounts of visitor use, see table 7.]

Monitoring Guidelines for Water Quality
Key aspects
All the rivers and streams within the Snake River Headwaters have been designated by the U.S. Environmental Protection Agency and the State of Wyoming as outstanding natural resource waters, where no water quality degradation is allowed.
Goal
Ensure the maintenance of water quality at the highest possible level.
Rationale for adopting monitoring protocols
▪ Natural geologic and geothermal forces, as well as artificial changes in streamflow due to Jackson Lake Dam, can affect the water quality of the Snake River Headwaters. These and other natural and human influences can cause changes in temperature, dissolved oxygen, and other water quality characteristics. ▪ These variables are appropriate to monitor water quality because their levels can be tied to human activities and human contact with water. ▪ Ongoing monitoring provides opportunities to study these influences on the natural features, systems, and processes of the Snake River Headwaters.
Past and ongoing monitoring strategies
▪ Yellowstone National Park began geothermal monitoring in the mid-1980s. This program yielded long-term baseline water quality data. ▪ There has been an ongoing water quality monitoring effort by the National Water Quality Assessment Program. This program monitors phosphorus levels, total nitrates, turbidity, summer water temperatures, and contaminants. ▪ Greater Yellowstone Coordinating Committee Inventory and Monitoring Program began monitoring water chemistry, dissolved oxygen, specific conductivity, pH, temperature, and phosphorus content in 2006. Data indicate that water quality remains excellent and continues to meet or exceed EPA and state standards. ▪ Project driven research studies monitoring pesticides and *E. coli* have been performed.
Future monitoring objectives
▪ While stream health and water quality currently meet desired conditions and do not appear to be at future risk, if baseline monitoring indicates otherwise, or ocular indicators show possible stream health or water quality issues may be occurring, a stream health assessment would be conducted. ▪ In addition to monitoring direct water quality attributes (e.g., dissolved nutrients, temperature, pH, bacteria, etc.), monitoring indirect indicators of water quality, such as health of aquatic invertebrate populations, would be considered. ▪ Annual field observations would be performed by park personnel. ▪ The National Park Service and U.S. Fish and Wildlife would continue and possibly enhance the current ongoing monitoring programs in place by staff and partners.

[Note: For specific guidelines related to the kinds and amounts of visitor use, see table 7.]

Monitoring Guidelines for Scenic Values
Key aspects
The Snake River Headwaters flows through an iconic landscape whose elements combine to offer a landscape character that is unique and unforgettable on a scale that draws visitors from all over the world.
Goal
Allow scenery to continue to be shaped by natural processes. Allow identified vista points and viewsheds to be enhanced in a manner that is protective of ecological conditions and cultural values.
Rationale for adopting monitoring protocols
▪ Periodic monitoring of scenic vistas and viewsheds would ensure that their quality remains outstanding, while also protecting ecological and cultural values. ▪ Provide a diversity of appropriate uses for visitors to experience and have a direct connection to the river and its unique scenic value.
Past and ongoing monitoring strategies
▪ Periodic visitor surveys are distributed to compile visitor experience as related to scenic values. ▪ Project-related analyses related to scenery, including photos, aerial photography, visibility data, and air quality monitoring, are undertaken as needed.
Future monitoring objectives
▪ Individual projects would be analyzed on a case-by-case basis to ensure protection of outstandingly remarkable scenic values while also protecting ecological and cultural values and allowing natural processes to occur (e.g., floods, wildfire, geologic processes). ▪ Visual surveys, noting visual anomalies and recommended corrections, would be performed at key vista points within the river corridor. ▪ Float surveys would be performed periodically to monitor for visual intrusions as seen from the river corridors. ▪ Long-term scenic integrity monitoring would be conducted through use of photo points at key areas within the corridor. Photos would be updated and reviewed as necessary. ▪ The National Park Service would continue and possibly enhance the current ongoing monitoring programs in place by park staff and partners.

[Note: For specific guidelines related to the kinds and amounts of visitor use, see table 7.]

Monitoring Guidelines for Recreational Values
Key aspects
The Snake River Headwaters offers world-class recreational opportunities in a largely pristine ecosystem. Activities such as boating, fishing, hiking, wildlife viewing, photography, and camping provide a connection to the natural landscape for a broad variety of users.
Goal
Provide high quality, resource-related visitor opportunities while protecting and enhancing river values now and into the future.
Rationale for adopting monitoring protocols
▪ Monitoring types and levels of visitor use would ensure that the recreational value of the rivers remains outstandingly remarkable. ▪ Provide a diversity of appropriate uses for visitors to experience and have a direct connection to the river and its unique recreational value.
Past and ongoing monitoring strategies
▪ Visitation data are monitored through various methods, such as visitor survey cards, transportation, river use, boat and backcountry permits, concessioner data, angling, and pack animal use permits.
Future monitoring objectives
▪ Many aspects of river use including concessioner operations, private use, shoreline fishing, and hiking would be monitored to ensure that the desired future conditions are achieved and the standards thresholds are not exceeded. ▪ The overall recreation program would be reviewed periodically, and changes to the development level would be assessed during the planning process for changes at recreation sites. ▪ The park would use feedback from routine patrols and biological/wildlife monitoring programs to assure that recreational activities were not adversely affecting other outstandingly remarkable values. ▪ Condition surveys at developed recreation sites would be conducted as needed. ▪ The National Park Service would continue and possibly enhance the current ongoing monitoring programs in place by park staff and partners.

[Note: For specific guidelines related to the kinds and amounts of visitor use, see table 7.]

Monitoring Guidelines for Cultural Values
Key aspects
The continuum of human use along the Snake River Headwaters encompasses thousands of years of diverse people, cultures, and uses, and is reflected in archeological resources, historic structures, cultural landscapes, and ethnographic resources along the river corridors.
Goal
Protect and enhance cultural resources as important links to the human history of the river corridors, including historic structures, archeological resources, cultural landscapes, and ethnographic resources.
Rationale for adopting monitoring protocols
▪ Monitoring is a fundamental program management tool that provides the ability to determine how well the National Park Service is achieving its long-term management objectives. With rare exceptions, once a cultural resource has been damaged, its condition and integrity cannot be restored. The National Park Service tracks changes in the condition of historic structures, cultural landscapes, and archeological resources and records site-specific threats, disturbances, and recommended management actions to prevent future damage or degradation of condition. ▪ NPS *Management Policies 2006,* Chapter 6, Section 5.3.5.1 Archeological Resources, direct that archeological resources would be protected and preserved in place, and that if such resources must be disturbed, mitigation measures would be undertaken.
Past and ongoing monitoring strategies
▪ Cultural resource surveys are conducted for proposed development-related projects and activities. ▪ The condition of historic structures, cultural landscapes, and archeological resources is documented and ethnographic assessment reports are developed.
Future monitoring objectives
▪ The National Park Service and U.S. Fish and Wildlife Service would practice good resource stewardship with regard to cultural resources. Standards would be developed that would signal when cultural resources were sustaining a minimally acceptable level of negative impact and periodically monitor these resources. ▪ Ongoing consultations with culturally associated American Indian tribes and groups regarding traditional cultural practices would help identify and protect places important to these practices and potential threats to these places. ▪ Sensitive cultural sites would be monitored annually or at an increased frequency. ▪ The National Park Service and U.S. Fish and Wildlife Service would continue and possibly enhance the current ongoing monitoring programs in place by staff and partners.

[Note: For specific guidelines related to the kinds and amounts of visitor use, see table 7.]

Monitoring Guidelines for Ecological/Wildlife Values
Key aspects
The Snake River Headwaters occurs within the largest intact ecosystem in the contiguous United States. A full complement of native plant and wildlife species is exhibited, significant on a regional and national scale.
Goal
Protect and enhance the natural function of the rivers' riparian areas, wetlands, floodplains, and adjacent uplands, including native ecosystem processes and natural levels of diversity, complexity, and resiliency. Protect and enhance the native plant and wildlife species within the headwaters area.
Rationale for adopting monitoring protocols
▪ Ongoing monitoring related to impacts as they affect ecological and wildlife values would ensure that this value of the river remains outstanding and is not impaired. Ongoing research is also a central component to the development of restoration solutions to maintain native plant and wildlife communities and habitats. Monitoring would determine the efficacy of restoration efforts and provide guidance for future restoration projects.
Past and ongoing monitoring strategies
▪ Large mammals in general are monitored through annual counts and population trends. Specific monitoring efforts target beavers, swans, raptors, eagles, ospreys, and harlequin ducks. Amphibians are monitored by the Greater Yellowstone Coordinating Committee Inventory and Monitoring Program. ▪ Yellowstone National Park may have monitoring data on special thermophilic species. ▪ Cottonwoods, willows, rare plants, and invasive plant species are monitored regularly. Wetlands will continue to be mapped and delineated.
Future monitoring objectives
▪ The National Park Service and U.S. Fish and Wildlife Service would conduct regularly scheduled monitoring, assessment, and evaluation to determine if visitation is affecting natural resources. If so, actions would be taken to reduce or eliminate the impacts. ▪ Special monitoring for identified species of interest, surveying new areas for occupancy, and reporting new activity would be performed. Trends over time in occupancy would be monitored. ▪ Periodic monitoring of river access and other use areas would be conducted to determine if excessive trampling is occurring and social trails are forming. If this is the case, then measures such as formalizing trails, fencing, and revegetation efforts would be considered. The use of additional river corridor vegetation monitoring methods would be considered to assess ecological health (e.g., using multiple indicator monitoring protocols or greenline method) ▪ The National Park Service and U.S. Fish and Wildlife would continue and possibly enhance the current ongoing monitoring programs in place by staff and partners.

[Note: For specific guidelines related to the kinds and amounts of visitor use, see table 7.]

Monitoring Guidelines for Fish Values
Key aspects
The Snake River Headwaters provides a unique fishery for the Yellowstone and Snake River fine-spotted cutthroat trout, which are both nationally significant, in addition to a diverse community of other native aquatic species.
Goal
Continue to provide management to protect and enhance habitat for self-sustaining populations of native fish, with representation of juvenile, sub-adult, and adult age categories. Management would provide good habitat conditions consisting of spawning and incubation conditions, cover, and food supply. Protect fish population characteristics such as species, size, and age through appropriate fishing regulations.
Rationale for adopting monitoring protocols
▪ Fish habitat, population, and macroinvertebrate monitoring determines changes in fish and aquatic species variables and ensures that this river value remains outstandingly remarkable.
Past and ongoing monitoring strategies
▪ Annual cutthroat trout spawning surveys are conducted as well as trout population estimates primarily on the Snake River scenic segment, and some movement studies and presence/absence monitoring have been conducted. ▪ Creel surveys have been conducted, such as the 1995 Snake River creel survey produced by the Wyoming Game and Fish Department; these population estimates and creel surveys give some indication of influence visitor use levels and other factors have on fish populations. ▪ Yellowstone National Park conducts macroinvertebrate monitoring within the park.
Future monitoring objectives
▪ Creel surveys would continue to be periodically conducted in collaboration with partners. ▪ The National Park Service and U.S. Fish and Wildlife Service would continue and possibly enhance the current ongoing monitoring programs in place by staff and partners.

[Note: For specific guidelines related to the kinds and amounts of visitor use, see table 7.]

Monitoring Guidelines for Geologic Values
Key aspects
The Snake River Headwaters lies within a seismically and geomorphically active zone where dynamic geologic processes continue to shape the landscape.
Goal
Promote the natural geologic processes of the rivers. Reduce impediments to these processes by restricting obtrusive development and protecting geologic features from accelerated erosive activity or other damage resulting from land-based development, visitor use, and other factors.
Rationale for adopting monitoring protocols
▪ Geologic monitoring identifies changes in unique features such as geothermal springs, landslides, debris flows, and exposed geologic layering and ensures that this river value remains outstandingly remarkable.
Past and ongoing monitoring strategies
▪ Geologic maps of the area have been completed, detailing volcanic and seismic connections, and the geomorphology of the Snake River below Jackson Lake Dam. These studies evaluated the influences of Pacific Creek and Buffalo Fork on the geomorphology of the Snake River below the dam.
Future monitoring objectives
▪ Periodic field observations would be performed. ▪ Site inspections at permitted ground disturbing activities would be performed as needed. ▪ The National Park Service and U.S. Fish and Wildlife would continue and possibly enhance the current ongoing monitoring programs in place by park staff and partners.

[Note: For specific guidelines related to the kinds and amounts of visitor use, see table 7.]

MITIGATION MEASURES COMMON TO ALL ACTION ALTERNATIVES

Congress has charged the National Park Service with managing the lands under its stewardship "in such manner and by such means as will leave them unimpaired for the enjoyment of future generations" (NPS Organic Act, 16 USC 1). As a result, the National Park Service routinely evaluates and implements mitigation measures whenever conditions occur that could adversely affect the sustainability of national park system resources. To ensure the protection of resources on the National Elk Refuge, these mitigation measures would also be applied to avoid impacts within the Gros Ventre River scenic corridor.

To ensure that implementation of the final selected management alternative protects natural and cultural resources unimpaired for future generations and provides for a high quality visitor experience, a consistent set of mitigation measures would be applied to actions proposed in this Comprehensive River Management Plan / Environmental Assessment. The National Park Service and U.S. Fish and Wildlife Service would prepare appropriate environmental compliance reviews (i.e., those required by the National Environmental Policy Act; National Historic Preservation Act, sections 106 and 110; Archaeological Resources Protection Act; Endangered Species Act; and other relevant legislation) for future proposed actions. As part of the environmental review, the National Park Service and U.S. Fish and Wildlife Service would avoid, minimize, and mitigate adverse impacts. The parks and elk refuge could consider implementing a compliance monitoring program that would apply these mitigation measures and also include reporting protocols.

The following mitigation measures and best management practices would be applied to avoid or minimize potential adverse impacts from implementation of the comprehensive river management plan.

NATURAL RESOURCES

Water Resources

- Take measures to reduce erosion, sedimentation, compaction, and to control surface runoff and wastewater from parking lots and from ground-disturbing activities.

- Delineate wetlands and apply protection measures before any ground disturbance (e.g., construction). For example, wetlands would be delineated by qualified NPS staff or certified wetland specialists and clearly marked before construction work. Perform construction activities in a careful manner to prevent damage caused by equipment, erosion, siltation, etc.

- Implement measures to minimize disturbance areas at the banks of drainages. One example includes placing limits on ground-disturbing activities in the vicinity of wetlands and drainage banks and clearly delineating boundaries with temporary fencing (as defined by wildlife-friendly fence specifications). If development is performed, drainage banks would be returned to their natural contours.

- Take action to keep waters free of turbidity that cause a nuisance or adversely affect beneficial uses.

- Through consultation with the NPS regional wetland ecologist, determine if a wetlands statement of findings is needed for any future implementation project that could affect wetlands, and produce wetlands

statement of findings documents where necessary.

Soils

- Minimize soil erosion by limiting the time soil is left exposed and by applying other erosion control measures such as erosion matting, silt fencing, and sedimentation basins in construction areas to reduce erosion, surface scouring, and discharge to water bodies. Once work is completed, revegetate disturbed areas with native plants in a timely manner.

Vegetation (including special status plants)

- Monitor areas used by visitors (e.g., trails) for signs of native vegetation disturbance. Use public education, erosion control, and barriers to control potential impacts on plants from trail erosion or social trailing.

- Develop and implement revegetation plans for disturbed areas. Revegetation plans would specify native seed / plant source and mixes, soil preparation, etc. Salvage vegetation would be used to the extent possible.

- Implement measures to ensure construction equipment and machinery entering the park are free of nonnative plant and aquatic invasive species.

- Use an early detection and rapid response strategy to remove invasive species before populations establish themselves and impact native species.

Wildlife (including special status wildlife)

- Employ various techniques to reduce impacts on wildlife, including visitor education programs, restrictions on visitor activities, and park ranger patrols.

- Implement a natural resource protection program that includes such standard measures as
  - scheduling construction during seasons that are best for wildlife
  - monitoring for adverse impact
  - implementing practices to prevent and reduce erosion and sedimentation
  - installing and maintaining temporary fences or other barriers to protect sensitive resources adjacent to construction sites (as defined by wildlife-friendly fence specifications)
  - removing all food-related items to reduce or prevent bear intrusion
  - salvaging topsoil
  - replanting with native vegetation
  - monitoring periodically by resource management specialists or other park staff who would provide treatment and status reports

- Perform mitigation actions during normal park operations as well as before, during, and after construction to minimize immediate and long-term impacts on wildlife, including rare, threatened, and endangered species. These actions would vary depending on the type of project and its location. Many of the measures listed previously for vegetation and wildlife would also benefit rare, threatened,

and endangered species by helping to preserve habitat.

Air Quality

- Implement a dust abatement program. Standard dust abatement measures may include the following elements: water spraying or otherwise stabilizing soils, cover haul trucks, employ speed limits on unpaved roads, minimize vegetation clearing, and revegetate after construction.

CULTURAL RESOURCES

Archeological Resources

- If during construction previously undiscovered archeological resources are uncovered, all work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented and an appropriate mitigation strategy developed in consultation with the Wyoming State Historic Preservation Office and, as necessary, associated American Indian tribes. Archeological sites would be fenced off and marked by a NPS-approved archeologist. All project personnel would be briefed to stay out of areas with sensitive archeological resources.

Historic Properties

- In accordance with section 106 of the National Historic Preservation Act, the National Park Service would consult with the Wyoming State Historic Preservation Office and American Indian tribes traditionally associated with park lands regarding any future proposed action resulting from this plan. If adverse impacts on historic properties were unavoidable, strategies to mitigate such impacts would be developed through consultation with all interested parties.

- To appropriately preserve and protect national register-listed or -eligible historic structures, all stabilization, preservation, and rehabilitation efforts would be undertaken in accordance with NPS *Management Policies 2006*, Chapter 5: Cultural Resources, and following *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (NPS 1995).

- Design all new construction within historic districts and landscapes or adjacent to historic sites to be compatible in terms of architectural elements, scale, massing, materials, and orientation.

Ethnographic Resources

- If the tribes subsequently identify the presence of site-specific ethnographic resources, appropriate mitigation measures would be undertaken in consultation with the tribes. The location of ethnographic sites would not be made public. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered, provisions outlined in the Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001) would be followed.

Museum Collections

- The natural and cultural resources management activities discussed in the plan may result in specimens, artifacts, and resource management

records that will be permanently retained in the park museum collections. Responsible management requires that these collections be documented (accessioned and cataloged) and preserved and that they be available for future access and use.

VISITOR USE AND EXPERIENCE

Access/Activities/Opportunities

- Every reasonable effort would be made to make the facilities, programs, and services of the National Park Service and its partners accessible to and usable by all people, including those who are disabled. This policy is based on the commitment to provide access to the widest cross-section of the public and to ensure compliance with the intent of the Architectural Barriers Act (42 USC 4151 et seq.) and the Rehabilitation Act (29 USC 701 et seq.).

Quality of Visitor Experience and Safety

- Implement measures to reduce adverse effects of construction on visitor experience and safety. Measures may include, but are not limited to, noise abatement, visual screening, and directional signs to help visitors avoid construction activities.

- Continue to collect and use visitation data and other information to identify user conflicts.

- Communicate with landowners about concerns related to public use within the river corridors.

- Implement an interpretation and education program to promote understanding among visitors.

- Improve directional signs and waysides at launch sites, overlooks, and historic sites.

Soundscapes

- Apply mitigation measures to protect the natural sounds of the national park. Implement standard noise abatement measures during construction and for traffic. Standard noise abatement measures may include the following elements: a schedule that minimizes impacts on adjacent noise-sensitive uses, the use of best available noise control techniques wherever feasible, the use of hydraulically or electrically powered impact tools when feasible, and the placement of stationary noise sources as far from sensitive uses as possible.

- Consider the impact of all administrative actions, such as planning, maintenance, resource management, interpretation, and ranger activities, on natural soundscapes. Incorporate noise mitigation into these administrative actions.

- Implement educational and outreach programs concerning natural soundscapes. Create brochures, interpretive signs, and programs to instill a culture of awareness of and respect for the value of natural soundscapes. Educate visitors and park staff about the growing impact of loud vehicles, motors, and other unnecessary noise disturbances.

Visual Resources

- Fence off and consolidate construction areas and equipment to visually screen construction activity and materials when possible.

- Site and design trails to route people away from sensitive natural and cultural resources while still allowing access to important viewpoints. Use vegetation screening when appropriate.

- Subject viewshed-related projects to site-specific planning and compliance. Avoid adverse impacts through use of *The Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation* to preserve historic scenic views and landscapes where scenic resources are an integral component of the cultural landscape (see cultural resource mitigation measures above). If adverse impacts could not be avoided, mitigate these impacts through a consultation process with all interested parties.

SUSTAINABLE DEVELOPMENT

- Projects would avoid or minimize adverse impacts on natural and cultural resources. Development projects (e.g., buildings, facilities, utilities, roads, bridges, trails, etc.) or reconstruction projects (e.g., road reconstruction, building rehabilitation, utility upgrade, etc.) would be designed to work in harmony with the surroundings. Projects would reduce, minimize, or eliminate air and water nonpoint source pollution. Projects would be sustainable whenever practicable, by recycling and reusing materials, minimizing materials, minimizing energy consumption during the project, and minimizing energy consumption throughout the life span of the project.

- Implement compliance monitoring to ensure that the project remains within the parameters of NEPA and NHPA compliance documents. The National Park Service would apply for and comply with all federal and state permits required for construction-related activities, including the U.S. Army Corps of Engineers.

- Develop and implement a comprehensive spill prevention and pollution control program that complies with federal and state regulations and addresses all aspects of spill prevention, notification, emergency spill response strategies for spills occurring on land and water, reporting requirements, monitoring requirements, personnel responsibilities, response equipment type and location, and drills and training requirements.

Comply with all applicable regulations and policies during the removal and remediation of asbestos, lead paint, and polychlorinated biphenyls, as applicable.

HEALTH AND SAFETY

Develop an emergency notification plan that complies with park, federal, and state requirements and allows contractors to properly notify park, federal, and/or state personnel in the event of an emergency during construction activities. This plan would address notification requirements related to fire, personnel, and/or visitor injury, releases of spilled material, evacuation processes, etc. The emergency notification plan would be submitted to the park for review/approval prior to commencement of construction activities.

STAFFING AND COST ESTIMATES

NPS decision makers and the public must consider a comprehensive picture of the costs and advantages of various alternatives, including the no-action alternative, to make wise planning and management decisions for the newly designated wild and scenic rivers. Such consideration can provide accurate estimates of the cost of the no-action alternative and make possible a more relevant comparison to the action alternatives.

The figures presented below are estimates for comparison purposes only and are not to be used for budgetary purposes or implementation funding requests. If and when the actions are implemented, actual costs may vary.

Presentation of costs in this plan does not guarantee future NPS funding. Project funding would not come all at once and it may take years to secure. Although Grand Teton and Yellowstone national parks and the National Elk Refuge hope to secure this funding and would prepare accordingly, the parks may not receive enough funding to achieve all desired conditions within the time frame of the comprehensive river management plan (approximately the next 20 years).

The estimates provided in this section include staffing levels, annual operating costs, one-time nonfacility costs, one-time facility costs, and other costs. A definition of each of these types of costs follows:

- ***Staffing*** is the total number of person-years of staff required to manage the wild and scenic rivers at an acceptable level, provide visitor services, and protect resources. The full-time equivalent (FTE) number indicates NPS staffing levels, not volunteer positions or positions funded by partners. FTE salaries and benefits are included in annual operating costs.
- ***Annual operating costs*** are the total costs per year for maintenance and operations associated with each alternative, including monitoring equipment and supplies, staff salaries and benefits, and other materials. Cost and staffing estimates assume that the alternative is fully implemented as described.
- ***One-time nonfacility costs*** include the development of nonfacility-related programs, such as development of interpretive media, which would require initial funding above annual operating costs.
- ***One-time facility costs*** include those for the design, construction, rehabilitation, and improvements of developed areas (e.g., boat launches, picnic areas, trailheads, parking areas, and waysides).
- ***Other costs*** are identified separately for projects that are wholly or partially funded from other sources.

Staffing and annual operating cost estimates for the action alternatives are calculated by taking staffing and annual operating costs under the no-action alternative and adding any additional costs associated with the proposed alternatives. Table 3 provides staffing and cost estimates to fully implement the three alternatives for Grand Teton and Yellowstone national parks. No increase in staffing levels or operating costs to implement the action alternatives is anticipated for the National Elk Refuge.

TABLE 3. STAFFING AND COST ESTIMATES FOR FULL IMPLEMENTATION OF THE ALTERNATIVES

	Alternative A No Action	Alternative B	Alternative C Preferred
Staffing Levels (FTEs)	18.75	18.75	18.75
Annual Operating Costs	$1,295,000	$1,419,000	$1,423,000
One-time Nonfacility Costs	$0	$41,000	$101,000
One-time Facility Costs	$0	$1,177,000	$1,131,000
Other Costs	$0	$0	$68,000

TABLE 4. ALTERNATIVE STAFFING LEVELS BY PARK AND DIVISION

Staffing (FTEs)	No Action		Alternatives B and C	
	Grand Teton NP	Yellowstone NP	Grand Teton NP	Yellowstone NP
Law Enforcement	5.0	0.5	5.0	0.5
Maintenance/Engineering	3.0	0.5	3.0	0.5
Interpretation	0.5	0.25	0.5	0.25
Concessions	0.5	0.25	0.5	0.25
Planning and Compliance	1.0	0.25	1.0	0.25
Resource Management and Monitoring	5.5	1.5	5.5	1.5
Subtotal	**15.5**	**3.25**	**15.5**	**3.25**
Grand Total	**18.75**		**18.75**	

Staffing Levels

Alternatives B and C propose no increase in FTE levels compared to the no-action alternative. The full-time equivalents presented in the table below are a portion of the total staff needed to manage the wild and scenic river, by division, for each park.

Although alternatives B and C propose a more comprehensive approach to wild and scenic river management, this does not require additional staff to implement these new management strategies. It is not about doing substantially more; it is about doing it differently—in a more proactive way that is in accordance with the requirements of the Wild and Scenic Rivers Act. Table 4 shows FTE levels by division for Grand Teton and Yellowstone national parks.

Annual Operating Costs

The majority of annual operating costs presented in table 4 are to cover salary and benefits for the corresponding number of full-time equivalents by alternative. The remaining amount is needed to cover equipment and supplies for monitoring and maintenance activities. The annual operating costs associated with alternatives B and C are slightly higher than alternative A due to the comprehensive nature of the proposed monitoring framework.

One-time Nonfacility Costs

Under alternatives B and C, the one-time nonfacility costs are associated with developing new interpretive media for the wild and scenic rivers such as waysides at select sites, brochures, and podcasts.

One-time Facility Costs

Under alternatives B and C, the one-time facility costs are primarily associated with corrective maintenance and improvements to nine access points along the Snake River and minor improvements along Buffalo Fork, Pacific Creek, and the Gros Ventre River tributaries in Grand Teton National Park. The slight difference in total one-time facility costs between the two alternatives is due to the different site-planning proposals described in "Chapter 2: Development of the Alternatives." The overall facility costs of alternative C are slightly lower than alternative B because of the more modest nature of the proposed improvements. Please note that a majority of the river access improvements would be completed "in-house" by the facility maintenance division at Grand Teton National Park, resulting in reduced overall costs.

Other Costs

Other costs include cost sharing to bury overhead utility lines along Buffalo Fork in Grand Teton National Park (under alternative C). The National Park Service would likely need to pursue other funding sources for this project.

River Segments

RIVER SEGMENT MANAGEMENT STRATEGIES

The second tier of the planning effort includes management strategies for each of the seven designated wild and scenic river segments. These strategies vary by kinds and amounts of recreation use and types and levels of development for each of the three alternatives (A, B, and C).

KINDS OF USE

The kinds of visitor use that can be accommodated in the Snake River corridor are expressed in terms of overnight and day use where applicable and organized by river segment.

- **Overnight use.** This category includes people who stay in a campsite, cabin, hotel or lodge within or near the corridors of the Snake River Headwaters. Many of the hotels and lodges are outside established corridor boundaries. Only the level of overnight use that actually occurs in the river corridors is included in these values.
- **Day use.** This category includes visitors who come to the Snake River Headwaters for the day to pursue recreational, cultural, or educational activities, but leave the corridors before night. Much of this use is concentrated within the designated scenic segment of the Snake River, though day users also access the other designated wild and scenic river segments. This category includes individuals participating in recreational activities like a 4-hour floating or rafting trip on the scenic segment of the Snake River or walk-in fishing for the day on the scenic segment of Pacific Creek. Specific day use activities vary across river segments and the kinds of use are consistent with the protection of river values for each river segment. Visitors who pass through designated river segments on main park roads are not included in the user capacity determinations because these visitors do not directly access the rivers or participate in direct river-related recreation.

AMOUNT OF USE

The alternatives also propose maximum amounts of use each river segment can accommodate without adverse impacts on the outstandingly remarkable values given the objectives, management strategies, and indicators and standards proposed in each alternative. Amounts of visitor use are expressed in different ways depending on the nature of use in a particular river segment. For some segments, group size limits have been introduced as management strategies; group size refers to the number of people per group. Additionally, there is a sliding scale of analysis applied to estimating maximum use levels. In higher use segments where visitor use levels may be of concern to river values and visitor experience, there is a greater level of detail and related data provided. In lower use segments where use levels are not of concern for river values, the amounts of current and expected use are addressed in more qualitative terms. In all cases, estimates are based on scientific data and information along with best professional judgment.

Visitor use management indictors, kinds and amounts of recreation use, and types and levels of development are presented by alternative for each river segment, from north to south:

- Lewis River (wild segment)
- Lewis River (scenic segment)

- Snake River (wild segment)
- Snake River (scenic segment)
- Pacific Creek (scenic segment)
- Buffalo Fork (scenic segment)
- Gros Ventre River (scenic segment)

LEWIS RIVER (WILD SEGMENT, YELLOWSTONE NATIONAL PARK)

Visitor Use Management Indicators

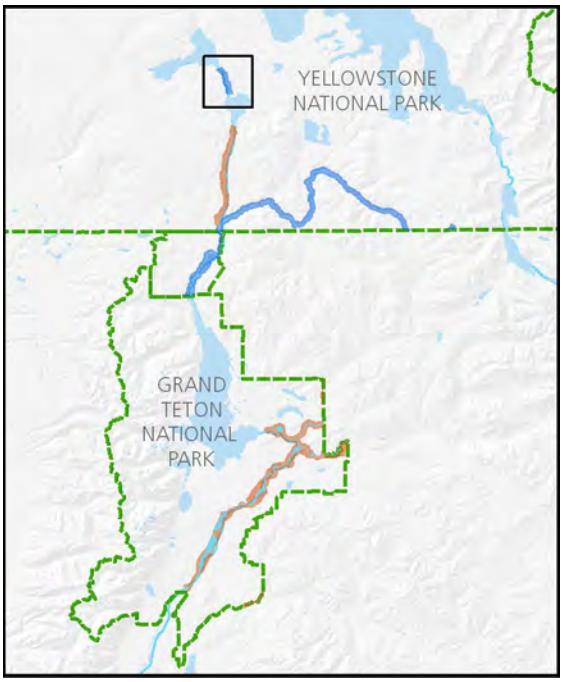
Indicators of quality for this segment include water quality, presence or expansion of aquatic invasive species and invasive plant species, extent of social trails, extent of vegetation loss at attraction sites, occupancy of sensitive bird species and nests, the number of encounters with other boats on the river.

Alternative A (No Action)

Kinds and Amount of Recreation Use. Under alternative A, no formal indicators are monitored and no formal standards exist except for water quality. Water quality features like dissolved nutrients, temperature, pH, and conductivity, as well as contaminants such as fecal coliform would continue to be monitored within this segment. The standard for water quality within this segment allows for no more than a 1% change in mean levels of constituents.

Currently, visitor use levels are low in this segment. Types of use include angling, hiking, boating, and camping. Typical peak use for this segment is 1,300 people per year with an average of 800 boaters and 319 anglers. There are 21 campsites with 164 people per night permitted. The permitting system would continue to help manage overnight use levels, but there would be no capacity levels set for day use.

Types and Levels of Development. As befits its wild classification, there are few



existing developments in this river corridor. Under alternative A, existing backcountry trails would continue to be maintained, and no new developments would be proposed.

Alternative B

Kinds and Amount of Recreation Use. Under alternative B, the kinds of direct river-related visitor use would be similar to alternative A, with the addition of interpretive messaging related to river values and the Wild and Scenic Rivers Act. Types of use include angling, hiking, boating, and camping. Typical peak use for this segment is 1,300 people per year with an average of 800 boaters and 319 anglers. There 21 campsites with 164 people per night permitted. Under this alternative, maximum use would be set at the current peak use levels described above. NPS staff would implement a visitor use management and monitoring program to maintain a quality visitor experience, to protect and enhance river values, and to address user capacity. Indicators would be monitored, and management strategies would be adjusted as needed to ensure that

conditions remain within established standards over time.

This alternative would allow no more than a 1% change in mean levels of constituents for water quality features and contaminants. No new aquatic invasive species or invasive plant species, or expansion of current invasive species would be acceptable. No more than a 5% increase in social trails and no more than 2% vegetation loss would be acceptable at attraction locations. The identification of targeted bird species nest sites would continue to be monitored within this segment and inform establishment of indicators and standards for sensitive species once data is determined to be sufficient. No more than five group encounters for 80% of the sampled time would be acceptable. Under this alternative, wild and scenic river interpretive information would be expanded to increase visitor understanding about river values and to encourage behavior that aligns with the preservation of outstandingly remarkable values within this river segment.

Types and Levels of Development. Under alternative B, existing backcountry trails would be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. No new developments would be proposed.

Alternative C (Preferred)

Kinds and Amount of Recreation Use. Under alternative C, the kinds of direct river-related visitor use would be similar to alternative A, with the addition of interpretive messaging related to river values and the Wild and Scenic Rivers Act. Types of use include angling, hiking, boating, and camping. Typical peak use for this segment is 1,300 people per year with an average of 800 boaters and 319 anglers. There 21 campsites with 164 people per night permitted. Under this alternative, maximum use would be set at the current peak use levels described above. NPS staff would implement a visitor use management and monitoring program to maintain a quality visitor experience, to protect and enhance river values, and to deal with and address user capacity. Indicators would be monitored, and management strategies would be adjusted as needed to ensure that conditions remain within established standards over time.

This alternative would allow no more than a 1% change in mean levels of constituents for water quality features and contaminants. No new aquatic invasive species or invasive plant species, or expansion of current invasive species would be acceptable. No more than a 5% increase in social trails, and no more than 2% vegetation loss would be acceptable at attraction locations. The identification of targeted bird species nest sites would continue to be monitored within this segment and inform establishment of indicators and standards for sensitive species once data is determined to be sufficient. No more than five group encounters for 80% of the sampled time would be acceptable. Under this alternative, wild and scenic river interpretive information would be improved and expanded to increase visitor understanding about river values and to encourage behavior that aligns with the preservation of outstandingly remarkable values within this river segment.

Types and Levels of Development. Under alternative C, existing backcountry trails would be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. No new developments would be proposed.

LEWIS RIVER (SCENIC SEGMENT, YELLOWSTONE NATIONAL PARK)

Visitor Use Management Indicators

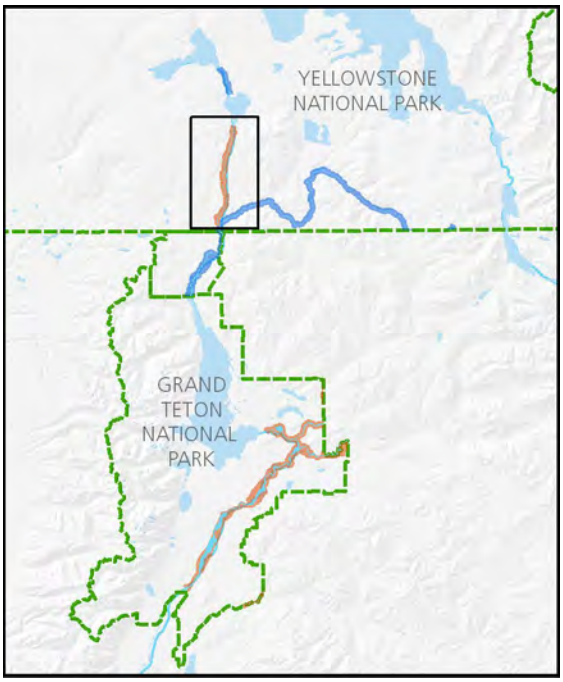
Indicators of quality for the scenic segment of the Lewis River include water quality, presence or expansion of aquatic invasive species and invasive plant species, extent of social trails, extent of vegetation loss at attraction sites, and occupancy of sensitive bird species and nests.

Alternative A (No Action)

Kinds and Amount of Recreation Use. Under alternative A, scenic driving is the predominant kind of visitor activity in this segment. An average of 240,451 vehicles travel along South Entrance Road each year. Due to the proximity of the park road along the canyon rim, the turnouts and overlooks do not provide direct access to the river. Therefore, the vast majority of these visitors are simply passing along the river corridor and do not stop for direct river-related recreation. Some fishing occurs along this segment with a maximum reported use of 138 anglers in 2003. Due to the transient nature and low levels of visitor use along the river, impacts on river values related to these activities are minimal.

No formal indicators or standards exist, except for water quality. Water quality features like dissolved nutrients, temperature, pH, and conductivity, as well as contaminants such as fecal coliform would continue to be monitored within this segment. The standard for water quality within this segment allows for no more than a 1% change in mean levels of constituents.

Types and Levels of Development. Existing transportation development along the canyon rim in this river corridor includes roads, bridges, and turnouts. Other visitor amenities include the nearby Pitchstone Plateau trailhead. Under alternative A, all existing developments would continue to be maintained. No new developments would be proposed.



Alternative B

Kinds and Amount of Recreation Use. Under alternative B, the types of direct river-related visitor use would remain similar to what occurs today with the improvement of information related to hiking opportunities in the area (most of which occur outside of the river corridor).

Currently, direct river-related visitor use levels are low in this segment. Under alternative B, maximum use levels for fishing would be set at 159 anglers per year, 15% higher than typical current peak use levels. Under this alternative, NPS staff would implement a visitor use management and monitoring program to maintain quality visitor experience, to protect and enhance river values, and to deal with and address user capacity. Indicators would be monitored, and management strategies would be adjusted as needed to ensure that

conditions remain within established standards over time.

This alternative would allow no more than a 1% change in mean levels of constituents for water quality features and contaminants. No new aquatic invasive species or invasive plant species or expansion of current invasive species would be acceptable. No more than a 5% increase in social trails, and no more than 5% vegetation loss would be acceptable at attraction locations. The identification of targeted bird species nest sites would continue to be monitored within this segment and inform establishment of indicators and standards for sensitive species once data is determined to be sufficient. Interpretive messaging would be improved to increase visitor understanding of river values and to encourage behavior that aligns with the preservation of outstandingly remarkable values within this river segment.

Types and Levels of Development. Under alternative B, existing developments would be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. Possible expansion of roadside turnouts that provide opportunities for visitors to overlook the Lewis River Canyon could be considered during the next major road reconstruction project to reduce traffic congestion and increase visitor safety. No new developments would be proposed.

Alternative C (Preferred)

Kinds and Amount of Recreation Use. Under alternative C, the current kinds and amounts of direct river-related visitor use opportunities available in this segment would remain. Some fishing occurs along this segment with a maximum reported use of 138 anglers in 2003. Under alternative C, maximum use for angling would be set at the current peak use level described above. Under alternative C, as in all action alternatives, NPS staff would implement a visitor use management and monitoring program to maintain quality visitor experience, protect and enhance river values, and deal with and address user capacity. Indicators would be monitored, and management strategies would be adjusted as needed to ensure that conditions remain within established standards over time.

Alternative C would allow no more than a 1% change in mean levels of constituents for water quality features and contaminants. No new aquatic invasive species or invasive plant species or expansion of current invasive species would be acceptable. No more than a 5% increase in social trails and no more than 5% vegetation loss would be acceptable at attraction locations. The identification of targeted bird species nest sites would continue to be monitored within this segment and inform establishment of indicators and standards for sensitive species once data is determined to be sufficient. Interpretive messaging would be improved to increase visitor understanding about river values and to encourage behavior that aligns with the preservation of the outstandingly remarkable values within this river segment.

Types and Levels of Development. Under alternative C, existing developments would be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. Roadside turnouts that provide opportunities for visitors to overlook the Lewis River Canyon would be considered for expansion during the next major road reconstruction project, to reduce traffic congestion and increase visitor safety. No new developments would be proposed.

SNAKE RIVER (WILD SEGMENT, YELLOWSTONE NATIONAL PARK)

Visitor Use Management Indicators

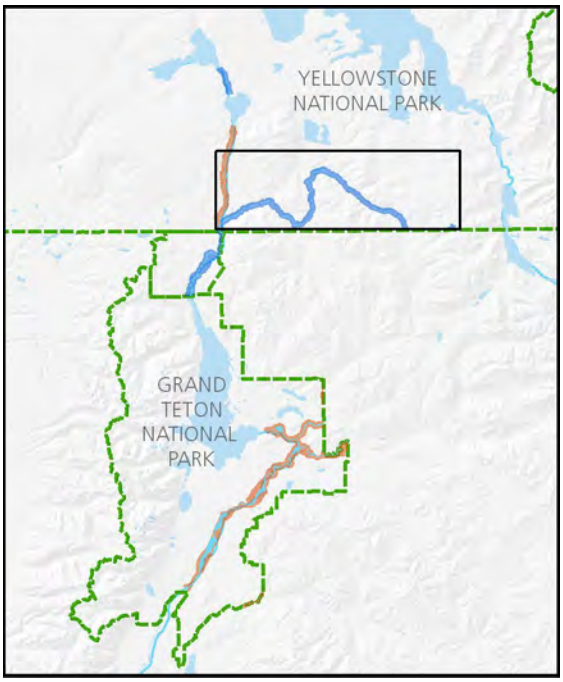
Indicators of quality for this segment include water quality and presence or expansion of aquatic invasive species and invasive plant species, extent of social trails, extent of vegetation loss at attraction sites, occupancy of sensitive bird species and nests, and the level and extent of visitor-modified hot spring features.

Alternative A (No Action)

Kinds and Amount of Recreation Use. Under alternative A, a variety of backcountry oriented activities are available in this segment. The kinds of visitor use activities include camping, hiking, horseback riding, and fishing. Backcountry camping is restricted to designated sites. There is a maximum of 84 people per night for backcountry camping and a maximum of 106 head of livestock (pack animals). Hiking and fishing uses are not limited and are relatively low in this segment. Fishing regulations apply.

No formal indicators and standards exist, except for water quality. Water quality features like dissolved nutrients, temperature, pH, and conductivity, as well as contaminants such as fecal coliform would continue to be monitored within this segment. The standard for water quality within this segment allows for no more than a 1% change in mean levels of constituents below baseline level.

Types and Levels of Development. The wild segment of the Snake River in Yellowstone National Park primarily includes backcountry trails and campsites. Downstream from the Lewis River confluence, frontcountry developments include the south entrance station, ranger station, picnic area, employee residences, and a horse corral. Under alternative A, all existing developments would continue to be maintained, and no new developments would be proposed.



Alternative B

Kinds and Amount of Recreation Use. Under alternative B, the maximum amount of overnight visitor use in this portion of the river segment would remain the same as under alternative A (84 people and 106 head of livestock [pack animals] per night). The range of direct river-related visitor use including camping, hiking, horseback riding, and fishing would remain the same as alternative A. Fishing regulations would continue to apply. Some improvements to enhance visitor experience would be implemented, including expansion of opportunities for interpretive information pertaining to appropriate behavior near hot springs features and related to river values and the Wild and Scenic Rivers Act. Under alternative B, as in all action alternatives, NPS staff would implement a visitor use management and monitoring program to maintain a quality visitor experience, protect and enhance river values, and address user capacity. Indicators would be monitored, and

management strategies would be adjusted as needed to ensure that conditions remain within established standards over time.

This alternative would allow no more than a 1% change in mean levels of constituents for water quality features and contaminants. No new aquatic invasive species or invasive plant species, or expansion of current invasive species would be acceptable. Within this segment, there would be no more than a 2% increase in social trails, and no more than 2% vegetation loss at attraction locations. The identification of targeted bird species nest sites would continue to be monitored within this segment and inform establishment of indicators and standards for sensitive species once data is determined to be sufficient. No incidence of human-modified hot springs features would be acceptable under this alternative. Interpretive messaging would be improved to increase visitor understanding about river values and to encourage behavior that aligns with the preservation of the outstandingly remarkable values within this river segment.

Types and Levels of Development. Under alternative B, existing developments would be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. Where existing developments are not consistent with the wild classification of this river segment, consider redesigning, relocating, or removing facilities to be more consistent with the river's classification over time. Under this alternative, no new developments would be proposed.

Alternative C (Preferred)

Kinds and Amount of Recreation Use. Under alternative C, the maximum amounts of overnight visitor use in this portion of the river segment would remain the same as under alternative A (84 people and 106 head of livestock [pack animals] per night). The range of direct river-related visitor use, including camping, hiking, horseback riding, and fishing, would remain the same as alternative A. Fishing regulations would continue to apply. Backcountry camping would continue to be restricted to designated sites. Some improve-ments to enhance the visitor experience would be implemented, including expansion of opportunities for interpretive information pertaining to appropriate behavior near hot springs features and related to river values and the Wild and Scenic Rivers Act. Under alternative C, as in all action alternatives, NPS staff would implement a visitor use management and monitoring program to maintain quality visitor experience, to protect and enhance river values, and to deal with and address user capacity. Indicators would be monitored, and management strategies would be adjusted as needed to ensure that conditions remain within established standards over time.

This alternative would allow no more than a 1% change in mean levels of constituents below baseline level for water quality features and contaminants. No new aquatic invasive species or invasive plant species, or expansion of current invasive species would be acceptable. Within this segment, there should be no more than a 2% increase in social trails, and no more than 2% vegetation loss at attraction locations. The identification of targeted bird species nest sites would continue to be monitored within this segment and inform establishment of indicators and standards for sensitive species once data is determined to be sufficient. No incidence of human-modified hot springs features would be acceptable under this alternative. Interpretive messaging would be improved to increase visitor understanding about river values and to encourage behavior that aligns with the preservation of outstandingly remarkable values within this river segment.

Types and Levels of Development. Under alternative C, existing developments would be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. Where existing developments are not consistent with the wild classification of this river segment, consider redesigning,

relocating, or removing facilities to be more consistent with the river's classification over time. Under this alternative, no new developments would be proposed.

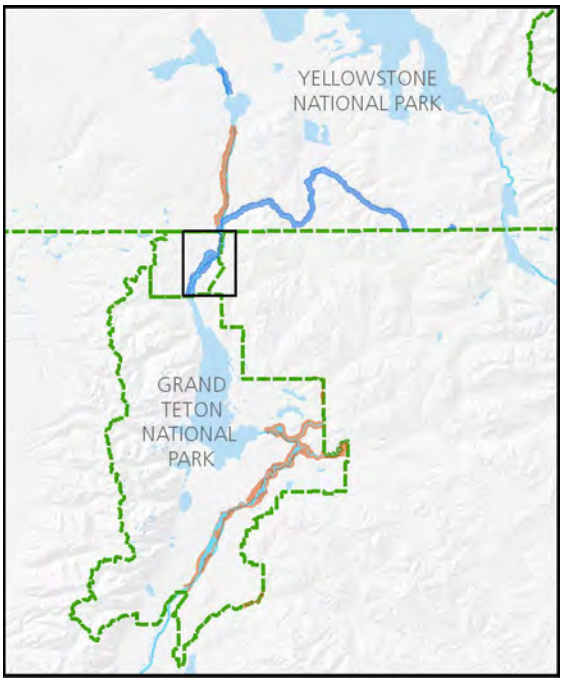
SNAKE RIVER (WILD SEGMENT, JOHN D. ROCKEFELLER, JR. MEMORIAL PARKWAY)

Visitor Use Management Indicators

Indicators of quality for this segment include water quality, presence or expansion of aquatic invasive species and invasive plant species, extent of social trails, extent of vegetation loss at attraction sites, occupancy of sensitive bird species and nests, the level and extent of visitor-modified hot spring features, number of encounters with other boats on the river, and wait times to put-in or take-out at launch sites.

Alternative A (No Action)

Kinds and Amount of Recreation Use. Under alternative A, the current kinds of visitor use in the John D. Rockefeller, Jr. Memorial Parkway area of the segment are more varied than those that exist in the Yellowstone National Park area. In this portion of the segment, Flagg Ranch offers overnight accommodations and commercial float and fishing trips. Some backcountry camping and hiking also occur. Maximum capacities for Headwaters Lodge and Cabins at Flagg Ranch would remain the same at a total of 97 RV sites, 74 tent sites, and a 92-room lodge. Forty of the current Flagg Ranch tent sites have been converted to camper cabins, but total capacity at the cabins, RV, and tent sites would remain at 171. Maximum backcountry camping capacity is 3 sites per 36 people per night. There is a maximum of 28 commercial float and 2 fishing trips per day along this segment. There is also a maximum of 60 private float trips per day (30 float and 30 fishing). Existing commercial



float trips have a time restriction related to wildlife disturbance.

Currently, no formal indicators or standards exist except for water quality. Water quality features like dissolved nutrients, temperature, pH, and conductivity, as well as contaminants such as fecal coliform would continue to be monitored within this segment. The standard for water quality within this segment allows for no more than a 1% change in mean levels of constituents below baseline level.

Types and Levels of Development. The wild segment of the Snake River in John D. Rockefeller, Jr. Memorial Parkway includes a variety of developments, including paved and unpaved roads, turnouts, overlooks, picnic areas, campground, trails, and two boat launches. This segment also includes Snake River Bridge, which has riprap to protect the bridge structure. Headwaters Lodge and Cabins at Flagg Ranch is the largest developed area within this river corridor and includes a campground, rental cabins, dining hall, general store, gas station, and a commercial horse operation. Dispersed campsites are situated along Grassy Lake Road within the designated wild and scenic river corridor downstream from Flagg Ranch.

Under alternative A, all existing developments would continue to be maintained and no new developments would be proposed, and backcountry camping would continue to be prohibited in specific areas of the John D. Rockefeller, Jr. Memorial Parkway, as described in the Superintendent's Compendium.

Alternative B

Kinds and Amount of Recreation Use. Under alternative B, the kinds of direct river-related visitor use currently available in this segment would remain with some improvements to infrastructure. However, to enhance recreational opportunities in this segment, maximum use levels would be approximately 10% higher than under alternative A, while retaining the current range of recreational opportunities within this segment. An increase in maximum use would allow additional visitor opportunities to enjoy the river corridor and enhance its recreational values. The 10% increase would likely increase the number of encounters with other visitors on the river, though they would remain at acceptable levels. This increase would be supported by site delineation, use regulation, and other management actions that would ensure the protection of river values. Maximum capacities and developments would remain the same as in alternative A. Forty of the current Flagg Ranch tent sites have been converted to camper cabins, but total capacity at the cabins, RV, and tent sites would remain at 171. The maximum number of commercial float trips would be increased to 31 trips per day with an additional 2 fishing trips per day. Private trips would also increase to a maximum of 66 trips per day (33 float and 33 fishing). Backcountry camping would continue to be allowed under the existing permit system.

Under alternative B, as in all action alternatives, NPS staff would implement a visitor use management and monitoring program to maintain a quality visitor experience, to protect and enhance river values, and to deal with and address user capacity. Indicators would be monitored, and management strategies would be adjusted as needed to ensure that conditions remain within established standards over time. Standards of quality for visitor use management indicators in this alternative would allow no more than a 1% change in mean levels of constituents for water quality features and contaminants. No new aquatic invasive species or invasive plant species, or expansion of current invasive species would be acceptable. Within this segment there should be no greater than a 5% increase in social trails, and no more than a 5% increase in vegetation loss per site. Occupancy of nest sites of sensitive bird species would be monitored under this alternative. Specific standards for targeted species within this segment can be referenced in table 7. No more than 15 group encounters for 80% of the sampled time would be acceptable, and no more than 10% of visitor groups waiting 30 minutes or longer at put-in or take-out would be acceptable. No incidence of human-modified hot springs features would be acceptable under this alternative. Under alternative B, boat launches and parking features would be improved. Increased presence of ranger patrols and interpretation at trailheads would be implemented to provide visitors with education pertaining to appropriate behavior near hot springs features, and encourage behavior that aligns with the preservation of outstandingly remarkable values within this river segment.

Types and Levels of Development. Under alternative B, the Flagg Canyon and Flagg Ranch boat launches would receive modest improvements to enhance river-related resources and visitor experience (see the site-planning section of this chapter for information). All other existing developments would be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act, and no new developments would be proposed.

Where existing developments are not consistent with the wild classification of this river segment, redesigning, relocating, or removing facilities would be considered to be more consistent with the river's classification over time. For example, vegetation restoration efforts would continue to be implemented on formerly developed areas at Flagg Ranch to enhance the compatibility with the wild classification. Riprap near Snake River Bridge would be "naturalized" with willow plantings and other vegetation treatments.

Alternative C (Preferred)

Kinds and Amount of Recreation Use. Under alternative C, the maximum capacities and range of direct river-related visitor use remains the same as in alternative A. Maximum capacities for Headwaters Lodge and Cabins at Flagg Ranch would remain the same at a total of 97 RV sites, 74 tent sites, and a 92-room lodge. Forty of the current Flagg Ranch tent sites have been converted to camper cabins, but total capacity at the cabins, RV, and tent sites would remain at 171. Maximum backcountry camping capacity is 3 sites / 36 people per night. There is a maximum of 28 commercial float and 2 fishing trips per day along this segment. There is also a maximum of 60 private float trips per day (30 float and 30 fishing). Existing commercial float trips have a time restriction related to wildlife disturbance.

Under this alternative, increased patrols would promote resource protection and enforce fishing and other park regulations. Other improvements would enhance the visitor experience in this segment including increased interpretation and education at Flagg Canyon and Flagg Ranch related to river values and the Wild and Scenic Rivers Act. The boat launches would also be improved. Backcountry camping would continue to be allowed under the existing permit system with no change in use levels.

Under alternative C, as in all action alternatives, NPS staff would implement a visitor use management and monitoring program to maintain a quality visitor experience, protect and enhance river values, and deal with and address user capacity. Indicators would be monitored, and management strategies would be adjusted as needed to ensure that conditions remain within established standards over time. This alternative would allow no more than a 1% change in mean levels of constituents below baseline level for water quality features and contaminants. No new aquatic invasive species or invasive plant species, or expansion of current invasive species would be acceptable. There should be no greater than a 5% increase in social trails, and no more than a 5% increase in vegetation loss per site. Occupancy of nest sites of sensitive bird species would be monitored under this alternative. Specific standards for targeted species within this segment can be referenced in table 7. No incidence of human-modified hot springs features would be acceptable under this alternative. Within the John D. Rockefeller, Jr. Memorial Parkway segment, no more than 10 group encounters for 80% of the sampled time would be acceptable, and no more than 10% of visitor groups waiting 30 minutes or longer at put-in or take-out would be acceptable. Increased presence of ranger patrols and wild and scenic river-focused interpretive messaging at Flagg Canyon and Flagg Ranch would be improved to increase visitor understanding about river values and to encourage behavior that aligns with the preservation of the outstandingly remarkable values within this river segment.

Types and Levels of Development. Under alternative C, the Flagg Canyon and Flagg Ranch boat launches would receive modest improvements to enhance river-related resources and visitor experience (see the site-planning section of this chapter for more information). All other existing developments would be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act, and no new developments would be proposed.

Where existing developments are not consistent with the wild classification of this river segment, redesigning, relocating, or removing facilities would be considered to be more consistent with the river's classification over time. For example, vegetation restoration efforts would continue to be implemented on formerly developed areas at Flagg Ranch to enhance the compatibility with the wild classification. Riprap near the Snake River Bridge would be "naturalized" with willow plantings and other vegetation treatments. At Huckleberry Hot Springs, undesired social trails would be restored and replaced with a designated route and remnants of old development would be removed.

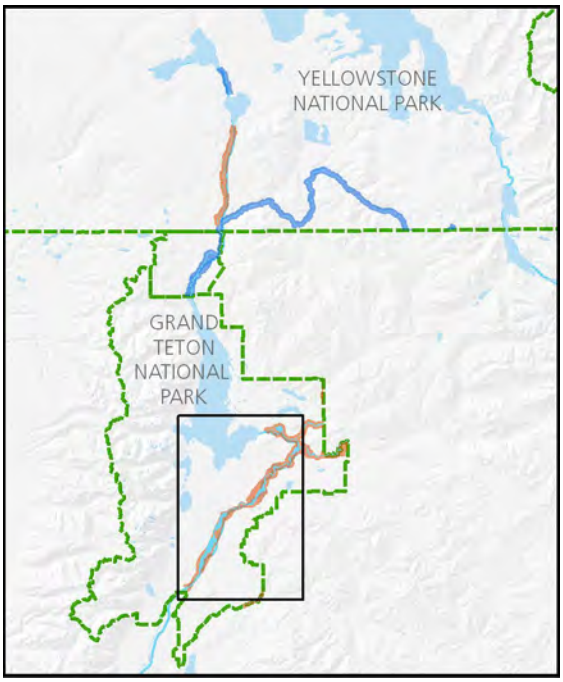
SNAKE RIVER (SCENIC SEGMENT, GRAND TETON NATIONAL PARK)

Visitor Use Management Indicators

Indicators of quality for this segment include water quality, presence or expansion of aquatic invasive species and invasive plant species, population estimates of the Snake River fine-spotted cutthroat trout, the extent of social trails, extent of vegetation loss at attraction sites, occupancy of sensitive bird species and nests, number of encounters with other boats on the river, and wait times to put-in or take-out at launch sites.

Alternative A (No Action)

Kinds and Amount of Recreation Use. Under alternative A, a diversity of recreational activities occur including scenic driving, commercial and private float and fishing trips, photography and wildlife viewing, picnicking, hiking, and bicycling. Recreational activities along this segment are generally easily accessible and characterized by largely natural settings. Use in this segment is also relatively high as compared to other segments of the Snake River Headwaters. Overall, between 1.2 and 1.4 million visitors per year travel along this



corridor. The vast majority of these visitors merely pass through the river corridor and do not stop fro direct river-related recreation.

Direct river-related visitor use is higher in this segment than in others, and is focused on floating and fishing. Commercial floating and fishing trips are most common and managed according to provisions of the NPS Concessions Management Improvement Act of 1998 and NPS *Management Policies 2006*. On average, there are 63,179 people on float trips per year (between 2007 and 2010) with a maximum reported use of 68,673 in 2007. Maximum daily launches for commercial trips are set at 133 float trips and 47 fishing trips. The current daily number of permitted fishing launches is 41 on scenic segments, 2 on wild (Flagg) segment, and 4 from Moose downstream. The current monthly fishing launch limit is 598 launches on scenic segments, 7 on the wild (Flagg) segment, and 58 from Moose downstream. Meal trips at Deadman's Bar are limited to 360 trips per year. Private use is less common on this segment of the river with an average estimated use of approximately 21,181 people per year (based on 25% of overall river use) and a maximum of 23,915 reported in 2007.

Private use is less common, and no limits are currently in place for private float and fishing use. Fishing regulations, i.e., limited fishing seasons, are in place to ensure this use does not negatively affect river values.

No formal indicators or standards currently exist in this segment except for water quality. Water quality characteristics such as dissolved nutrients, temperature, pH, and conductivity, as well as contaminants such as fecal coliform would continue to be monitored within this segment. The standard for water quality within this segment allows for no more than a 5% change in mean levels of constituents below baseline level.

Types and Levels of Development. The scenic segment of the Snake River includes numerous visitor amenities including river access roads, turnouts, overlooks, six boat launch areas, picnic areas, and trails. There are no designated campgrounds and river camping is not allowed along this segment.

Other park infrastructure within this river corridor includes the Moran Entrance / Ranger Station and community, Murie Ranch, Craig Thomas Discovery and Visitor Center, a portion of the park's headquarters complex, and Menor's Ferry Historic District (which includes the Maud Noble Cabin).

Under alternative A, all existing developments would continue to be maintained.

Alternative B

Kinds and Amount of Recreation Use. Alternative B responds to public comment expressing interest in expanding visitor recreational opportunities along this segment of the Snake River Headwaters. The overall kinds of direct river-related visitor use that currently exist would continue. However, two new primitive campsites, possibly with pit toilets, would be established along the river at the end of RKO Road. Other enhancements would include improvements to the Oxbow Bend overlook and active interpretation of the Menor's Ferry, Bar BC Dude Ranch, and 4 Lazy F Dude Ranch cultural sites. Trail improvements between the river and Bar BC Dude Ranch would be made to enable boaters to access the ranch. Boat launches would be improved in this alternative to facilitate better access to the river, reduce crowding and congestion, and protect sensitive vegetation and wetland resources. Other resource protection measures that would affect visitor experience include improved food storage and waste management at river cook sites and periodic boat checks for aquatic invasive species.

The maximum amounts of direct river-related visitor use in alternative B would be approximately 15% higher than alternative A. This increase would promote additional access to the numerous recreational opportunities along this segment. Visitor use and resource management strategies such as site delineation, fishing regulations, boat checks for aquatic invasive species, and other measures would ensure that this increase in use is accommodated without adverse impact to river values. Commercial float use would increase to a maximum daily launch of 153 boats and an expected overall use of 78,974 people per year. Maximum fish trips per day would increase to 54 with no more than 763 per month. Meal trips would also increase to 415, accommodating a maximum of 4,140 people per season. Private float use would remain less than commercial use and not be limited, though the maximum use expected would be approximately 27,502 per year based on historic use patterns. These increases in the amounts of use would create more frequent encounters with other visitors along the river and potentially longer put-in and take-out wait times at river access points. Site improvements would help ensure the flow of use and related traffic continues to function at these access points.

Under alternative **B**, as in all action alternatives, NPS staff would implement a visitor use management and monitoring program to maintain a quality visitor

experience, protect and enhance river values, and address user capacity. Indicators would be monitored, and management strategies would be adjusted as needed to ensure that conditions remain within established standards over time. This alternative would allow no more than a 5% change in mean levels of constituents below baseline level for water quality features and contaminants. No new aquatic invasive species or invasive plant species, or expansion of current invasive species would be acceptable, and periodic boat checks would take place to help alleviate potential aquatic invasive species encroachment. Population levels of the Snake River fine-spotted cutthroat trout should be maintained at or above the historical 10-year average within the segment. Standards for social trails indicate that there should be no more than a 5% increase in social trails, and that this segment should incur no more than 5% increase in vegetation loss at attraction sites. Occupancy of nest sites of sensitive bird species would be monitored under this alternative. Specific standards for targeted species within this segment can be referenced in table 7. Within the Grand Teton National Park segment, no more than 15 group encounters for 80% of the sampled time would be acceptable and no more than 10% of visitor groups waiting 45 minutes or longer at put-in or take-out would be acceptable. Off-site interpretation concerning the historic ranch sites within the corridor would be implemented to encourage visitor behavior that aligns with the preservation of the outstandingly remarkable values within this river segment.

Types and Levels of Development. Under alternative B, development changes along the scenic segment of the Snake River would include more substantial modifications at six boat launch areas and the Oxbow Bend turnout. Please refer to the site-planning section of this chapter for information about these proposed changes.

Under this alternative, River Road (along the west side of the Snake River) would remain open to public vehicular access), and cyclic maintenance of River Road would continue. Limited overnight camping would be provided for visitors, including walk-in and boat access camping near the end of RKO Road.

Alternative C (Preferred)

Kinds and Amount of Recreation Use. Under alternative C, the overall kinds of direct river-related visitor use would be maintained to promote resource protection goals. Floating and boating through the Oxbow Bend area would be closely managed to avoid visitor conflicts due to viewshed intrusions. Two cook sites along the river (Deadman's Bar and Triangle X) would be retained with a maximum capacity of 40 people each. Boat launch sites would be consolidated where possible. Other actions that would enhance visitor experience include the provision of off-site interpretation of the historic ranch sites. Trail improvements between the river and Bar BC Dude Ranch would be made to enable boaters to access the ranch. Resource protection measures that would affect visitor experience include periodic boat checks for aquatic invasive species, improved food storage, waste management, and other requirements. Under this alternative, vehicle turnouts would be redesigned to minimize impacts on resources, and existing social trails would be revegetated to natural conditions. Under this alternative, River Road (along the west side of the Snake River) would remain open to public vehicular access (including bicycles). In this alternative, the maximum amounts of direct river-related visitor use would remain at the same level as alternative A. Maximum daily launches for commercial trips are set at 133 float trips and 47 fishing trips. The current daily number of permitted fishing launches is 41 on scenic segments, 2 on wild (Flagg) segment, and 4 from Moose downstream. The current monthly fishing launch limit is 598 launches on scenic segments, 7 on the wild (Flagg) segment, and 58 from Moose downstream. The current daily scenic raft limit is 102

launches on scenic segments, 28 launches on the wild (Flagg) segment, and 3 from Moose downstream. There are also 25 permitted daily reserve raft launches on the scenic segments and 2 per day from Moose downstream. Meal trips are limited to 360 trips per year. Private use is less common on this segment of the river with an average estimated use of approximately 21,181 people per year (based on 25% of overall river use) and a maximum of 23,915 reported in 2007.

Under alternative C, as in all action alternatives, NPS staff would implement a visitor use management and monitoring program to maintain a quality visitor experience, protect and enhance river values, and address user capacity. Indicators would be monitored, and management strategies would be adjusted as needed to ensure that conditions remain within established standards over time. This alternative would allow no more than a 5% change in mean levels of constituents below baseline level for water quality features and contaminants. No new aquatic invasive species or invasive plant species, or expansion of current invasive species would be acceptable, and periodic boat checks would take place to prevent potential aquatic invasive species encroachment. Population levels of the Snake River fine-spotted cutthroat trout should be maintained at or above the historical 10-year average within the segment. Standards for social trails indicate that there should be no more than a 5% increase in social trails, and that this segment should incur no more than 5% increase in vegetation loss at attraction sites. Occupancy of nest sites of sensitive bird species would be monitored under this alternative. Specific standards for targeted species within this segment can be referenced in table 7. Within this segment, no more than 10 group encounters for 80% of the sampled time would be acceptable and no more than 10% of visitor groups waiting 45 minutes or longer at put-in or take-out would be acceptable. Off-site interpretation concerning the historic ranch sites within the corridor would be implemented to encourage visitor behavior that aligns with the preservation of the outstandingly remarkable values within this river segment.

Types and Levels of Development. Under alternative C, development changes along the scenic segment of the Snake River would include modest improvements at six boat launch areas and the Oxbow Bend turnout. Please refer to the site-planning section of this chapter for information about these proposed changes.

Vehicular access and cyclic maintenance of River Road would continue. Under this alternative, River Road would remain open for public vehicular use as road conditions allow. Park management would close the road to public vehicular use in the future if portions of the road fail due to the natural migration of the Snake River channel and road repairs and reroutes cannot be accomplished without impact to adjacent sagebrush and other sensitive habitats.

A portion of the main park road (along the west side of the Snake River) near the confluence of Buffalo Fork may be redesigned to allow more natural river processes.

PACIFIC CREEK (SCENIC SEGMENT, GRAND TETON NATIONAL PARK)

Visitor Use Management Indicators

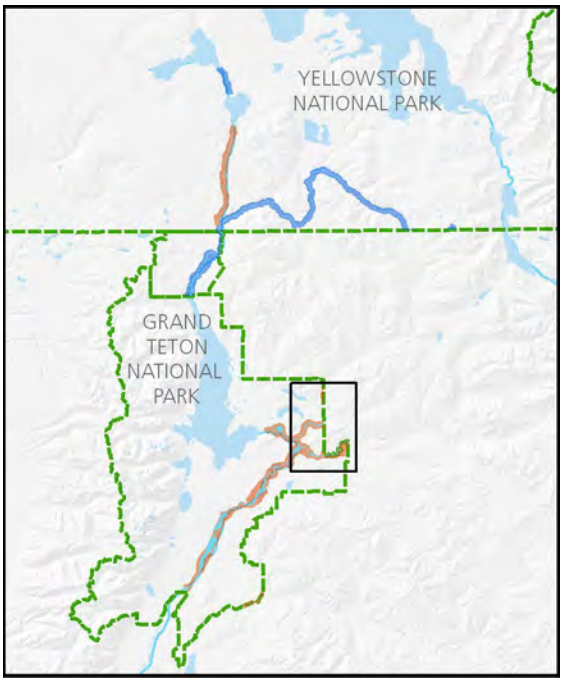
Indicators of quality for this segment include water quality, presence or expansion of aquatic invasive species and invasive plant species, extent of social trails, extent of vegetation loss at attraction sites, and occupancy of sensitive bird species and nests.

Alternative A (No Action)

Kinds and Amount of Recreation Use. Under alternative A, the kinds of use that currently occur along this segment would continue. These include scenic driving / viewing scenery, some unguided walk-in fishing, hiking, unguided horseback riding, photography, and wildlife viewing. Overall, use is low along this segment with approximately 600 direct river-related visitors per year and a maximum daily use of approximately five people per day during the visitor use season. No overnight use is allowed within this segment.

No formal indicators and standards exist except for water quality. Water quality characteristics such as dissolved nutrients, temperature, pH, and conductivity, as well as contaminants such as fecal coliform would continue to be monitored within this segment. The standard for water quality within this segment allows for no more than a 5% change in mean levels of constituents below baseline level.

Types and Levels of Development. Visitor amenities within the Pacific Creek corridor include Two Ocean Lake Road, seasonal elk reduction camp, roadside turnouts, and the Emma Matilda Lake Trail. There are also some social trails near access points along the road. Under alternative A, all existing developments would continue to be maintained, and no new developments would be proposed.



Alternative B

Kinds and Amount of Recreation Use. In addition to the existing kinds of direct river-related visitor use in this river segment, alternative B would allow guided horseback riding along existing trails and guided walk-in fishing. Horseback riding trips would consist of a maximum of three groups of approximately 20 participants per group per day or approximately 2,000 per year. Paired with concessioner-guided fishing equating to approximately 9 anglers daily within this segment, this corridor could maintain a maximum of 34 visitors per day during the visitor use season. Overall, the resources within this segment could sustain a maximum 3,270 visitors annually.

Under alternative **B**, as in all action alternatives, NPS staff would implement a visitor use management and monitoring program to maintain a quality visitor experience, protect and enhance river values, and address user capacity. Indicators would be monitored, and management strategies would be adjusted as needed to ensure that conditions remain within established standards over time. This alternative would

allow no more than a 5% change in mean levels of constituents below baseline level for water quality features and contaminants. No new aquatic invasive species or invasive plant species, or expansion of current invasive species would be acceptable. Standards for social trails indicate that there be no more than a 5% increase in social trails, and that this segment should incur no more than 5% increase in vegetation loss at attraction sites. The identification of targeted bird species nest sites would continue to be monitored within this segment and inform establishment of indicators and standards for sensitive species once data is determined to be sufficient.

Types and Levels of Development. Under alternative B, existing developments would continue to be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act, including better delineation of parking areas and trails. Informal parking areas and social trails would be removed and revegetated. Improvements to the seasonal elk reduction camp may include providing a toilet facility and water trough with seasonal water pump.

Alternative C (Preferred)

Kinds and Amount of Recreation Use. Under alternative C, the types of direct river-related visitor use would remain the same as alternative A with improvements to the seasonal elk reduction camp as described in alternative B. Direct river-related visitor use levels would be expected to remain low. Maximum expected use levels would be five visitors per day during the visitor use season, equating to approximately 600 day use visitors annually. No overnight use would be allowed.

Under alternative C, as in all action alternatives, NPS staff would implement a visitor use management and monitoring program to maintain a quality visitor experience, protect and enhance river values, and address user capacity. Indicators would be monitored, and management strategies would be adjusted as needed to ensure that conditions remain within established standards over time. This alternative would allow no more than a 5% change in mean levels of constituents below baseline level for water quality features and contaminants. No new aquatic invasive species or invasive plant species, or expansion of current invasive species would be acceptable. Standards for social trails indicate that there should be no more than a 5% increase in social trails, and that this segment should incur no more than 5% increase in vegetation loss at attraction sites. The identification of targeted bird species nest sites would continue to be monitored within this segment and inform establishment of indicators and standards for sensitive species once data is determined to be sufficient.

Types and Levels of Development. Under alternative C, existing developments would continue to be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act, including better delineation of parking areas and trails. Informal parking areas and social trails would be removed and revegetated. Improvements to the seasonal elk reduction camp may include providing a toilet facility and water trough with seasonal water pump.

BUFFALO FORK (SCENIC SEGMENT, GRAND TETON NATIONAL PARK)

Visitor Use Management Indicators

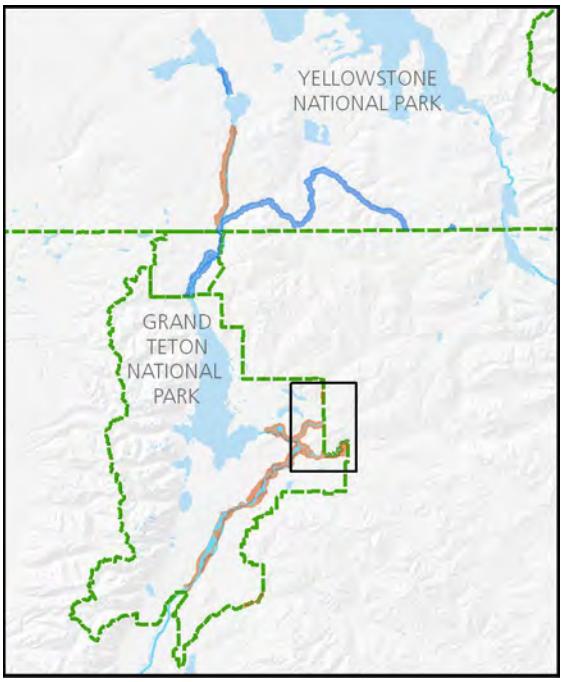
Indicators for this segment include water quality, presence or expansion of aquatic invasive species and invasive plant species, extent of social trails, extent of vegetation loss at attraction sites, and occupancy of sensitive bird species and nests.

Alternative A (No Action)

Kinds and Amount of Recreation Use. Visitor use in this segment consists of scenic driving / viewing scenery, fishing, some trail access from Elk Ranch Road, and snow-mobile use. Generally, as in the Pacific Creek segment, use levels are low along Buffalo Fork. Approximately 500 people per year participate in direct river-related recreation along this segment with approximately five people per day during the visitor use season. No overnight use is allowed within this segment.

Under alternative A, no formal indicators or standards exist except for water quality. Water quality features like dissolved nutrients, temperature, pH, and conductivity, as well as contaminants such as fecal coliform would continue to be monitored within this segment. The standard for water quality within this segment allows for no more than a 5% change in mean levels of constituents below baseline level.

Types and Levels of Development. Visitor amenities within the Buffalo Fork corridor include several paved roads, bridges, turnouts, and parking areas. There are no formal trails, but some social trails do exist. The Snake River Land Company and Elk Ranch are within the river corridor. Other developments include an overhead utility line and river debris entrapment cable fencing on the north bank of Buffalo Fork near Moran Junction.



Under alternative A, all existing developments would continue to be maintained, and no new developments would be proposed.

Alternative B

Kinds and Amount of Recreation Use. Alternative B would maintain the same kinds and amounts of direct river-related visitor use as alternative A. Maximum expected use levels would be 500 day use visitors annually, or approximately five daily visitors during the visitor use season. No overnight use would be allowed within this segment.

Under alternative **B**, as in all action alternatives, NPS staff would implement a visitor use management and monitoring program to maintain a quality visitor experience, protect and enhance river values, and address user capacity. Indicators would be monitored, and management strategies would be adjusted as needed to ensure that conditions remain within established standards over time. Alternative B would allow no more than a 5% change in mean levels of constituents below baseline level for water quality features and contaminants. No new aquatic invasive

species or invasive plant species, or expansion of current invasive species would be acceptable. Standards for social trails indicate that there should be no more than a 5% increase in social trails, and that this segment should incur no more than 5% increase in vegetation loss at attraction sites. Occupancy of nest sites of sensitive bird species would be monitored under this alternative. Specific standards for targeted species within this segment can be referenced in table 7.

Types and Levels of Development. Under alternative B, existing developments would continue to be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act, including better delineation of parking areas and trails. Informal parking areas and social trails would be removed and revegetated. No new developments would be proposed.

Alternative C (Preferred)

Kinds and Amount of Recreation Use. Alternative C would maintain the same kinds and amounts of direct river-related visitor use as alternatives A. Maximum expected use levels would be 500 day use visitors annually, or approximately five daily visitors during the visitor use season. No overnight use would be allowed within this segment.

Under alternative C, as in all action alternatives, NPS staff would implement a visitor use management and monitoring program to maintain a quality visitor experience, protect and enhance river values, and address user capacity. Indicators would be monitored and management strategies would be adjusted as needed to ensure that conditions remain within established standards over time. This alternative would allow no more than a 5% change in mean levels of constituents below baseline level for water quality features and contaminants. No new aquatic invasive species or invasive plant species, or expansion of current invasive species would be acceptable. Standards for social trails indicate that there should be no more than a 5% increase in social trails, and that this segment should incur no more than 5% increase in vegetation loss at attraction sites. Occupancy of nest sites of sensitive bird species would be monitored under this alternative. Specific standards for targeted species within this segment can be referenced in table 7.

Types and Levels of Development. Under alternative C, existing developments would continue to be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act, including better delineation of parking areas and trails.

Informal parking areas and social trails would be removed and revegetated. An overhead utility line would be placed underground to improve natural conditions and scenic quality. A fence in the riparian area that is no longer necessary would be removed to enhance natural conditions. No new developments would be proposed.

GROS VENTRE RIVER (SCENIC SEGMENT, NATIONAL ELK REFUGE AND GRAND TETON NATIONAL PARK)

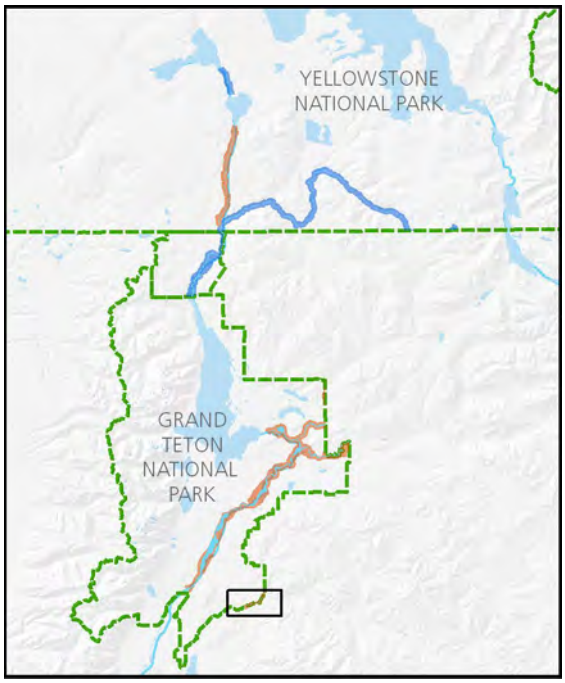
Visitor Use Management Indicators

Indicators of quality for this segment include water quality, presence or expansion of aquatic invasive species and invasive plant species, extent of social trails, extent of vegetation loss at attraction sites, population estimates of the Snake River fine-spotted cutthroat trout, level and extent of visitor-modified hot spring features and occupancy of sensitive bird species and nests.

Alternative A (No Action)

Kinds and Amount of Recreation Use. Under alternative A, existing visitor uses along this segment would continue including hiking, fishing, swimming, and photography. Public boat use is prohibited on refuge waters. However, there are an estimated 150 boat take-outs at the refuge boundary during the peak whitewater season. Approximately two to five administrative boat trips occur each season on the river through the park/refuge. Overall, approximately 1,900 people per year use this segment. There are an estimated 1,455 user days along the bank, or 20 people per day. Peak use consists of approximately 1,100 general users (hiking, photography, etc.), 450 anglers, and 300 people per season along this portion of the river. The majority of this use originates from an informal access at the forest boundary that supports a take-out during whitewater season and riverbank access for anglers.

No formal indicators or standards exist except for water quality. Water quality features like dissolved nutrients, temperature, pH, and conductivity, as well as contaminants such as fecal coliform would continue to be monitored within this segment. The standard for water quality within this segment allows



for no more than a 5% change in mean levels of constituents below baseline level.

Types and Levels of Development. Visitor amenities within the Gros Ventre corridor include the paved Gros Ventre Road, two private road bridges, an informal trail, a dirt two-track road upstream from Kelly, and an informal visitor access point with several social trails on the east boundary between Grand Teton National Park and Bridger-Teton National Forest. There are also some social trails near this informal access point. Under alternative A, all existing park and refuge developments would continue to be maintained, and no new developments would be proposed.

Other developments include private residences and roads on both riverbanks at the town of Kelly and an irrigation ditch on the north river.

Alternative B

Kinds and Amount of Recreation Use. Under alternative B, the kinds and levels of

direct river-related visitor use in this segment would remain the same as alternative A. Maximum expected use levels would be approximately 1,900 people per year with an 1,100 general users (hiking, photography, etc.), 450 anglers, and 300 people per season along this portion of the river. Under alternative **B**, as in all action alternatives, NPS staff would implement a visitor use management and monitoring program to maintain a quality visitor experience, protect and enhance river values, and address user capacity. Indicators would be monitored, and management strategies would be adjusted as needed to ensure that conditions remain within established standards over time.

Alternative B would allow no more than a 5% change in mean levels of constituents below baseline level for water quality features and contaminants. No new aquatic invasive species or invasive plant species, or expansion of current invasive species would be acceptable. Populations of the Snake River fine-spotted cutthroat trout should be maintained at or above the historical five-year (or 10-year) average within the segment. Standards for social trails indicate that there should be no more than a 5% increase in social trails, and that this segment should incur no more than 5% increase in vegetation loss at attraction sites. Additionally, current social trails would be hardened and consolidated to protect resources. No additional visitor-caused modifications to hot spring features should be present within any of the sites. Finally, occupancy of nest sites of sensitive bird species would be monitored under this alternative. Specific standards for targeted species within this segment can be referenced in table 7.

Types and Levels of Development. Under alternative B, existing developments would continue to be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. Social trails would be removed and revegetated. No new developments would be proposed. Grand Teton National Park, the National Elk Refuge, and Bridger-Teton National Forest would collaborate on better delineation of parking areas, trails, and signs at the informal visitor access point that overlaps all three agencies' boundaries.

Alternative C (Preferred)

Kinds and Amount of Recreation Use. Under alternative C, the kinds and levels of direct river-related visitor use would be the same as alternative A. Maximum expected use levels would be approximately 1,900 people per year with an 1,100 general users (hiking, photography, etc.), 450 anglers, and 300 people per season along this portion of the river. Under alternative **C**, as in all action alternatives, NPS staff would implement a visitor use management and monitoring program to maintain quality visitor experience, to protect and enhance river values, and to deal with and address user capacity. Indicators would be monitored, and management strategies would be adjusted as needed to ensure that conditions remain within established standards over time.

This alternative would allow no more than a 5% change in mean levels of constituents below baseline level for water quality features and contaminants. No new aquatic invasive species or invasive plant species, or expansion of current invasive species would be acceptable. Populations of the Snake River fine-spotted cutthroat trout should be maintained at or above the historical five-year (or 10-year) average (based on five sampling periods) within this segment. Standards for social trails indicate that there should be no more than a 5% increase in social trails, and that this segment should incur no more than 5% increase in vegetation loss at attraction sites. No additional visitor-caused modifications to hot spring features should be present within any of the sites. Occupancy of nest sites of sensitive bird species would be monitored under this alternative. Specific standards for targeted species within this segment can be referenced in table 7.

Types and Levels of Development. Under alternative C, existing developments would continue to be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. Social trails would be removed and revegetated. No new developments would be proposed.

Grand Teton National Park, the National Elk Refuge, and Bridger-Teton National Forest would collaborate on better delineation of parking areas, trails, and signs at the informal visitor access point that overlaps the boundaries of all three agencies

River Access Points

1

RIVER ACCESS POINTS MANAGEMENT STRATEGIES

The third tier of the alternatives includes site-specific management strategies for nine access points along the Snake River. The primary purpose of this site-planning effort is to address long-standing design issues to enhance resource conditions and improve access and circulation for visitors.

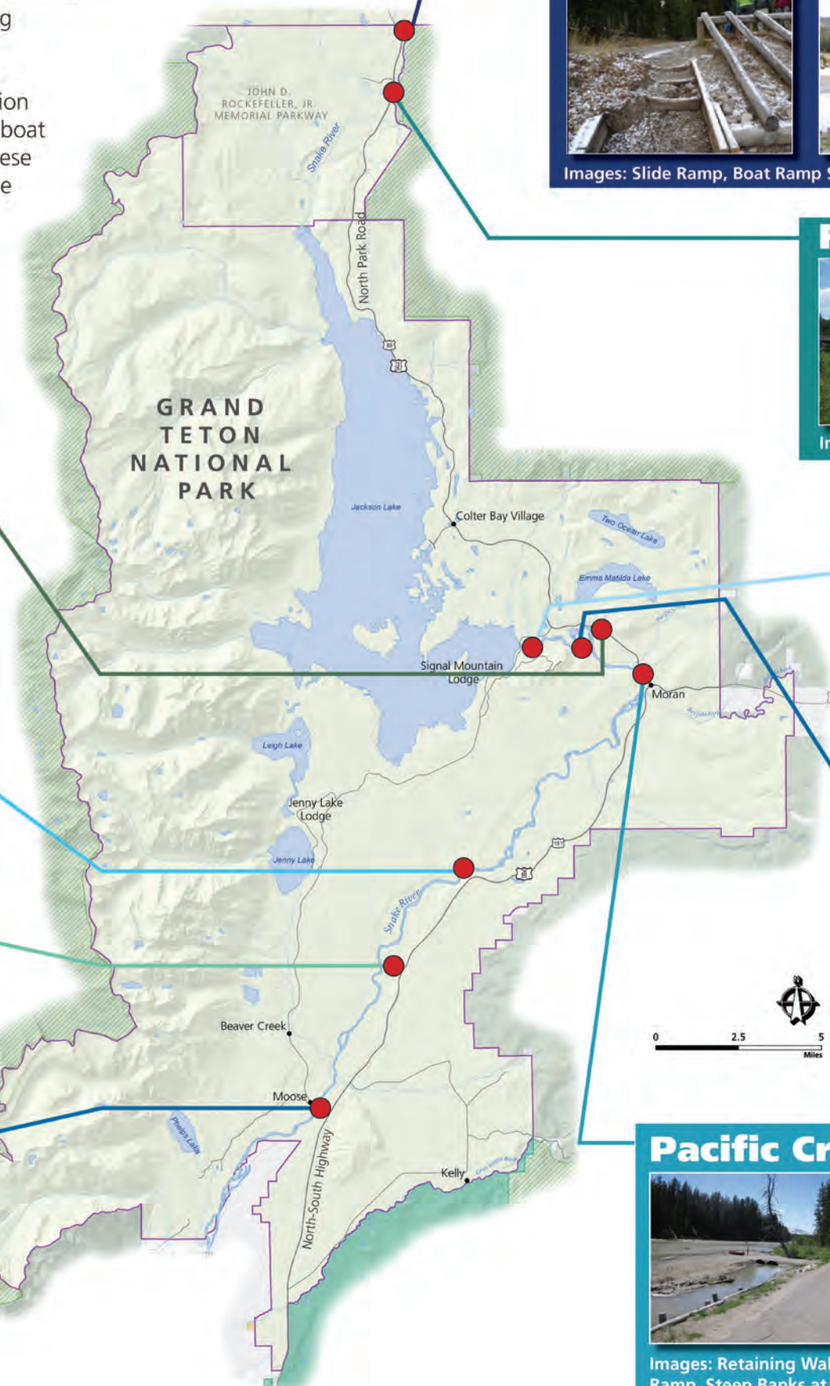
All the facilities, boat launches, trails, and parking in the areas listed below would provide universal access and meet minimum accessibility standards according to the Architectural Barriers Act, as well as the *Accessibility Guidelines for Outdoor Developed Areas*. Determination of feasibility for universal access would be determined during the implementation phase.

The following is a list of the access points that are covered in this section, from north to south. The first two sites are in John D. Rockefeller, Jr. Memorial Parkway, and seven sites are in Grand Teton National Park. For each site, a range of alternative management strategies were considered as it relates to types and levels of development. For all sites, alternative C has been identified as the preferred alternative.

- Flagg Canyon boat launch area
- Flagg Ranch boat launch area
- Jackson Lake Dam boat launch area
- Cattleman's Bridge boat launch area
- Oxbow Bend overlooks
- Pacific Creek Landing
- Deadman's Bar Landing
- Schwabacher Landing
- Moose Landing

RIVER ACCESS POINTS STRATEGIES

Early in this planning process, it was determined by the planning team that site planning was needed at many of the aging boat launch sites. This planning effort presented an opportunity to evaluate and plan for these needed improvements comprehensively and within the wild and scenic river framework. The draft alternatives presented in this section were developed by the planning team and technical experts. The team evaluated eight boat launch sites and one overlook. This section presents conceptual draft alternatives for these sites. The National Park Service is seeking input from the public to better understand the issues at these sites and the components of their future design.



Flagg Canyon

Images: Slide Ramp, Boat Ramp Sign

Flagg Ranch

Images: Boat Launch Area, Parking Lot

Oxbow Bend Overlooks

Images: Roadside Pullout, Trail at Main Overlook

Deadmans Bar

Images: Sand Ramp (High Water), Parking Area

Schwabacher Landing

Images: Landing and Trailhead at Northern Parking Lot

Moose Landing

Images: Moose Landing Boat Pullouts/Passenger Unloading Areas (High Water), Boat Ramp for Larger Boats, Retaining Wall

Jackson Lake Dam

Images: Boat Launching, Lower Parking Area

Cattleman's Bridge

Images: Boat Launch Area, Location of Proposed Trail

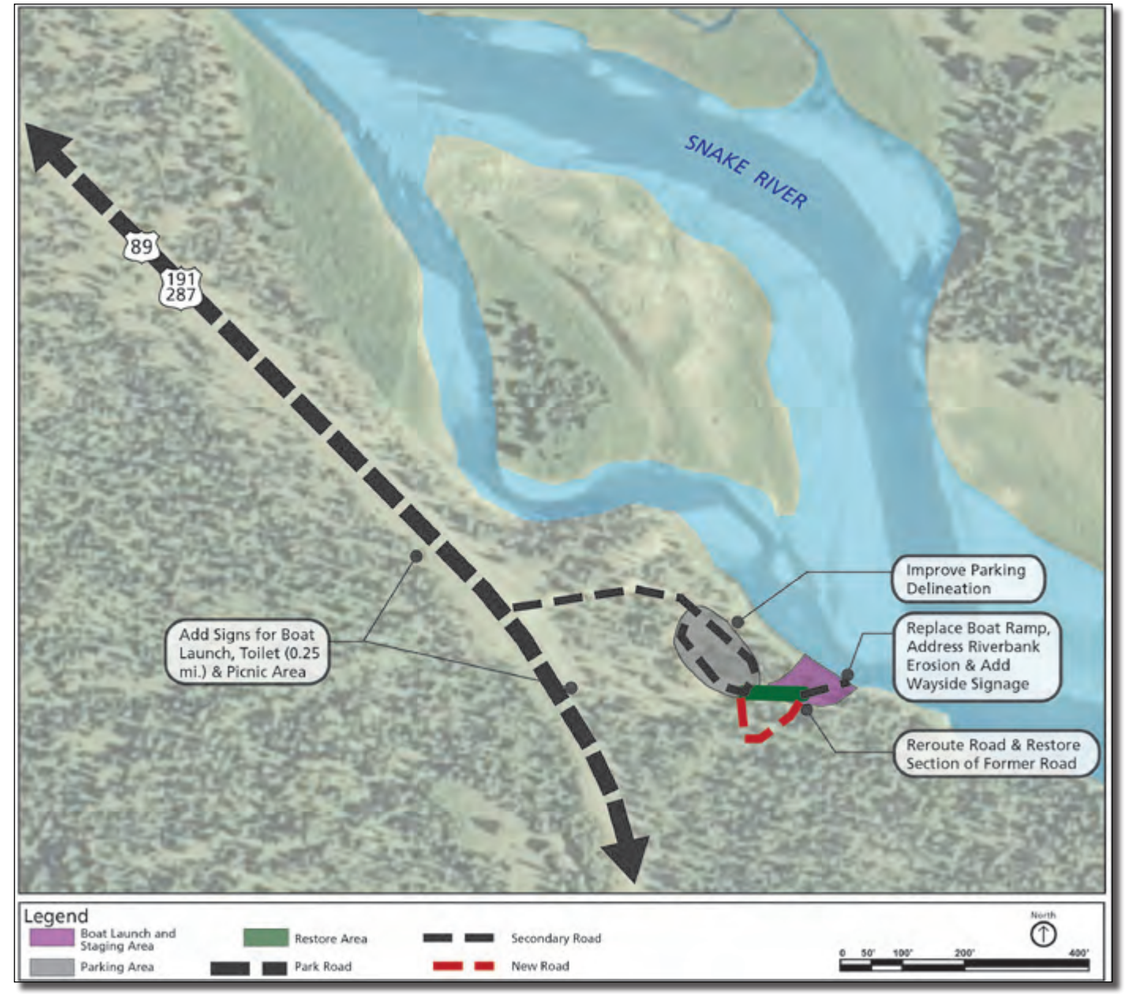
Pacific Creek Landing

Images: Retaining Wall and Boat Ramp, Single-lane Road to Pacific Creek Landing Boat Ramp, Steep Banks at Proposed Pacific Creek Landing Relocation Site

FLAGG CANYON

Alternative A

Alternatives B & C (Preferred)



Alt. A Description

The Flagg Canyon boat launch is located in a braided section of Snake River. The site is 0.05 miles (approx.) downriver from a well-established island. The boat launch is located on a smaller channel of the river. During periods of low water, it can be challenging to launch a boat due to shallow water.

The development at Flagg Canyon includes a 0.12-mile gravel road, which extends from US 89/191/287 to the parking lot and boat launch. There is a picnic area with two picnic tables to the north of the boat launch. The boat launch is steep and has a wood slide ramp system with steps connecting to the water.

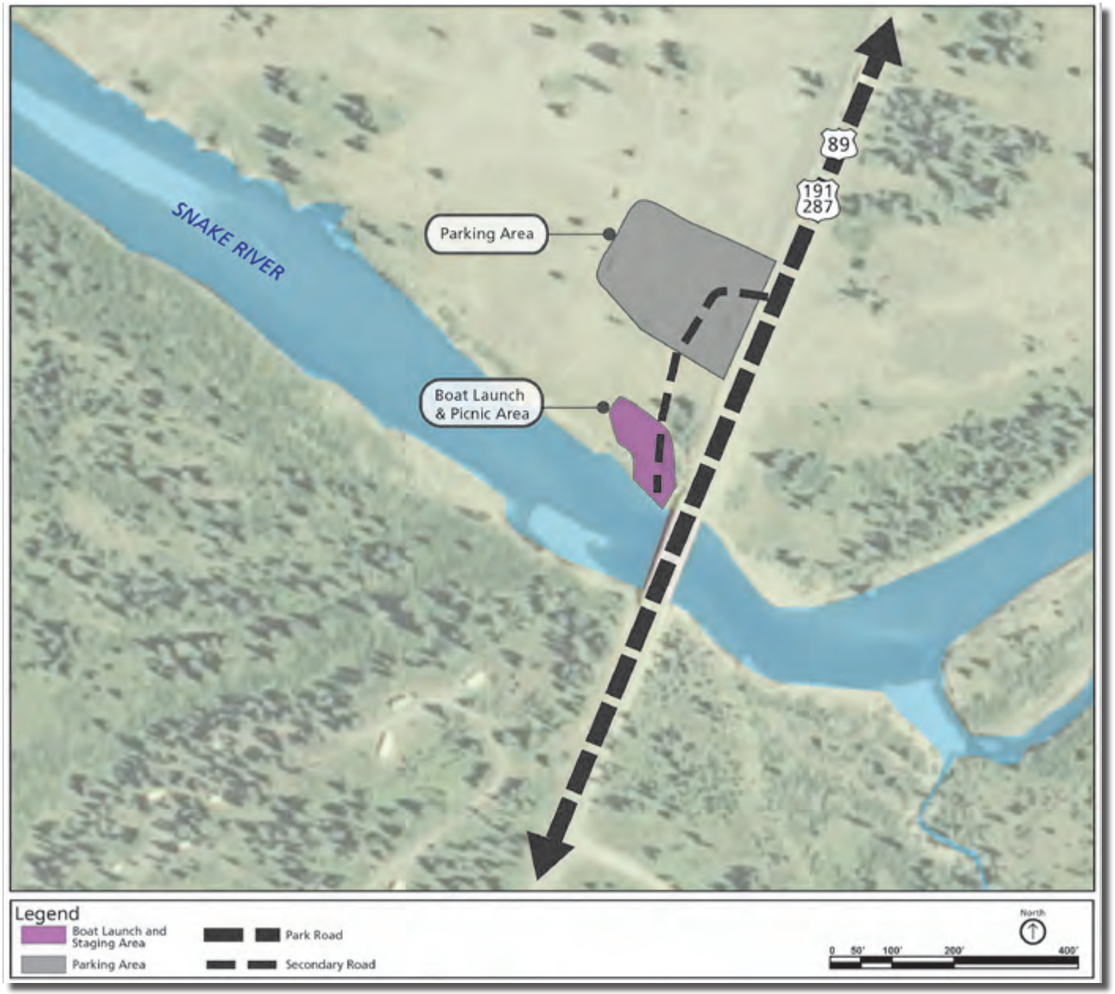
Flagg Canyon is the put-in site for commercial and private floating and fishing trips. Generally, smaller boats (10- to 12-foot rafts, 12- to 14-foot drift boats, and whitewater kayaks) are launched at this site. The launch receives light use.

Alt. B & C Description

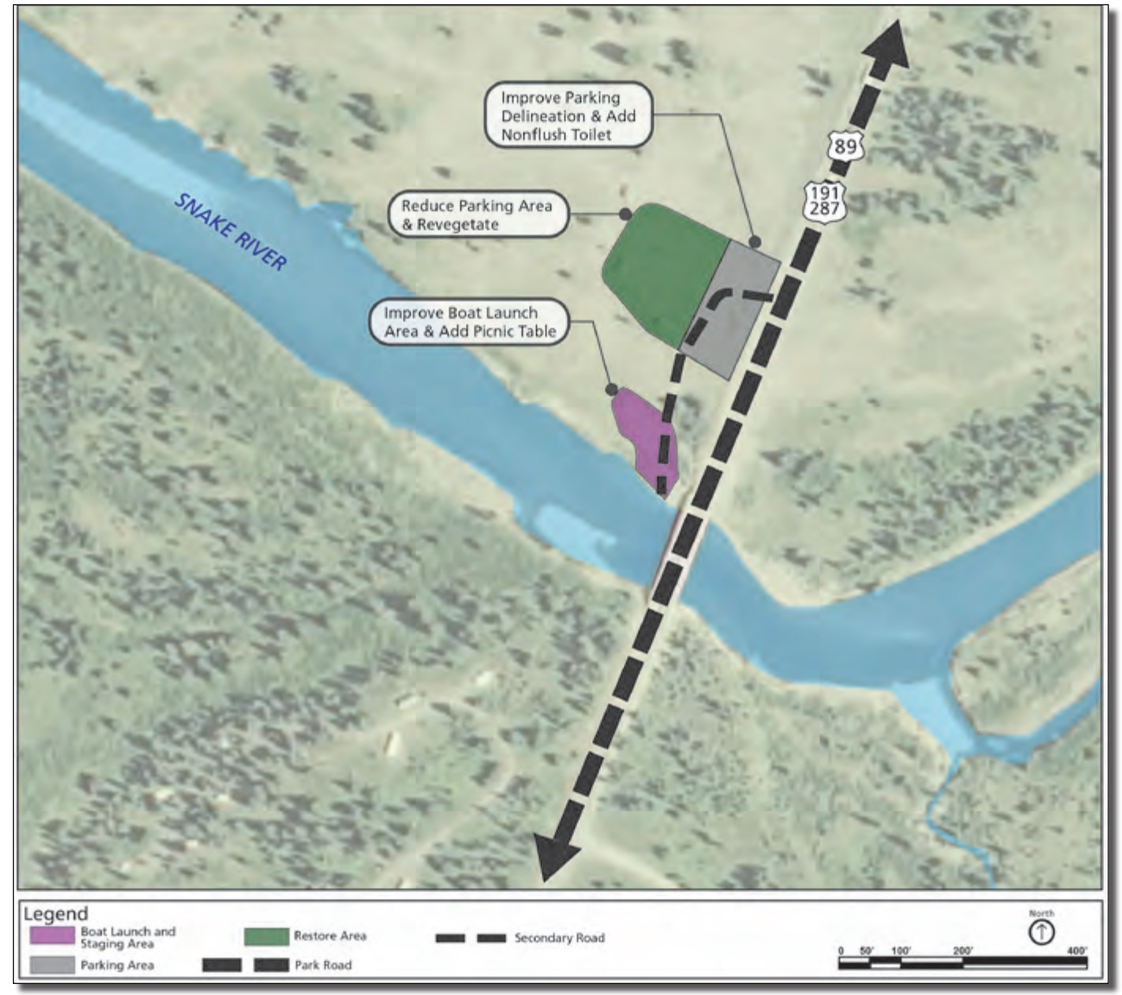
In these alternatives, signs on north and south sides of US 89/191/287 would be installed to alert visitors to the location of the picnic area and boat launch site as well as the location of the nearest restroom facility (0.25 mile north). A portion of the boat launch access road would be reconstructed to the south to improve visitor safety by reducing the steep grade of the road. The boat launch would have a minimal grade to the river and be designed to prevent riverbank erosion. The vehicle turnaround at the boat launch would be reconfigured for efficiency and safety. The aging boat slide system and steps would be replaced. A new wayside with boating and area information would replace the existing sign. Areas along the bank that are experiencing erosion would be stabilized.

FLAGG RANCH

Alternative A



Alternatives B & C (Preferred)



Alt. A Description

The Flagg Ranch boat launch site is located immediately downriver from a US 89/191/287 bridge over Snake River. The river is stable in this location without significant amounts of sedimentation or erosion.

The development at Flagg Ranch includes a 0.08-mile gravel road that extends from US 89/191/287 to the parking lot and boat ramp. There is one natural surface and metal matting ramp for boat launching. There is one picnic table adjacent to the parking lot. The parking lot is approximately 0.75 acres and rarely is full. The Wyoming Department of Environmental Quality maintains a building for monitoring a fuel-contaminated site in the area.

Flagg Ranch is the take-out point for private and commercial floating and fishing tours through Flagg canyon. Some boats put in at this location and float to Jackson Lake. Generally, the boats that use this launch are smaller in size (10- to 12-foot rafts, 12- to 14-foot drift boats, and whitewater kayaks). The launch receives light use.

Alt. B & C Description

In these alternatives, the parking area would be reduced in size to accommodate up to 10 vehicles. The portion of the parking lot that would no longer be used would be restored to natural conditions. The vehicle turnaround and the parking area would be delineated with natural materials to prevent future user created expansion of the area. "No Parking" signs would be installed in the vehicle turnaround area. A wayside providing boating and area information would replace the existing sign. A single nonflush toilet facility may be added near the parking lot area. To improve safety, the metal matting at the boat launch would be removed. One additional picnic table would be added.

The National Park Service would coordinate with the Wyoming Department of Environmental Quality to have the fuel-contaminated site monitoring well building removed when contaminant levels are reduced to acceptable levels.

JACKSON LAKE DAM

Alternative A

Alt. A Description

This boat launch site is not technically within the wild and scenic river corridor because of its proximity to Jackson Lake Dam. This is a highly stable section of river that does not experience much erosion or deposition. The site is located a few hundred feet from the outlet of the dam. It consists of a 20- to 30-foot high earthen berm used for parking, fishing, and launching boats. No formal boat launch facilities or designated areas exist at this site and user conflicts are common among visitors who are launching boats and visitors who are fishing. There is a second gravel parking area (upper parking lot) located further from the water that has a few picnic tables and restroom facilities; this parking lot receives light to moderate use.

This launch site is popular for private use and commercial fishing trips. The types of boats used at this site include drift boats, canoes and kayaks, and occasional rafts. Visitors hand carry or slide their boats down the gravel slope.

Alternative B

Alt. B Description

In alternative B, changes to the Jackson Lake Dam boat launch would enhance recreational opportunities for visitors. To more efficiently accommodate boat launching, two hardened single ramps (or one double-wide ramp) would be constructed at the far end of the lower parking area. This area would be dedicated to boat launching and staging (including rigging) in an effort to reduce visitor conflicts and improve visitor experience. As a result, parking in the lower parking area would be reduced and limited to passenger vehicles only (no RVs). It is anticipated that more vehicles would use the upper parking area. Pedestrian access between the two parking areas would be improved. Improvements to this site would stay within the existing developed footprint. Consultation with the Bureau of Reclamation would be required prior to any redesign of the area.

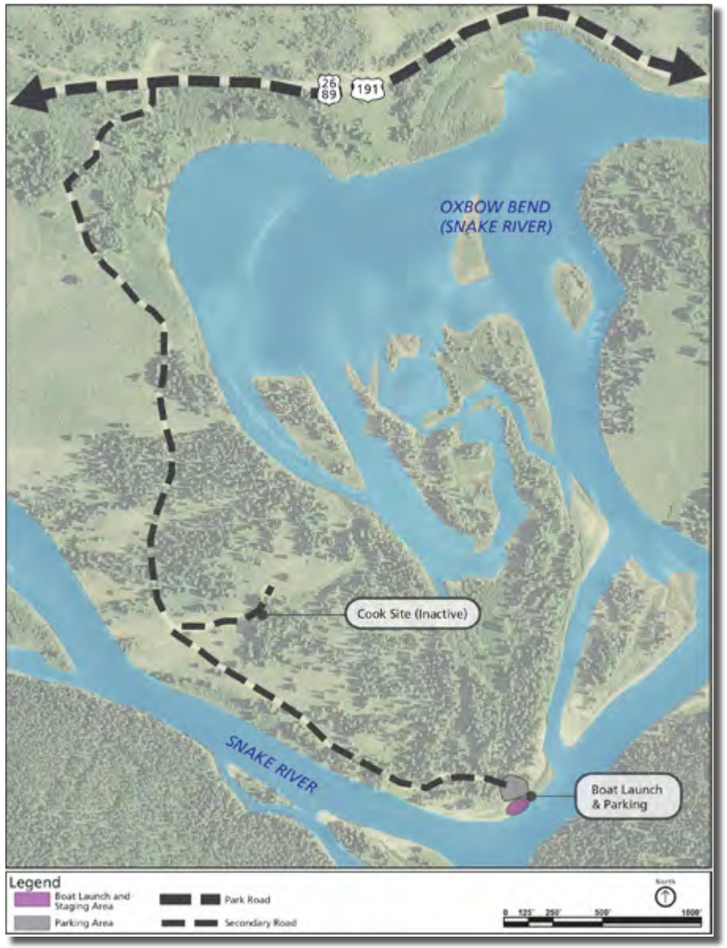
Alt. C (Preferred)

Alt. C Description

In alternative C, changes to the Jackson Lake Dam boat launch would enhance resource conditions. A single hardened ramp would be constructed at the far end of the lower parking area. In the existing lower parking area, the area near the ramp would be designated for boat launching, staging, and rigging use only. There would no longer be parking the lower area with the exception of accessible parking spaces; landscape improvements to enhance the function and natural appearance would be made. Pedestrian connections between the upper parking lot and the new staging area would be improved. The upper parking lot would be studied for redesign if it is determined that additional capacity is needed. Improvements to this site would stay within the existing developed footprint. Consultation with the Bureau of Reclamation would be required prior to any redesign of the area.

CATTLEMAN'S BRIDGE

Alternative A



Alt. A Description

A 1.15-mile gravel road extends south from US 26/89/191 to a small gravel parking lot and primitive boat launch site. Between the highway and the launch site is a cook site that is no longer used. At the parking lot and launch area, there is a large sign marking the former location of Cattleman's Bridge. There are no restroom facilities. The river is reasonably stable in this location, although the parking area and sections of the road do experience seasonal flooding. Most years this area has closures because of nesting eagles, making this area inaccessible to boaters. This area also has significant grizzly bear activity and visitor safety is a concern.

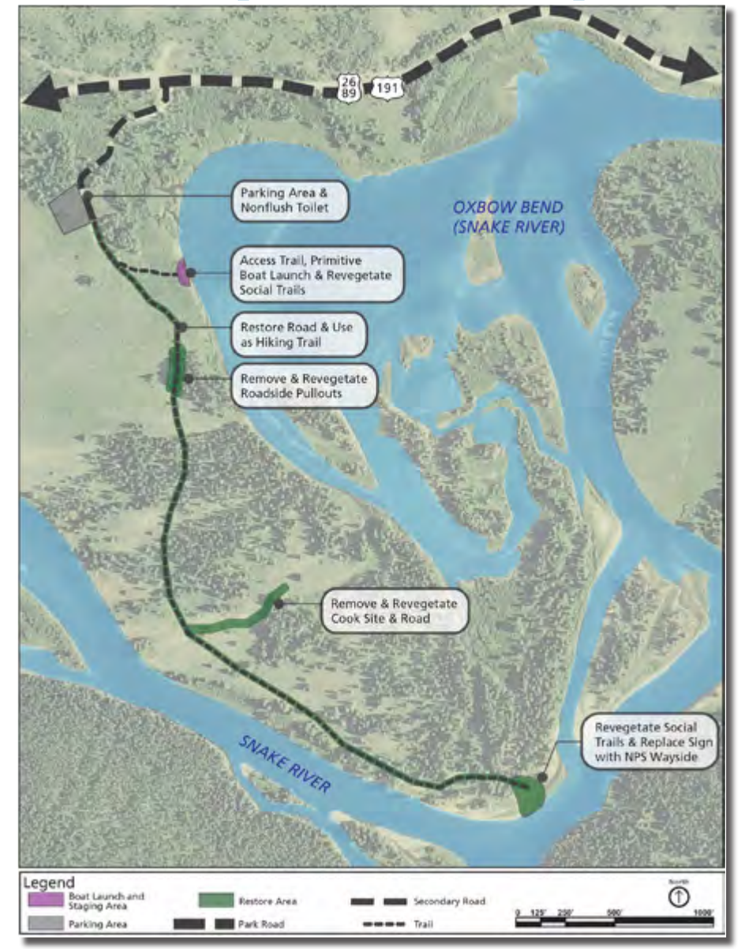
Cattleman's Bridge is the least used launch site of the nine river access points. There is some demand for put-in at this site by private users with small, non-trailered boats.

Alternative B

Alt. B Description

To provide a range of visitor opportunities, Cattleman's Bridge Road would be closed at the former cook site. A small parking area would be constructed and a nonflush restroom may be constructed at the former cook site. The cook site facilities would be removed and revegetated. A minimally improved boat launch facility for hand-carried boats would be located near the parking area. A trail would be developed on the remainder of the road and some restoration work would be done. The new hiking trail would loop back along the banks of Snake River. The existing Cattleman's Bridge sign would be replaced with a NPS wayside. This wayside would include information about the scenic segment of the Snake River.

Alt. C (Preferred)

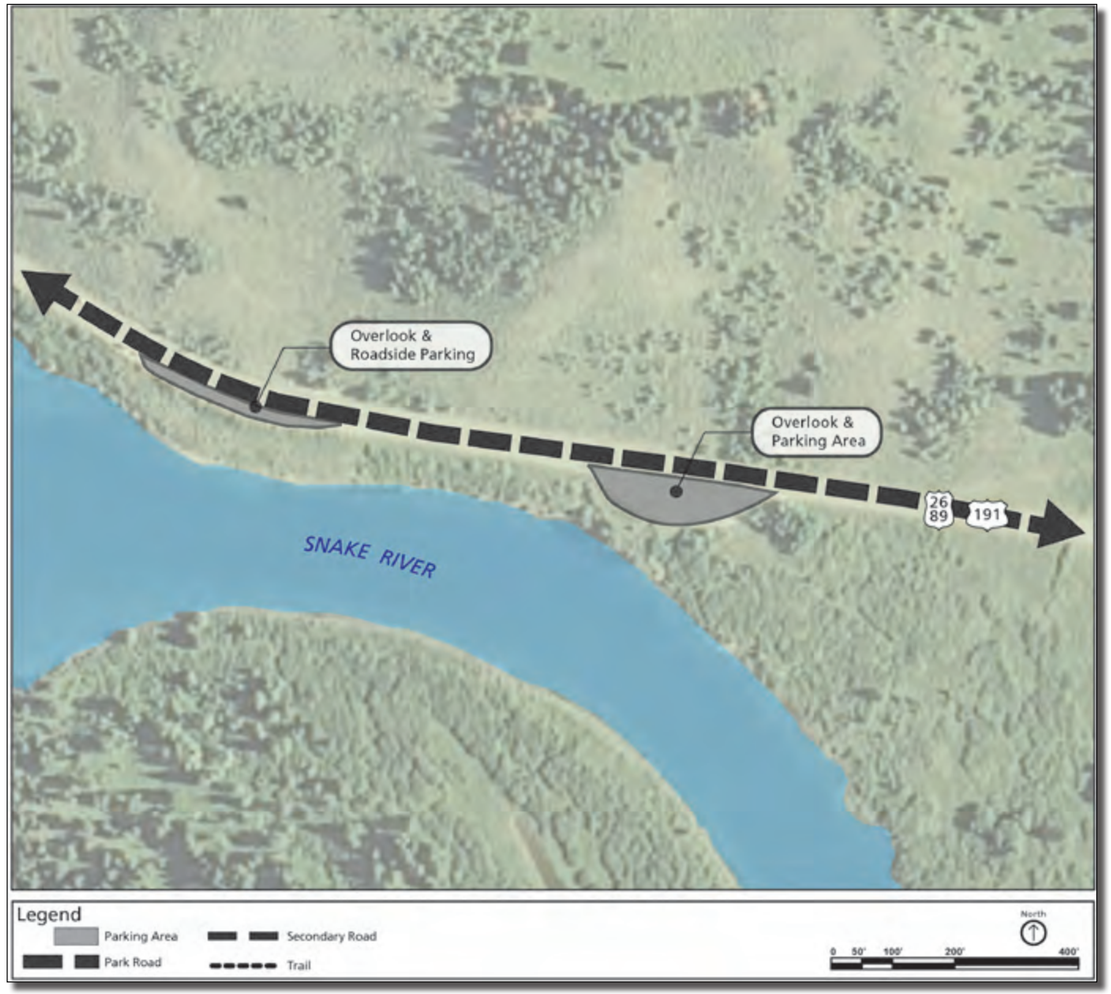


Alt. C Description

To enhance the resource conditions in this high value wildlife habitat area, the majority of the road to Cattleman's Bridge would be closed and the area partially restored to natural conditions. A small parking area (approximately 10 cars) would be constructed south of the intersection with US 26/89/191. A nonflush restroom may be added to the parking area. A trailhead would be located at the parking area and a hiking trail would be provided along the former road alignment. A portion of the hiking trail would be made accessible for people with disabilities. A new trail connecting the parking area to Oxbow Bend would be created and a primitive boat launch would be provided for hand-carried boats. The cook site area and boat launch parking area would be restored to natural conditions. The existing Cattleman's Bridge sign would be replaced with a NPS wayside. This wayside would include information about the scenic segment of the Snake River.

OXBOW BEND OVERLOOKS

Alternative A



Alt. A Description

These popular overlooks provide outstanding views of Teton Range with the Oxbow Bend feature of Snake River in the foreground. Oxbow Bend provides high quality habitat for many species, including moose, trumpeter swans, pelicans, and other birds. The area is a popular spot for viewing wildlife and photography.

Development at the overlooks includes a paved parking area and a paved parking pull-off. Both parking areas often reach capacity during periods of peak visitation or NPS ranger-led interpretive programs. Vegetation (scrubs and trees) at the overlooks obscures some views and visitors often walk down the slope from the parking area to the edge of the water to obtain clearer views. There is no official trail from either parking area and as a result there are many steep, eroded/erodable social trails leading to the water.

Alternatives B & C (Preferred)

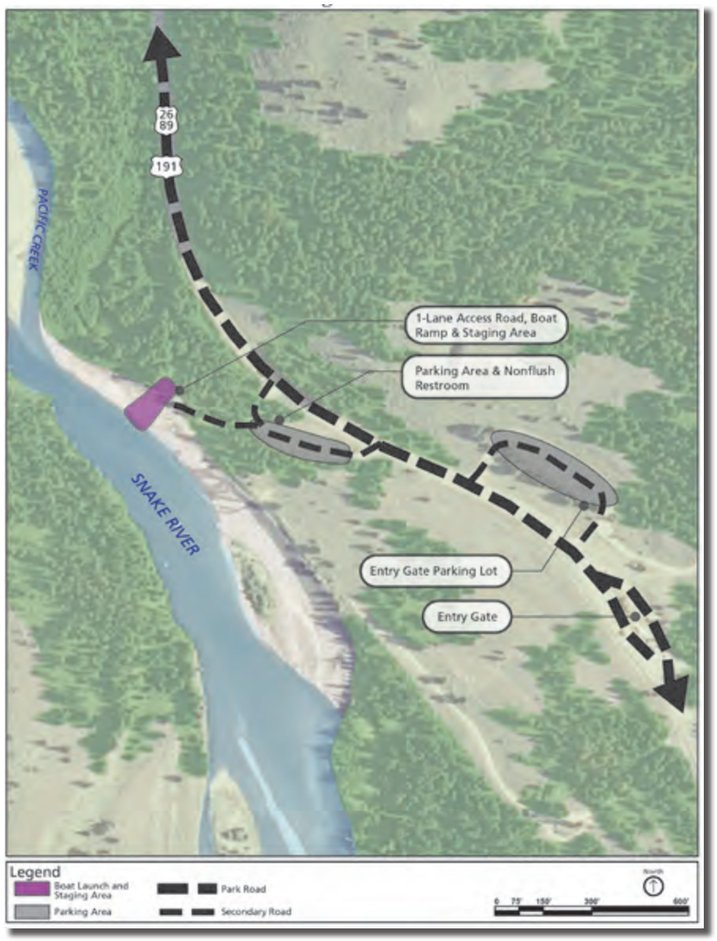
Alt. B & C Description

In these alternatives, the pavement in the eastern parking lot would be striped to improve efficiency and increase parking capacity. The parking lot would not be expanded. A wayside sign with wild and scenic river interpretation would be added to the overlook. If a restroom facility is constructed at Cattleman's Bridge (approximately 0.85 miles east), a sign would be installed at Oxbow Bend directing visitors to its location. A natural surface loop trail to the water would be added and the social trails would be revegetated.

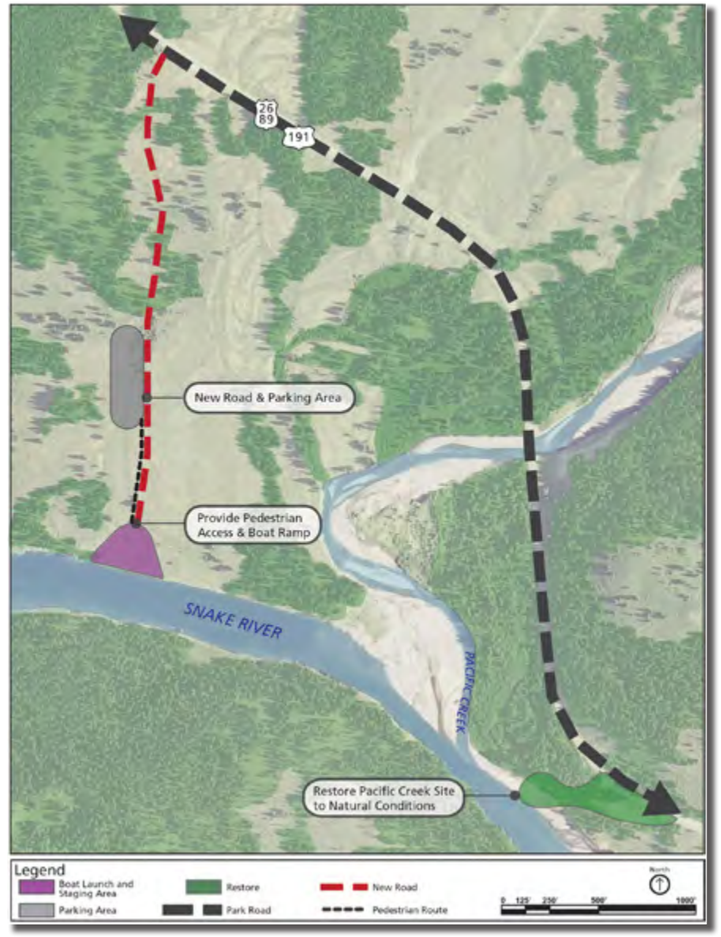
Barriers would be added to the western overlook to keep vehicles from parking in vegetated areas. Social trails and other denuded areas would be revegetated. A loop trail connecting the parking area to the water would be added.

PACIFIC CREEK LANDING

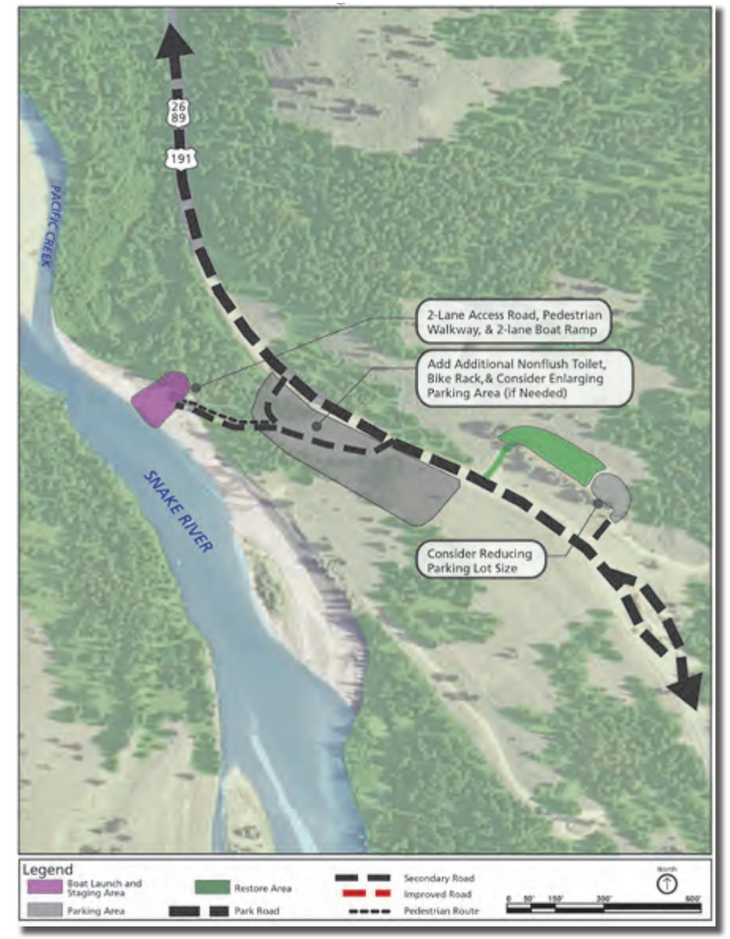
Alternative A



Alternative B



Alt. C (Preferred)



Alt. A Description

Just northwest of the Moran entrance station is the Pacific Creek launch site. The hydrological and geomorphological conditions at this location are the most challenging of the boat launch sites due to its location just below the Pacific Creek confluence. This location results in high levels of sedimentation that require frequent maintenance and adaptive management (e.g., sediment removal, application of temporary matting) of the ramp to maintain access through the season. This launch site consists of a medium-sized paved parking lot, a nonflush restroom facility, a one-lane road connecting the parking area to the launch, a failing log and boulder retaining wall, a boat ramp, and the associated ramp circulation area. Located across US 26/89/191 is a asphalt parking area. This parking lot is occasionally used for overflow parking from the Pacific Creek parking lot. There are safety concerns regarding pedestrian travel between the two sites due to the alignment of the road and proximity of the entry gate station.

Pacific Creek Landing is the most heavily used take-out site for private users with mostly drift boats, canoes, and kayaks. It is also a heavily used put-in site for commercial fishing. There is some commercial put-in for rafting. There is a high volume of fishing users at this launch site. Fishing users predominantly use 14- to 16-foot drift boats and some 12- to 14-foot rafts. Scenic rafting use is mostly 20-foot rafts, some 14- to 18- foot rafts, and a few 28- to 32-foot rafts. Most boaters are using trailers at this site.

Alt. B Description

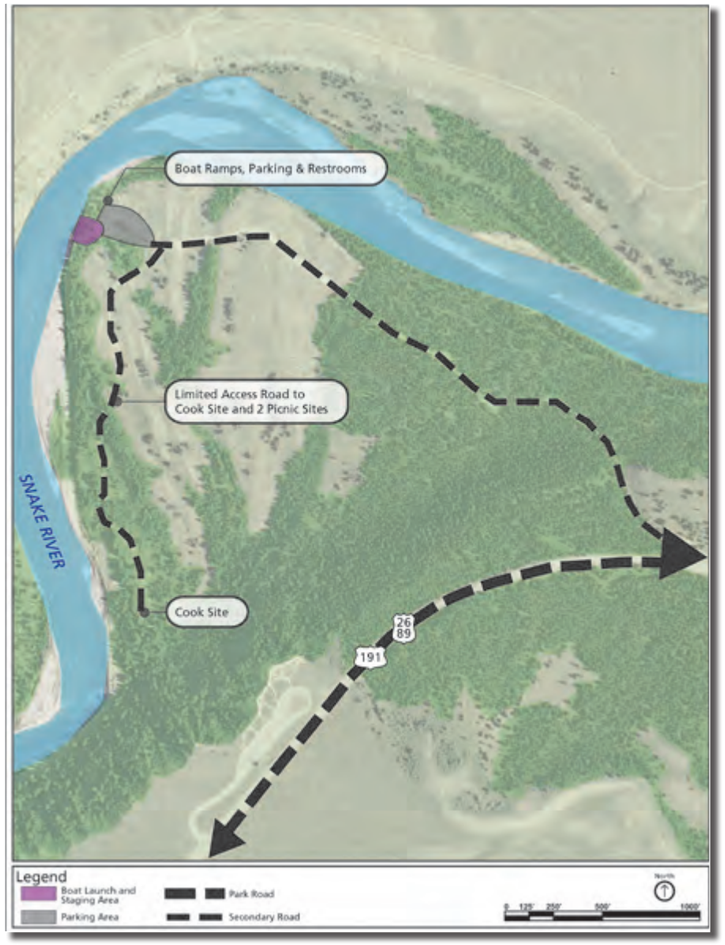
To provide improved boat launch access, the site would be moved to a more stable location above the confluence of Pacific Creek. The following infrastructure would be developed at the new site: a 0.75-mile access road, a pedestrian path, a medium-sized parking lot, and a double-wide articulated concrete ramp. A nonflush restroom facility may be constructed. While this location is more stable and access would be improved, the river banks are approximately 25 feet above the river and the ramp would require a large volume of excavation. The current Pacific Creek boat ramp and all associated development, with the exception of the entry gate parking lot, would be restored to natural conditions.

Alt. C Description

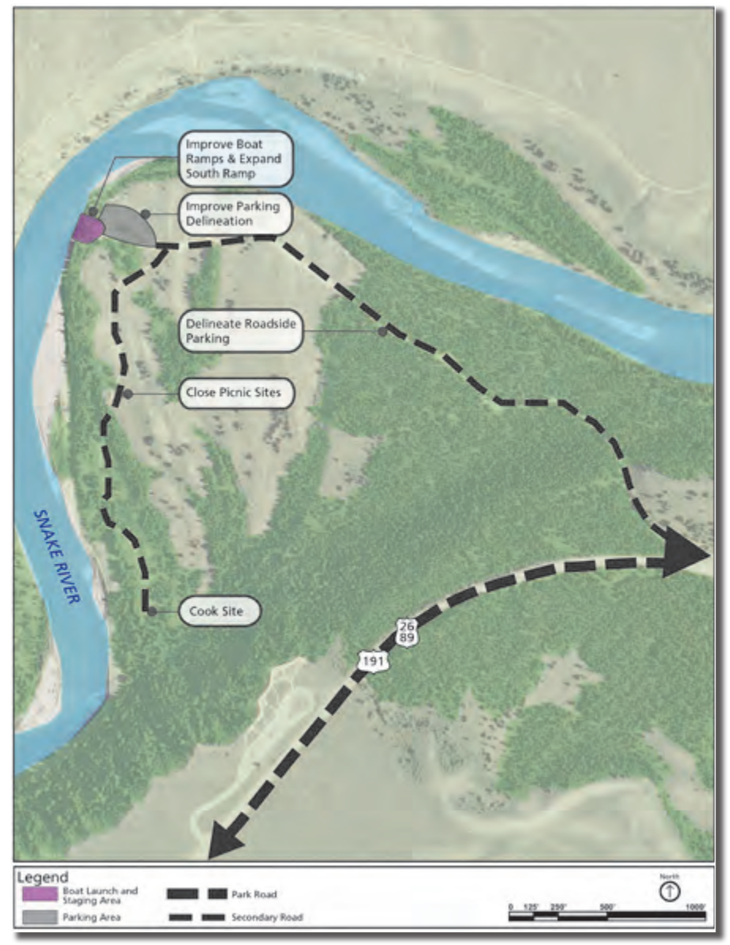
In this alternative, the boat launch facilities would remain at the current site. Given the rapidly changing conditions and dynamic nature of the river in this location, this site would require intensive management and maintenance. The launch would be expanded to two lanes and nonpermanent materials and active maintenance would be used to maintain ramp access. The circulation area would be minimally expanded to allow for new turning movements. For improved safety and circulation, the one-lane road extending to the launch (from the parking lot) would be expanded to accommodate two-way traffic and a pedestrian walkway. The failing retaining wall would be reconstructed and designed to blend in with the natural environment. The park staff would evaluate the capacity needs and efficiency of the existing parking lot, which was recently reconfigured. If more parking is needed, the park staff would consider expanding the existing parking lot to the southeast. Park management would also consider reducing the size of the parking lot near the Moran entrance station. An additional nonflush toilet may be added and the relocation of the existing nonflush toilet would be considered to improve functionality.

DEADMANS BAR

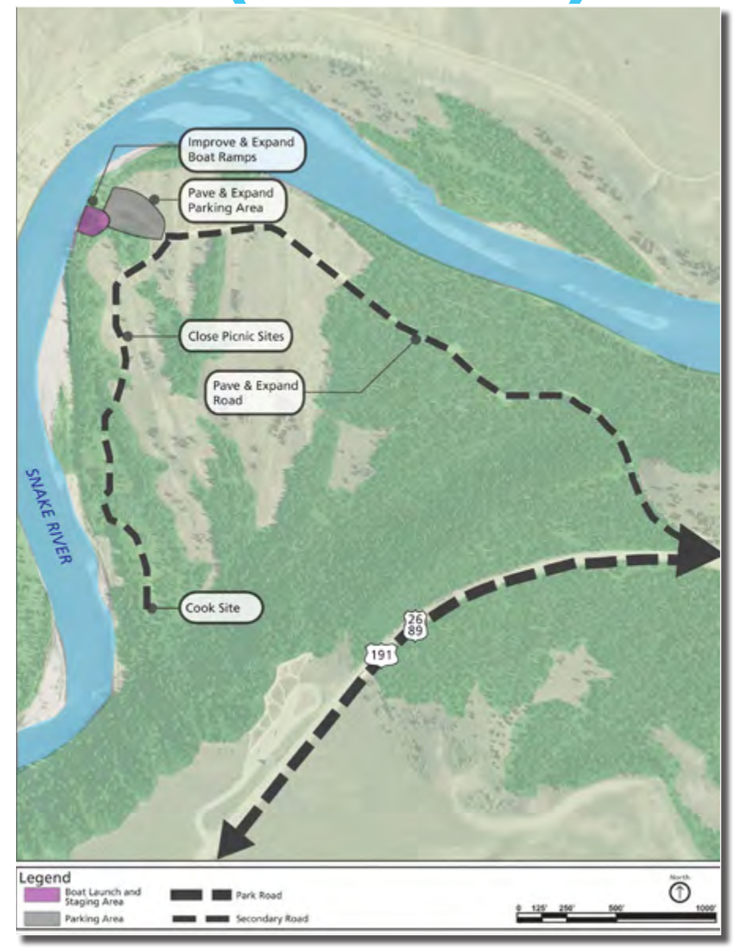
Alternative A



Alternative B



Alt. C (Preferred)



Alt. A Description

The hydrologic and geomorphic conditions at Deadmans Bar are challenging, but reasonably stable. The boat ramp is located on the inside of a bend, on what is essentially a point bar. Unlike most point bars, this bar is relatively stable in location due to the high, slowly eroding bluff on the other side of the river. The location of the ramp above the gravel bar does present some operational difficulties. During the majority of the season, visitors must navigate the shallow cobble bottom portion of the river to reach the main current.

The development at Deadmans Bar includes a 0.83-mile gravel and paved road that extends from US 26/89/191 to the parking lot and boat ramp. There are two sand ramps and nonflush restroom facilities adjacent to the gravel parking lot. A concessioner operated cooksite and picnic area is located on a 0.25 mile limited access gravel road.

Deadman's Bar is the most heavily used put-in site for commercial users (mostly scenic). The upstream launch is more heavily used because there is a rock outcropping downstream of this launch site and boats entering the river at the upstream launch site have more time to navigate around the rock outcropping. The fishing users predominantly use 14- to 16-foot drift boats and 12- to 14-foot rafts. Scenic rafting use is mostly 20-foot rafts, a few 14- to 18-foot rafts, and a few 28- to 32-foot rafts.

Alt. B Description

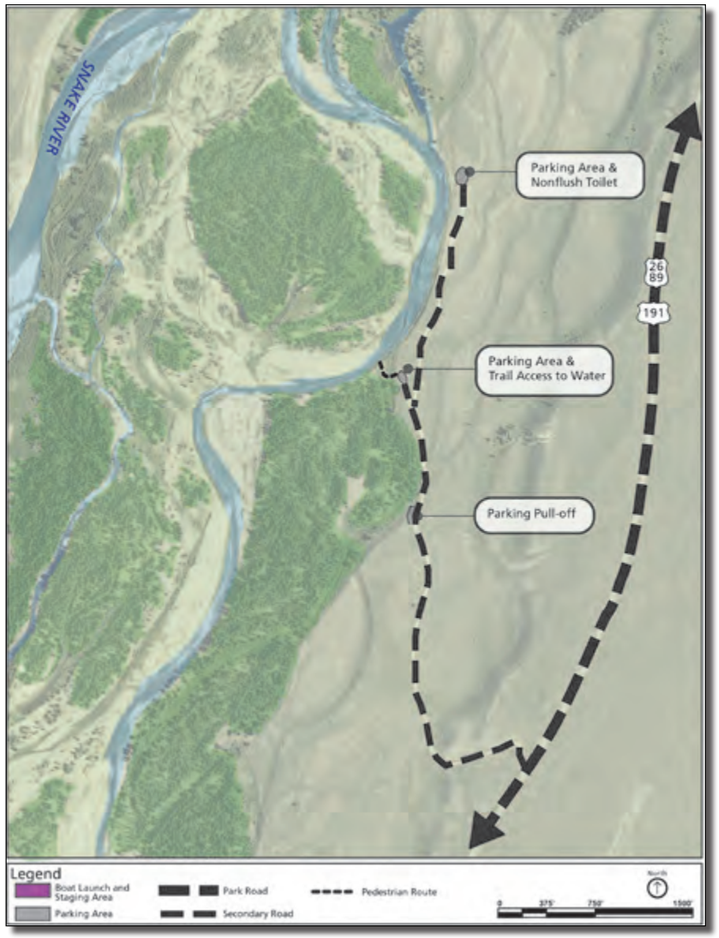
In this alternative, roadside parking would be delineated with natural materials. Parking lot efficiency would be improved through signage and improved delineation using natural materials (e.g., partially buried logs). The south boat launch would be expanded to two lanes. A new material, such as articulated concrete block, would be used for one or both of the ramps to improve access. A phased approach would be used to better understand the potential of a new material. The cook site would be maintained and the two picnic sites would be restored to natural conditions.

Alt. C Description

In this alternative, the portions of the access road that are gravel would be paved and slightly expanded to accommodate two-lane traffic, where needed. Areas along the road previously used for parking would be restored. The parking lot would be expanded, paved, and striped to improve efficiency and parking capacity. A new material, such as articulated concrete block, would be used for one or both of the ramps to improve access. The ramps would be expanded to two lanes. A phased approach would be used to better understand the potential of a new material. The cook site would be improved to reduce wildlife-human interactions. The two picnic sites would be phased out and restored to natural conditions.

SCHWABACHER LANDING

Alternative A



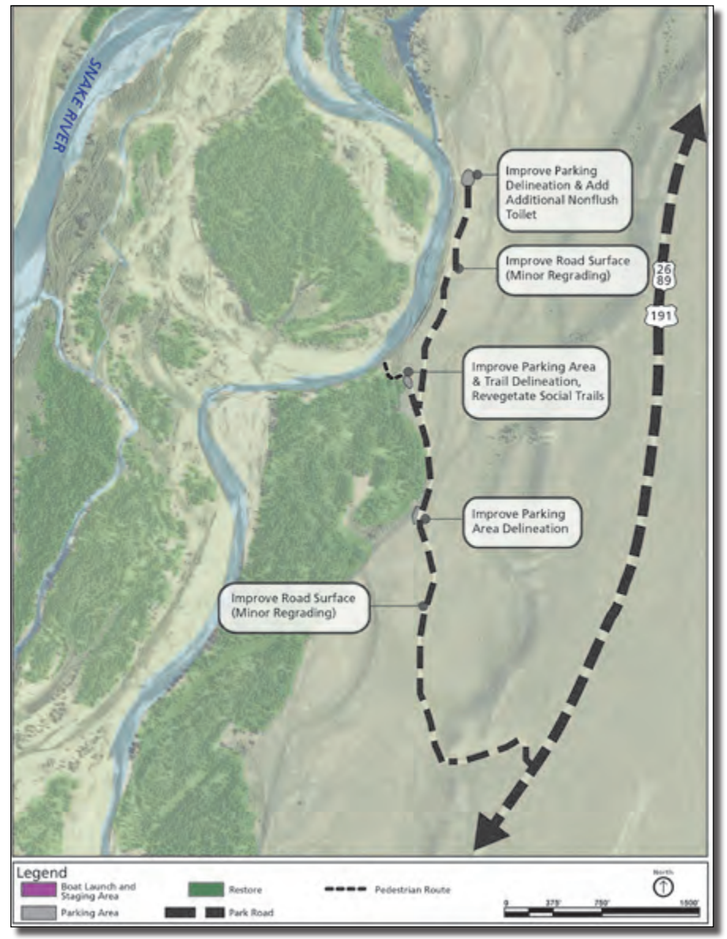
Alt. A Description

Schwabacher Landing is located in a braided section of Snake River. For many years, the main channel of Snake River was located near the two parking areas. The main channel is currently located to the west of the road and parking area. There is a smaller channel that passes by the parking lot and road areas, but it is often shallow and boat access is very limited.

The development at Schwabacher Landing includes a 1.1-mile gravel road, small southernmost parking area adjacent to the road (0.08 acres), a middle parking area (0.12 acres) and short trail to the water, and a northernmost larger parking area (0.28 acres) with a single nonflush restroom. All roads and parking areas are gravel.*

Schwabacher Landing is a popular location for events (by special use permit) such as weddings, fishing, and scenic views (Teton Range and wildlife).

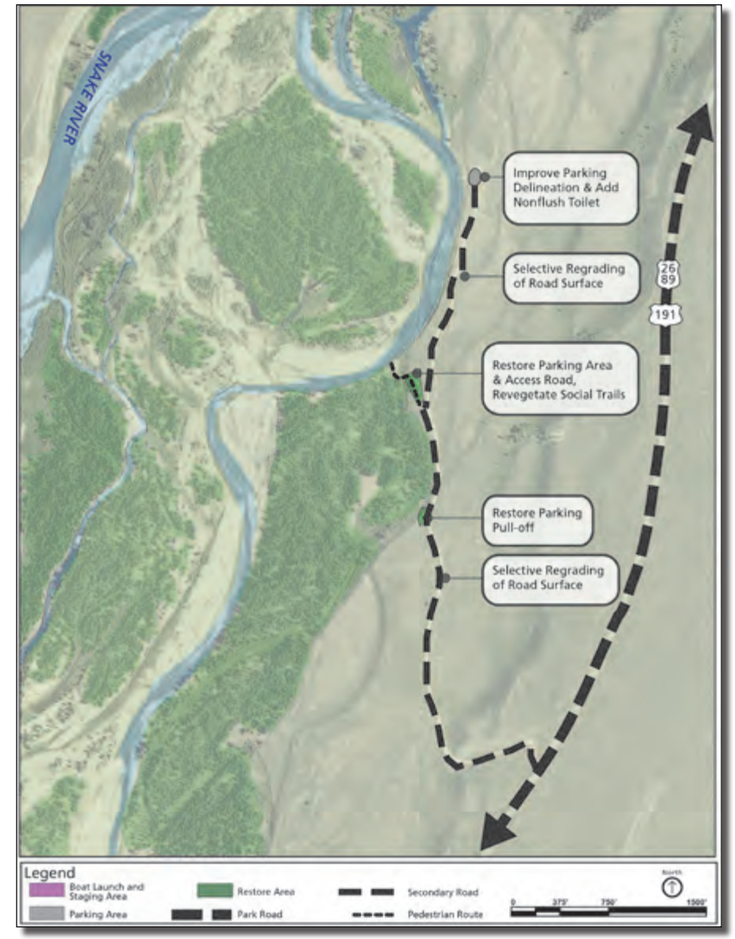
Alternative B



Alt. B Description

Under this alternative, a majority of the road would undergo minor regrading. The road surface and parking lot surfaceswould remain gravel. The extents of the parking areas and the spaces would be better delineated with natural materials (e.g., logs) to improve parking efficiency and to limit cars from driving in vegetated areas. Improvements to the trail connecting the middle parking area to the water would be made to improve delineation. The trail would remain a natural surface. Barriers (e.g., boulders, posts) would be installed to prevent vehicle access on the trail. Social trails would be revegetated. A second nonflush restroom may be added to the northernmost parking area.

Alt. C (Preferred)



Alt. C Description

In this alternative, parking would be consolidated in the northern lot. The road would experience selective regrading to address isolated areas with surface ruts. The two southern parking lots would be restored to natural conditions. The trail to the water would be better delineated and extended to the road. Barriers (e.g., boulders, posts) would be installed to prevent vehicle access on the trail. Social trails in the vicinity of the trail would be revegetated. The extents of the northern parking area and the parking spaces would be better delineated with natural materials (e.g., logs) to improve parking efficiency and to limit cars from driving in vegetated areas. A second nonflush restroom may be added to the northernmost parking area.

*In 2014, the park plans to pave the upper 0.33 mile of Schwabacher Road, widening it slightly in some places to achieve a standard 16 foot width. The rest of the road will remain gravel.

MOOSE LANDING

Alternative A

Alt. A Description

The area is one of the few reaches of Snake River with a single thread channel. There is a slight bend to the east, which tends to keep much of the flow energy on the west bank. This situation causes bank erosion and the development of submerged bars near the west bank. A gravel bar is dredged approximately every 10 years to maintain access to the boating facilities. It is possible that the bridge located downstream also adds complexity to the river processes in this reach. To minimize the rate of erosion on the west bank, it is important to maintain a healthy riparian forest, the roots of which add structural integrity to the bank.

The Moose Landing boat launch facilities are located between the park administrative area and Snake River, north of Craig Thomas Discovery and Visitor Center. The boat launch development is scattered along the shore. The development includes a gravel parking lot and staging area (used by concessioners), several boat pullouts/passenger unloading areas ("Landing Area"), new trails, concrete ramp ("Upper Ramp"), concrete ramp with overhead hoisting infrastructure ("Lower Ramp"), a concrete and steel retaining wall, nonflush restroom facilities, concessioner rigging area, concessioner client parking area, and a RV and angler parking lot.

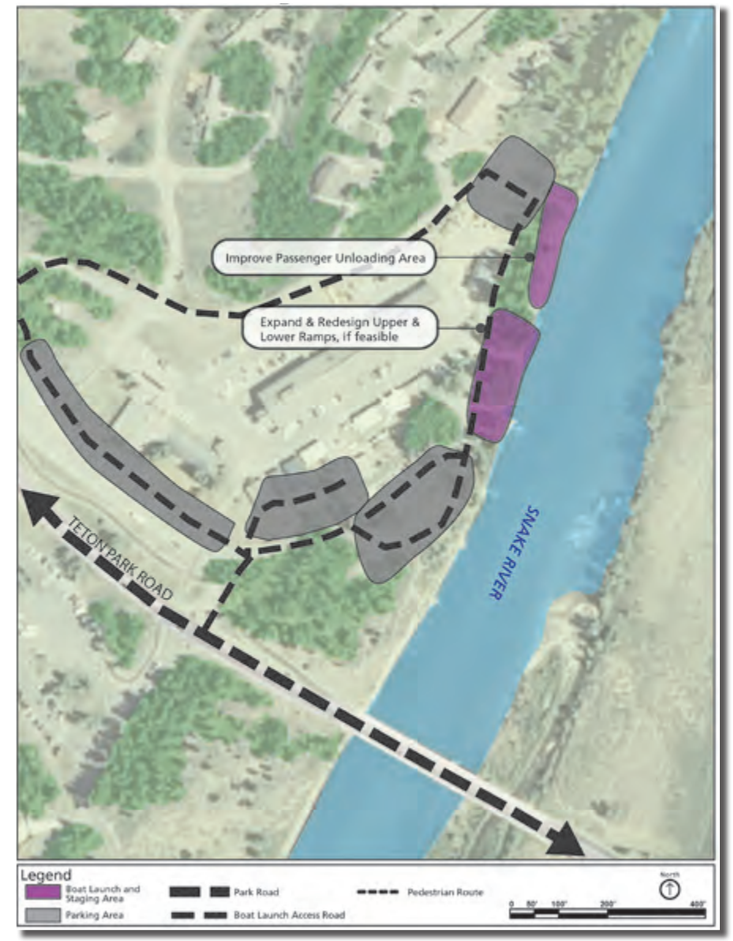
Moose Landing is the busiest boat launch site under study in this plan. This site is primarily used for getting off the river, and is predominantly used by concessioners removing 20-foot rafts. There are a few 28- to 32-foot rafts pulling out at this site. This site can get congested with up to ten to twelve 20-foot rafts trying to get off the river at the same time.

Alternative B

Alt. B Description

This alternative would consolidate boating facilities in one location near the existing visitor parking lot. This alternative would seek to create an improved separation between the administrative facilities and the boating facilities. The new consolidated site would include two double ramps, parking for visitors, boat trailer parking and rigging area, and restroom facilities. The ramps would be designed to create eddies to allow for safe access. The previously used boat ramps would be restored while providing for bank protection designed to blend with the natural environments (i.e., boulders, fill material, and vegetation). The previously used northern parking area and boat pullouts would be restored to natural conditions.

Alt. C (Preferred)



Alt. C Description

This alternative would consider expanding and redesigning one or both of the boat ramps while maintaining the maximum amount of vegetation. The vegetation is critical to bank stabilization, so expansion of the ramp(s) would be carefully balanced with the need to secure the bank. The retaining wall would be redesigned to create an improved eddy for the second ramp. The boat pullouts would be secured with terracing, natural bank protection including vegetation, and improved delineation of use and trail areas to reduce erosion. Due to the dynamic nature of the river in this location, this site would require adaptive management and regular maintenance during the boating season. Trail links to the administrative complex trail would be developed.

Summary Tables

SUMMARY OF KEY DIFFERENCES AND IMPACTS AMONG THE ALTERNATIVES

A summary of key differences among the alternatives is presented in the following tables. Table 5 compares the broad-level strategies that would be applied across the entire NPS- and USFWS-managed wild and scenic river designation. Table 6 compares the types and levels of development for each of the seven designated wild and scenic river segments by alternative. Table 7 compares the user capacity components for each of the seven river segments by alternative. Site-specific management strategies are not included in the summary tables. To understand the differences between the site-specific management strategies, please refer back to the diagrams and descriptions for each site. Table 8 provides a summary of impact of the alternatives. These summaries were derived from the conclusion statements presented in "Chapter 5: Environmental Consequences," and do not include cumulative impacts. For more information on how these conclusions were reached, please see chapter 5.

TABLE 5. SUMMARY OF KEY DIFFERENCES AMONG THE ALTERNATIVES—HEADWATERS-WIDE STRATEGIES

Alternative A: No Action	Alternatives B and C
Natural Resources Management Strategies	
Ecological/Wildlife ▪ Continue to encourage appropriate human behavior toward bears to visitors within the designated wild and scenic river corridors, including food storage requirements and visitor education to minimize conflicts (mainly with the use of signs along roads, at launches, and posted in restrooms). ▪ Continue to implement seasonal visitor use closures for nesting bald eagles and peregrine falcons. These include, but are not limited to, nesting sites at Cattleman's Bridge, Triangle X cook site, and on the Gros Ventre River. ▪ Continue to implement winter closures along the Snake River bottom from Moose north to Moran Junction and along Buffalo Fork from December 15 to April 1, to avoid disturbance of wildlife. **Fish** ▪ Continue to coordinate with Wyoming Game and Fish Department on aquatic invasive species inspections of boats entering park waters to prevent the introduction and spread of nonnative plants and animals. ▪ Continue to coordinate with Wyoming Game and Fish Department to conduct periodic fisheries monitoring and creel surveys. ▪ Continue to implement seasonal fishing closures to protect spawning fish. **Free-flowing Condition** ▪ Continue to evaluate water resource projects to ensure consistency with the wild and scenic river designation. (See section 7 "Evaluation Guidelines" in chapter 3.) **Water Quality** ▪ Continue periodic monitoring to ensure water quality remains in good condition. ▪ Continue to mitigate the effects of snow storage and stormwater runoff at developed areas to avoid water quality degradation of designated wild and scenic river segments.	The following management strategies would be applied to all the natural resource-related outstandingly remarkable values, including free-flowing condition and water quality: ▪ Review and adjust park maintenance activities (e.g., road sanding, culvert cleaning, and boat launch maintenance) as needed to ensure impacts on wild and scenic river values are minimized. ▪ Coordinate wild and scenic river management activities across all park divisions to ensure an integrated, interdisciplinary management approach. ▪ Collaborate with neighboring federal and state agencies on resource management issues, scientific research, and monitoring. (See the monitoring section in chapter 2 for more information about natural resource-related indicators.) **Ecological/Wildlife** ▪ Continue to encourage appropriate human behavior toward bears to visitors within the designated wild and scenic river corridors, including food storage requirements and visitor education to minimize conflicts (mainly with the use of signs along roads, at launches, and posted in restrooms). ▪ Continue to implement winter closures along the Snake River bottom from Moose north to Moran Junction and along Buffalo Fork from December 15 to April 1, to avoid disturbance of wildlife. ▪ Continue to implement seasonal visitor use closures for nesting bald eagles and peregrine falcons. These include, but are not limited to, nesting sites at Cattleman's Bridge, Triangle X cook site, and on the Gros Ventre River. Utilize area closures for other resource protection purposes as necessary. ▪ Identify species of concern and coordinate monitoring and protection activities between park units and other federal and state agencies. ▪ Establish thresholds that would indicate minimally acceptable levels of human disturbance (e.g., abandonment of historic eagle and osprey nest sites, increased number of grizzly bear encounters, or decreased observations of certain species). ▪ Promote Leave No Trace principles by educating wild and scenic river visitors about how to enjoy river resources without negatively affecting river-related values. ▪ Coordinate with other federal and state agencies to manage and prevent the introduction and spread of invasive aquatic and terrestrial species within and adjacent to the designated wild and scenic river corridors. ▪ Accommodate wildlife and fish passage with road crossings, culverts, and other similar techniques. **Fish** ▪ Continue to coordinate with Wyoming Game and Fish Department on aquatic invasive species inspections of boats entering park waters to prevent the introduction and spread of nonnative plants and animals. ▪ Continue to coordinate with Wyoming Game and Fish Department to conduct periodic fisheries monitoring and creel surveys. ▪ Continue to implement seasonal fishing closures to protect spawning fish. ▪ Identify aquatic species of concern and coordinate monitoring and protection activities between park units and other federal and state agencies.
	Free-flowing Condition ▪ Continue to evaluate water resource projects to ensure consistency with the wild and scenic river designation. (See section 7 "Evaluation Guidelines" in chapter 3.) ▪ When river channels migrate against roads, seek solutions that allow the continuation of natural river processes. ▪ When feasible, modify bridges, culverts, riprap, and other developments that impede the free-flowing condition of designated wild and scenic river segments. ▪ Apply sustainable design practices to any new NPS or USFWS infrastructure that could potentially affect the free-flowing condition to ensure the infrastructure does not degrade this river value. ▪ Commit to working with public and private partners (e.g., highway departments, private landowners) to raise awareness of what it takes to meet free-flowing condition standards of the Wild and Scenic Rivers Act. **Water Quality** ▪ Continue periodic monitoring to ensure water quality remains in good condition. ▪ Continue to mitigate the effects of snow storage and stormwater runoff at developed areas to avoid changes in water quality of designated wild and scenic river. Modify boat launches, access roads, and parking lots as necessary to prevent sedimentation of designated river segments. **Geologic** ▪ Promote Leave No Trace principles by educating visitors about the harmful effects of social trailing along the rivers that can destabilize riparian vegetation and lead to bank erosion. ▪ Utilize area closures of geothermal features as necessary to protect sensitive resources. ▪ Allow natural geomorphic processes (including channel braiding, lateral erosion, aggradation, and degradation) to continue. Where infrastructure exists (e.g., boat ramps, roads, culverts), the National Park Service and U.S. Fish and Wildlife Service would strive to maintain the geomorphic processes to the extent possible. Also, natural materials, including vegetation, rocks, and wood, would be used for erosion control and riverbank stabilization efforts to maintain the natural processes and appearance of the river segment.

TABLE 5. SUMMARY OF KEY DIFFERENCES AMONG THE ALTERNATIVES—HEADWATERS-WIDE STRATEGIES

Alternative A: No Action	Alternatives B and C
Cultural Resources Management Strategies	
▪ In compliance with section 106 of the National Historic Preservation Act, cultural resources inventory would continue to occur prior to all infrastructure improvements and other projects involving construction or ground disturbance. National register-eligible cultural resources discovered would be avoided and protected during subsequent planned projects. ▪ Continue to provide limited interpretation of select cultural resources within the designated wild and scenic river corridors. ▪ Continue to periodically monitor and record the condition of cultural resources within the river corridor. Management to protect threatened resources would require additional actions, to be determined on a case-by-case basis. ▪ Historic structures and cultural landscapes would continue to be maintained to retain these resources' current levels of integrity to the maximum extent possible. Ongoing preservation and maintenance activities would employ techniques that are sensitive to the river and its landscape to protect natural ecosystem processes and wilderness values where appropriate. All treatments of archeological resources, historic structures, cultural landscapes, or ethnographic resources must be planned in consultation with the Wyoming State Historic Preservation Office and other consulting groups. All restoration or rehabilitation activities to historic structures or cultural landscapes would be planned and conducted in accordance with NPS *Management Policies 2006*, Chapter 5: Cultural Resources, and following *The Secretary of the Interior's Standards and Guidelines for the Treatment of Historic Properties* (1995). ▪ Ethnographic resources, including those involving American Indian traditional cultural uses, would continue to be managed in consultation with associated tribes.	▪ In compliance with section 106 of the National Historic Preservation Act, cultural resources inventories would continue to occur prior to all infrastructure improvements and other projects involving construction or ground disturbance. National register-eligible cultural resources discovered would be avoided and protected during subsequent planned projects. ▪ Continue to periodically monitor and record the condition of cultural resources within the river corridors. Management to protect threatened resources would require additional actions, to be determined on a case-by-case basis. ▪ Historic structures and cultural landscapes would continue to be maintained to retain these resources' current levels of integrity to the maximum extent possible. Ongoing preservation and maintenance activities would employ techniques that are sensitive to the river and its landscape to protect natural ecosystem processes and wilderness values where appropriate. All treatments of archeological resources, historic structures, cultural landscapes, or ethnographic resources must be planned in consultation with the Wyoming State Historic Preservation Office and other consulting groups. All restoration or rehabilitation activities to historic structures or cultural landscapes would be planned and conducted in accordance with NPS *Management Policies 2006*, Chapter 5: Cultural Resources, and following *The Secretary of the Interior's Standards and Guidelines for the Treatment of Historic Properties* (1995). ▪ Ethnographic resources, including those involving American Indian traditional cultural uses, would continue to be managed in consultation with associated tribes. ▪ Coordinate with partner agencies to develop a prehistoric and historic resources study specific to the history of human occupation and the use of the Snake River Headwaters. This understanding of the "big picture" of human use and settlement on the Snake River Headwaters would best aid cultural resources managers and the development of interpretive and educational tools. ▪ In support of ongoing efforts to inventory and document designated river segments that have not been previously surveyed, seek permission to conduct cultural resources inventories on nonfederal inholdings within the wild and scenic boundary. Inventories and monitoring of cultural sites would be carried out on nonfederal land only with the landowner's permission or as specified in landowner agreements. The agency would seek agreements with landowners to develop appropriate strategies for protecting identified cultural resources. ▪ Expand existing interpretation and education programs to include the historic significance of river corridors, the history of human use of the river segments, and the outstandingly remarkable cultural values associated with the Snake River Headwaters. The goal of this expanded program would encourage understanding and appreciation of historical and archeological sites, cultural landscapes, and ethnographic resources. ▪ On-site interpretation of the history and cultural values of the wild and scenic corridors would be emphasized in river segments classified as scenic, including easily accessible historic sites, such as the Bar BC Dude Ranch and 4 Lazy F Dude Ranch. On-site interpretation could include ranger-led interpretive programs, wayside exhibits, or signs. Cultural resources within river segments classified as wild would be interpreted at an off-site location in order to maintain the undeveloped character of these river corridors. Interpretive materials would be enhanced by information available in the historic resource survey.
Scenery Conservation Measures	
▪ There is currently no formal guidance for protecting scenic views within the river corridors; however, some maintenance of scenic vistas would continue when conditions warrant (i.e., vegetation pruning and removal).	▪ The unparalleled scenery of the Snake River Headwaters has been identified as an outstandingly remarkable value—an important characteristic that makes this river system worthy of protection under the Wild and Scenic Rivers Act. To ensure the protection of this iconic scenic landscape, the following set of scenery conservation measures would be implemented under all action alternatives: ▫ Evaluate the compatibility of existing and any newly proposed developments to protect scenic river values. Facilities would be designed, sited, and constructed to avoid or minimize visual intrusion. ▫ Minimize the use of signs within the designated river corridors. When signs are necessary, maintain a consistent sign theme and place them in areas that minimize visual impacts. ▫ Utilize vegetation treatments to screen and blend structures with the natural landscape. ▫ Design and maintain developed and dispersed recreation sites to reduce visibility from designated river segments. ▫ Emphasize the use of natural materials (e.g., vegetation, rocks, and wood) for erosion control and riverbank stabilization efforts to maintain the natural appearance of the river corridors. Structures would be designed to minimize visual intrusions to the maximum extent possible, consistent with section 7 of the Wild and Scenic Rivers Act. ▫ Where appropriate, use facilities such as designated trails, boardwalks, and directional fencing to route people away from sensitive natural and cultural resources, while permitting access to important viewpoints. ▫ Maintain historic vistas and other remarkable views, to the extent possible, allowing visitors the opportunities to experience a variety of scenic settings without disrupting the integrity of the natural ecosystem. Where possible, allow these viewpoints to be dynamic and subject to change due to natural processes (i.e., geologic, hydrologic, and vegetation changes).

TABLE 5. SUMMARY OF KEY DIFFERENCES AMONG THE ALTERNATIVES—HEADWATERS-WIDE STRATEGIES

Alternative A: No Action	Alternatives B and C
Recreation Management Strategies	
▪ Continue to manage recreation use within the river corridors without a comprehensive river management plan. General recreation management guidelines described in the Snake River Plan (1997) would continue to provide overarching management direction for the Snake River below Jackson Lake in Grand Teton National Park.	▪ Visitor use management strategies would include: ▫ Implement visitor use and impact monitoring program using indicators and standards of quality. ▫ Develop interpretive and educational messaging related to the Wild and Scenic Rivers Act and the protection of river values. ▫ In general, provide a range of visitor experience opportunities. ▫ Implement periodic checks of boats for aquatic invasive species. ▫ Continue state and park fishing and hunting regulations where appropriate. ▫ Improve launch and river access points (locations and specific improvements vary by alternative). ▫ Utilize area closures to prevent visitor use impacts on wildlife such as nesting bird species. ▫ Improve signing and wayfinding where needed. ▫ Delineate parking areas with fencing or other barriers to avoid impacts on soils and vegetation. ▫ Designate and delineate river access points to prevent social trails and related bank erosion issues along the river. ▫ Educate visitors on Leave No Trace ethics to minimize resource impacts. ▫ Continue food storage and bear safety programs.
Partnership Strategies	
▪ Continue to partner with federal and state agencies to monitor water quality and other biological indicators. Some partnership efforts are underway to collaborate on managing the Greater Yellowstone Ecosystem, yet there is little emphasis on managing the Snake River Headwaters across agency boundaries.	▪ In the same spirit of collaboration that led to designate the Snake River Headwaters, the National Park Service would explore a broader base of partnerships with federal and state agencies, communities, private landowners, and interested citizens throughout the implementation of this comprehensive river management plan. The following set of strategies has been developed to promote this partnership approach: ▫ The National Park Service has worked closely with the U.S. Fish and Wildlife Service to develop this plan, which includes joint management guidance for a portion of the Gros Ventre River. This designated river segment serves as the boundary between Grand Teton National Park and the National Elk Refuge. The National Park Service would continue to partner with the U.S. Fish and Wildlife Service on managing the Gros Ventre River throughout the implementation of this plan. ▫ The National Park Service and Bridger-Teton National Forest have worked collaboratively, developing separate yet concurrent management plans for the Snake River Headwaters. The National Park Service would continue to work collaboratively with the U.S. Forest Service to ensure the most seamless management possible for designated river segments. When consistent management is not possible on river segments that cross agency boundaries (e.g., different allowable uses), the National Park Service would coordinate with the U.S. Forest Service to develop joint management solutions. ▫ The Bureau of Reclamation manages Jackson Lake Dam. As stated in the Craig Thomas Snake Headwaters Legacy Act, the storage and release of water from the dam is not affected by the wild and scenic river designation. To the extent possible, the National Park Service would partner with the Bureau of Reclamation to mimic natural flow regimes on the Snake River below Jackson Lake (e.g., spring freshets) when compatible with meeting all water rights requirements. ▫ The State of Wyoming has been a formal cooperator on the development of this comprehensive river management plan. The National Park Service would continue to collaborate with the State of Wyoming, including Wyoming Game and Fish Department and Wyoming Department of Environmental Quality, on the implementation of this plan. The National Park Service would seek their technical assistance and input in monitoring and managing for terrestrial and aquatic species, water quality, in-stream flows, and other biological conditions. The National Park Service would also continue to work closely with the Wyoming State Engineer's Office to file for a federal reserved water right for designated wild and scenic river segments as required in the Craig Thomas Snake Headwaters Legacy Act. ▫ The National Park Service would work with private landowners with properties within the wild and scenic river designation to achieve common goals for managing the river. The wild and scenic river designation does not affect private property rights; however, projects occurring within the riverbed and banks may be subject to evaluation under section 7 of the Wild and Scenic Rivers Act.

TABLE 5. SUMMARY OF KEY DIFFERENCES AMONG THE ALTERNATIVES—HEADWATERS-WIDE STRATEGIES

Alternative A: No Action	Alternatives B and C
Development Guidelines	
▪ Current development within the river corridors include transportation infrastructure such as roads, bridges, and trails along with minimal riverbank stabilization to protect these types of developments. Visitor amenities at river access points include boat launches, picnic areas, restrooms, parking lots, and trailheads. The level of development within the designated wild and scenic river corridors varies from almost no development in the wild segment of the Lewis River and the upper Snake River to more substantial development on the scenic segment of the Snake River below Jackson Lake. Existing conditions of these developments are described in chapter 3.	▪ The types and levels of development for each segment should be sustainable and consistent with each river segment's classification. Where existing development is not compatible with the classification of the segment, the parks would strive to redesign, relocate, or remove facilities to be more compatible with the river's classification over time. Both action alternatives would ensure types and levels of development are designed to allow appropriate kinds and amounts of recreation use while protecting river values. The following set of development guidelines would be implemented under all action alternatives: ▫ The compatibility of any newly proposed developments (or redesign of existing developments) would be evaluated to ensure they protect river values and natural river processes. Facilities would be designed, sited, and constructed to ensure compatibility with each river segment's classification. ▫ Developed recreation sites near the river would be reviewed to determine if negative effects to river values (such as vegetation trampling, streambank erosion, or soil compaction) could be reduced or eliminated. ▫ Vegetation treatments would be used to screen and blend new or existing structures with the natural landscape to improve riparian habitat, protect river values, and enhance the natural appearance of the developed areas. ▫ Erosion control and riverbank stabilization efforts would emphasize the use of natural materials. Structures would be designed to minimize impact to natural river processes and free-flowing condition to the maximum extent possible. Any erosion control or riverbank stabilization efforts would be evaluated to ensure consistency with section 7 of the Wild and Scenic Rivers Act.

TABLE 6. SUMMARY OF KEY DIFFERENCES AMONG THE ALTERNATIVES BY RIVER SEGMENTS—TYPES AND LEVELS OF DEVELOPMENT

Alternative A: No Action	Alternative B	Alternative C
Types and Levels of Development		
Lewis River (wild segment)		
As befits its wild classification, there are few existing developments in this river corridor. Under alternative A, existing backcountry trails and campsites would continue to be maintained.	Under alternative B, existing backcountry trails and campsites would continue to be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act, and no new developments would be proposed.	Under alternative C, existing backcountry trails and campsites would continue to be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act, and no new developments would be proposed.
Lewis River (scenic segment)		
Existing transportation developments along the canyon rim in this river corridor include roads, bridges, and turnouts. Other visitor amenities include the Pitchstone Plateau Trail and South Boundary Trail. Under alternative A, all existing developments would continue to be maintained.	Under alternative B, existing developments would continue to be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. Roadside turnouts that provide opportunities for visitors to overlook the Lewis River Canyon could be slightly expanded to reduce traffic congestion and increase visitor safety. No new developments would be proposed.	Under alternative C, existing developments would continue to be maintained. Roadside turnouts that provide opportunities for visitors to overlook the Lewis River Canyon could be slightly expanded to reduce traffic congestion and increase visitor safety. No new developments would be proposed.
Snake River (wild segment in Yellowstone National Park)		
The wild segment of the Snake River in Yellowstone National Park primarily includes backcountry trails and campsites. Downstream from the Lewis River confluence, frontcountry developments include the south entrance station, ranger station, picnic area, employee residences, and a horse corral. Under alternative A, all existing developments would continue to be maintained.	Under alternative B, existing developments would be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act, and no new developments would be proposed.	Under alternative C, existing developments would be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act, and no new developments would be proposed.
Snake River (wild segment in John D. Rockefeller, Jr. Memorial Parkway)		
The wild segment of the Snake River in John D. Rockefeller, Jr. Memorial Parkway includes a variety of developments, including paved and unpaved roads, turnouts, overlooks, picnic areas, campground, trails, and two boat launches. This segment also includes the Snake River Bridge, which has riprap to protect the bridge structure. Headwaters Lodge and Cabins at Flagg Ranch is the largest developed area within this river corridor and includes a campground, rental cabins, dining hall, general store, gas station, and a commercial horse operation. Dispersed backcountry campsites are along Grassy Lake Road adjacent to the river downstream from Flagg Ranch. Under alternative A, all existing developments would continue to be maintained.	Under alternative B, the Flagg Canyon and Flagg Ranch boat launches would receive modest improvements to enhance river-related resources and visitor experience (see the site-planning section of this chapter for information). All other existing developments would be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act, and no new developments would be proposed. Over time, vegetation restoration efforts would continue to be implemented on formerly developed areas at Flagg Ranch to enhance the compatibility with the wild classification. Riprap near the Snake River Bridge would be "naturalized" with willow plantings and other vegetation treatments.	Under alternative C, the Flagg Canyon and Flagg Ranch boat launches would receive modest improvements to enhance river-related resources and visitor experience (see the site-planning section of this chapter for more information). All other existing developments would be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act, and no new developments would be proposed. Over time, vegetation restoration efforts would continue to be implemented on formerly developed areas at Flagg Ranch to enhance the compatibility with the wild classification. Riprap near the Snake River Bridge would be "naturalized" with willow plantings and other vegetation treatments. At Huckleberry Hot Springs, undesired social trails would be restored and replaced with a designated route and remnants of old development would be removed.
Snake River (scenic segment)		
The scenic segment of the Snake River includes numerous visitor amenities such as river access roads, turnouts, overlooks, trails, and six boat launch areas. There are no designated campgrounds and river camping is not allowed along this segment. Other park infrastructure within this river corridor includes the Moran Entrance / Ranger Station and community, Murie Ranch, Craig Thomas Discovery and Visitor Center, a portion of the park's headquarters complex, and Menor's Ferry Historic District. Structures near the corridor are the Moose Entrance Station, Cunningham Cabin Historic Site, and Jackson Lake Dam. Under alternative A, all existing developments would continue to be maintained.	Under alternative B, development changes along the scenic segment of the Snake River would include more substantial modifications at six boat launch areas and the Oxbow Bend turnout. Please refer to the site-planning section of this chapter for information about these proposed changes. Under this alternative, River Road (along the west side of the Snake River) would remain open to public vehicular access (including bicycles); cyclic maintenance of River Road would continue. Limited overnight camping would be provided for visitors, including walk-in and boat access camping.	Under alternative C, development changes along the scenic segment of the Snake River would include modest improvements at six boat launch areas and the Oxbow Bend turnout. Please refer to the site-planning section of this chapter for information about these proposed changes. River Road (along the west side of the Snake River) would remain open for public vehicular use as road conditions allow. Park management would close the road to public vehicular use in the future if portions of the road fail due to the natural migration of the Snake River channel and road repairs and reroutes cannot be accomplished without impact to adjacent sagebrush and other sensitive habitats. A portion of the main park road (along the west side of the Snake River) near the confluence of Buffalo Fork may be redesigned to allow more natural river processes.

TABLE 6. SUMMARY OF KEY DIFFERENCES AMONG THE ALTERNATIVES BY RIVER SEGMENTS—TYPES AND LEVELS OF DEVELOPMENT

Alternative A: No Action	Alternative B	Alternative C
Pacific Creek (scenic segment)		
Visitor amenities within the Pacific Creek corridor include an access road, seasonal elk reduction camp, roadside turnouts, and the Emma Matilda Lake Trail. There are also some social trails near access points along the road. Under alternative A, all existing developments would continue to be maintained.	Under alternative B, existing developments would continue to be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act, including better delineation of parking areas and trails. Informal parking areas and social trails would be removed and revegetated. Improvements to the seasonal elk reduction camp may include providing a toilet facility and water trough with seasonal water pump.	Under alternative B, existing developments would continue to be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act, including better delineation of parking areas and trails. Informal parking areas and social trails would be removed and revegetated. Improvements to the seasonal elk reduction camp may include providing a toilet facility and water trough with seasonal water pump.
Buffalo Fork (scenic segment)		
Visitor amenities within the Buffalo Fork corridor include several paved roads, bridges, turnouts, and parking areas. There are no formal trails, but some social trails do exist. The Snake River Land Company and Elk Ranch are within the river corridor. Other developments include an overhead utility line and river debris entrapment cable fencing. Under alternative A, all existing developments would continue to be maintained.	Under alternative B, existing developments would continue to be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act, including better delineation of parking areas and trails. Fencing materials (associated with ineffective attempts at riverbank stabilization) and informal parking areas would be removed, and social trails would be revegetated. No new developments would be proposed.	Under alternative B, existing developments would continue to be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act, including better delineation of parking areas and trails. No new developments would be proposed. Fencing materials (associated with ineffective attempts at riverbank stabilization) and informal parking areas would be removed, and social trails would be revegetated. An overhead utility line would be placed underground to improve natural conditions and scenic quality. A river debris entrapment fence in the riparian area, which is no longer necessary, would be removed to enhance natural conditions.
Gros Ventre River (scenic segment)		
Visitor amenities within the Gros Ventre River corridor includes the paved Gros Ventre Road, two private road bridges, an informal trail, a dirt two-track road upstream from Kelly, and an informal visitor access point with several social trails on the east boundary between Grand Teton National Park and Bridger-Teton National Forest. Other developments include private residences and roads on both riverbanks at the town of Kelly and an irrigation ditch on the north riverbank. (The cemetery is beyond the scope of the river corridor).	Under alternative B, existing developments would continue to be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. Social trails would be removed and revegetated. No new developments would be proposed. Grand Teton National Park, the National Elk Refuge, and Bridger-Teton National Forest would collaborate on better delineation of parking areas, trails, and signs at the informal visitor access point that overlaps all three agencies' boundaries.	Under alternative C, existing developments would continue to be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. Social trails would be removed and revegetated. No new developments would be proposed. Grand Teton National Park, the National Elk Refuge, and Bridger-Teton National Forest would collaborate on better delineation of parking areas, trails, and signs at the informal visitor access point that overlaps all three agencies' boundaries.

SUMMARY OF THE KINDS AND AMOUNTS OF VISITOR USE AND ASSOCIATED INDICATORS AND STANDARDS OF QUALITY TO ENSURE PROTECTION OF RIVER VALUES FROM VISITOR USE IMPACTS

SUMMARY RATIONALE FOR USER CAPACITY IN ALTERNATIVE B

Overall, this alternative accommodates some additional kinds of visitor use as expressed in public scoping as well as slightly higher amounts of use. These additions remain protective of river values due to a suite of complementary site improvements and a program of visitor use management that emphasizes river resource protection.

- The kinds of visitor use are expanded to meet the intent of this alternative to enhance the visitor experience. Expanded visitor activities, such as camping along the river, remain protective of river values, provided appropriate site design and delineation and related mitigation measures are put in place. For example, site delineation would prevent the proliferation of social trails that impact riverbank vegetation and soils. Additionally, the expansion of new and existing visitor recreation and interpretive opportunities effectively enhances the recreational outstandingly remarkable values.

- Use levels are slightly higher under this alternative to accommodate enhanced visitor experience opportunities, but remain at levels protective of river values. For example, the number of boat launches in the Snake River scenic segment could increase, though encounters would remain at levels protective of the recreational outstandingly remarkable values. Similarly, launch site improvements in this alternative would mitigate impacts of increased use to riparian vegetation, water quality, and other river values. In sum, increases in visitor use levels are protective of river values insofar as they are complemented with the appropriate development improvements, use regulations, education and interpretation, and other management actions necessary to ensure use does not adversely affect them.

- Visitor use management strategies common to all action alternatives (see table 5), including the monitoring of indicators and standards of quality, also help to ensure the protection of river values. Collectively these "best management practices" mitigate visitor use impacts on river values regardless of use type and level. See step 4, "Identify Management Strategies and Tools for Visitor Use," of the user capacity process for a list of specific management strategies.

SUMMARY RATIONALE FOR USER CAPACITY IN ALTERNATIVE C

Under this alternative, visitor connections with the natural world would be emphasized through unobtrusive interpretive opportunities and more primitive, resource-related recreational experiences in undeveloped natural settings. Recreational activities would be considered consistent with the protection and enhancement of river values. Visitor uses would adapt to changing natural conditions, such as rebraiding river

channels and fluctuating water levels, seasons, or protections for sensitive habitats and nesting areas. In general, use levels would be similar to or lower than current conditions under this alternative.

- In general, this alternative continues the current program of visitor use management as exists today with some key site improvements and some restrictions that ensure the protection of river values while promoting river-related experiences oriented to resource interaction.

- The kinds of visitor use proposed in this alternative are similar to current conditions with some restrictions to protect river values where development footprints are less preferred and different visitor experiences are sought.

- Maximum amounts of visitor use remain the same as current conditions (or the no-action alternative). With the improvement of key visitor-related infrastructure and continued use of management practices such as periodic boat checks for aquatic invasive species, the current levels of use remain protective of river values. Further-more, improvements in education and interpretation related to the Wild and Scenic Rivers Act and the Craig Thomas Snake Headwaters Legacy Act would create a heightened awareness of the river's importance and inform visitors of how they can appreciate the river while ensuring its protection.

- As in alternative B, visitor use management strategies common to all action alternatives (see table 5), including the monitoring of indicators and standards of quality, help to ensure the protection of river values. Collectively, these best management practices mitigate visitor use impacts on river values regardless of use type and level. See step 4, "Identify Management Strategies and Tools for Visitor Use," of the user capacity process for a list of possible management strategies.

TABLE 7. SUMMARY OF KEY DIFFERENCES AMONG THE ALTERNATIVES BY RIVER SEGMENTS—USER CAPACITY COMPONENTS

User Capacity Components	Alternative A: No Action	Alternative B	Alternative C
LEWIS RIVER (WILD SEGMENT)			
Kinds of Visitor Use and Related Management Strategies	▪ portaging boats on the Lewis River channel to access Shoshone Lake ▪ fishing ▪ hiking (Channel Trail) ▪ pack animal use (Channel Trail) ▪ boating (permits required)	▪ retain range of opportunities as in the no action ▪ develop wild and scenic river interpretive messaging	▪ retain range of opportunities as in the no action ▪ develop wild and scenic interpretive messaging ▪ fishery emphasizes protection of native species ▪ expand/improve bear safety outreach ▪ monitor/inspect boats for aquatic invasive species ▪ retain boating permits and restricts as in the no action
Maximum Amounts of Visitor Use—defined as the estimated amount of use each river segment can accommodate without adverse impacts on river values given the objectives, management strategies, and indicators and standards proposed in the alternatives.	TYPICAL PEAK USE: 1,300 people, 800 boats, 319 anglers per year OVERNIGHT USE LIMITS: 21 campsites / 164 people per night permitted.	MAX USE: Set at the current peak use levels under alternative A; currently low levels of use; continue to manage use and monitor.	MAX USE: Set at the current peak use levels under alternative A; currently low levels of use; continue to manage use and monitor.
Indicators and Standards[5] Note: General monitoring guidelines for all ORVs can be found in the monitoring guidelines tables and are not necessarily specific to visitor use issues and impacts. Items found in this table ("Summary of Kinds and Amounts of Use and Related Management Strategies by Alternative") have a strong connection to visitor use-related issues and impacts.	No systematic monitoring program for visitor use and capacity related indicators and standards of quality for potential impacts on river values. Existing monitoring of water quality will continue.	Implement monitoring program for visitor use and capacity related indicators and standards of quality for potential impacts on river values.	Implement monitoring program for visitor use and capacity related indicators and standards of quality for potential impacts on river values.
Water Quality: Contaminants—fecal coliform, dissolved nutrients, temperature, pH, and conductivity.	No more than 1% change in mean levels of constituents.	No more than 1% change in mean levels of constituents.	No more than 1% change in mean levels of constituents.
Presence or expansion of aquatic invasive species.	No existing standard.	No new aquatic invasive species or expansion of aquatic invasive species currently in area.	No new aquatic invasive species or expansion of aquatic invasive species currently in area.
Extent of social trails along river access areas.	No existing standard.	No more than 5% increase of social trails.	No more than 5% increase of social trails.
Extent of vegetation loss at attraction sites.	No existing standard.	No more than 2% vegetation loss per site.	No more than 2% vegetation loss per site.
Presence or expansion of invasive plant species.	No existing standard.	No presence of new invasive species, and/or no further spread of existing invasive species.	No presence of new invasive species, and/or no further spread of existing invasive species.
Number of encounters with other boats on the river.	No existing standard.	No more than five encounters with other groups, 80% of the sampled time.	No more than five group encounters, 80% of the sampled time.
Occupancy of nest sites of sensitive bird species.	The identification of targeted bird species nest sites would continue to be monitored within this segment and inform establishment of indicators and standards for sensitive species once data is determined to be sufficient. No existing standard.	The identification of targeted bird species nest sites would continue to be monitored within this segment and inform establishment of indicators and standards for sensitive species once data is determined to be sufficient.	The identification of targeted bird species nest sites would continue to be monitored within this segment and inform establishment of indicators and standards for sensitive species once data is determined to be sufficient.

[5] Adaptive management strategies would be used to ensure conditions are maintained within standards. See the section on User Capacity Indicators and Standards and Management Strategies in chapter 3 for a discussion of adaptive management strategies by indicator that would be used as needed to respond to changing conditions.

TABLE 7. SUMMARY OF KEY DIFFERENCES AMONG THE ALTERNATIVES BY RIVER SEGMENTS—USER CAPACITY COMPONENTS

User Capacity Components	Alternative A: No Action	Alternative B	Alternative C
LEWIS RIVER (SCENIC SEGMENT)			
Kinds of Visitor Use and Related Management Strategies	▪ scenic driving / viewing scenery ▪ fishing	▪ retain range of opportunities as in the no action ▪ improve interpretive information ▪ improve/expand scenic turnouts	▪ retain range of opportunities as in the no action ▪ improve interpretive information ▪ improve/expand scenic turnouts
Maximum Amounts of Visitor Use—defined as the estimated amount of use each river segment can accommodate without adverse impacts on river values given the objectives, management strategies, and indicators and standards proposed in the alternatives.	TYPICAL PEAK USE: 138 anglers per year.	MAX USE: 159 anglers per year.	MAX USE: Set at the current peak use levels under alternative A; currently low levels of use; continue to manage use and monitor.
Indicators and Standards[6] Note: General monitoring guidelines for all ORVs can be found in the monitoring guidelines tables, and are not necessarily specific to visitor use issues and impacts. Items found in this table ("Summary of Kinds and Amounts of Use and Related Management Strategies by Alternative") have a strong connection to visitor use related issues and impacts.	No systematic monitoring program for visitor use and capacity related indicators and standards of quality for potential impacts on river values. Existing monitoring of water quality will continue.	Implement monitoring program for visitor use and capacity related indicators and standards of quality for potential impacts on river values.	Implement monitoring program for visitor use and capacity related indicators and standards of quality for potential impacts on river values.
Water Quality: Contaminants—fecal coliform, dissolved nutrients, temperature, pH, and conductivity.	No more than 1% change in mean levels of constituents.	No more than 1% change in mean levels of constituents.	No more than 1% change in mean levels of constituents.
Presence or expansion of aquatic invasive species.	No existing standard.	No new aquatic invasive species or expansion of aquatic invasive species currently in area.	No new aquatic invasive species or expansion of aquatic invasive species currently in area.
Extent of social trails along river access areas.	No existing standard.	No more than 5% increase of social trails.	No more than 5% increase of social trails.
Extent of vegetation loss at attraction sites.	No existing standard.	No more than 5% vegetation loss per site.	No more than 5% vegetation loss per site.
Presence or expansion of invasive plant species.	No existing standard.	No presence of new invasive species, and/or no further spread of existing invasive species.	No presence of new invasive species, and/or no further spread of existing invasive species.
Occupancy of nest sites of sensitive bird species.	The identification of targeted bird species nest sites would continue to be monitored within this segment and inform establishment of indicators and standards for sensitive species once data is determined to be sufficient. No existing standard.	The identification of targeted bird species nest sites would continue to be monitored within this segment and inform establishment of indicators and standards for sensitive species once data is determined to be sufficient.	The identification of targeted bird species nest sites would continue to be monitored within this segment and inform establishment of indicators and standards for sensitive species once data is determined to be sufficient.
SNAKE RIVER (WILD SEGMENT)			
Kinds of Visitor Use and Related Management Strategies	▪ camping (backcountry and campgrounds) ▪ lodging (Flagg Ranch) ▪ hiking ▪ fishing ▪ horseback riding and pack animal use ▪ boating (down river from Yellowstone's south boundary and Flagg Ranch launches) ▪ picnicking ▪ hunting (John D. Rockefeller, Jr. Memorial Parkway only)	▪ retain range of opportunities as in the no action ▪ expand interpretive information opportunities for visitors ▪ improve boat launches (John D. Rockefeller, Jr. Memorial Parkway) Institute periodic checks of boats for aquatic invasive species	▪ retain overall range of activities as in the no-action alternative ▪ expand interpretive information opportunities for visitors ▪ improve boat launches (John D. Rockefeller, Jr. Memorial Parkway), but use minimal footprint ▪ institute periodic checks of boats for aquatic invasive species

[6] Adaptive management strategies would be used to ensure conditions are maintained within standards. See the section on User Capacity Indicators and Standards and Management Strategies in chapter 3 for a discussion of adaptive management strategies by indicator that would be used as needed to respond to changing conditions.

TABLE 7. SUMMARY OF KEY DIFFERENCES AMONG THE ALTERNATIVES BY RIVER SEGMENTS—USER CAPACITY COMPONENTS

User Capacity Components	Alternative A: No Action	Alternative B	Alternative C
Maximum Amounts of Visitor Use—defined as the estimated amount of use each river segment can accommodate without adverse impacts on river values given the objectives, management strategies, and indicators and standards proposed in the alternatives.	OVERNIGHT USE Yellowstone ▪ 107 backcountry permits per year (2006–2010) ▪ MAX 84 people per night backcountry camping ▪ MAX Livestock Capacity 106 pack animals John D. Rockefeller, Jr. Memorial Parkway Flagg Ranch ▪ 97 RV, 74 tent site capacity ▪ 92 room lodging capacity ▪ backcountry campsite capacity: MAX 3 sites / 36 people FLOAT USE—down river from Flagg Canyon (day use only): ▪ MAX 28 commercial float and 2 fishing trips per day ▪ MAX 60 private trips per day total (30 float / 30 fishing trips) ▪ existing commercial float trips have a time restriction related to wildlife disturbance	OVERNIGHT USE ▪ MAX USE: Same as no action FLOAT USE—down river from Yellowstone's south boundary ▪ MAX 31 commercial float and4 fishing trips per day ▪ MAX 66 private trips per day total (33 float / 33 fishing trips) ▪ MAX day use can increase 10% from current conditions	MAX OVERNIGHT AND FLOAT USE: Maintain current conditions (same as no action).
Indicators and Standards[7] Note: General monitoring guidelines for all ORVs can be found in the monitoring guidelines tables, and are not necessarily specific to visitor use issues and impacts. Items found in this table ("Summary of Kinds and Amounts of Use and Related Management Strategies by Alternative") have a strong connection to visitor use-related issues and impacts.	No systematic monitoring program for visitor use and capacity related indicators and standards of quality for potential impacts on river values. Existing monitoring of water quality will continue. Note: The occurrence of the New Zealand mud snail population is dense in the upper Snake River in John D. Rockefeller, Jr. Memorial Parkway and tributaries (Polecat Creek)—researchers, Wyoming Game and Fish Department, and the National Park Service have monitored for over a decade.	Implement monitoring program for visitor use and capacity related indicators and standards of quality for potential impacts on river values.	Implement monitoring program for visitor use and capacity related indicators and standards of quality for potential impacts on river values.
Water Quality: Contaminants—fecal coliform, dissolved nutrients, temperature, pH, and conductivity.	Yellowstone and John D. Rockefeller, Jr. Memorial Parkway segments—no more than 1% change in mean levels of constituents.	Yellowstone and John D. Rockefeller, Jr. Memorial Parkway segments—no more than 1% change in mean levels of constituents.	Yellowstone segment—no more than 1% change in mean levels of constituents.
Presence or expansion of aquatic invasive species.	No existing standard.	Yellowstone and John D. Rockefeller, Jr. Memorial Parkway segments—No new aquatic invasive species or expansion of aquatic invasive species currently in area.	Yellowstone and John D. Rockefeller, Jr. Memorial Parkway segments—No new aquatic invasive species or expansion of aquatic invasive species currently in area.
Extent of social trails along river access areas.	No existing standard.	Yellowstone segment—no more than 2% increase in social trails. John D. Rockefeller, Jr. Memorial Parkway segment—no more than 5% increase in social trails.	Yellowstone segment—no more than 2% increase in social trails. John D. Rockefeller, Jr. Memorial Parkway segment—no more than 5% increase in social trails.
Extent of vegetation loss at attraction sites.	No existing standard.	Yellowstone segment—no more than 2% vegetation loss per site John D. Rockefeller, Jr. Memorial Parkway segment—no more than 5% increase in vegetation loss per site.	Yellowstone segment—no more than 2% vegetation loss per site John D. Rockefeller, Jr. Memorial Parkway segment—no more than 5% increase in vegetation loss per site.
Presence or expansion of invasive plant species.	No existing standard.	Yellowstone and John D. Rockefeller, Jr. Memorial Parkway segments—No presence of new invasive species, and/or no further spread of existing invasive species.	Yellowstone and John D. Rockefeller, Jr. Memorial Parkway segments—No presence of new invasive species, and/or no further spread of existing invasive species.
Level and extent of visitor caused modifications to hot spring features.	No existing standard.	Yellowstone segment—no incidence of human modification reported at any given site.	Yellowstone segment—no incidence of human modification reported at any given site.
Number of encounters with other boats on the river.	No existing standard.	Yellowstone segment—boating is prohibited. John D. Rockefeller, Jr. Memorial Parkway segment—no more than 15 encounters with other groups, 80% of the sampled time.	Yellowstone segment—boating is prohibited. John D. Rockefeller, Jr. Memorial Parkway segment—no more than 10 encounters with other groups, 80% of the sampled time.

[7] Adaptive management strategies would be used to ensure conditions are maintained within standards. See the section on User Capacity Indicators and Standards and Management Strategies in chapter 3 for a discussion of adaptive management strategies by indicator that would be used as needed to respond to changing conditions.

TABLE 7. SUMMARY OF KEY DIFFERENCES AMONG THE ALTERNATIVES BY RIVER SEGMENTS—USER CAPACITY COMPONENTS

User Capacity Components	Alternative A: No Action	Alternative B	Alternative C
Wait times to put-in/take-out at launch sites.	No existing standard.	John D. Rockefeller, Jr. Memorial Parkway segment—No more than 10% of visitor groups wait 30 minutes or longer.	John D. Rockefeller, Jr. Memorial Parkway segment—No more than 10% of visitor groups wait 30 minutes or longer.
Occupancy of nest sites of sensitive bird species	Yellowstone segment— The identification of targeted bird species nest sites would continue to be monitored within this segment and inform establishment of indicators and standards for sensitive species once data is determined to be sufficient. John D. Rockefeller, Jr. Memorial Parkway segment—≥ 3 occupied trumpeter swan territories; ≥ 2 occupied bald eagle territories; ≥ 2 occupied osprey territories; ≥ 1 occupied heronry (great blue herons).	Yellowstone segment— The identification of targeted bird species nest sites would continue to be monitored within this segment and inform establishment of indicators and standards for sensitive species once data is determined to be sufficient. John D. Rockefeller, Jr. Memorial Parkway segment—≥ 3 occupied trumpeter swan territories; ≥ 2 occupied bald eagle territories; ≥ 2 occupied osprey territories; ≥ 1 occupied heronry (great blue herons).	Yellowstone segment—The identification of targeted bird species nest sites would continue to be monitored within this segment and inform establishment of indicators and standards for sensitive species once data is determined to be sufficient. John D. Rockefeller, Jr. Memorial Parkway segment—≥ 3 occupied trumpeter swan territories; ≥ 2 occupied bald eagle territories; ≥ 2 occupied osprey territories; ≥ 1 occupied heronry (great blue herons).
SNAKE RIVER (SCENIC SEGMENT)			
Kinds of Visitor Use and Related Management Strategies	▪ boating (nonmotorized) and floating ▪ fishing (walk-in and floating) ▪ scenic driving / viewing scenery ▪ photography and wildlife viewing ▪ picnicking ▪ hiking ▪ bicycling (private and guided) ▪ interpretation and education	▪ retain range of opportunities as in the no action ▪ add camping along the river to accommodate overnight boating and floating trips ▪ relocate and/or redesign boat launches ▪ River Road remains open to vehicles, bicycles, and pedestrians ▪ improve food storage and waste management at Deadman's Bar and Triangle X cook sites ▪ improve viewing area at Oxbow Bend ▪ actively interpret Menor's Ferry, Bar BC Dude Ranch and 4 Lazy F Dude Ranch ▪ allow commercial float trips to stop at Bar BC Dude Ranch for interpretive opportunity ▪ improve access trail between the river and Bar BC Dude Ranch ▪ institute periodic boat checks for aquatic invasive species	▪ retain range of opportunities as in the no action ▪ relocate and/or redesign boat launches, no dispersed launch sites ▪ redesign Oxbow Bend turnouts and restore social trails to natural conditions ▪ access points on River Road open to vehicles, bicycles, and pedestrians River Road remains open to vehicles as road conditions allow. Park management would close the road to public vehicular use in the future if portions of the road fail due to the natural migration of the Snake River channel and road repairs and reroutes cannot be accomplished without impact to adjacent sagebrush and other sensitive habitats." ▪ improve food storage and waste management at Deadman's Bar and Triangle X cook sites ▪ provide off-site and limited interpretation of historic ranch sites ▪ institute periodic boat checks for aquatic invasive species
Maximum Amounts of Visitor Use—defined as the estimated amount of use each river segment can accommodate without adverse impacts on river values given the objectives, management strategies, and indicators and standards proposed in the alternatives.	OVERNIGHT USE—None FLOAT USE—CONCESSION ▪ average 63,179 people per year (2007–2010) ▪ typical peak use: 68,673 people per year (2007) ▪ MAX daily launches: 133 float trips ▪ MAX daily fish trips: 47 ▪ MAX meal trips: 360 trips FLOAT USE—PRIVATE (25% of overall river use) ▪ average 21,181 people per year (2007–2010) ▪ MAX 23,915 people per year (2007)	MAX OVERALL USE: Slightly higher than no action OVERNIGHT USE ▪ provide two designated campsites along River Road for drive-in use and/or float trip overnight access; anticipated use is approximately 120 people per season FLOAT USE—CONCESSION: Increase MAX float and fish trips by 15% of current levels ▪ MAX 78,974 people per year ▪ MAX daily launches: 153 float trips ▪ MAX daily fish trips: 54 ▪ MAX meal trips: 415 trips FLOAT USE—PRIVATE (25% of overall river use) ▪ MAX 27,502 people per year	MAX OVERALL USE: Maintain current conditions (same as no action).

TABLE 7. SUMMARY OF KEY DIFFERENCES AMONG THE ALTERNATIVES BY RIVER SEGMENTS—USER CAPACITY COMPONENTS

User Capacity Components	Alternative A: No Action	Alternative B	Alternative C
Indicators and Standards[8] Note: General monitoring guidelines for all ORVs can be found in the monitoring guidelines tables, and are not necessarily specific to visitor use issues and impacts. Items found in this table ("Summary of Kinds and Amounts of Use and Related Management Strategies by Alternative") have a strong connection to visitor use-related issues and impacts.	No systematic monitoring program for visitor use and capacity related indicators and standards of quality for potential impacts on river values. Existing monitoring of water quality will continue.	Implement monitoring program for visitor use and capacity related indicators and standards of quality for potential impacts on river values	Implement monitoring program for visitor use and capacity related indicators and standards of quality for potential impacts on river values.
Water Quality: Contaminants—fecal coliform, dissolved nutrients, temperature, pH, and conductivity.	No more than 5% change in mean levels of constituents below normal, baseline conditions.	No more than 5% change in mean levels of constituents below normal, baseline conditions	No more than 5% change in mean levels of constituents below normal, baseline conditions
Presence or expansion of aquatic invasive species.	No existing standard.	No new aquatic invasive species or expansion of aquatic invasive species currently in area	No new aquatic invasive species or expansion of aquatic invasive species currently in area
Population estimate of Snake River fine-spotted cutthroat trout from Deadman's Bar to upper Bar BC Dude Ranch.	No existing standard.	Maintain population levels of the Snake River fine-spotted cutthroat trout at or above the historical 10-year average	Maintain population levels of the Snake River fine-spotted cutthroat trout at or above the 10-year average
Extent of social trails along river access areas.	No existing standard.	No more than 5% increase in social trails	No more than 5% increase in social trails
Extent of vegetation loss at attraction sites.	No existing standard.	No more than 5% increase in vegetation loss per site	No more than 5% increase in vegetation loss per site
Presence or expansion of invasive plant species.	No existing standard.	No presence of new invasive species, and/or no further spread of existing invasive species	No presence of new invasive species, and/or no further spread of existing invasive species
Number of encounters with other boats on the river.	No existing standard.	Grand Teton—no more than 15 encounters with other groups, 80% of the sampled time	Grand Teton—no more than 10 encounters with other groups, 80% of the sampled time
Wait times to put-in/take-out at launch sites.	No existing standard.	No more than 10% of visitor groups wait 45 minutes or longer	No more than 10% of visitor groups wait 45 minutes or longer
Occupancy of nest sites of sensitive bird species.	≥ 7 occupied bald eagle territories; ≥ 5 occupied osprey territories; ≥ 1 occupied heronry (great blue herons)No existing standard.	≥ 7 occupied bald eagle territories; ≥ 5 occupied osprey territories; ≥ 1 occupied heronry (great blue herons)	≥ 7 occupied bald eagle territories; ≥ 5 occupied osprey territories; ≥ 1 occupied heronry (great blue herons)
PACIFIC CREEK (SCENIC SEGMENT)			
Kinds of Visitor Use and Related Management Strategies	▪ scenic driving / viewing scenery ▪ fishing (walk-in only) ▪ hiking ▪ photography ▪ wildlife viewing ▪ horseback riding (non-guided)	▪ retain range of opportunities as in the no action ▪ allow guided horseback riding along trails ▪ improve elk reduction camp ▪ improve delineation of parking areas and trails	▪ retain range of opportunities as in the no action ▪ improve elk reduction camp ▪ improve delineation of parking areas and trails
Maximum Amounts of Visitor Use—defined as the estimated amount of use each river segment can accommodate without adverse impacts on river values given the objectives, management strategies, and indicators and standards proposed in the alternatives.	TYPICAL AVERAGE USE: Approximately 600 direct river-related visitors per year during visitor use season. TYPICAL DAY USE: Approximately 5 people per day during visitor use season. OVERNIGHT USE: None.	MAX DAY USE: There are no existing horse trails along Pacific Creek. If one concession horseback riding trip was approved, use may go as high as 2,000 per year. This area could handle a maximum of three guided groups per day for an additional approximately 270 people per year, (figuring 90 possible fishing days). Maximum use per year would be about 3,270. If a concession horse trip was approved, use may go as high as 20+ per day. Concession fishing would add about 9 people per day. Maximum total per day of 34 people per day.	MAX DAY USE: Maintain current conditions (same as no action).

[8] Adaptive management strategies would be used to ensure conditions are maintained within standards. See the section on User Capacity Indicators and Standards and Management Strategies in chapter 3 for a discussion of adaptive management strategies by indicator that would be used as needed to respond to changing conditions.

TABLE 7. SUMMARY OF KEY DIFFERENCES AMONG THE ALTERNATIVES BY RIVER SEGMENTS—USER CAPACITY COMPONENTS

User Capacity Components	Alternative A: No Action	Alternative B	Alternative C
Indicators and Standards[9] Note: General monitoring guidelines for all ORVs can be found in the monitoring guidelines tables, and are not necessarily specific to visitor use issues and impacts. Items found in this table ("Summary of Kinds and Amounts of Use and Related Management Strategies by Alternative") have a strong connection to visitor use related issues and impacts.	No systematic monitoring program for visitor use and capacity related indicators and standards of quality for potential impacts on river values. Existing monitoring of water quality will continue.	Implement monitoring program for visitor use and capacity related indicators and standards of quality for potential impacts on river values.	Implement monitoring program for visitor use and capacity related indicators and standards of quality for potential impacts on river values.
Water Quality: Contaminants—fecal coliform, dissolved nutrients, temperature, pH, and conductivity.	No more than 5% change in mean levels of constituents below normal, baseline conditions.	No more than 5% change in mean levels of constituents below normal, baseline conditions.	No more than 5% change in mean levels of constituents below normal, baseline conditions.
Presence or expansion of aquatic invasive species.	No existing standard.	No new aquatic invasive species or expansion of aquatic invasive species currently in area.	No new aquatic invasive species or expansion of aquatic invasive species currently in area.
Extent of social trails along river access areas.	No existing standard.	No more than 5% increase in social trails.	No more than 5% increase in social trails.
Extent of vegetation loss at attraction sites.	No existing standard.	No more than 5% increase in vegetation loss per site.	No more than 5% increase in vegetation loss per site.
Presence or expansion of invasive plant species.	No existing standard.	No presence of new invasive species, and/or no further spread of existing invasive species.	No presence of new invasive species, and/or no further spread of existing invasive species.
Occupancy of nest sites of sensitive bird species.	The identification of targeted bird species nest sites would continue to be monitored within this segment and inform establishment of indicators and standards for sensitive species once data is determined to be sufficient. No existing standard.	The identification of targeted bird species nest sites would continue to be monitored within this segment and inform establishment of indicators and standards for sensitive species once data is determined to be sufficient.	The identification of targeted bird species nest sites would continue to be monitored within this segment and inform establishment of indicators and standards for sensitive species once data is determined to be sufficient.
BUFFALO FORK (SCENIC SEGMENT)			
Kinds of Visitor Use and Related Management Strategies	▪ scenic driving / viewing scenery ▪ fishing ▪ trail access (from Elk Ranch Road) ▪ over-snow vehicles (on Continental Divide Snowmobile Trail)	▪ retain range of opportunities as in the no action ▪ improve delineation of parking areas and trails	▪ retain range of opportunities as in the no action ▪ improve delineation of parking areas and trails
Maximum Amounts of Visitor Use—defined as the estimated amount of use each river segment can accommodate without adverse impacts on river values given the objectives, management strategies, and indicators and standards proposed in the alternatives.	TYPICAL AVERAGE USE: Approximately 500 direct river-related visitors per year during visitor use season. TYPICAL DAY USE: Approximately 5 people per day during visitor use season. OVERNIGHT USE: None.	MAX DAY USE: Maintain current conditions (same as no action).	MAX DAY USE: Maintain current conditions (same as no action).
Indicators and Standards[10] Note: General monitoring guidelines for all ORVs can be found in the monitoring guidelines tables, and are not necessarily specific to visitor use issues and impacts. Items found in this table ("Summary of Kinds and Amounts of Use and Related Management Strategies by Alternative") have a strong connection to visitor use-related issues and impacts.	No systematic monitoring program for visitor use and capacity related indicators and standards of quality for potential impacts on river values. Existing monitoring of water quality will continue.	Implement monitoring program for visitor use and capacity related indicators and standards of quality for potential impacts on river values.	Implement monitoring program for visitor use and capacity related indicators and standards of quality for potential impacts on river values.

[9] Adaptive management strategies would be used to ensure conditions are maintained within standards. See the section on User Capacity Indicators and Standards and Management Strategies in chapter 3 for a discussion of adaptive management strategies by indicator that would be used as needed to respond to changing conditions.
[10] Adaptive management strategies would be used to ensure conditions are maintained within standards. See the section on User Capacity Indicators and Standards and Management Strategies in chapter 3 for a discussion of adaptive management strategies by indicator that would be used as needed to respond to changing conditions.

TABLE 7. SUMMARY OF KEY DIFFERENCES AMONG THE ALTERNATIVES BY RIVER SEGMENTS—USER CAPACITY COMPONENTS

User Capacity Components	Alternative A: No Action	Alternative B	Alternative C
Water Quality: Contaminants—fecal coliform, dissolved nutrients, temperature, pH, and conductivity.	No more than 5% change in mean levels of constituents below normal, baseline conditions.	No more than 5% change in mean levels of constituents below normal, baseline conditions.	No more than 5% change in mean levels of constituents below normal, baseline conditions.
Presence or expansion of aquatic invasive species.	No existing standard.	No new aquatic invasive species or expansion of aquatic invasive species currently in area.	No new aquatic invasive species or expansion of aquatic invasive species currently in area.
Extent of social trails along river access areas.	No existing standard.	No more than 5% increase in social trails.	No more than 5% increase in social trails.
Extent of vegetation loss at attraction sites.	No existing standard.	No more than 5% increase in vegetation loss per site.	No more than 5% increase in vegetation loss per site.
Presence or expansion of invasive plant species.	No existing standard.	No presence of new invasive species, and/or no further spread of existing invasive species.	No presence of new invasive species, and/or no further spread of existing invasive species.
Occupancy of nest sites of sensitive bird species.	≥ 1 occupied trumpeter swan territory; ≥ 1 occupied bald eagle territory; ≥ 2 occupied osprey territories; ≥ 1 occupied heronry (great blue herons)No existing standard.	≥ 1 occupied trumpeter swan territory; ≥ 1 occupied bald eagle territory; ≥ 2 occupied osprey territories; ≥ 1 occupied heronry (great blue herons).	≥ 1 occupied trumpeter swan territory; ≥ 1 occupied bald eagle territory; ≥ 2 occupied osprey territories; ≥ 1 occupied heronry (great blue herons).
GROS VENTRE RIVER (SCENIC SEGMENT)			
Kinds of Visitor Use and Related Management Strategies	▪ hiking ▪ fishing ▪ swimming ▪ photography	▪ retain range of opportunities as in the no action ▪ provide additional interpretation and education to anglers on wild and scenic river values ▪ improve delineation of parking areas and trails ▪ continue to allow public use on north bank. South bank remains closed to public use	▪ retain range of opportunities as in the no action ▪ provide additional interpretation and education to anglers on wild and scenic river values ▪ improve delineation of parking areas and trails ▪ continue to allow public use on north bank. South bank remains closed to public use
Maximum Amount of Visitor Use—defined as the estimated amount of use each river segment can accommodate without adverse impacts on river values given the objectives, management strategies and indicators and standards proposed in the alternatives.	TYPICAL AVERAGE USE: Approximately 1,900 people per year ▪ 1,150 people, general riverbank use and 450 anglers / 8 month season ▪ estimated 150 boat take-outs at refuge boundary during whitewater season; two to five administrative boat trips/season on park/refuge portion of river. ▪ hiking/general bank use/photography = 1,150 people/season ▪ fishing = 450 anglers/season ▪ swimming = 300 people/season	MAX DAY USE: Maintain current conditions (same as no action)	MAX DAY USE: Maintain current conditions (same as no action)
Indicators and Standards[11] Note: General monitoring guidelines for all ORVs can be found in the monitoring guidelines tables, and are not necessarily specific to visitor use issues and impacts. Items found in this table ("Summary of Kinds and Amounts of Use and Related Management Strategies by Alternative") have a strong connection to visitor use related issues and impacts.	No systematic monitoring program for visitor use and capacity related indicators and standards of quality for potential impacts on river values. Existing monitoring of water quality will continue.	Implement monitoring program for visitor use and capacity related indicators and standards of quality for potential impacts on river values.	Implement monitoring program for visitor use and capacity related indicators and standards of quality for potential impacts on river values.
Water Quality: Contaminants—fecal coliform, dissolved nutrients, temperature, pH, and conductivity.	No more than 5% change in mean levels of constituents below normal, baseline conditions.	No more than 5% change in mean levels of constituents below normal, baseline conditions.	No more than 5% change in mean levels of constituents below normal, baseline conditions.
Presence or expansion of aquatic invasive species.	No existing standard.	No new aquatic invasive species or expansion of aquatic invasive species currently in area.	No new aquatic invasive species or expansion of aquatic invasive species currently in area.
Population estimate of Snake River fine-spotted cutthroat trout from National Elk Refuge boundary to Kelly.	No existing standard.	Maintain population levels of the Snake River fine-spotted cutthroat trout at or above historical five-year (or 10-year) average.	Maintain population levels of the Snake River fine-spotted cutthroat trout at or above historical five-year (or 10-year) average.
Extent of social trails along river access areas.	No existing standard.	No more than 5% increase in social trails.	No more than 5% increase in social trails.

[11] Adaptive management strategies would be used to ensure conditions are maintained within standards. See the section on User Capacity Indicators and Standards and Management Strategies in chapter 3 for a discussion of adaptive management strategies by indicator that would be used as needed to respond to changing conditions.

TABLE 7. SUMMARY OF KEY DIFFERENCES AMONG THE ALTERNATIVES BY RIVER SEGMENTS—USER CAPACITY COMPONENTS

User Capacity Components	Alternative A: No Action	Alternative B	Alternative C
Extent of vegetation loss at attraction sites.	No existing standard.	No more than 5% increase in vegetation loss per site.	No more than 5% increase in vegetation loss per site.
Presence or expansion of invasive plant species.	No existing standard.	No presence of new invasive species, and/or no further spread of existing invasive species.	No presence of new invasive species, and/or no further spread of existing invasive species.
Level and extent of visitor caused modifications to hot spring features.	No existing standard.	No incidents of human modification reported at any given site.	No incidents of human modification reported at any given site.
Occupancy of nest sites of sensitive bird species.	≥ 1 occupied bald eagle territory.	≥ 1 occupied bald eagle territory.	≥ 1 occupied bald eagle territory.

SUMMARY OF IMPACTS OF THE ALTERNATIVES

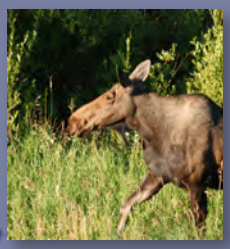
The impacts of the alternatives are summarized in table 8 based on the information presented in "Chapter 5: Environmental Consequences." The purpose of this table is to provide a general comparison of the impacts of the alternatives. See chapter 5 for a detailed analysis of each alternative's specific management proposals.

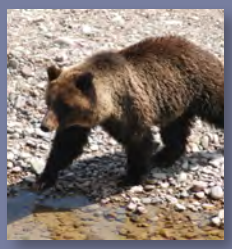
TABLE 8. SUMMARY OF IMPACTS OF THE ALTERNATIVES

Impact Topic	Alternative A (No Action)	Alternative B	Alternative C
Water Resources (including water quality and free-flowing conditions)	Alternative A would have long-term, minor to moderate, adverse, local to regional impacts and long-term, minor, beneficial, local to regional impacts on water resources and free-flowing conditions.	Alternative B would have long-term, minor to moderate, adverse, local to regional impacts and long-term, minor to moderate, beneficial, local to regional impacts on water resources and free-flowing conditions.	Alternative C would have long-term, minor to moderate, adverse, local to regional impacts and long-term, minor to moderate, beneficial, local to regional impacts on water resources and free-flowing conditions.
Vegetation (including floodplains) and Wildlife	Alternative A would have long-term, minor to moderate, adverse, local to regional impacts and long-term, minor to moderate, beneficial, local to regional impacts on vegetation and wildlife.	Alternative B would have long-term, minor to major, adverse, local to regional impacts and long-term, minor to moderate, beneficial, local to regional impacts on vegetation and wildlife.	Alternative C would have long-term, minor to moderate, adverse, local to regional impacts and long-term, minor to moderate, beneficial, local to regional impacts on vegetation and wildlife.
Fish (including aquatic invertebrates)	Alternative A would have long-term, minor to moderate, adverse, local to regional impacts and long-term, minor to moderate, beneficial, local to regional impacts on fish.	Alternative B would have long-term minor to major, adverse, local to regional impacts and long-term, minor to moderate, beneficial, local to regional impacts on fish.	Alternative C would have long-term, minor to moderate, adverse, local to regional impacts and long-term, minor to moderate, beneficial, local to regional impacts on fish.
Threatened and Endangered Species	Alternative A would have long-term, minor to moderate, adverse, local to regional impacts and long-term, minor to moderate, beneficial, local to regional impacts on threatened and endangered species.	Alternative B would have long-term, minor to major, adverse, local to regional impacts and long-term, minor to moderate, beneficial, local to regional impacts on threatened and endangered species.	Alternative C would have long-term, minor to moderate, adverse, local to regional impacts and long-term, minor to moderate, beneficial, local to regional impacts on threatened and endangered species.
Soils	Alternative A would have long-term, minor to moderate, adverse, localized impacts and long-term, minor to moderate, beneficial, localized impacts on soils.	Alternative B would have long-term, minor to major, adverse, localized impacts and long-term, minor to moderate, beneficial, localized impacts on soils.	Alternative C would have long-term, minor to moderate, adverse, localized impacts and long-term, minor to moderate, beneficial, localized impacts on soils.
Archeological Resources	Alternative A would have negligible to minor, permanent, site-specific adverse impacts on archeological resources within the wild and scenic-designated river corridor.	Alternative B would have negligible to minor, permanent, site-specific adverse impacts on archeological resources within the wild and scenic-designated river corridor.	Alternative C would have negligible to minor, permanent, site-specific adverse impacts on archeological resources within the wild and scenic designated river corridor.
Historic Structures and Cultural Landscapes	Alternative A would have negligible to minor, permanent, site-specific adverse impacts on historic structures and cultural landscapes within the wild and scenic designated river corridor.	Alternative B would have negligible to minor, permanent, site-specific adverse impacts on historic structures and cultural landscapes within the wild and scenic designated river corridor.	Alternative C would have negligible to minor, permanent, site-specific adverse impacts on historic structures and cultural landscapes within the wild and scenic designated river corridor.
Visitor Use and Experience	Alternative A would continue to have a variety of recreational opportunities that provide long-term, minor to moderate, beneficial impacts on visitor use and experience. However, without proper monitoring, visitor opportunities and experience may be diminished due to proliferation of visitor use-related impacts, resulting in long-term, minor to moderate adverse, local to regional impacts on visitor use and experience.	Alternative B would have long-term, minor to moderate, beneficial impacts on recreational access and opportunities, but likely result in minor to moderate, adverse, local to regional impacts on aspects pertaining to visitor experience.	Alternative C would likely have long-term, moderate, beneficial, local to regional impacts on visitor use and experience within the headwaters by providing improved infrastructure and interpretation that would assist with resource protection, while maintaining recreational opportunities in a safer environment.
Visual Resources	Alternative A would have long-term, negligible to minor, beneficial, local impacts on the visual resources found within the headwaters.	Alternative B would have both beneficial and adverse impacts on the visual resources in localized areas. Long-term, minor to moderate, beneficial, local impacts include increased and improved access to visual opportunities, and implementation of monitoring of resource and social conditions. Short-term, minor to moderate, adverse, local effects include impacts on the visual environment from new or expanded developments. Long-term, minor to moderate, adverse, local impacts on the visual resources include potential crowding and associated resource impacts stemming from increased visitation, which may lead to impacts on visual resources.	Alternative C would have long-term, minor to moderate, beneficial, local impacts on the visual resources within the headwaters. Long-term, minor to moderate, beneficial, local impacts include improved access to visual opportunities, and implementation of monitoring of resource and social conditions.
Park Operations	Alternative A would have an overall long-term, minor, and adverse impact.	Alternative B would have long-term impacts on park operations ranging from minor to moderate and would be beneficial overall. Short-term impacts, however, would be minor to moderate and adverse due to construction efforts and implementation of new procedures.	Alternative C would have long-term impacts on park operations ranging from minor to moderate and would be beneficial overall. Short-term impacts, however, would be minor to moderate and adverse due to construction efforts and implementation of new procedures.
Socioeconomics	Alternative A would have long-term, minor to moderate, beneficial, local to regional impacts.	Alternative B would have short- to long-term, minor to moderate, beneficial, local to regional impacts.	Alternative C would have short- to long-term, minor to moderate, beneficial, local to regional impacts.

Affected Environment

4





INTRODUCTION

OVERVIEW

This chapter describes the environment of the designated wild and scenic river corridors within and along the boundary of Grand Teton and Yellowstone national parks, the John D. Rockefeller, Jr. Memorial Parkway, and the National Elk Refuge. The intent of this chapter is not to provide an exhaustive description of resources and other relevant factors, but to provide sufficient detail to reasonably assess and compare the effects of implementing the management alternatives described in chapters 2 and 3. Topics were selected on the basis of federal laws, NPS expertise, and the concerns expressed by other agencies or members of the public during scoping. Information provided in the affected environment establishes the baseline for analyzing impacts presented in "Chapter 5: Environmental Consequences."

The interdisciplinary planning team conducted a preliminary analysis to determine the anticipated context, duration, and intensity of effects on resources from implementing the alternatives. As a result, some impact topics have been eliminated from further analysis because these resources do not occur within the designated river corridors or because the anticipated impacts would have no effect, negligible effect, or possibly a minor effect on resources. Impact topics carried forward for analysis were determined to result in moderate or greater levels of intensity.

Table 9 lists the impact topics that are analyzed in detail verses those that have been eliminated from detailed analysis. The first section in this chapter discusses the impact topics that have been retained for analysis; the next section describes impact topics that have been eliminated from the analysis with rationale for this decision. Information about each resource topic corresponds to the level and type of impact being analyzed. Because comprehensive resource inventories have not been completed in some cases, these descriptions are based on the best available information that has been gathered to date.

TABLE 9. IMPACT TOPICS

Impact Topics Analyzed in Detail	Impact Topics Eliminated from Detailed Analysis
Alternatives in this plan could affect these resources or topics:	**These resources or topics are important, but alternatives in this plan would have negligible and/or possibly minor impacts:**
Water Resources (including water quality and free-flowing conditions)	Wetlands
Vegetation (including floodplains) and wildlife	Night Skies
	Wilderness
Fish (including aquatic invertebrates)	Air Quality
Threatened and Endangered Species	Prime and Unique Farmlands
Soils	Natural or Depletable Resource Requirements and Conservation Potential
Archeological Resources	Energy Requirements and Conservation Potential

TABLE 9. IMPACT TOPICS

Impact Topics Analyzed in Detail	Impact Topics Eliminated from Detailed Analysis
Alternatives in this plan could affect these resources or topics:	**These resources or topics are important, but alternatives in this plan would have negligible and/or possibly minor impacts:**
Historic Structures and Cultural Landscapes	Carbon Footprint
Ethnographic Resources	Environmental Justice
Visitor Use and Experience	Museum Collections
Visual Resources	
Park Operations	
Socioeconomics	

CLIMATE CHANGE

To understand future trends in the condition of the Snake River Headwaters and its resources and values, a synopsis of projected regional climate changes and their potential influences on the headwaters natural and cultural resources and visitor experience is provided in this section. This approach has been used in place of incorporating these potential effects throughout the various impact topics discussed in this chapter.

Various climate change modeling efforts (and associated impact identification studies) are currently being conducted and refined across all regions of the National Park Service. Important information on potential future changes to park resources and values can be gleaned from this modeling and impact analysis. For example, a recent 2012 report by Patrick Gonzalez, PhD, of the NPS Climate Change Response Program identifies possible changes that could occur in the Yellowstone National Park region over the duration of the 21st century. Information from this report can clarify what might be expected to occur throughout the Snake River Headwaters (Gonzalez 2012).

The report, *Climate Change and Ecological Impacts at Yellowstone National Park, USA*, indicates that mean annual temperature increases have occurred across the Rocky Mountain region over the 20th century (with somewhat lesser increases noted at Yellowstone National Park. Similarly, the total annual precipitation across the region increased over the same 100-year time period (once again, with less significant changes at Yellowstone). The report asserts that further analysis of these 20th century climate data reveal that the documented changes to temperature and precipitation can be attributed to broader climate change trends. Some of these noted regional changes include increased winter temperatures, decreased snowpack, a decreased ratio of snow to rain, and earlier spring flow (attributed to a documented shift in spring warmth 10 days early for the Yellowstone region during the second half of the 20th century). The report also indicates that tree ring data reveals that 20th century snowpack melt in the Yellowstone region was greater than any period since AD 1200, with this change also attributed to climate change (Gonzalez 2012).

Looking ahead through the 21st century, climate modeling conducted by the Intergovernmental Panel on Climate Change factors in multiple possible scenarios for greenhouse gas emissions. For the various emission scenarios (lower, medium, and

higher), the modeling projects a temperature increase in Yellowstone that is 7 to 11 times the amount of documented 20th century warming in the park, with accompanying increases in precipitation across all three scenarios (Gonzalez 2012).

Under the scenario of increased global greenhouse gas emissions, mean annual temperature could increase 4.4 degrees Celsius (+/- 1.2 degrees) by the end of the 21st century in the Yellowstone region. The projected length of the growing season for this region under the same emission scenario could increase 20 to 25 days over a similar duration. Similarly, modeling for the Yellowstone region under the higher emission scenario projected an average increase in precipitation of 5% (+/- 8%) in the region, granted that notable variations and uncertainty in precipitation modeling results exist under the various models (Gonzalez 2012).

In addition to potential increases in precipitation and mean annual temperature, the modeling under the higher emissions scenario also revealed potential changes in the frequency of extreme precipitation and temperature periods (lower frequency of extreme cold days and higher frequency of high precipitation events and low precipitation periods) (Gonzalez 2012).

These types of projected climate changes are important because climate is a dominant factor affecting the physical and ecological processes of the region. For example, changes in temperature and precipitation levels (and the frequency and severity of extreme weather events/conditions) could lead to notable shifts in wildlife ranges, as well as the migration of native plant communities to higher elevations and more northern environs (Gonzalez 2012). Likewise, some species of plants and animals are less resilient to changes in climate conditions. Thus, considerable alterations in species populations, natural community biodiversity, and ecological systems (e.g., food chain) could occur. Notable changes to hydrologic resources in the region would also likely have effects on native aquatic species, including likely adverse effects on the native cutthroat trout species in the Snake River Headwaters.

In addition to a wide variety of potential effects to natural processes and natural communities, changes in climate conditions in the headwaters region would also have likely effects on cultural resources and visitor experience. Changes to natural resources in the region from climate change would likely, in turn, have effects on how people (e.g., park visitors) would enjoy, use, and experience these natural resources. For example, strained hydrologic conditions could have direct effects on recreation such as fishing and rafting the Snake River Headwaters waterways. Similarly, the possibility of increased wildfires and extreme weather conditions could have increasing effects on preservation of cultural resources in the region.

IMPACT TOPICS INCLUDED FOR DETAILED ANALYSIS

NATURAL RESOURCES

Introduction

This section describes the natural resource components of the environment within the Snake River Headwaters that would be affected by implementing the alternatives. It presents sufficient detail to understand the effects of the alternatives and is not an encyclopedic description. These descriptions are concise summaries organized by resource topic, which corresponds to the type of impacts being analyzed in chapter 5. Descriptions of these resources are at the headwaters-wide level, rather than for each of the seven river segments and nine major river access areas. If there is a potential for site-specific resource impacts within an individual river segment or access area from implementation of any of the alternatives, then additional background information about that particular resource is included as part of the analysis in chapter 5. The only exception to this is the locations of threatened and endangered species, which are not provided due to protection of these species. The topics are as follows:

- Water Resources (including water quality and free-flowing conditions)
- Vegetation (including floodplains) and Wildlife
- Fish
- Threatened and Endangered Species
- Soils

Water Resources (including water quality and free-flowing conditions)

The Snake River Headwaters is a complex system. Draining approximately 3,465 square miles in Wyoming, this major tributary of the Columbia River originates on the western slope of the continental divide in northwest Wyoming's Teton Wilderness Area. Less than 100 miles of the Snake River Headwaters flows through Grand Teton and Yellowstone national parks and includes the Lewis River, the Snake River, Pacific Creek, Buffalo Fork, and the Gros Ventre River. Flowing westward, the Snake River originates in and passes through a portion of Yellowstone National Park where it is met by the Lewis River before flowing south through John D. Rockefeller, Jr. Memorial Parkway, and entering Jackson Lake in Grand Teton National Park. It then flows east out of Jackson Lake and south crossing the south boundary of the park (NPS 1997).

The Bureau of Reclamation manages Jackson Lake Dam and regulates the flow of the Snake River. Beginning 4 miles downstream, the input from unregulated tributaries, including Pacific Creek, Buffalo Fork, and Spread Creek, moderates the influence of the dam on sediment and river flows (Erwin et al. 2011). Additional smaller tributaries flow into the Snake River in this stretch from the dam to Moose. Near the south boundary of Grand Teton, the Snake River then converges with the Gros Ventre River coming out of U.S. Forest Service and U.S. Fish and Wildlife Service National Elk Refuge lands, bordering the Grand Teton boundary.

The Snake River Headwaters provides an important habitat for many aquatic species, including fish, beaver, river otters, waterfowl, and wetland plants as well as for many land-based species whose habitat is directly adjacent to the river in riparian areas and the floodplain. The high water quality of these waterways results from protection of adjacent riparian area and floodplains from development and over use.

All surface waters are designated as class I (highest of four water quality classifications)

by the Wyoming Department of Environmental Quality and meet or exceed these standards. During certain portions of the runoff period, tributaries to the Snake River below the Jackson Lake Dam transport large concentrations of suspended material due to the erosion of unstable streambanks and overland flow during melt. Tributaries throughout the watershed are natural high sediment systems. For example, in the wild segment of the Snake River, natural debris flows from the volcanic geology yield considerable amounts of sediment and bed load during spring runoff. This is a natural process and is not considered a threat to the water quality of that area. Conversely, the most common nonpoint source problem in the upper Snake River basin is sediment loading caused by irrigated agriculture, rangeland grazing, land development, levee construction, road building for oil and gas development, and off-road vehicle use (NPS 1998).

Other threats to water quality within the headwaters include recreation activities such as camping, hiking, floating, snowmobiling, and horseback riding in heavily used areas. In addition, other threats include oil and gas activities upstream on USFS lands and livestock grazing.

Free-flowing conditions or natural stream/river fluctuations are being impeded by riverbank stabilization activities, roadways, and bridges (Lewis River at the falls, Flagg Ranch launch, Pacific Creek, Buffalo Fork at Moran Junction, at Moose, in Kelly), specifically at Buffalo Fork near Moran Junction. Jackson Lake Dam also influences the free-flowing condition of the Snake River from the dam southward.

Vegetation

Climatic, topoedaphic (soil-related), and other disturbance factors create a mosaic of vegetation communities in the Snake River floodplain and terraces. This mosaic consists of forested and unforested lands, varying in age and species composition. Vegetation can be categorized into the aquatic, riparian, and upland zones (NPS 1997).

In the aquatic zone, consisting of aquatic and semiaquatic vegetation in the flood channels and tributaries, watercress, white water crowfoot, and pondweed are most prevalent. Watercress is found primarily in the shoreline areas; white water crowfoot is associated with gravel-rocky bottom areas; and pondweed is associated with silt bottom areas. Other major species found in the aquatic zone are star duckweed, water milfoil, mare's tail, monkey flower, and horsetail. Moss and algae are also in this zone. Both encrusting and filamentous algae are present in the river proper, with encrusting algae most common in swifter water (NPS 1997).

A variety of vegetation species inhabits areas surrounding and paralleling the Snake River. This area is known as the *riparian zone*. The riparian zone frequently has a high number of edges and strata in a comparatively small area. This results in a habitat that produces a large number of species, reflecting diversity in community structure. Sandbars, gravel bars, and abandoned river channels provide substrate for terrestrial plant communities. Narrowleaf cottonwood usually develops on gravel; interior willow usually develops on sand; and blueberry willow usually develops on silt and flooded areas. In succession, these plants are often replaced by blue spruce in wetter sites and by sagebrush or bunchgrass in more xeric (dry) locations (NPS 1997).

The floodplain forest is a plant community found within the riparian zone. In addition to blue spruce and narrowleaf cottonwood, this community contains lodgepole pine, quaking aspen, russet buffaloberry, red osier dogwood, thinleaf alder, balsam poplar, and willow. The understory contains a mixture of western wheatgrass, alpine timothy, bluegrass, brome grass, yellow sweetclover, elk thistle, redtop, snowberry, and woods rose (NPS 1997).

Another plant community associated with the riparian zone is the marshy meadow. In addition to willow, marshy meadows contain sedges, bluegrass, tufted hairgrass, rushes, and shrubby cinquefoil (NPS 1997).

The *upland zone*, also known as the outwash or floodplain, exists on more xeric sites, and extends from the river terraces to the foothills. This zone contains big sagebrush, low sagebrush, bitterbrush, rabbitbrush, yarrow, bluebunch wheatgrass, Idaho fescue, balsamroot, lupine, and wild buckwheat. Existing in this upland zone is the sagebrush-forest ecotone (transition zone between two adjacent ecological communities). Soil texture and moisture are the primary factors affecting the ecotone between sagebrush and forest communities, with lodgepole pine advancing into the sagebrush area only during the wettest years (NPS 1997).

Aspen, a relatively short-lived tree species (80–100 years), occurs in both the riparian and upland zones. It is considered a pioneer species (organism that successfully establishes itself in a barren area) and is succeeded by shade tolerant and longer-lived species. However, this succession is reduced with the presence of recurrent fire in aspen stands (NPS 1997).

Nonnative plant species are a concern. Control measures are performed to reduce the population level of high priority nonnative species, using chemical, mechanical, and biological controls. These species of highest priority include musk thistle, spotted knapweed, diffuse knapweed, Canada thistle, common tansy, common mullein, oxeye daisy, butter-n-eggs, hound's-tongue, black henbane, dyer's woad, Dalmatian toadflax, leafy spurge, and St. John's wort. These species are most commonly found in the parks in roadside ditches, areas grazed by cattle, and throughout the riparian zone (NPS 1997).

Wildlife

The Snake River Headwaters supports a variety of wildlife species. River otters, muskrat, and beavers inhabit aquatic and riparian zones. Small mammals such as red-backed voles, deer mice, pocket gophers, squirrels, and chipmunks are abundant in riparian and upland areas and provide important food sources for carnivorous mammals such as coyotes, martens, badgers, and weasels. Larger mammals that utilize the riparian and upland areas include moose, bison, elk, mule deer, pronghorn, black bear, mountain lion, wolves, and grizzly bear.

Elk, moose, and bison use the riparian and upland areas during the summer for calving. Moose and mule deer winter within the river corridor, along with small numbers of elk and bison. The Snake River in Grand Teton National Park is open to elk hunting from Spread Creek south to Ditch Creek from approximately mid-October through early December, as part of a parkwide elk reduction program. The Gros Ventre River corridor is considered crucial winter range for moose. The area along the Snake River south of Moran and in Buffalo Fork is also important winter ranges for moose and elk. Kelly Hill, adjacent to the Gros Ventre River segment, is also an important wintering area for ungulates, including mule deer.

Amphibians and reptiles, such as boreal chorus frog, spotted frog, boreal toad, tiger salamander, common garter snake, wandering garter snake, and sagebrush lizard, also occur within the headwaters. A rich diversity of insects, mollusks, and other invertebrate animals also inhabit the headwaters lands and waterways (NPS 1997).

There are over 300 bird species within the area. Some of the more prominent species that use the river corridor's aquatic and riparian zones for feeding, and nesting are the white pelican, great blue heron, bald eagle, osprey, trumpeter swam, Canada goose, and sandhill crane. A variety of other raptors, waterfowl, and neotropical migrants also use

the river corridor (NPS 1997). The bald eagle, osprey, great blue heron, and trumpeter swan are all protected by seasonal closures along the waterways in Grand Teton National Park.

The bald eagle was removed from the endangered species list in June 2007, and is now considered recovered. Bald and golden eagles are still a protected species under the Bald and Golden Eagle Protection Act of 1940. Bald eagles use the Snake River, Pacific Creek, Buffalo Fork, and the Gros Ventre River throughout the year. There are seasonal closures in areas along the Snake River corridor, especially from Jackson Lake Dam to Moose to protect bald eagle nesting sites. Threats to bald eagles include habitat disturbance or removal and contaminants (USFWS 2012).

Other birds that use the riparian and upland areas for nesting and feeding include red-tailed hawks, common ravens, great horned owls, and Canada geese (NPS 1997).

Fish (including aquatic invertebrates)

Fish species native to the Snake River Headwaters include Yellowstone cutthroat trout, Snake River fine-spotted cutthroat trout, mountain whitefish, longnose dace, Bonneville redside shiner, speckled dace, Utah chub, longnose sucker, bluehead sucker, mountain sucker, Utah sucker, mottled sculpin, leatherside chub, and Paiute sculpin.

Nonnative fish species found within Snake River Headwaters include rainbow trout, lake trout, brook trout, golden trout, and brown trout.

According to the Greater Yellowstone Science and Learning Center, there are two genetically pure forms of native cutthroat trout in the Snake River Headwaters, the Yellowstone cutthroat trout and its close relative, the Snake River fine-spotted cutthroat trout. The Snake River fine-spotted cutthroat trout has a smaller native range that is entirely within the Snake River basin. Intermediate forms of the cutthroat trout are the result of fish stocking and hybridization with rainbow trout; however, the Yellowstone cutthroat trout and Snake River fine-spotted cutthroat trout appear to have maintained many distinct populations due to reproductive isolation within the Snake River basin (GYSLC 2008).

The Snake River fine-spotted cutthroat trout is part of a morphologically distinct group (possibly a race) of cutthroat trout found only in the Snake River (NPS 1998). In creek and river segments upstream of Jackson Lake, both the Snake River fine-spotted cutthroat trout and the Yellowstone cutthroat trout (also native) are found.

In response to a petition to list these cutthroat trout species for protection under the Endangered Species Act, the U.S. Fish and Wildlife Service issued a status review finding in 2006. The finding considered the Yellowstone cutthroat and the Snake River fine-spotted cutthroat to be a single entity for the purposes of review since biochemical-genetic studies have "revealed little genetic difference between the large-spotted form of the [Yellowstone cutthroat trout] and the fine-spotted cutthroat trout of the Snake River basin" (*Federal Register* 2006). Although the regional distribution of these native species may have been reduced by over 50% over the past 200 years due to a variety of human-induced impacts, interagency research indicates that healthy stronghold populations exist in several watersheds of the upper Yellowstone River and upper Snake River. In the Snake River basin, the central core of the population exists in the headwaters. Given the wide distribution, robust populations, and proactive agency management of the Yellowstone cutthroat and Snake River fine-spotted cutthroat, the U.S. Fish and Wildlife Service determined that listing of the species under the Endangered Species Act is not warranted (*Federal Register* 2006).

Over the past century, substantial declines in the population of Yellowstone cutthroat

trout have been attributed to overfishing throughout the native range (Gresswell 2011). In waters where nonnative trout and native trout co-exist, angling has been known to take a higher toll on native species due to nonnative species being more tolerant and resilient to fishing stresses such as aquatic disturbances and repeated catch and release. These areas are prone to an eventual dominance of nonnative trout and/or extirpation of native species (Gresswell 2011) if fishery managers do not intervene with species protection measures or more effective angling regulations.

Consumptive use (e.g., angling) of fish is managed by State of Wyoming regulations and fisheries management programs. Major fisheries in Grand Teton National Park are Jackson Lake and the Snake River downstream from the lake. Grand Teton National Park staff work closely with the Wyoming Game and Fish Department to permit an annual fisheries work plan in which the protection of native fisheries are emphasized (especially in the Snake River and its tributaries). Recent collaborative projects have improved fish passage in several tributaries, and the Wyoming Game and Fish Department is actively trying to reduce nonnative trout in several rivers and is considering proposals to eliminate them from a tributary to the upper Snake River in Grand Teton National Park. Yellowstone National Park and Grand Teton National Park also implement seasonal closures to fishing to protect spawning fish; the time frame varies by segment. The many ongoing interagency conservation efforts (including the Yellowstone Cutthroat Trout Interagency Coordination Group) and regulatory measures to protect the Yellowstone cutthroat and Snake River fine-spotted cutthroat contributed to the status determination by the U.S. Fish and Wildlife Service in 2006 (*Federal Register* 2006; Gresswell 2011).

Continued threats to native fish species such as the native cutthroats include disease, water quality and riparian area degradation, aquatic habitat fragmentation, the introduction of aquatic invasive species, loss of spawning gravel in tributaries, irrigation water diversions, and hybridization with nonnative fish such as the rainbow trout. Other notable threats, such as mining, timber harvest, and cattle grazing, exist throughout the region on other public and private lands (Gresswell 2011).

In addition to the continued risk of species hybridization, the past introductions and self-sustaining populations of nonnative trout also pose threats such as predation, disease, and habitat competition (Gresswell 2011). However, the fact that many of the stronghold populations of the native cutthroats are in remote, isolated areas (far removed from some human-induced threats and nonnative fish migration) and that so much of these tributaries are under the protection of federal land management and angling regulations, many of the native core populations are in a healthy, robust condition. Regardless, given the dynamic nature of hybridization trends, continual monitoring of this and other threats is important (Gresswell 2011). As it relates to the effects of nonnative fishes on the native cutthroats, it is also important to note that fishery managers face the challenge of balancing the trade-offs of tributary habitat connectivity. For example, improving habitat connectivity could strengthen the long-term distribution, health, and resilience of the native fish stronghold populations. However, increasing connectivity of tributary habitat can also increase the risk of nonnative fish migration to waters that previously supported pure genetic populations of native fish (Gresswell 2011; *Federal Register* 2006).

Also, a relict population of the northern leatherside chub exists in Pacific Creek. There is another known population of the northern leatherside chub in a small spring-fed tributary to the Snake River (Triangle X spring), approximately 10 miles south of Moran Junction. These are the only known populations of this species in the Wyoming

portion of the Snake River drainage (L. Schultz, pers. comm., 2012).

Invertebrate productivity in the Snake River Headwaters is slightly above average compared to similar rivers in the west and is an integral part of the fisheries, wildlife, and ecosystem. The aquatic invertebrate fauna is complex with approximately 170 species having been collected and identified. Species diversity is much lower between the Jackson Lake Dam and Pacific Creek than in other areas of the headwaters within Grand Teton and Yellowstone national parks. This may reflect fluctuating flows from dam operations, differences in substrate, and the lack of niche diversity above Pacific Creek. Caddisflies, mayflies, stoneflies, and true flies compose the greatest amount of total biomass of invertebrates in the river. Caddisflies of the genus *Hydropsyche* and *Arctopsyche* are the most abundant group present. Portions of the Snake River Headwaters are home to the western pearlshell mussel (*Margaritifera falcata*), a nationally significant species of concern. As it relates to proposed action alternatives, an active bed of western pearlshell mussels is present in the vicinity of the boat launch at Flagg Canyon. The western pearlshell represents one of the many native macroinvertebrate species experiencing declining populations in the region.

Threatened and Endangered Species

The Endangered Species Act of 1973, as amended, requires that federal agencies consult with the U.S. Fish and Wildlife Service before taking any action that could jeopardize the continued existence of any federally listed threatened or endangered species. As a result, the National Park Service must consider potential effects that any proposed action may have on these species. NPS policy also requires the protection of all federal candidate species and state listed threatened and endangered species.

Although federal and state species of concern are not included as part of the environmental assessment, these species would be protected under management direction set forth by NPS policy and both action alternatives. The U.S. Fish and Wildlife Service defines *species of concern* as those species in need of more concentrated conservation actions. The criteria for this classification can relate to declining population trends, threats to species habitat, limited distribution, or other factors. The necessary conservation actions could range from a periodic monitoring of populations and threats to a possible need to propose the species for listing as a U.S. threatened or endangered species.

The U.S. Fish and Wildlife Service and the State of Wyoming were consulted by the National Park Service regarding federally and state listed species that may occur in the Snake River Headwaters. Both agencies provided lists of special status species that may exist in both Teton and Park counties within the headwaters. This information was used to help frame the impact analysis in chapter 4 for threatened and endangered species. Information from the U.S. Fish and Wildlife Service provides the federal status of various species based on the Endangered Species Act (endangered, threatened, delisted, candidate, etc.). The Wyoming Game and Fish Department provided a list of Wyoming's Species of Greatest Conservation Need (SGCN) from the 2010 State Wildlife Action Plan. As noted in the plan, each of these SGCN species has an assigned Native Species Status (NSS), which provides insight on the species status and identifies priorities for management. The NSS status ratings range from "1" to "4," and include "U" for unknown (with an "NSS1" status being most critical).

Table 10 lists the federally threatened and endangered species that are likely to occur in the headwaters based on a synthesis of existing inventories and a comparison of the general habitat types found in the headwaters and the habitat requirements of these species. Because some federally and state listed species that occur in Park and Teton counties may not occur within or near the boundaries

of the headwaters, professional judgment of park staff and other subject matter experts was used to determine which listed species occur within the headwaters. Species that occur outside the boundary of the headwaters would not be adversely affected by the management actions of this plan. Thus, these species are not included in table 10. Also, for the full list of SGCN species provided by the Wyoming Fish and Game Department (and their respective NSS ratings), please refer to the consultation letter received from the state agency in appendix C.

TABLE 10. LIST OF FEDERALLY THREATENED, ENDANGERED, AND CANDIDATE SPECIE IN THE SNAKE RIVER HEADWATERS IN GRAND TETON AND YELLOWSTONE NATIONAL PARKS AND THE NATIONAL ELK REFUGE

Common Name	Scientific Name	County	Federal Status	State Status*
Mammals				
Grizzly bear	*Ursus arctos*	Park and Teton	Threatened	—
Canada lynx	*Lynx canadensis*	Park and Teton	Threatened	NSS1
Gray wolf	*Canis lupus*	Park and Teton	Delisted; experimental population, nonessential	—
North American wolverine	*Gulo gulo luscus*	Teton	Candidate	NSS3
Birds				
Greater sage grouse	*Centrocercus urophasianus*	Park and Teton	Candidate	NSS2
Yellow-billed cuckoo	*Coccyzus americanus*	Teton	Candidate	NSSU
Vegetation				
Whitebark pine	*Pinus albicaulis*	Park and Teton	Candidate	—

Sources: USFWS 2011; Wyoming Game and Fish Department consultation letter dated September 27, 2012 (appendix C)

* Note: The State of Wyoming Native Species Status ratings are derived from the 2010 Wyoming State Wildlife Action Plan. Ratings range from 1 to 4, with "NSS1" being most critical at a state level and "U" indicating an unknown status)

A detailed description and regulatory profile of all federally listed species can be found at http://www.fws.gov/species/#endangered. The following describes the federally threatened and endangered species that are of particular management concern in the headwaters and/or could be affected by management actions or strategies in the proposed alternatives. The listed species in table 10 that are not described below would not be affected by any proposed actions.

Grizzly Bear. The grizzly bear was listed as threatened in 1975, and due to intensive management efforts, the populations within the Yellowstone Distinct Population Segment have been increasing between 4% and 7% annually (USFWS 2012). Grizzly bears are known to inhabit the areas within and immediately adjacent to the river corridors, and their range is generally anywhere from 25 to 500 mi^2. The Lewis River and Pacific Creek segments are completely within the primary conservation area within the recovery zone of both parks, and large portions of the Snake

River and Buffalo Fork are within the recovery zone (if the population is delisted, the recovery zone would be managed as a primary conservation area). According to the U.S. Fish and Wildlife Service (2012), the biggest threat to grizzly bears is human-caused mortality. This includes accidental kills from hunters mistaking grizzlies for black bears, illegal kills, and management removal of bears that become food-conditioned or dangerously habituated to humans.

Canada Lynx. The Canada lynx is listed as a federally threatened species (*Federal Register* 2000). The State of Wyoming classifies Canada lynx as Native Species Status 1 (NSS1), which indicates populations are greatly restricted or declining—extirpation appears possible and there is an ongoing significant loss of habitat (WGFD 2005).

Canada lynx, considered rare in the Greater Yellowstone Area, are solitary carnivores generally occurring at low densities in boreal forest habitats, with their distribution and abundance closely tied to that of the snowshoe hare, their primary prey. However, this relationship may be muted or absent in more southern populations (Halfpenny et al. 1982). In Wyoming, lynx occur primarily in spruce/fir and lodgepole pine forests with slopes of 8 to 12 degrees and at elevations from 7,995 feet to 9,636 feet (2,437 meters to 2,937 meters) (Ruediger et al. 2000). However, aspen stands and forest edges may also be important.

Potential Canada lynx habitat areas for Grand Teton National Park and John D. Rockefeller, Jr. Memorial Parkway have been identified based on these general habitat preferences. Suitable habitat is found within the Snake River Wild, Snake River Scenic, Pacific Creek Scenic, and Buffalo Fork Scenic segments.

Information on lynx abundance and distribution within Grand Teton National Park is limited. Historical presence of Canada lynx has been documented within the park (Reeve et al. 1986; McKelvey et al. 2000). More recent sightings and DNA detections have confirmed the continued occurrence of lynx in and adjacent to the park (Squires and Laurion 2000; Squires and Oakleaf 2005; Murphy et al. 2006; Holmes and Berg 2009; N. Berg, Utah State University, pers. comm., 2010). During the winter of 2007–2008, researchers documented lynx tracks in the Arizona Creek drainage near the park (N. Berg, pers. comm., 2010) and in the Colter Bay area (S. Patla, Wyoming Game and Fish Dept. biologist, pers. comm., 2010). Canada lynx tracks were detected on 10 occasions in the winter of 2008–2009 in the Togwotee Pass area (Holmes and Berg 2009). Identified lynx tracks included an area just south of the park boundary in the Spread Creek drainage. Radio-collared lynx from Colorado have been documented passing through the Teton Range and in the Togwotee Pass area. Whether any of the recently detected Canada lynx are residents or transients, or if lynx currently reside in Grand Teton National Park, is unknown. Based on general habitat preferences and existing vegetation cover types, potential habitat for Canada lynx is present in the park. Forest cover types found in the general project area are within the elevation range and appear to be generally suitable habitat for lynx. However, low habitat quality (e.g., low densities of snowshoe hares) may mean that Canada lynx, if present, would also occur at very low densities, perhaps only as transients (S. Cain, NPS wildlife biologist, pers. comm., 2002).

Gray Wolf. Gray wolves were eliminated from the Greater Yellowstone Ecosystem in the 1930s and placed on the endangered species list in 1973. In 1995 and 1996, wolves were reintroduced into Yellowstone National Park and central Idaho. At reintroduction, wolves were classified as a nonessential experimental population in accordance with the Endangered Species Act. Nonessential experimental populations are treated as proposed for listing in national forests and as threatened in national parks and wildlife refuges (50 CFR 17). Gray wolves are keystone predators and use the Snake River

corridor and its tributaries within the project area throughout the year. They prey primarily on ungulates and on smaller mammals (such a beavers). A pack's home range can span from 25 to 1,500 mi^2 depending on prey density. Threats to gray wolves include wolf and prey habitat loss or encroachment from development and human conflicts (USFWS 2012).

North American Wolverine. In December 2010, the North American wolverine was designated a candidate species under the Endangered Species Act in the contiguous 48 states (*Federal Register* 2010)—their current range is believed to include parts of Wyoming.

Wolverines are the second-largest member of the weasel family in North America. Breeding commences at four years of age or older, occurs only every two to three years, and produces litter sizes of just over one cub on average. Offspring accompany their mother for about a year before they disperse from the area. Female wolverines use natal (birthing) dens that are excavated in snow. Persistent, stable snow is strongly tied to wolverine habitat suitability and appears to be a requirement for natal denning because it provides security for offspring and buffers against cold temperatures. Wolverines are highly territorial and naturally occur at very low densities owing to their large spatial requirements. They are opportunistic feeders that consume a variety of foods, depending on availability. They primarily scavenge carrion, using an excellent sense of smell to find food beneath deep snow, but they also prey on small animals and birds, and feed on fruits, berries, and insects.

In the Rocky Mountain states where they typically prefer high elevations and rugged, snowy terrain, the known breeding range of wolverines reaches its southernmost extent in Grand Teton National Park. In the Yellowstone region, where wolverines occur at a density of less than one per 100 mi^2, long-term research has revealed that just two breeding females and two breeding male wolverines occupy the entire Teton Range. Because of the small wolverine population, the search for a mate and breeding territory requires covering long distances, sometimes traveling hundreds of miles; crossing low-elevation valleys between mountain ranges in the process. Recently, a radio-marked wolverine was tracked from just east of the park to Rocky Mountain National Park in Colorado.

In Grand Teton National Park, wolverine observations are common in the Teton canyons across Jackson Lake. Several observations are documented in low elevation areas within Snake River Headwaters. These include observations at Leeks Lodge in the Pacific Creek subdivision on the park's east border and along the Snake River at Deadman's Bar, Pacific Creek, Oxbow Bend, and Flagg Ranch.

Greater Sage Grouse. In March 2010, the greater sage grouse was listed by the U.S. Fish and Wildlife Service as a candidate species. They are highly dependent on sagebrush for habitat and forage, which is found in various areas within and adjacent to the river corridor. Threats to the greater sage grouse include habitat removal and fragmentation (USFWS 2012). The Snake River scenic segment (from Spread Creek confluence to Moose) and the Gros Ventre River scenic segment are within a State of Wyoming Greater Sage Grouse Core Area (WGFD 2010). In an attempt to fulfill the intent of this core area designation, habitat conservation strategies are being implemented by federal and state agencies and local governments to prevent a future listing of the greater sage grouse. Any developments or ground disturbance activities permitted in these corridors should comply with core area management guidelines (State of Wyoming Executive Order 2011-5).

Yellow-billed Cuckoo. The yellow-billed cuckoo was listed by the U.S. Fish and Wildlife Service as a candidate species in July 2010. This species breeds in dense willow and cottonwood stands in riparian areas and river

floodplains. Threats to the yellow-billed cuckoo include loss of riparian habitat, often attributed to agriculture, dams, river flow management, overgrazing, and nonnative plant species.

Closures

A number of seasonal closures and public use limits are in effect along the Snake River corridor. These include the following areas:

- December 15 to April 1, the Snake River floodplain from Buffalo Fork downstream to Menor's Ferry crossing north of the Moose development is closed to all public use for protection of wildlife during critical wintering or nesting periods.
- February 1 to August 15, all lands within 0.5 mile of all bald eagle nests are closed (when posted) to protect bald eagles during nesting and fledging periods.
- February 1 to August 20, all lands within 250 yards of nesting sites of osprey, trumpeter swan, and great blue heron are closed (when posted) to protect birds during nesting.
- December 1 to August 1, all streams downstream of Jackson Lake Dam (excluding the Snake River, Buffalo Fork, Pacific Creek, and the Gros Ventre River). This closure includes several spring creeks that are important for spawning and recruitment of the Snake River fine-spotted cutthroat trout.

Soils

In the Snake River Headwaters, sedimentation and extensive erosion has occurred due to various stages of volcanism, glaciation, and uplift. The area contains a series of glacier-formed lakes. There are also several relatively small streams that drain from the steep-walled canyons along the east front of Teton Range while larger tributaries from the north and east drain out of the highlands. All of these streams flow into the main stem river and tributaries within the Snake River Headwaters (NPS 1997).

The Snake River and surrounding lowlands were formed during three different glacial periods—Paleozoic, Mesozoic, and Tertiary (whose features are geologically young). Sand, gravel, and boulders are remnants of alluvial and glacial deposits from these three periods. Glacial and recent alluvial terraces parallel the present floodplain throughout sections of the headwaters within the parks. The Snake River is relatively active on its floodplain and is braided throughout nearly half of its length in Grand Teton National Park (NPS 1997).

Soils in the Snake River Headwaters were formed in alluvium and glacial deposits, and consist mainly of fine to coarse loams, fine to coarse silts, and mixes. They range from 17 inches to 60 inches in depth and vary from poorly to well drained with low to high available moisture holding capacities. Major problems for these soils include water erosion, wetness, and sensitivity to drought (NPS 1998).

CULTURAL RESOURCES

This section describes the cultural resources present in the Snake River Headwaters corridor that would be affected by the management alternatives. These descriptions are concise summaries organized by the resource topics listed below, which match the impact topics analyzed in "Chapter 5: Environmental Consequences." Information about each of the following resource topics corresponds to the level and type of impacts being analyzed:

- Archeological Resources
- Historic Structures and Cultural Landscapes

- Ethnographic Resources (analyzed in "Chapter 5: Environmental Consequences" under the topics Water Resources and Vegetation, Wildlife, and Fish)

Historic Overview of the Snake River Headwaters

This historic overview is a brief summary of the major historical themes and events of the Snake River Headwaters, which have been identified and documented by historians. This summary relies on the 1999 report, "A Place Called Jackson Hole: A Historic Resource Study of Grand Teton National Park" (Daugherty et al. 1999), and various histories of Yellowstone National Park.

The continuum of human use of the Snake River Headwaters encompasses thousands of years of diverse people, cultures, and uses. Cultures flourished along these headwaters because they provided a corridor for travel through rugged terrain and they offered sustenance for travelers. The earliest artifacts, such as stone tools and projectile points, date to 11,000 years ago to the Paleo-Indian period (between 12,000 and 8,000 years ago). The people relied on hunting and gathering, with deer, elk, bighorn sheep, and bison providing the primary meat sources for mountain dwellers, while bison and antelope were staples for peoples of the Great Plains of the Rocky Mountain region.

Early American Indian use of the Snake River Headwaters included travel routes, resource procurement, and seasonal camps. American Indians camped near rivers and lakes to hunt wildlife and harvest roots and berries, often roasting camas root in underground pits. Both wildlife and plants were essential to their diet. With the coming winter, American Indians often left the region for milder locales as did most of their prey.

There is no evidence to suggest that prehistoric inhabitants of the Snake River Headwaters practiced agriculture or established permanent settlements. From the Paleo-Indian through Late Prehistoric periods, the inhabitants of the headwaters and the New World were primarily pedestrian. Although the first Europeans arrived around AD 1500, horses were not widely used by tribes in the Rocky Mountain region until around AD 1700. The arrival of the horse and the influx of European trade goods, such as beads, metals, cloth, and guns, brought about profound changes in the economic and cultural systems of the region.

Europeans first came to the area in the early 1800s for fur trading, beginning around the explorations of Lewis and Clark in 1804–1806, and ending around 1840. The Grand Tetons were a landmark for trappers, and the valley became the crossroads of the fur trade in the northern Rockies. John Colter—a member of the Lewis and Clark Expedition, explorer of the Yellowstone area, and for whom the Colter Bay District is named—set out on foot in 1807 from a fur trading post at the junction of the Bighorn and Yellowstone rivers to become perhaps the first person of European descent to enter Jackson Hole Valley.

Fur trapping and trading in the region reached its peak in the 1830s, but suffered a decline by the end of the decade due to competition in the region and a sharp decrease in demand. Prime trapping grounds had been decimated, and easy profits were gone; beaver, which had been in high demand, were scarce. Changes in fashion caused the price of beaver plews (pelts) to plummet as demand increased for silk and rabbit felt. Although trade in buffalo hides continued after 1840, the peak of trapping in the region was over. Jackson Hole returned to isolation for the next 20 years until civilian and military explorers followed the trappers' routes across the high passes.

Federal government expeditions and miners visited the headwaters during visits to the areas of what are today Yellowstone National Park and the Jackson Hole valley between

1850 and 1880. As expeditions, such as the 1871 Hayden Expedition, garnered interest from the scientific community and the nation, the creation of Yellowstone National Park in 1872 protected the upper portions of the Snake River Headwaters, the Snake River and Lewis River segments within the park boundary, from private development along these river segments.

While Yellowstone National Park gradually was developed for tourism during its first several decades, these activities happened at the park's geographic center and northern areas. However, while the Snake River segment within the park remained relatively undisturbed by the increasing presence of park visitors, Yellowstone's South Entrance Road was built in the mid-1890s along the bank of the Lewis River segment to link Lake Yellowstone to the park's south entrance. Meanwhile to the south, the first permanent Jackson Hole settlers arrived in 1884, attracted by prospecting for gold on the floodplain from 1880 to 1900. Around 1900, prospectors had filed numerous 160-acre placer claims up and down the Snake River from Jackson Lake to Menor's Ferry, and near Pacific Creek, Spread Creek, and Deadman's Bar. Evidence of placer mining activity is most noticeable in the Deadman's Bar area. When the prospectors failed to find gold, the claims lapsed. None of the claims were patented and the area was withdrawn from mineral entry when the Jackson Hole National Monument was established in 1943.

The most intense period of homesteading in Jackson Hole occurred after 1900. Settlement peaked between 1908 and 1919, then declined as depressed agricultural prices and natural events, such as the drought of 1919, discouraged further settlement. The homesteader frontier ended in 1927 with a presidential executive order withdrawing virtually all public lands in Jackson Hole from settlement; only a few settlers received patents for land after 1927. Cattle ranching—primarily dude ranching—anchored early settlement in the valley, providing an economic base and the stability needed to establish viable communities. As homesteading declined in the late 1920s, ranching became and remained the economic mainstay through World War II, when ranching was fully displaced by tourism.

The history of irrigation in Jackson Hole followed the pattern that occurred elsewhere in the American West. Individual, partnership, and group efforts accounted for virtually all irrigation systems in the valley. Homesteaders constructed small-scale ditches in the park between 1896 and 1927; the largest ditches seldom exceeded 10 appropriated users, and most ditches were no more than 3 miles long. Aside from Jackson Lake Dam, large-scale irrigation projects failed. The Carey Act of 1894, which allowed private companies to build irrigation systems and profit from water sales, generated no successful reclamation projects in Jackson Hole. The first bona fide dude ranches in Jackson Hole were the JY, Bar BC, and White Grass. The Bar BC Dude Ranch (along the Snake River segment) became one of the most famous dude ranches in the Rocky Mountain West. During Bar BC's heyday in the 1920s, famous writers, artists, and Hollywood filmmakers stayed at the ranch. The dude ranch epitomized an idealized western experience, of which a wilderness setting was the most essential element.

Between 1900 and 1920, dude wranglers established ranches throughout the northern Rockies, but perhaps most intensely in the Jackson Hole Valley, making it a hub for dude ranching in the West. Dude ranches in Jackson Hole were working ranches that offered guest lodging and both traditional ranching and outdoor recreational activities to tourists. Horseback riding was the primary recreational activity, followed by pack trips, hunting, fishing, and hiking. Beginning in the late 1920s through 1941, NPS landscape architects and the Bureau of Public Roads improved the South Entrance Road along the Lewis and Snake River segments, ensuring that the roadway design harmonized with the natural features and surrounding landscape

adjacent to the riverbanks (Osman and Regula 2004).

The rise of the conservation movement occurred concurrently with the settlement of the frontier. The creation of federal reserves in the form of parks and monuments withdrew millions of acres from the public domain, preventing their transfer to private ownership, and enabled government to introduce conservation practices and regulation to reduce wasteful consumption of resources. The enabling legislation for Yellowstone National Park and the Forest Reserve Act of 1891 endure as the most significant laws in the history of the conservation movement. The fact that more than 96% of the land in Teton County is public land administered by federal agencies has been decisive in shaping the history of the region and the Snake River Headwaters.

In 1927, the Snake River Land Company formed to buy lands in Jackson Hole for park purposes. Funded by John D. Rockefeller Jr., company agents bought out numerous important dude ranches and resorts. The Snake River Land Company purchased Elbo Ranch, Danny Ranch, Triangle X Ranch, Hogan's Ranch, JY Dude Ranch, and Bar BC Dude Ranch. In 1929, Congress set aside the original area that became Grand Teton National Park, designating only Teton Range and six glacial lakes at the base of the mountains. In 1943, President Franklin D. Roosevelt established Jackson Hole National Monument through presidential proclamation. The monument combined Teton National Forest acreage and other federal properties, including Jackson Lake, and a 35,000-acre donation by John D. Rockefeller Jr. The Rockefeller lands continued to be privately held until December 16, 1949, when the lands were added to the national park system. On September 14, 1950, the areas encompassing the original park established in 1929 and the national monument established in 1943 were combined into the Grand Teton National Park of the present-day boundaries (NPS 2000).

The last major development around the Snake River Headwaters occurred when tourism blossomed and displaced cattle ranching as the dominant economic activity in Jackson Hole. After World War I, the U.S. Forest Service, National Park Service, and State of Wyoming rebuilt and upgraded access highways into the Jackson Hole region and Yellowstone National Park. In the 1920s, the Bureau of Public Roads built a highway from Jackson to Menor's Ferry and built a steel truss bridge across the Snake River at the ferry. Even before the bridge, automobiles crossing on the ferry had become routine (Daugherty et al. 1999). By 1939, the tourism industry, aided by rise of the automobile, had altered the areas of the Snake River Headwaters in the Jackson Hole region. Also during this time, the Snake River Headwaters' river segments that flow due east of the Teton Range became part of a scenic landscape rooted in American culture through a variety of visual media. During the 19th century, cartographers and artists created widely distributed images of the Grand Teton landscape. In the 20th century, these images were replaced by popular photography (particularly that of Ansel Adams), motion pictures, and commercial television. The combined effect of mass dissemination of these images elevated the Grand Teton landscape to become one of the most iconographic landscape images of the American West.

The composition of these iconic images share common elements and themes associated with the Teton Range view. The images are usually taken from the vantage point of the valley floor, often including a view of the Snake River or one of its tributaries, with Teton Range visible in the background. These images not only capture the dramatic natural features of the landscape—flat plains and winding tributaries contrasted by steep mountain peaks—but they often include evidence of the valley's cultural history. Historic buildings and landscape features, such as homesteads, ranch structures, and fences, are often featured. Many photographs include people (real or fictional) historically

associated with the landscape, such as American Indians, ranchers, conservationists, or outdoor recreationalists. The sheer abundance of these photographs has resulted in an iconic image of the Grand Tetons and Jackson Hole Valley that is set in the American consciousness as an idealized view of the American West. For more detail on the creation of this iconic landscape, see William H. Goetzmann's essay, "Picturing Jackson Hole and Grand Teton National Park," in, *A Place Called Jackson Hole: A Historic Resource Study of Grand Teton National Park* (Daugherty et al. 1999).

Today, ongoing human activities in the areas of the Snake River Headwaters in Grand Teton National Park, John D. Rockefeller, Jr. Memorial Parkway, and the lower portion of Yellowstone National Park primarily involve park visitation, outdoor recreation, wilderness conservation, and the preservation of natural and cultural resources. The themes of this historic context are represented by the numerous cultural resources of the headwaters, including prehistoric and historic archeological sites, buildings and structures, human-made landscape features, and resources significant to people traditionally associated with the lands that follow the banks of the designated wild and scenic Snake River Headwaters corridor. These cultural resources are described in the following section as archeological resources, historic structures, cultural landscapes, and ethnographic resources.

Archeological Resources

Archeological resources are the remains of past human activity and documentation of scientific analysis of these remains. Archeological resources can include stratified layers of household debris, weathered pages of a field notebook, laboratory records of pollen analysis, and museum collections. Archeological features are typically buried, but may be above ground. They are commonly associated with prehistoric peoples, but may also be products of a contemporary society. Archeological resources have shed light on family organization and dietary patterns of past peoples. They have aided the understanding of the spread of ideas over time and the development of settlements. Archeological resources are nonrenewable and irreplaceable. Thus, it is important that all management decisions and activities throughout the national park system do no harm or otherwise adversely impact the integrity of the resources.

The areas of the Snake River Headwaters corridor are rich in prehistoric and historic archeological sites. Although very rare, sites dating to the Paleo-Indian period (10,000 BC–6000 BC) include projectile points and other evidence of people who camped, hunted, fished, and gathered plants on a seasonal basis. Archeological evidence from the Archaic Cultures (7500 BC–AD 500) in the region include fire pits that show evidence of new cooking technology such as fire pits filled with heated stones for cooking meat. During the Late Prehistoric Cultures (AD 500–AD 1750), archeological evidence shows innovation in weaponry and food processing. Around AD 1500, the bow and arrow replaced the spear, and tipi rings are common archeological features of this period, suggesting that animal skin tipis were in use by this time. Throughout prehistory, seasonal users of Jackson Hole possibly wintered at lower elevations to the east in areas including Big Hole Basin, Wind River Basin, and Green River Basin. Most of the archeological sites identified in Jackson Hole Valley represent repeated camping over thousands of years. Archeologists have noted that special use hunting sites have low artifact frequencies and are smaller in area than base camps (NPS n.d.).

The first large-scale archeological investigations in the region, including Snake River Headwaters, began in the 1970s, led by archeologist Gary Wright and his colleagues from the State University of New York at Albany. From his findings, Wright and his team formed an archeological "model" of

prehistoric life in Jackson Hole whereby they hypothesized a season-round settlement pattern of prehistoric peoples lived in the Jackson Hole area in the spring and early summer to harvest spawning cutthroat trout and to dig camas bulbs. By late summer, the people moved to the higher elevations to subsist from berry crops. Wright led a majority of the archeological fieldwork at Grand Teton National Park until the 1980s.

Archeological surveys along the floodplain below Jackson Lake Dam have been limited, although reconnaissance surveys have been completed for most of the river corridor. Archeological base maps from 1990 confirm that the Snake River was a barrier to travel from east to west for the prehistoric inhabitants of the valley, as few archeological sites have been found in the area immediately west or east of the river between Ditch Creek and Spread Creek. Most of the existing archeological sites near the floodplain are to the east on terraces set back from the river. It is likely that regular channel changes would displace or destroy archeological material on the floodplain. Prehistoric campsites around lakes and the Snake River delta area above Jackson Lake provide the largest sources of information concerning prehistoric life in Jackson Hole. Further, archeological surveys in certain areas of the Snake River Headwaters continue to investigate and document the prehistoric cultural resources in the Snake River corridor (NPS 1997).

The National Park Service has an ongoing archeological program to determine the extent of prehistoric and historic activity within the boundaries of all of the parks, including areas within the Snake River Headwaters corridor. NPS staff and visitors are discouraged from picking up surface artifacts. Instead, surface artifacts are left in situ (i.e., in place) and the site of the artifacts is documented in the park archeological inventory. Other archeological materials recovered during survey are accessioned in the museum collections at Grand Teton National Park, John D. Rockefeller, Jr. Memorial Parkway, or Yellowstone National Park, depending in which park unit the item is found (Landrum 2005).

Because previous archeological surveys have largely occurred for the purposes of project-related undertakings, less than 10% of the scenic areas within the river corridor have been surveyed for archeological resources, with even less survey coverage in the wild segments and the segments within Yellowstone National Park. Archeological surveys conforming to NPS *Management Policies 2006*, Chapter 5: Cultural Resources, and following *Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation* would be required within many portions of the wild and scenic river corridor as site-specific projects associated with this plan are implemented in the future. Additionally, archeological surveys would be conducted along those designated river segments where no inventory has been previously conducted.

River Segments.

Lewis River (wild segment)—The Lewis River may have served as a major transportation corridor for the many nomadic native peoples who traveled the corridor for more than 12,000 years. Archeological sites along the Lewis River and other tributaries of the Snake River are known to represent the Birch Creek Culture, identified along Salmon River in Idaho; these sites indicate considerable human use from 10,000–7,000 years ago. Obsidian from Yellowstone was identified in sites outside of the park, indicating these people traveled to the region using the Lewis River and its resources. Archeological evidence on this segment of the Lewis River is regionally significant and possibly nationally significant.

Lewis River (scenic segment)—Regionally significant and possibly nationally significant archeological sites along this segment of the Lewis River represent 12,000 years of use as a travel route. Early trails are associated with trappers (e.g., Osborne Russell and Jim

Bridger, well-known trappers in the Grand Teton and Yellowstone regions), U.S. cavalry who first administered the park, and tourists from late 19th century through present day.

Snake River (wild segment)—Archeological sites that may be found along this segment indicate that seasonal hunting, fishing, and camping by native peoples occurred. Captain John W. Barlow, who made scientific explorations of the river, traced the Snake River to its source at Mount Hancock, named by Captain Barlow. Barlow Peak, named in Captain Barlow's honor, include archeological features visible from various locations along the river corridor.

Snake River (scenic segment)—Prehistoric archeological campsites along the banks of the river below Jackson Lake indicate seasonal use, especially near the confluences of tributaries (Pacific Creek and Buffalo Fork). As with the upstream segment, the Snake River was a major travel route used by American Indian tribes. There are nationally significant archeological resources on this portion of the Snake River.

Beginning in the first quarter of the 19th century, fur traders gained access to the valley via former game trails, which were used previously by seasonal American Indian occupants of the area, along the river. Twentieth-century homesteaders, dude ranchers, and conservationists took advantage of the river's scenic and recreational attributes as well as its strategic location to establish ranches and homesteads.

A 2003 archeological survey of the area in and around the Bar BC Dude Ranch national register historic site did not identify sites in the area other than the ranch itself. Archeological features associated with the Bar BC Ranch historic district include privy pits, remnants of former buildings, trash dumps, stone-circle fireplaces, and other features, all dating to 1912–1930. These features are thus contributing elements of the Bar BC Dude Ranch history (Sanders, Wedel, and Holtman 2003).

Pacific Creek and Buffalo Fork (scenic segments)—No archeological sites are currently known in the designated segments of Pacific Creek, Buffalo Fork, and the Gros Ventre River. However, currently undiscovered archeological sites that may be found along these segments would likely indicate that seasonal hunting, fishing, and camping occurred by native peoples for the past 12,000 years. Moreover, although no physical evidence of historical use has yet been identified along the length of the Gros Ventre segment within the boundaries of this plan, national register-eligible archeological resources have been identified along this river segment outside the boundaries of this plan.

River Access Points. To date, no national register-eligible or -listed archeological sites have been identified at the nine access points used as boat launch sites in this plan. However, many of these areas have not been fully surveyed for archeology, and therefore would require future archeological survey prior to implementation of certain site-specific actions described in this plan. (See "Chapter 5: Environmental Consequences" for a description of the cultural resources survey needs associated with the actions proposed in alternatives B and C of this plan.)

Flagg Canyon—The Flagg Canyon boat launch area (formerly known as Southgate Launch) has not been surveyed for cultural resources.

Flagg Ranch—Flagg Ranch boat launch area has been surveyed for cultural resources in surveys in 1991, 1993, and in 2002. No archeological sites were found.

Jackson Lake Dam—At the Jackson Lake boat launch, only the area around the restroom has been surveyed for archeological resources. No sites were found in this effort.

Cattleman's Bridge—The area in and around Cattleman's Bridge launch site has not been

surveyed. Cattleman's Bridge was removed by Grand Teton National Park staff in 2000.

Oxbow Bend Overlooks—Cultural resource surveys completed for the Oxbow Bend overlooks did not identify national register-eligible archeological resources in these areas (Connor 1985).

Pacific Creek Landing—At Pacific Creek Landing, only the area around the existing boat launch site has been surveyed for archeological resources. No sites were found.

Deadman's Bar—The vicinity of Deadman's Bar launch site is currently being surveyed for archeological resources and is scheduled for completion in summer 2012. A few small surveys have been conducted near the picnic area, but no sites were identified. Historians have noted that evidence of old placer mining activity is most obvious in the Deadman's Bar area, suggesting that material evidence of mining activities could be in this vicinity (Dougherty et al. 1999).

Schwabacher Landing—The vicinity of Schwabacher Landing is currently being surveyed for archeological resources and is scheduled for completion in summer 2012.

Moose Landing—The entire vicinity of the Moose Landing boat launch has been surveyed for archeological resources. No sites were found.

Historic Structures and Cultural Landscapes

A prehistoric or historic structure is a constructed work, usually immovable by nature or design, consciously created to serve human activity. Examples of these structures include buildings and monuments, dams, millraces and canals, stockades and fences, defensive works, temple mounds and kivas, ruins of all structural types, and outdoor sculptures. The Snake River Headwaters corridor includes individually national register-eligible historic structures as well as historic districts consisting of multiple buildings, structures, landscape features, and other associated elements.

The corridor also includes five documented cultural landscapes. According to NPS-28: *Cultural Resource Management* (2002), cultural landscapes are

> . . . settings we have created in the natural world. They reveal fundamental ties between people and the land ties based on our need to grow food, give form to our settlements, meet requirements for recreation, and find suitable places to bury our dead. Landscapes are intertwined patterns of things both natural and constructed: plants and fences, watercourses and buildings. They range from formal gardens to cattle ranches, from cemeteries and pilgrimage routes to village squares. They are special places: expressions of human manipulation and adaptation of the land.

A cultural landscape encompasses a diversity of places, many with important land use history or other cultural values. Cultural landscapes include battlefields; homes and designed estate grounds of dignitaries, inventors, and writers; sites held sacred by native peoples from prehistoric times to present; and valleys where our ancestors settled and farmed. Cultural landscapes have often maintained a continuity of land use into the present.

Headwaters-wide. Historic buildings, structures, and cultural landscapes identified within the Snake River Headwaters corridor represent cultural remains of 20th century homesteaders, dude ranchers, conservationists, and early park administration. These resources were established close to the riverbanks to take advantage of the headwaters as a water source, but also to enjoy the river's scenic and recreational attributes. National register-listed or -eligible

structures and cultural landscapes, such as the Yellowstone National Park South Entrance Road Historic District, Bar BC Dude Ranch, Elk Ranch, Menor's Ferry Historic District, 4 Lazy F Dude Ranch, Murie Ranch, and Snake River Land Company buildings, now stand as vestiges of the historic development that occurred at the Snake River Headwaters.

All structures and cultural landscapes known to exist within the Snake River Headwaters corridor have been identified and evaluated under national register criteria. Resources found to be national register-eligible are described below in the river segments where they occur. If previously unknown structures and landscapes are discovered in the future, a section 110 survey would be conducted to evaluate the national register eligibility of those resources.

River Segments.

Lewis River (wild segment)—To date, no historic structures or cultural landscapes have been identified within the Lewis River wild segment.

Lewis River (scenic segment)—The scenic segment of the Lewis River tributary includes the nationally significant national register-eligible South Entrance Road Historic District. This district lies within Yellowstone National Park and parallels the Lewis River segment. The South Entrance Road Historic District contains several national register-listed buildings associated with early and present park administration that were established near the river to assure protection and provide easy access to water.

Snake River (wild segment)—The wild segment of the Snake River has several national register-eligible backcountry patrol cabins in Yellowstone National Park. These include Fox Creek Patrol Cabin, Soldiers Meadow, and Harebell Patrol Cabin. These cabins are associated with early historic, as well as current park administration. Patrol cabins were positioned along early trails and in proximity to rivers to facilitate army or ranger forays into park wilderness to conduct various resource surveys and protection patrols. Near the Snake River / Lewis River confluence is the regionally significant South Entrance Historic District, which contains several national register-listed buildings associated with early and present park administration.

Snake River (scenic segment)—The scenic segment of the Snake River includes the highest concentration of identified historic structures and cultural landscapes within the Snake River Headwaters wild and scenic designated corridor. This river segment includes four historic districts in the Snake River scenic segment that are eligible for or listed in the national register.

Bar BC Dude Ranch—Bar BC Dude Ranch is a national register-listed historic site that includes historic structures and a cultural landscape. Listed in the National Register of Historic Places in 1990, Bar BC Dude Ranch is considered nationally significant. The associated landscape was determined eligible in a 1999 cultural landscape inventory, which was updated in 2007. The period of significance for the ranch and landscape is 1912–1941. The ranch includes 36 contributing structures, most of which are small dude cabins.

The Bar BC Dude Ranch is the most famous of the Jackson Hole dude ranches, in large part due to the efforts of Struthers and Katherine Burt, the original ranch owners. Katherine Burt had influence in the early development of Hollywood westerns and was instrumental in bringing Hollywood filmmakers to Jackson Hole. Struthers Burt was a writer for national publications, using those publications to lobby for the creation of Grand Teton National Park. Struthers was also a novelist, whose most notable book, *Diary of a Dude Wrangler*, documented his experiences at the Bar BC Dude Ranch. The *Development Concept Plan for the Teton Corridor Moose to North Jenny Lake* (NPS 1991) determined that the issue of treatment

of the ranch structures and landscape features would be determined by the results of a historic structures report. The historic structures report strongly recommends retention of the property and proposed an extensive and complete restoration of the ranch. A historic properties management plan, currently underway for Grand Teton National Park, is revisiting the recommendations of the historic structures report in the hopes of stabilizing the ranch. This historic properties management plan is anticipated to be completed in 2012.

4 Lazy F Dude Ranch—The 4 Lazy F Dude Ranch is a national register-listed historic district that includes buildings, structures, and a cultural landscape. 4 Lazy F Dude Ranch was established by William and Margaretta Frew in 1927. The ranch served as a family retreat (4 Lazy F stood for "4 Lazy Frews"). When Emily Frew Oliver and her husband inherited the ranch in 1949, they began accepting paying guests. In 1967, Emily Frew Oliver sold the ranch to the federal government for $650,000 and reserved the right to occupy the ranch and continue the dude ranch operation for the duration of her lifetime. In 2006, Emily Frew Oliver voluntarily terminated her life estate, and Grand Teton National Park assumed management of the property. Grand Teton National Park will be proposing a range of alternatives regarding the future preservation and use of the ranch. These alternatives would be part of the park's historic properties management plan and environmental assessment, which is currently being developed.

The 4 Lazy F Dude Ranch was listed in the national register in 1990. In 2008, a historic structures report was completed, and in 2010, a cultural landscape inventory was completed. Several of the listed buildings and eligible landscape features are visible from the Snake River. The district encompasses 19 contributing buildings and is listed as locally significant. The period of significance is 1927–1938, when the ranch was used as a family retreat.

Menor's Ferry Historic District—The Menor's Ferry complex, which includes the Maud Noble Cabin, is adjacent to the Snake River near Moose. Menor's Ferry is a significant representation of early homesteading and the transportation frontier in Jackson Hole. William "Bill" Menor was the first homesteader on the east bank of the Snake River north of Jackson in 1894, where he established a small store and ferry operation. The Snake River was a barrier to crossing and settlement on the east side of the river until Bill Menor built the ferry. In 1918, Bill Menor sold the operation to Maud Noble. Maud Noble's cabin on Cottonwood Creek was moved to its present site near Menor's Ferry crossing in 1918, where she operated the ferry until 1927, when a steel truss bridge was built across the river. Maud Noble sold her 149-acre property to the Snake River Land Company in 1929. In 1949, Jackson Hole Preserve, Inc., under the sponsorship of John D. Rockefeller Jr., restored Bill Menor's store and reconstructed the ferry. The National Park Service acquired the property in 1953 and listed it in the national register in 1969. The park plans to submit an updated national register nomination and cultural landscape inventory to the Wyoming State Historic Preservation Office in 2012. An archeological survey of the Menor's Ferry site was conducted in 1990, with no significant findings.

Murie Ranch—Murie Ranch was listed in the National Register of Historic Places in 1988. The national register nomination was revised in 1998 to include the entire ranch, and in 2006, Murie Ranch was designated a national historic landmark. The ranch is historically significant for its ties to Olaus Murie and his wife Margaret "Mardy" (called the "grandmother of the conservation movement"), and to Adolph Murie and his wife Louise and the families' contributions to wildlife management, biological science, and conservation throughout 1945–1980. Murie Ranch consists of 31 contributing buildings, and 8 noncontributing buildings. The cultural landscape was determined eligible for listing

in the National Register of Historic Places in a 2010 cultural landscape inventory.

In honor of the Murie family, the ranch property now serves as The Murie Center. In partnership with Grand Teton National Park, The Murie Center engages people to understand and commit to the enduring value of conserving wildlife and wilderness. The center tells the Murie families' stories to the public by docent programs and public outreach that highlight the relevance of the Murie families'' efforts to the 21st century.

Pacific Creek (scenic segment)—To date, no historic structures or cultural landscapes have been identified in the Pacific Creek scenic segment.

Buffalo Fork (scenic segment)—The Buffalo Fork scenic segment contains the Snake River Land Company residence and office, an individually national register-eligible historic building. This river segment also includes the Elk Ranch cultural landscape, which contains contributing historic structures, including a residence.

Snake River Land Company Residence and Office—The Snake River Land Company residence and office near the Moran entrance station, was listed in the National Register of Historic Places in 1998. A nationally significant historic district, the district contains three contributing buildings (a large lodge/residence, a garage, and a shed), and a small noncontributing storage building. Originally it was the property of John Hogan, a politician, from 1926–1930. Hogan developed the property into a small dude ranch and fox farm. It was purchased by Snake River Land Company in 1930, and was used as the primary in-park administrative entity associated with John D. Rockefeller Jr.'s efforts to consolidate private lands in Jackson Hole and to expand Grand Teton National Park. In addition to its association with Rockefeller, the residence is a significant example of late-period vernacular architecture, as defined in the Grand Teton National Park Multiple Property Submission Settlement Context (NPS 1998). The period of significance spans from 1927, when Hogan constructed the main residence, to 1950, when ownership of the property was transferred to the National Park Service.

Gros Ventre River (scenic segment)—To date, no historic structures or cultural landscapes have been identified in the Gros Ventre River scenic segment.

River Access Points. No national register-eligible or -listed historic structures or cultural landscapes have been identified in the immediate vicinity of the nine river access points addressed in this plan.

Ethnographic Resources

Ethnographic resources are defined as "the cultural and natural features of a park that are of traditional significance to traditionally associated peoples." For at least the last 10,000 years American Indians occupied the lands in the designated wild and scenic designated corridor. Consequently, places and resources in the river corridor continue to hold both historical and contemporary traditional significance. American Indians often passed through areas of the river corridor for hunting and foraging, migration, or for religious or other cultural endeavors.

Today, there are 30 associated American Indian tribes that each have particular historical traditions associated with what is now park land that includes the Snake River Headwaters wild and scenic river corridor. Tribes that are associated with the parks and with whom consultation occurs include the following:

- Apache Tribe of Oklahoma
- Arapaho Tribe of the Wind River Reservation
- Assiniboine and Sioux Tribes of the Fort Peck Indian Reservation
- Blackfeet Tribe of the Blackfeet Indian Reservation of Montana

- Burns Paiute Tribe
- Cheyenne River Sioux Tribe of the Cheyenne River Reservation
- Coeur D'Alene Tribe
- Comanche Nation
- Confederated Salish & Kootenai Tribes of the Flathead Reservation
- Confederated Tribes of the Colville Reservation
- Confederated Tribes of the Umatilla Indian Reservation
- Confederated Tribes and Bands of the Yakama Nation
- Crow Tribe of Montana
- Crow Creek Sioux Tribe of the Crow Creek Reservation
- Flandreau Santee Sioux Tribe of South Dakota
- Fort Belknap Assiniboine and Gros Ventre Tribes
- Kiowa Indian Tribe of Oklahoma
- Lower Brule Sioux Tribe of the Lower Brule Reservation
- Nez Perce Tribe
- Northern Cheyenne Tribe of the Northern Cheyenne Indian Reservation
- Oglala Sioux Tribe
- Rosebud Sioux Tribe of the Rosebud Indian Reservation
- Shoshone-Bannock Tribes of the Fort Hall Reservation
- Shoshone Tribe of the Wind River Reservation
- Sisseton-Wahpeton Oyate of the Lake Traverse Reservation
- Spirit Lake Tribe
- Standing Rock Sioux Tribe of North & South Dakota
- Turtle Mountain Band of Chippewa Indians of North Dakota
- Yankton Sioux Tribe of South Dakota

The parks continue to collect data on ethnographic resources through consultations and oral history interviews with the associated tribes. Each of the associated tribes was contacted regarding this environmental assessment process.

Places and resources within the river corridor are associated with the development and continuance of ethnically distinctive peoples and are closely linked with peoples' sense of community. To date, over 300 ethnographic resources have been recorded at the parks that contain portions of the wild and scenic river corridor. These ethnographic resources include numerous native plants and nearly all wildlife species found throughout the Snake River Headwaters. For these reasons, the impact analysis of ethnographic resources has been integrated into the topics of Water Resources and Vegetation, Wildlife, and Fish in "Chapter 5: Environmental Consequences."

American Indian tribes were consulted on June 8, 2012, regarding the actions proposed in this plan. To date, no American Indian tribes have identified or described specific sites or other ethnographic resources within the Snake River Headwaters wild and scenic corridor to NPS staff. If these tribes subsequently provide detailed information concerning the presence of ethnographic resources in certain areas of the wild and scenic river corridor, additional tribal consultation would occur to gain a better understanding of the ethnographic resources specific to the affected environment of this plan. Information concerning the sites of ethnographic sites would not be made public. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act would be followed.

Please note that in chapter 5, impacts on ethnographic resources are analyzed under the topics Water Resources, and Vegetation, Wildlife, and Fish.

VISITOR USE AND EXPERIENCE

Introduction

This section describes aspects of visitor use and experience that may be affected by the management alternatives within each of the Snake River Headwaters segments. The description of these elements is based on the best professional judgment of Yellowstone National Park, John D. Rockefeller, Jr. Memorial Parkway, and Grand Teton National Park staff; NPS planners; and research results from other specialists.

The following sections are organized by describing visitor use and experience at three different levels:

1. Headwaters-wide – explains the visitor use and experience from a riverwide perspective by first outlining overall use levels, trends, and visitor characteristics
2. River segments – describes visitor use and experience within the individual river segments
3. River access points – focuses on visitor use and experience at particular places within the river segments

In addition to the elements listed above, at each of the three levels, the following visitor use and experience characteristics will be discussed:

- Recreational access and opportunities: Include the types of recreational opportunities that can be experienced within the Snake River Headwaters. These can include activities such as boating, fishing, scenic driving, camping, and other activities conducted either privately or through concessioner services.
- Quality of the experience: Includes characteristics associated with visitor experience within the headwaters, and consist of elements pertaining to perceived crowding, satisfaction with facilities and services, and opportunities to experience solitude and quiet.
- Interpretation and education: Includes the opportunities for visitors to experience interpretation and education within the headwaters.
- Safety: Includes elements regarding visitor safety within the headwaters.

Headwaters-wide

Visitor Use Levels and Trends. The Snake River Headwaters comprises seven river segments that span three separate NPS national park system units: (1) Grand Teton and Yellowstone national parks, (2) John D. Rockefeller, Jr. Memorial Parkway, and the (3) National Elk Refuge. Many of the visitors to these protected areas visit the Snake River Headwaters during their trip. Research shows that approximately 46% of visitors to Grand Teton National Park visit the wild and scenic Snake River during their trips to the park (Univ. of Idaho 2008).

Visitor counts indicate that the Snake River visitation within Grand Teton National Park and John D. Rockefeller, Jr. Memorial Parkway declined slightly between 2007 and 2009, although 2010 data suggest that visitation is on the rise. River-related visitation peaks in July with an average of approximately 15,341 visitors; most of which are day use visitors who raft/float, kayak, or fish the headwaters (figure 4). The majority of the boaters and anglers on the Snake River Headwaters are guided through concessioners. Concessioner-guided visitor counts suggest that use of these services has declined slightly over the past couple of years, but is increasing based on 2010 and 2011 data (figure 5). Visitor counts indicated that there were 59,192 concessioner-guided boaters, and 2,691 guided anglers on the headwaters in 2011 (NPS 2011b).

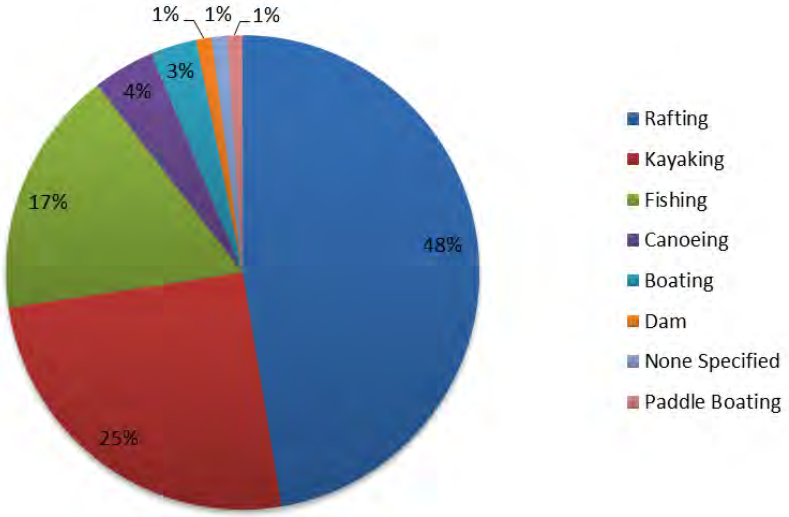


FIGURE 4. RIVER-RELATED ACTIVITY PARTICIPATION LEVELS AT SNAKE RIVER HEADWATERS

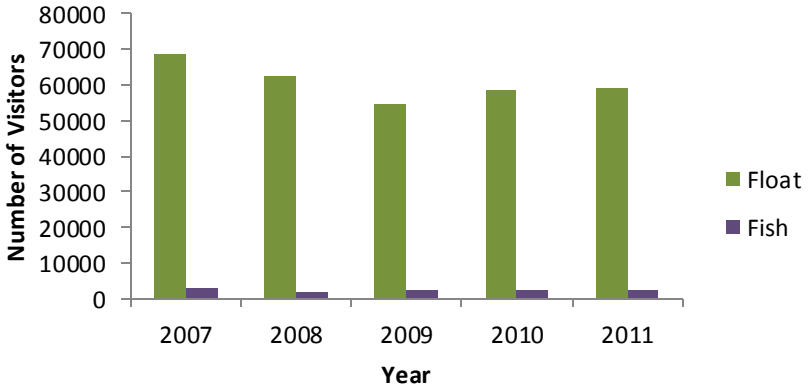


FIGURE 5. CONCESSIONER-GUIDED FLOATING AND FISHING VISITOR COUNTS FROM 2007–2011 ON THE SNAKE RIVER WITHIN GRAND TETON NATIONAL PARK AND JOHN D. ROCKEFELLER, JR. MEMORIAL PARKWAY

TABLE 11. 2008 VISITOR STUDY SAMPLING LOCATIONS WITHIN GRAND TETON NATIONAL PARK

Sampling Location	Frequency	Percentage
Flagg Canyon	249	34
Moose Entrance Station	175	24
Moran Junction Entrance	122	17
Highway 89 turnouts, Snake River overlook, Teton Point overlooks	121	16
Moose-Wilson Road / Granite Canyon entrance	72	10
Total	739	101*

*Total percentages do not equal 100 due to rounding.

Visitor Characteristics. Visitor characteristics were evaluated using several data sources. The information presented represents data evaluated through visitor use statistics collected by park staff at Yellowstone National Park, Grand Teton National Park, and John D. Rockefeller, Jr. Memorial Parkway; a Grand Teton National Park visitor study conducted by the University of Idaho in 2008; and a Snake River Headwaters visitor study conducted in 2011 (Park and Tucker 2012). Please note the 2011 study was conducted as part of public scoping for this planning effort to better inform the development of alternatives and the environmental analysis.

The July 2008 University of Idaho study focused on visitor services, demographics, activities, and perspectives within Grand Teton National Park. A sample of n = 739 was collected at four locations (table 11).

The 2012 Park and Tucker study of Snake River visitors evaluated visitor use, behaviors, and perceptions of visitor experience on the Snake River Headwaters. A sample of n = 97 was collected at six sites within the Snake River scenic segment from June to mid-August 2011 (table 12).

TABLE 12. RIVER USER SURVEY COLLECTION TOTALS

Sampling Location	Frequency	Percentage
Deadman's Bar	4	4
Flagg Ranch	1	1
Moose	15	16
Moose Bridge	20	21
Moose Landing	0	0
Pacific Creek	57	59
Schwabacher Landing	0	0
Total	97	101*

*Total percentages do not equal 100 due to rounding.

Group Size and Composition, Age, Distribution, and Origin of Visitors— Visitor group size on the Snake River averages approximately seven visitors per group (Park and Tucker 2012), and previous research with visitors to Grand Teton National Park suggests that the majority (72%) of visitor groups to the area are families (Univ. of Idaho 2008). The average age of visitors to the Snake River Headwaters is 50, with slightly more female (58%) than male (42%) visitors (Park and Tucker 2012). Approximately 90% of visitors to the area are from the United States, and the remaining 10% of international visitors are mostly from Canada (~18%), United Kingdom (~17%), Netherlands (~10%), and Germany (~10%) (Univ. of Idaho 2008).

Travel Patterns— There are numerous roads or trails on which visitors can access the Snake River Headwaters. (See maps 2–8 of the Snake River Headwaters, including roads to the river access points, and map 9 for an overview of river access points.) From the north and within Yellowstone National Park, the scenic segment of the Lewis River can be accessed via North Park Road (U.S. 89/191/287). Near the south entrance of Yellowstone National Park, this segment intersects with the designated wild segment of the Snake River. The wild segment of the Snake River parallels North Park Road through John D. Rockefeller, Jr. Memorial Parkway for a short distance, then meanders west and south toward Jackson Lake. North Park Road continues south into Grand Teton National Park. At this point, U.S. 191/287 travels east, diverging after it intersects with the designated scenic segment of Pacific Creek. At this junction, East Boundary Road (U.S. 26/287) travels east near the designated scenic segment of Buffalo Fork. North Park Road continues south following the designated scenic segment of the Snake River until it diverges southward from the Snake River near Moose and travels toward Jackson Lake. The scenic segment of the Gros Ventre River is east of Moose and can be accessed off Gros Ventre Road. Research suggests that most visitors to the area travel by personal vehicle (~63%), with approximately 41% of visitors arriving in Grand Teton National Park from the north, visiting the Snake River, and nearly one-half of the visitors entering Grand Teton National Park from the south (~48%), visiting the Snake River (Univ. of Idaho 2008).

Length of Stay and Repeat Visitors— Approximately one-half of the Snake River recreationists are first-time visitors, while 16% have visited two to five times and 34% have visited six or more times (table 13) (Park and Tucker 2012). Whether visitors are participating in rafting, floating, kayaking, or fishing activities, the average length of the activity is approximately 2.6 hours (Park and Tucker 2012).

Frequency of Recreation Areas Visited. The scenic segment of the Snake River receives more visitation than the other wild and scenic river segments. Within the scenic segment, Deadman's Bar put-in to the Moose Junction take-out averages the highest visitation with approximately 48,788 visitors in 2010 (NPS, Rhinehart, pers. comm. 2011c) (see figure 9). Pacific Creek Landing to Deadman's Bar, within the designated scenic Snake River segment, is the second-most visited section of the river, averaging 7,443 floaters in 2010. Use levels on the scenic segment of the Snake River are generally lowest on Wednesdays, and peak at most sections during the weekend. Visitor counts from 2011 suggest that average daily use ranges from zero visitors at river sections such as Schwabacher Landing to 280 visitors at more heavily visited sites such as Moose Landing (Park and Tucker 2012). Research suggests that the majority of river visitors (59%) visit no more than one section of the river during a given trip.

TABLE 13. NUMBER OF TRIPS ON THE SNAKE RIVER WITHIN GRAND TETON NATIONAL PARK

Number of Trips	Total	Percentage
1	46	50.0
2 to 5	15	16.0
6 to 10	6	6.0
11 to 25	7	8.0
25+	18	20.0
Total	**92**	**100.0**

Recreational Access and Opportunities. A recent study of visitors to Grand Teton National Park indicated that approximately 66% of respondents felt that recreational opportunities were an important part of their visit to the area (Univ. of Idaho 2008). Visitors to the headwaters have opportunities to enjoy the scenic beauty of the iconic waterway while boating, fishing, trail-based recreating, scenic driving, viewing wildlife, taking photographs, camping, and lodging. Many of these visitors are day use recreational boaters, and approximately two-thirds of these are guided through concessioners. Headwaters-wide descriptions of these recreational activities are described as follows:

Boating—There are abundant nonmotorized boating opportunities on the Snake River Headwaters, ranging from rafting, scenic floating, canoeing, kayaking, and fishing. The majority of visitors to the headwaters are day use visitors participating in boating activities, who have opportunities to boat privately or with concessioner vendors. Visitor boating use varies depending on the designated segment. Some of the river segments, including the Lewis River scenic and Snake River wild segments within Yellowstone National Park; Pacific Creek and Buffalo Fork scenic segments within Grand Teton National Park; and the Gros Ventre River within Grand Teton National Park and the National Elk Refuge are closed to boating (see table 7 alternative A for a summary of existing use statistics). The designated segments provide various levels of infrastructure and development to accommodate the many types and numbers of boaters. Visitor boating use varies drastically depending on the designated segment—boating is not permitted in some of the river segments. While the segments require different processes for boating, permits are required for boaters within the headwaters and must be acquired prior to launch. All permits must be properly displayed on the rear left side of the boat. The State of Wyoming requires boaters to purchase an aquatic invasive species decal from the Wyoming Game and Fish Department and post it on their boat.

Angling— There are fishing opportunities at all seven designated river segments. Each segment provides unique fishing opportunities, whether by boat, wading in the river, or standing on the shore. Some segments, such as the designated scenic segment of the Snake River, are more popular with boat-based anglers, while other sections, such as the designated scenic segment of Pacific Creek, are used by walk-in anglers. Angling within Yellowstone National Park requires a Yellowstone National Park fishing

permit. Anglers 16 years old and older are required to purchase a 3-day, 7-day, or season permit. Anglers 12 to 15 years old are required to obtain a nonfee permit. Permits are available at various places throughout the park and in gateway communities. State fishing licenses are not required in the park and are not a substitute for a Yellowstone National Park fishing permit. Fishing within Grand Teton National Park requires visitors to follow State of Wyoming fishing regulations, which include acquiring a valid State of Wyoming fishing license.

Trail-based Recreation— Trail-based recreation is an important component of the purpose of the Snake River Headwaters to provide high quality recreational experiences for visitors. Although the majority of visitors participate in boating or scenic driving activities, many visitors use the river corridor for trail-based recreation. Research suggests that approximately 37% of visitors to Grand Teton National Park participate in hiking, and many of those visitors hike within the headwaters corridors. All seven designated river segments provide some level of trail-based recreational opportunities. These include day-hiking, backpacking, horseback riding, walk-in fishing, wildlife viewing, and photography. In particular, the designated wild segment of the Snake River offers extensive trail systems, many of which connect to other popular trail networks outside the designated river corridor. As in the other river segments and related backcountry areas within Yellowstone National Park, overnight use is regulated through a permit system, and a trip planner and an advance reservation system are used to control overnight use levels. Reservations are processed April 1 each year; backcountry rangers patrol these areas on foot to check for permit compliance.

Scenic Driving / Traveling— The Snake River Headwaters has many paralleling and intersecting roadways that provide breathtaking views of the diverse landscape. Research suggests that the majority of visitors participate in scenic drives (Univ. of Idaho 2008). Whether visitors travel by vehicle, bicycle, or snowmobile, the Snake River Headwaters provide opportunities to see geologic formations, waterfalls, iconic river bends, historic ranchlands, and stunning views of the Teton Range. In particular, the designated scenic Lewis River segment, which is paralleled by U.S. 89/191/287 for approximately 12 miles, provides views of the narrow gorge and popular Lewis Falls. The designated scenic segment of the Snake River, which includes Oxbow Bend, is popularized in photographic works of Ansel Adams. Each segment provides unique scenic experiences for visitors to the Snake River Headwaters.

Photography/Wildlife Viewing— All of the designated wild and scenic segments of the Snake River Headwaters provide opportunities for visitors to take photographs and view unique wildlife. Because wildlife viewing is important and often related to photographic pursuits, visitors receive wildlife messaging and information to prevent negative visitor interactions and to protect wildlife. Visitors also enjoy the breathtaking views of the Teton Range, glaciers, lakes, and the Absaroka and Red Mountains in Yellowstone. Other attractions include thermal features (e.g., Huckleberry Hot Springs, Snake River Hot Springs), vast expanses of forests, meadows, sagebrush grasslands, historic structures, and landscapes.

Campgrounds— There are many opportunities for visitors to camp near the Snake River Headwaters, whether it is in a primitive but maintained backcountry campsite, or at an established campground with RV amenities. Prospective campers within Yellowstone National Park segments, such as the wild Lewis River, must obtain an overnight permit through an advance reservation system; comply with NPS regulations including overnight permits; limit group size to eight people per site; and follow Leave No Trace principles within the corridor and at campsites. Camping and backpacking within Grand Teton National Park requires permits allocated through a

reservation system. All campers and backpackers are required to practice Leave No Trace to prevent resource impacts, and campers and other visitors in all three national park system units are required to comply with food storage regulations, which are designed for the safety of visitors and wildlife.

Lodging and Other Concessioner Services— The headwaters have several lodging and concessioner services, each offering varying levels of amenities and recreational activities. Most of the segments have concessioner services, many of which provide floating, rafting, or fishing opportunities. Other guided activities available within the headwaters include canoeing and kayaking, backpacking, horseback riding, and pack animal-related trips. While there are backpacking and camping options within several of the segments, resort-style lodging options are limited to the wild Snake River segment within John D. Rockefeller, Jr. Memorial Parkway.

Quality of Experience. Visitor experience consists of the perceptions, feelings, and reactions a person has before, during, and after a visit to a park site. This includes planning for the visit, engaging with all aspects of the area (resources, facilities, and staff), gaining knowledge of and developing attitudes toward the cultural and natural resources, and taking home memories and emotions associated with the visit. It also includes how visitors view the opportunities available and the quality of service provided at the park. Visitor experience is an essential, albeit intangible, resource within every national park.

The natural and cultural resources and recreational opportunities that are the motivation for an individual's visit are not the only aspects that influence the quality of visitor experience. Visitors react to everything in the park—from directional signage to restrooms, to interpretive programs to behavior of other visitors. Moreover, the quality of the visitor experience is a highly subjective matter because not all visitors react in the same manner to situations and circumstances. Some visitors enjoy a social atmosphere, whereas others seek solitude. Some recreational users like to be challenged, while others may prefer less challenging endeavors. Similarly, some visitors prefer participating in guided activities, while others enjoy being self-sufficient. Although the quality of visitor experience is subjective, park management can evaluate these experiences based on aspects such as (1) perceived crowding and conflict; (2) satisfaction with facilities and services; and (3) opportunities to experience solitude and quiet, as described within the following contexts of the headwaters:

Perceived Crowding and Conflict— Crowding is defined as "the negative evaluation of a use level" (Manning 1999). Crowding involves the interpretation of descriptive information such as number of people a visitor encounters at one time on a given river segment, and evaluative information such as visitor reaction to the number of other visitors encountered on that river segment (Whittaker et al. 2011). Crowding can be evaluated by determining if visitors negatively perceive the use levels they experience. This is frequently evaluated by examining visitor perceptions, either positive or negative, of encounters with other recreationists. As the number of encounters increases, perceived crowding increases (Vaske and Donnelly 2002). Conflict can also occur when recreational activities are perceived to interfere with each other. This can occur between visitors participating in the same activities, potentially competing for use of a particular location, or between recreationists participating in different activities. For example, boaters may perceive that angling activities negatively interfere with paddling, while anglers may perceive that boaters negatively interfere with fishing (Driver and Bassett 1975).

These issues have been explored within the Snake River Headwaters through visitor

surveys. During a 2011 study, 38% of respondents who had visited the scenic segment of the Snake River suggested that they observed more people during their recent visit. Although "more people" were identified as a primary change over time, most respondents did not report crowding or crowding-related conflict to be major visitor experience concerns (Park and Tucker 2012). The majority of visitors (65%) did not encounter more than five other groups, and approximately 20% reported seeing more than 10 other groups on the river during their recreation activity (table 14). Approximately 75% of respondents indicated that they were "not at all crowded," and only 4% reported that other recreationists had negatively impacted their experience on the river (figures 6 and 7), suggesting that generally visitors were not crowded and experienced little conflict during their activities on the Snake River. However, when asked hypothetically how important it would be to see fewer people during a trip, responses tended to favor seeing fewer people or groups (figure 8) (Park and Tucker 2012).

TABLE 14. NUMBER OF GROUPS ENCOUNTERED WHILE ON THE RIVER

Number of Groups	Total	Percent
0	13	14.0
1 to 5	62	65.0
6 to 10	14	15.0
11 to 15	1	1.0
15+	5	5.0
Total	**95**	**100.0**

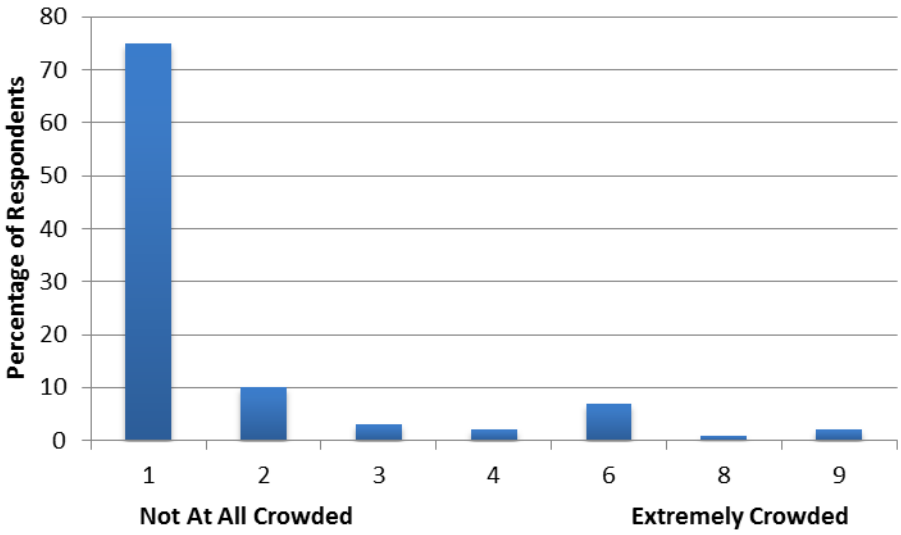


FIGURE 6. LEVEL OF CROWDING EXPERIENCED ON THE SCENIC SEGMENT OF THE SNAKE RIVER

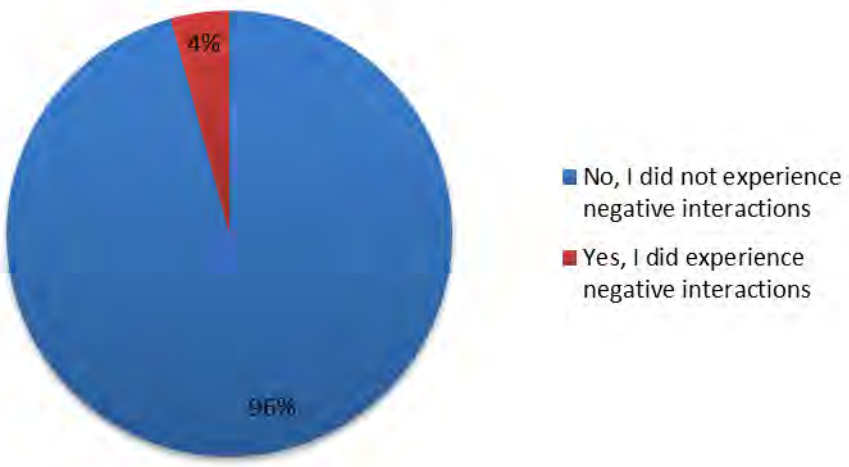


FIGURE 7. EXPERIENCES RELATED TO OTHER VISITOR INTERACTIONS ON SCENIC SEGMENTS OF THE SNAKE RIVER

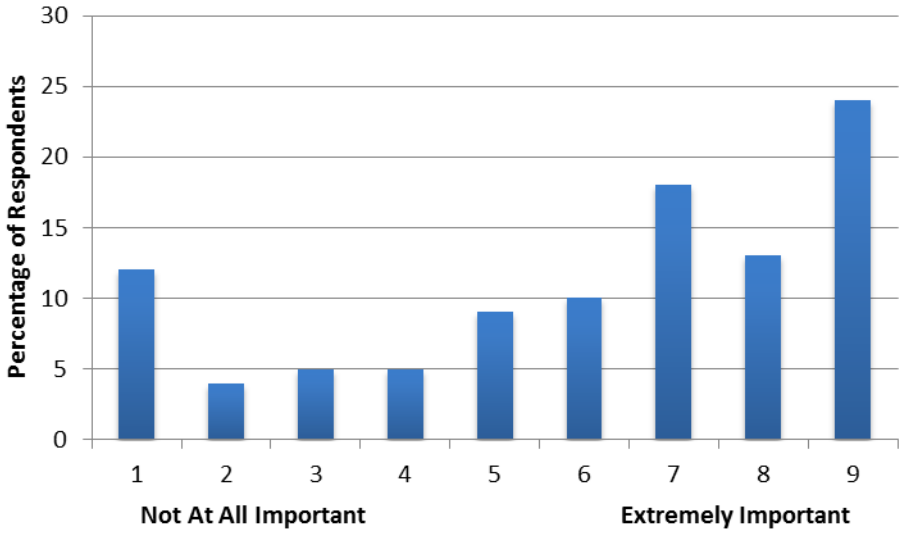


FIGURE 8. IMPORTANCE OF SEEING FEWER PEOPLE DURING TRIP ON THE SCENIC SEGMENT OF SNAKE RIVER

Facilities and Services— Evaluation of visitor experience of facilities provided within or near the Snake River Headwaters affords greater understanding of how visitors perceive their visit. Ninety-six percent of visitors suggested that the overall quality of facilities, services, and recreational opportunities during their trip were good (Univ. of Idaho 2008). Generally, the Snake River infrastructure components that affect visitor experience are considered to be of high quality. For example, developments such as put-ins, parking, informational signage, and trash facilities were suggested to be of high quality. Facilities such as restrooms and picnic areas were evaluated lower, but still regarded as high quality facilities. Access for persons with special needs were rated as the lowest level of quality compared with other indicators, but remained at a level of high quality according to most visitors (Park and Tucker 2012). These types of facilities are considered to be an important component of visitor experience (Univ. of Idaho 2008) and, generally, these findings suggest that most visitors are satisfied with the facilities provided within or near the Snake River Headwaters corridors.

The services provided within the wild and scenic segments range from interpretive programming to concessioner-facilitated rafting/floating, fishing, backpacking, and horseback riding. Exploring how visitors felt about the services they received during their visits provides greater understanding of visitor experience on the headwaters. Visitor surveys suggest that the provided information/interpretation and concessioner services are considered to be above average in their importance and quality. For example, 96% of visitors considered assistance from park staff to be of high quality (Univ. of Idaho 2008).

Generally, visitor surveys suggest that services at restaurants (80%), grocery and camp stores (73%), and assistance from concessioner staff (76%) are a very important component of visitor experience. Research suggests that 98% of visitors floated or rafted the Snake River with concessioner services. Ninety-eight percent indicated that these services were an important component of their trips, and 93% indicated that the services provided were of good quality (Univ. of Idaho 2008).

Opportunities to Experience Solitude and Natural Quiet— The opportunity to experience solitude, quiet, and natural sounds are important when defining the quality of visitor experience in parks (Gramann 1999). A survey of the American public showed that 95% of people believed that experiencing natural peace and sounds of nature were important reasons to preserve national parks (Haas and Wakefield 1998). Another survey of park visitors showed that 91% of respondents believed that enjoyment of natural quiet and sounds of nature were compelling reasons for visiting national parks (McDonald et al. 1995). Visitors have many opportunities to experience the sounds of nature within the headwaters, although research evaluating visitor perspectives toward the sounds they experience while recreating within the headwaters' corridors is limited. Research has shown that anthropogenic (human-generated) sounds such as loud voices, cell phones, radios, and motorized equipment that mask the sounds of nature are annoying and unacceptable to visitors at Grand Teton National Park at locations near the headwaters (Pilcher, Newman, and Stack 2006). Because solitude and natural quiet are important components of visitor experience, it is expected that anthropogenic sound intrusions may negatively affect visitor experience within the headwaters' corridors. Acoustic monitoring data for areas within the designated wild and scenic headwaters' corridors is limited. However, within the segments-wide section, a description of recent sound events at areas near the scenic Snake River and the scenic Gros Ventre River are discussed.

Interpretation and Education. There are currently many opportunities to experience

interpretation and education within and surrounding the headwaters. These include elements such as roadside and trailhead signage, interpretive displays, visitor centers, museums and learning structures, and park staff, as well as concessioner services. These elements provide opportunities for visitors to learn about the history and natural processes that occur within the area, while gaining understanding of proper behavior to help protect the resources. Interpretive opportunities vary depending on in which segment of the Snake River Headwaters visitors are recreating. However, all segments require that visitors practice the seven Leave No Trace principles:

1. Plan Ahead and Prepare
2. Travel and Camp on Durable Surface
3. Dispose of Waste Properly
4. Leave What You Find
5. Minimize Campfire Impacts
6. Respect Wildlife
7. Be Considerate of Other Visitors

Research suggests that the majority of visitors to the area are satisfied with the level of information they receive, and 95% of visitors seek and receive information prior to their arrival in the area. However, once on-site, approximately 92% of visitors use park brochures/maps, 44% gain information from park staff, and 40% learn information from roadside exhibits (Univ. of Idaho 2008).

Safety. River safety is emphasized by boating concessioners and at launch waysides in Grand Teton National Park and John D. Rockefeller, Jr. Memorial Parkway. Perceived safety is a measure that can be assessed to evaluate the quality of visitor experience. Studies indicate that most visitors perceive the areas surrounding the headwaters to be safe. For example, 86% of visitors felt safe from crime and 60% felt safe from accidents during their visit to the area. However, results from visitor surveys suggest that some visitors have safety concerns pertaining to vehicle-related accidents and wildlife interactions (Univ. of Idaho 2008). Visitor surveys at Grand Teton National Park suggests that perceived hazards related to wildlife encounters are the most prevalent safety concern, followed by motor vehicle accidents and falling (Tuler and Golding 2002). Visitor activities in the headwaters corridors were not specifically mentioned as a reason for feeling unsafe. However, visitor use elements such as educational information, wayfinding, access, parking, and regulations all determine the level of safety visitors may experience within the headwaters. For example, visitor surveys suggest that trail signage and directional signage were the most popular source for safety information for visitors in Grand Teton National Park (Tuler and Golding 2002). These factors are vital components of visitor safety that must be considered.

River Segments

Introduction. This section describes the unique recreational access and opportunities provided by each river segment. The quality of the experiences, interpretation and education opportunities, and safety conditions are also described for only those segments that require deeper discussion beyond that mentioned within the "Headwaters-wide" section of this chapter. Within this section, the wild Snake River segment is discussed separately under the Yellowstone National Park and John D. Rockefeller, Jr. Memorial Parkway sections due to the diverse recreational opportunities provided within each.

Lewis River (wild segment). The designated wild segment of the Lewis River receives approximately 1,500 visitors annually, and approximately 1,300 of those visitors travel by boat through this section, primarily accessing Shoshone Lake. Nonmotorized boating is allowed, but paddling requires upstream travel and can be challenging or even impassible during low flow. Motorboats, which can be used on Lewis Lake, are not permitted within the

river channel. Currently, three authorized concessioners offer overnight kayak trips, and two local Boy Scout camps operate under special use permits to provide canoe trips on Shoshone Lake via the Lewis River Channel, which contribute to 800 boats traveling this section annually. Many of the day use boaters in this river section fish, which requires a Yellowstone National Park fishing permit that is not interchangeable with a State of Wyoming fishing license. These permits are available at many sites within the park and in the surrounding gateway communities. The 3.5-mile Channel Trail, which runs along the east shore of the Lewis River channel, serves as a hiking route to access Shoshone Lake with most of the day use hiking on this trail focused on fishing. Walk-in fishing use along this trail can be high during peak season, equating to approximately 200 anglers per year. This segment also offers primitive overnight camping, which primarily occurs along the shores of Shoshone Lake. These sites are technically outside the designated river corridor, but are largely accessed via boat or trail within the designated Lewis River.

Visitor experience within the wild Lewis River segment largely stem from the quality of experience visitors may have while boating, fishing, hiking, and camping. Visitation levels within this segment suggest that crowding may take place during the peak summer season, particularly with boaters on the Lewis River channel and hikers and walk-in anglers on the Channel Trail. However, the lack of data limits the ability to predict how this may affect visitor experience. Similarly, little is known about how the facilities and services, or the opportunities to experience solitude or natural quiet within this segment affect visitors.

Interpretive opportunities are minimal within this segment, but visitors are encouraged to practice Leave No Trace to prevent resource impacts. Some level of interpretation may occur when accessing permits, as overnight visitors within this segment are required to obtain a permit through an advance reservation system, and anglers must obtain a Yellowstone National Park fishing permit, which is available at many locations within the park and in the surrounding gateway communities.

Visitor safety within the wild Lewis River segment pertains to how safe visitors feel while boating, fishing, hiking, and camping, as well as the perceived safety experienced while accessing the river and these activities. The lack of data about visitor perceptions of safety within this segment limits the ability to understand how this may affect visitor experience. There is limited interpretation and informational opportunities provided within this segment, which may cause safety concerns for some visitors.

Lewis River (scenic segment)— Most of the visitor use within the designated scenic Lewis River segment stems from scenic driving, which equates to approximately 240,000 vehicles between May and October each year. North Park Road parallels the river for approximately 12 miles from the confluence of the wild Snake River to Lewis Lake. Approximately 16 road turnouts and parking areas provide additional access to view the river including popular attractions such as the narrow river gorge and Lewis Falls. These points also provide river access to anglers, many of whom are hoping to catch brown trout, which are prevalent in this segment. Boating is not allowed due to the extreme gradient and narrow canyon walls. This segment also provides access to overnight backcountry trips within the southern portion of Yellowstone National Park, although no overnight use is allowed within this designated river section. The Pitchstone Plateau Trail, which can be accessed via the trailhead along the park road near the south entrance, travels north and west approximately 0.25 mile before leaving the river corridor boundary. This trail provides backcountry access from the river corridor and requires backcountry permitting for overnight use.

Visitor experience within the scenic Lewis River segment stem from the quality of

experience visitors may have while scenic driving, hiking, or fishing. Previous research suggests that scenic driving is an important component of visitor experience within this area (Univ. of Idaho 2008). However, the 240,000 vehicles that pass through this segment during peak season may cause some perceived crowding. Little is known about visitor perceptions of this potential impact at this time. Similarly, little is known about how the facilities and services, or the opportunities to experience solitude or natural quiet within this segment affect visitors. Vehicle noise propagating from the roadway to the river corridor may also affect visitor experience, but the lack of data on this topic limits the ability to predict the potential impact.

Some of the 16 road turnouts and parking areas provide interpretive waysides. The south gate of Yellowstone National Park, which includes the park's south entrance station and ranger station, provides additional opportunities for visitors to interact with park staff and learn about the resources of the area.

Visitor safety within the scenic Lewis River segment is concerned about how safe visitors feel while scenic driving, hiking, or fishing, as well as the perceived safety experienced while accessing the river and these activities. Little is known about visitor perceptions of this safety within this segment, although visitors within the area have suggested that vehicle-related accidents are of concern (Univ. of Idaho 2008). The volume of vehicular traffic within this segment may cause some visitors to perceive this as a safety hazard therefore adversely impacting their visitor experience.

Snake River (wild segment, Yellowstone National Park)— The 47-mile-long wild Snake River segment provides visitors with opportunities to hike, backpack, camp, fish, horseback ride, and picnic within southern Yellowstone National Park. This segment also provides visitors with access to some of the most unique geological formations within Yellowstone National Park. Most recreation within this segment occurs on the scenic trails, many of which parallel the river. For example, the popular 27.7-mile South Boundary Trail follows the river through some of the most remote areas within the park. Access to this trail is limited only to seasons in which the river can be crossed at the South Boundary Trail trailhead, which typically occurs in July. Backcountry visitors can also access the river corridor from the Bridger-Teton National Forest on either Coulter Creek or Fox Creek Trails. The Continental Divide National Scenic Trail (Continental Divide Trail), which parallels the river on the Snake River Trail for several miles, receives approximately 40 to 50 thru-hikers each year from July to September. Four concessioners offer guided backpacking trips in this section, resulting in an average of four commercial trips each year. Seven designated backcountry campsites exist along the river within this segment, which maintain maximum visitor and pack animal use limits to protect resources (table 15). Within this segment, an average of 107 backcountry permits are issued each year. A maximum of 84 campers per night are allowed.

Six concessioners offer overnight pack trips on the 27.7-mile-long South Boundary Trail, which parallels the river to some of the most remote areas within Yellowstone National Park. Collectively, these concessioners conduct an average of 16 trips per year within this segment.

All commercial pack animal use is subject to the terms and conditions of the respective contracts as administered by the National Park Service along with applicable backcountry permit and use regulations. Livestock use in Yellowstone National Park is not allowed until July 1 each year to allow wet areas to dry and mitigate trampling impacts. Fishing is also popular within this segment, but boating in not allowed. However, boaters can access the river at Flagg Canyon and proceed downstream through the John D. Rockefeller, Jr. Memorial Parkway segment.

TABLE 15. MAXIMUM CAMPING LIMITS WITHIN THE YELLOWSTONE NATIONAL PARK WILD SEGMENT OF THE SNAKE RIVER

Site No.	Maximum People	Maximum Livestock	Other Information
8C1	8	0	
8C2	20	25	
8C4	12	6	
8C5	12	25	Within Heart Lake Bear Management Area (closed April 1 to June 30)
8C6	8	0	
8C7	12	25	Livestock parties only
8C9	12	25	

A small portion of roadway follows the river near the south entrance, where visitors can view the river by vehicle or stop to picnic at the established picnic area.

Visitor experience within the Yellowstone National Park section of the wild Snake River segment stem from the quality of the experience visitors may have while hiking, backpacking, camping, fishing, or horseback riding. Regulations requiring permitting and group size limits, as well as interpretive education focusing on Leave No Trace principles may limit visitor exposure to crowding and anthropogenic noise within this section. However, little is known about visitor perceptions of their experiences within this section at this time, limiting ability to specify impacts.

The Yellowstone National Park section of the Snake River offers interpretive opportunities at the south entrance station and visitor center, as well as trailhead signage. Additional interpretation opportunities may occur when accessing permits, as overnight visitors within this segment are required to obtain a permit through an advance reservation system, and anglers must obtain a Yellowstone National Park fishing permit, which is available at many locations within the park and in the surrounding gateway communities.

Perceived safety within the Yellowstone National Park section of the wild segment of the Snake River stems from notions of safety while hiking, backpacking, camping, fishing, or horseback riding. Regulations requiring permitting, as well as interpretive education focusing on Leave No Trace may increase visitor safety and alter perceptions of safety, thus improving visitor experience within this segment. However, the lack of data concerning visitor perceptions of safety within this segment limits the ability to understand how this may affect visitor experience here.

Snake River (Wild Segment, John D. Rockefeller, Jr. Memorial Pkwy)—Boating, fishing, hiking, horseback riding, and camping are popular activities within the John D. Rockefeller, Jr. Memorial Parkway wild segment of the Snake River. Many of these activities are conducted through the commercial services at the Headwaters Lodge and Cabins at Flagg Ranch. Within this segment, dispersed camping is permitted and available along Grassy Lake Road, and through an established campground at the resort. The resort provides lodging in one of its 92 cabin rooms or camping at one of its 97 RV sites, 20 camper cabin sites (40 sites available beginning in 2013), or 34 tent sites. Additional amenities include a dining room, gift shop, grocery store, and gas station. The resort also offers recreational activities as

well as hiking, fishing, horseback riding, and rafting trips. The lodge's horseback riding trips mostly occur outside the river corridor boundary. Recent research suggests that approximately 14% of visitors to Grand Teton National Park use services provided by the lodge (Univ. of Idaho 2008). A total of 28 commercial floating trips and 2 fishing trips are allowed each day within this section of river. While many visitors use the resort for recreation within this segment (private trips are also common), and the river can be accessed at the Flagg Canyon or Flagg Ranch launch areas.

Visitor experience within the John D. Rockefeller, Jr. Memorial Parkway section of the wild segment of the Snake River stem from the quality of the experience visitors may have while boating, fishing, horseback riding, camping, or staying at the Headwaters Lodge and Cabins at Flagg Ranch accommodations. Research suggests that the information services and facilities at the lodge are thought to be very important and of good quality by the majority of visitors to this area (Univ. of Idaho 2008), suggesting that this component of visitor experience is highly regarded. However, additional research pertaining to visitor experience within this river section is limited. Crowding, conflict, and anthropogenic noise from the lack of regulated camping may be causing impacts on visitor experience. At this time, the scarcity of data on these issues limits understanding of these impacts on visitor experience.

Most of the interpretive opportunities within the John D. Rockefeller, Jr. Memorial Parkway section of the Snake River occur through the lodge and the recreational opportunities it provides. For example, 13% of visitors to Grand Teton National Park suggested that they used the Flagg Ranch information station, and the majority of those respondents indicated that this information source was very important (Univ. of Idaho 2008).

Visitor safety within the John D. Rockefeller, Jr. Memorial Parkway section of the wild segment of the Snake River stems from visitor perceptions of safety while boating, fishing, horseback riding, camping, or staying at resort accommodations. Little is known about how visitors perceive their safety within this segment. However, because unmanaged camping is permitted within portions of this corridor, some visitors may behave inappropriately due to the lack of regulations, leading to potentially unsafe situations for themselves and other visitors within this segment. At this time, limited research regarding visitor perceptions of safety within this corridor inhibits understanding how this may affect visitor experience.

Snake River (scenic segment)—The 24.8-mile designated scenic section of the Snake River receives the highest amount of visitor use, most of which are boaters or floaters recreating privately or under the guidance of a concessioner. This segment receives approximately 1.2 to 1.4 million visitors annually. Private boating use averaged 21,181 between 2007 and 2010, with maximum use at 23,915 in 2007, while concessioner-facilitated boating averages 63,179 visitors annually. The boating season generally runs from July to October and is dependent upon snowmelt and related seasonal river flows, and water released from Jackson Lake Dam. The majority of use occurs between Deadman's Bar and Moose Landing (figure 9), where approximately 48,778 visitors floated the river in 2010. The Pacific Creek Landing to Deadman's Bar, also within this segment, is the second-most visited section of the river, with 7,443 floaters in 2010.

Sixteen concessioners provide opportunities for boating and floating, including scenic floats, meal-provided floats, and fishing. These concessioners are managed by the National Park Service through concession contracts. These contracts provide the maximum daily and monthly reserves of how many boats can be launched by the concessioner (table 16). During peak season, 133 concessioner boats launch within this section daily. The Snake River scenic segment

launches are found from Jackson Lake Dam to Moose, and the Flagg Canyon and Flagg Ranch launches are on the wild segment of the Snake River.

A maximum of 47 commercial fishing trips take place within this section daily during peak season, in accordance with NPS regulations and restricted limits (table 17). Additionally, walk-in fishing on informal trails takes place within this segment.

A small amount of hiking occurs within this segment, although most happens on unofficial trails along the river and roadways. Most hiking is associated with boating access, walk-in fishing, or gaining better access to view the river and surrounding landscape.

Wildlife viewing, photography, and scenic driving are popular along this segment, and the highway follows the river through much of this section. There are two scenic overlooks and four parking areas along the western edge of the road that facilitate scenic viewing opportunities. Most of these are formally designated and well delineated with the exception of the turnout at Oxbow Bend. The work of Ansel Adams has immortalized this segment of the Snake River in his photograph of the Teton Range in the background. Visitors frequent this location, often attempting to replicate Ansel Adam's well-known image. Bicycling also takes place on the road, primarily by locals and some commercial groups, but this is largely outside the designated wild and scenic river corridor.

While river camping is not allowed within this segment, day use visitors can access the river through several boat launch areas including the Jackson Lake Dam, Cattleman's Bridge, Pacific Creek Landing, Deadman's Bar, and Moose Landing. These launch areas will be discussed in greater detail within the site-specific section.

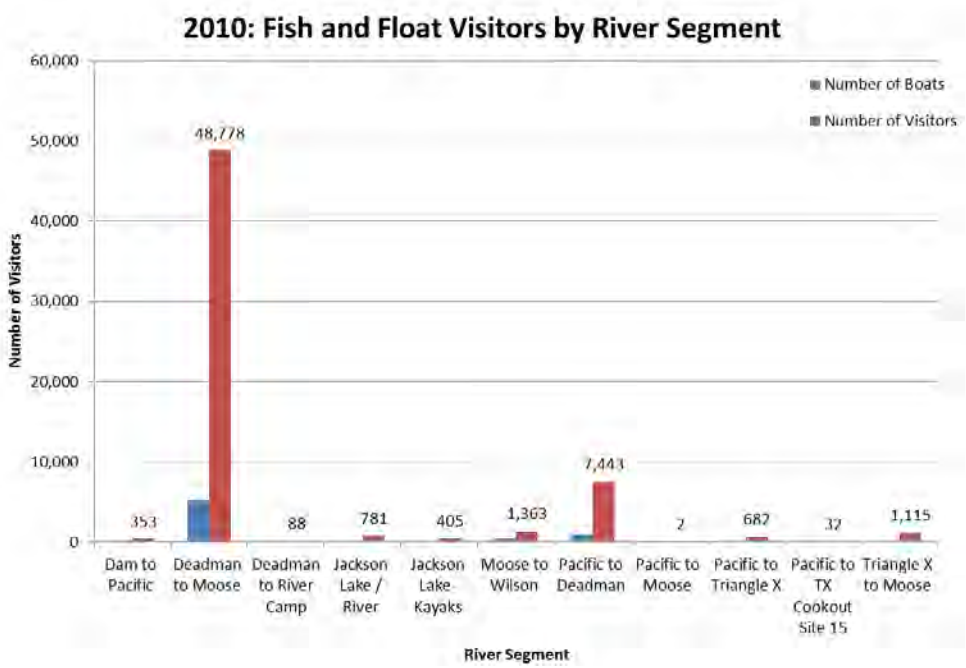


FIGURE 9. CONCESSIONER FISH AND FLOAT VISITORS BY SECTION OF THE SCENIC SNAKE RIVER SEGMENT

TABLE 16. CONCESSIONER DAILY AND MONTHLY QUOTAS FOR THE SCENIC SNAKE RIVER SEGMENT

Concessioner	Daily Launch	Daily Reserve	Max Monthly Reserve
Barker-Ewing Float	26	5	13
Jack Dennis	0	0	0
Snake River	3	2	2
Pinto Ranch	2	1	1
Snake River Anglers*	0	0	0
National Park Float	15	5	9
OARS	2	0	0
Solitude	8	3	3
Lost Creek Ranch	2	0	0
BSA	6	0	0
R Lazy S	0	0	0
GTLC	21	5	11
Signal	2	1	1
Triangle X	18	5	9
Flagg (on wild segment)	28	0	0
Grand Fishing Adventures	0	0	0
TOTALS	**133**	**27**	**49**

*The Snake River's three launches are from Moose downstream on the wild segment.

TABLE 17. DAILY AND MONTHLY LIMITS ON COMMERCIAL FISHING TRIPS

Concessioner	Daily Limit	Monthly Limit
Barker-Ewing Float	0	0
Jack Dennis	7	192
Snake River	6	72
Pinto Ranch	0	0
Snake River Anglers	4	60
National Park Float	7	80
OARS	0	0
Solitude	0	0

TABLE 17. DAILY AND MONTHLY LIMITS ON COMMERCIAL FISHING TRIPS

Concessioner	Daily Limit	Monthly Limit
Lost Creek Ranch	2	10
BSA	0	0
R Lazy S	2	10
GTLC	6	95
Signal	2	51
Triangle X	5	28
Flagg	2	7
Grand Fishing Adventures*	4	58
TOTALS	**47**	**598**

*Grand Fishing Adventures only operates from Moose downstream, and Flagg is on the wild segment.

Visitor experience within the scenic segment of the Snake River emanates from the quality of the experience visitors may have while boating, fishing, scenic driving, and taking photographs. Much visitor experience research has been conducted on this river segment, and as previously described, most visitors indicate not feeling crowded or conflicted by other visitors despite the high use within this segment (Park and Tucker 2012). However, park staff has noted that several of the boat launch areas can become congested with boats being put in and taken out during peak season. Generally, Snake River infrastructure components, such as boat launches, parking, informational signage, and other facilities, are considered to be of high quality by most visitors to this segment (Park and Tucker 2012). As mentioned previously, visitor perceptions of sounds have been evaluated near this river segment, but not within the corridor. This research demonstrated that anthropogenic sounds were perceived as annoying and unacceptable (Pilcher, Newman, and Stack 2006). Acoustic monitoring data from an area just west of the river (i.e., between the Pacific Creek and Deadman's Bar boat launches), suggests that aircraft sounds were detected approximately 6% and road vehicle sounds were detected approximately 2% of the time during the summer sampling period (S. Burson, pers. comm., 2012). It is reasonable to assume that these intrusions may negatively affect visitor experience within the headwaters corridors; however, the lack of visitor perception data from this segment limits ability to address this issue.

The large number of visitors has increased the need for orientation, interpretation, and education within this segment, and the newly constructed Craig Thomas Discovery and Visitor Center at Moose Junction, which is an educational center created through a public/private joint initiative between Grand Teton National Park and Grand Teton National Park Foundation. It provides interpretive and educational information to park visitors. Other opportunities for interpretation within the corridor include Murie Ranch National Historic Landmark and Menor's Ferry. Near the river corridor are the Moose Entrance Station, Cunningham Cabin Historic Site, and Jackson Lake Dam—all feature additional orientation options for visitors. In addition, several wayside exhibits exist at various scenic turnouts along U.S. 191 for visitors to stop and learn more about the park and river corridor.

Visitor safety within the scenic segment of the Snake River pertains to visitor perceptions of safety while boating, fishing, scenic driving, and taking photographs. The sheer volume of visitation and the various kinds of recreational opportunities afforded within this segment may cause some visitors to feel unsafe. However, at this time, limited research regarding visitor perceptions of safety within this corridor inhibits understanding how this may affect visitor experience.

Pacific Creek (scenic segment)—This segment is popular for its walk-in fishing, photography, wildlife viewing, and scenic driving opportunities. Approximately 600 visitors recreate within this segment annually, most of who are walk-in anglers or photographers. This number represents visitors interested in the resources of the river corridor and not vehicular traffic moving through the corridor to reach a destination. No maintained trail systems exist within this segment, but many unmaintained social trails provide access to the river and its resources. This segment provides exceptional opportunities for photography, especially during transitional times between seasons and early or late in the day when the light is conducive to the activity. Additionally, this segment provides ample opportunities for wildlife viewing including eagles, elk, moose, and other species, which can occasionally be seen while scenic driving along the Pacific Creek Road.

The views of the river are particularly striking where the North Park Road crosses the Pacific Creek Road, paralleling the river fork.

Visitor experience and perceptions of safety within the scenic segment of Pacific Creek stem from those experiences and perceptions associated with fishing, taking photographs, viewing wildlife, or scenic driving. Little is known about visitor perceptions of their experiences or of their safety within this segment at this time, limiting ability to specify potential impacts.

Buffalo Fork (scenic segment)—The Buffalo Fork segment receives approximately 500 visitors annually. This number represents visitors interested in the resources of the river corridor and not vehicular traffic moving through the corridor to reach a destination. Few trail-based activities occur within this segment; most of the activity is associated with walk-in fishing. However, there is an unmanaged trail stemming off Elk Ranch Road, but no formal trails exist within this segment. This segment offers spectacular scenic views and opportunities for snowmobile use in the winter. East Boundary Road provides opportunities for scenic driving and offer viewpoints along Buffalo Fork. In the winter, snowmobiles are allowed to travel along the Continental Divide Snowmobile Trail.

Visitor experience within the scenic segment of Buffalo Fork stems from the quality of the experience visitors may have with walk-in fishing or participating in snowmobile activities. Little is known about visitor perceptions of their experiences within this segment at this time, limiting the ability to specify potential impacts.

Visitor safety within the scenic segment of Buffalo Fork stems from the level of perceived safety visitors may have while walk-in fishing or participating in snowmobile activities. Little is known about visitor perceptions of safety within this segment at this time, limiting the ability to specify potential impacts on visitor experience.

Gros Ventre River (scenic segment)—The designated scenic section of the Gros Ventre River receives approximately 1,900 visitors annually, where most recreational activity consists of hiking, fishing, swimming, and photography. Approximately 150 of those visitors paddle upstream the Gros Ventre River segment each year within Bridger-Teton National Forest. This number represents visitors interested in the resources of the river corridor and not vehicular traffic moving through the corridor to reach a

destination. Public boat use is prohibited on this segment, leading boaters to take out at the park/refuge boundary during whitewater season. Approximately two to five administrative boat trips travel on the refuge portion of river annually. Fishing for brown, rainbow, and native cutthroat trout is common on this segment, and visitors can access the river and surrounding areas via several informal trails within the corridor. These include access from Gros Ventre Road within the Bridger-Teton National Forest, an informal trail across Grand Teton National Park, and several unmaintained social trails along the riverway. Hiking here is primarily associated with walk-in fishing, photography, and swimming. There are several options for swimming, and many rocks lining the bank of the river offer popular jumping points via the unmaintained social trails. Photography in this area often affords opportunities to capture wildlife because this segment of the river shares boundaries with the National Elk Refuge and Bridger-Teton National Forest. However, portions of this area are closed to visitors in the winter due to wildlife sensitivity.

Visitor experience within the scenic segment of the Gros Ventre River is based on the quality of experience visitors have while sightseeing along the riverbank, wading and bank fishing, swimming, and taking photographs. At this time, little is known about visitors' perceptions of their experiences within this segment. Acoustic monitoring data collected during the summer of 2011 at an area north of the river suggests that road vehicles were detected approximately 29% of the time and aircraft sounds were detected approximately 10% of the time (S. Burson, pers. comm., 2012). While visitor perceptions of these sounds are unknown, visitor experience may be impacted if these sounds are evaluated negatively.

Visitor safety within the scenic segment of the Gros Ventre River pertains to how visitors perceive their safety while boating, walk-in fishing, taking photographs, and swimming. There may be safety issues within this segment that stem from the diverse recreational activities in which visitors participate. There may be user conflicts, particularly between anglers and visitors jumping off the rocks into the river, which may degrade visitor experience within this segment. However, the lack of research evaluating aspects of visitor safety limits understanding of how this may affect visitor experiences within this segment.

River Access Points

Introduction. Only those river access points that require deeper discussion beyond that mentioned within the headwaters-wide and river segments are described in the following. Discussion points include recreational access and opportunities, quality of the experience, interpretation and education, and safety, as appropriate to each river access point.

Flagg Canyon. Flagg Canyon, within the John D. Rockefeller, Jr. Memorial Parkway segment of the wild segment of the Snake River south of the entrance into Yellowstone National Park, is difficult to find because it lacks effective signage indicating the turn from the park road to access the site. Because of this issue, some visitors miss the recreational opportunities available at Flagg Canyon. The steep road at this site requires high clearance vehicles to obtain access. No restroom is available and orientation and safety information is minimal.

Flagg Ranch. The Flagg Ranch within the John D. Rockefeller, Jr. Memorial Parkway segment of the wild segment of the Snake River currently serves as a take-out site for visitors making short trips down the river from the Flagg Canyon site. There are rusted metal materials present that could potentially cause safety issues for boaters and recreationists in the area. No restroom is available, and orientation and safety information is minimal. The parking area is large, but the picnic area is insufficient.

Jackson Lake Dam. While the boat launch is not technically within the designated river corridor, it provides many visitors with access to the scenic segment Snake River, and is therefore an important component of visitor use and experience. Park officials suggest that this site experiences occasional crowing during peak season. Additionally, user conflicts are common among visitors who are fishing and those who are launching boats. Occasional crowding and conflict at this site may degrade visitor experience.

Cattleman's Bridge. Cattleman's Bridge is the least used launch site within the scenic segment of the Snake River. It consists of a 1.15-mile gravel road (Cattleman's Road), which extends from Outside Highway (U.S. 26/89/191) to a small gravel parking lot and primitive boat launch site. Most visitors here use small nontrailered boats. There is significant wildlife activity within the area encompassing this launch site, including grizzly bears, nesting raptors, waterfowl, beavers, moose, and elk, so visitor and wildlife safety is of concern.

Pacific Creek Landing. Pacific Creek Landing is northwest of the Moran entrance station and is the most highly used take-out site for private users, mostly with fishing dories, canoes, and kayaks. The landing is a popular put-in site for commercial fishing and rafting boats. This access point is difficult for two-way traffic and for those who wish to turn vehicles around. There is a need for annual maintenance in the river, and there is hydrologic and geomorphic instability similar to that under Deadman's Bar. There also tends to be insufficient parking in the upper lot.

Deadman's Bar. Deadman's Bar is the most heavily used put-in site for commercial scenic float recreationists. There are two sand boat ramps, one upstream and one downstream, and vault restroom facilities adjacent to the gravel parking lot, and a 0.25-mile restricted gravel road leading to a cook site and two picnic sites, which are frequently used by concessioners.

This popular site within the scenic segment of the Snake River occasionally experiences crowding during peak season, which may impact visitor experience. When it occurs, this crowding can displace some visitors, causing recreationists to park vehicles alongside the roadway. This action places visitors in potential safety hazards, as they are parking beside active roadways. There is also significant wildlife activity in this area, including grizzly bears, so visitor and wildlife safety is of concern. The hydrologic and geomorphic conditions at this site are challenging, but reasonably stable. The boat ramp is on the inside of a bend, on what is essentially a point bar. Unlike most point bars, this bar is relatively stable due to the high, slowly eroding bluff on the other side of the river. The position of the ramp above the gravel bar presents some operational difficulties for boaters. During the majority of the season, visitors must navigate the shallow cobble bottom portion of the river to reach the main current. The upstream launch is more heavily used because there is a rock outcropping downstream of this launch site, and boats entering the river at the upstream launch site have more time to navigate around the rock outcropping.

Moose Landing. Moose Landing is the most heavily used take-out boat launch area along the Snake River in Grand Teton National Park, predominantly used by concessioners removing 20-foot rafts, although there are a few 32-foot rafts pulling out at this site. Only occasionally would this boat launch be used as a put-in. At peak times, this site can become congested with up to twelve 20-foot rafts trying to get off the river at the same time, potentially leading to perceptions of crowding, conflict, and safety issues. This access point is difficult for two-way traffic and for who wish to turn vehicles around. There is a need for annual maintenance in the river. There are also issues with social trails and insufficient restroom and picnic facilities.

VISUAL RESOURCES (SCENERY AND VIEWSHED)

Introduction

This section describes the visual resources associated with the Snake River Headwaters. The visual resources being discussed within this section include the scenic landscape areas viewed from the river, roadways, turnouts and scenic overlooks, and landscapes viewed while participating in the numerous recreational activities prevalent within the headwaters. The scenic landscapes of the headwaters include views of the flora, fauna, geologic formations, mountains, plains, and historic structures during the daylight hours, as well as under the darkness of the night sky. The description of these resources is based on the best professional judgment of Yellowstone National Park, John D. Rockefeller, Jr. Memorial Parkway and Grand Teton National Park staff; NPS planners; and research results from other specialists.

The following section is organized by describing the visual resources at three different levels: (1) "Headwaters-wide," which explains the visual resources from a riverwide perspective; and (2) "River Segments," which describe visual resources within individual segments, including river access points contained within each segment.

Headwaters-wide

The Snake River Headwaters flow through the breathtakingly beautiful landscape that encompasses Yellowstone Plateau and Teton Range within Yellowstone National Park, John D Rockefeller, Jr. Memorial Parkway, and Grand Teton National Park. The seasonal changes, diverse topography, and flora and fauna offer an unforgettable landscape character that draws visitors from all over the world. The visual resources found within the headwaters are one of the most important reasons for visiting this area (Univ. of Idaho 2008). The visual resources here contain iconic scenery that represents elements that embody the essence of the American West. For more detail on the historical and cultural values of the visual landscape, see "Historic Overview of the Snake River Headwaters" within the "Cultural Resources" section of this chapter. The headwaters comprise seven designated wild and scenic river segments, for which each offer unique views of the landscape.

River Segments

Lewis River (wild segment). The wild segment of the Lewis River, which flows between Shoshone and Lewis lakes in Yellowstone National Park, is reachable by boat or the Lewis River channel trail, and offers unique examples of river dynamics as the water flows fluctuate with seasonal changes. Approximately 1,300 visitors annually view the visual resources found within this segment by boat, while fishing or hiking, or through pack animal use.

Lewis River (scenic segment). The scenic segment of the Lewis River has carved the dramatic canyon through the Yellowstone Caldera, creating a narrow gorge with continuous cascading waterfalls. This segment is paralleled by North Park Road for approximately 12 miles, and numerous vehicle turnouts and parking areas provide access to view the river gorge and popular sites within this segment. Lewis Falls, which cascade down the canyon nearly 30 feet, attract many passersby to stop and explore the sites found here. On average, 240,451 vehicles pass through this scenic river segment each summer season.

Snake River (Wild Segment, Yellowstone National Park). The wild segment of the Snake River, which flows through Yellowstone National Park, follows sheer canyon walls carved by volcanic flows. Hot springs along the banks of the river have created unique landscape vistas, which visitors can view from many trail segments

such the Continental Divide Trail and South Boundary Trail.

Snake River (wild segment, John D. Rockefeller, Jr. Memorial Parkway). The wild segment of Snake is paralleled by North Park Road for a short distance, allowing visitors to view the scenery by vehicle. Additionally, visitors can access the visual resources within this segment by boat; while fishing, hiking, camping; or using pack animals. The segment provides access to view the river at the Flagg Canyon boat launch. Concessioners also provide activities, enabling visitors to view the visual resources through guided experiences.

Snake River (scenic segment). The scenic segment of the Snake River provides visitors with viewing opportunities through activities such as boating, fishing, hiking, scenic driving, picnicking, bicycling, and taking photographs. This segment has the highest amount of visitor use, receiving between 1.2 and 1.4 million visitors annually. The scenic segment offers many of the iconic views of Grand Teton National Park, which is a primary draw for visitors. Outside Highway parallels the Snake River along some of this segment, and visitors traveling along this route have the opportunity to view the spectacular scenery of the Snake River in the foreground, with Teton Range in the background. There are two scenic overlooks and four parking areas along the western edge of the road that facilitate scenic viewing opportunities. Most of these are formally designated and well delineated with the exception of the turnout at Oxbow Bend. The work of Ansel Adams has immortalized this segment of the Snake River in his photograph from the Snake River overlook with the Teton Range in the background. Visitors frequent this spot, often attempting to replicate Ansel Adams' well-known image in their own photographs. This area can occasionally reach visitor capacity because of its attractiveness and iconic nature. Often, visitors walk from the parking areas to the banks of the river to experience the visual resources and obtain a better view. This segment of the river also contains iconic views of the Grand Tetons reflected in beaver ponds at Schwabacher Landing, and views of the historic Menor's Ferry district.

Pacific Creek (scenic segment). The scenic segment of Pacific Creek reflects the various colors of the changing flora that surround it. The seemingly endless groves of cottonwoods lining this segment display various shades of green, gold, amber, red, and frosty white, and uniquely sparkle among the surrounding stands of conifers. These stunning visual resources can be experienced by scenic driving via the Pacific Creek Road. The views of the river are particularly striking where North Park Road crosses the Pacific Creek Road, paralleling the river fork. Other recreational opportunities that provide access to the visual resources within this segment include walk-in fishing, hiking, viewing wildlife, and taking photographs, although only 600 visitors see these sites annually.

Buffalo Fork (scenic segment). The scenic segment of Buffalo Fork receives approximately 500 visitors annually. However, visitors recreating here can experience the visual scenery consisting of low-lying rolling hills and plains that sit below Teton Range. Many of these lands were formerly ranches and the history and the views of Teton Range from these low-lying hills provide unique visitor visual experiences. Wildlife is frequent in this area, and the area occasionally provides unparalleled views of the American bison, elk, moose, pronghorn, wolves, and waterfowl. Both North Park and East Boundary roads provide visitor opportunities for scenic driving, and Elk Ranch Road provides access to the river for closer viewing. This segment also provides for unique winter visual experiences, as it offers spectacular scenic views along the Continental Divide Snowmobile Trail via snowmobiles.

Gros Ventre River (scenic segment). The scenic segment of the Gros Ventre River separates Grand Teton National Park and

National Elk Refuge, frequently providing views of wildlife such as elk and other megafauna. This segment receives approximately 1,900 visitors annually, who view the visual resources by hiking, fishing, swimming, and taking photographs. This segment offers a unique view of a cliff wall that lines the bank of the river and is a popular site for visitors.

PARK AND REFUGE OPERATIONS

Introduction

Park operations for Grand Teton and Yellowstone national parks consist of NPS, concessioner, and contractor operations that encompass protection of natural resources; maintaining all roads, trails, buildings, and other structures in a safe and aesthetically pleasing condition; preventing deterioration that would render the structures unsightly, unsafe, or beyond efficient repair; and providing dining, shopping, and lodging facilities to park visitors. The National Park Service provides operations and support for administrative services, management of cultural and natural resources, visitor facilities, visitor protection, and emergency services throughout both parks.

The National Elk Refuge, which is administered by the U.S. Fish and Wildlife Service, administers 25,000 acres as a unit of the national wildlife refuge system. The National Elk Refuge works to provide, preserve, restore, and manage winter habitat for the nationally significant Jackson elk herd and habitat for endangered species, birds, fish, and other big game animals, and provide compatible human uses associated with the wildlife and wildlands.

Yellowstone National Park

Administrative Services. The park's administrative division is responsible for budget and finance, fee collection, payroll, computer support, human resources, NPS mail, procurement, property, supplies, and telecommunications. It is headquartered in Mammoth Hot Springs and has support staff stationed in most of the developed areas. About 3,500 employees are hired every year in Yellowstone National Park, as either park or concessioner staff, to provide services for the nearly 3 million annual visitors.

Yellowstone Center for Resources. The Yellowstone Center for Resources provides scientific and practical support for a variety of park responsibilities, including resource management, cultural resources (historic architecture, NPS museum collections, research library, and archeological and ethnographic resources), and natural resources (geologic resources, vegetation, aquatic life, and wildlife). It is headquartered in Mammoth Hot Springs and has staff members stationed in most of the developed areas. A main component of the aquatic sciences section, the lake trout suppression program, is stationed at Yellowstone Lake from May to October.

Maintenance. Parkwide operations include maintenance of museums, ranger stations, housing, campgrounds, warming huts, vault restrooms, water and sewage systems, housing and other buildings, roads, and NPS vehicle fleet (snowmobiles, snow coaches, boats, cars, trucks, and heavy equipment). In addition, NPS personnel collect garbage and maintain hundreds of miles of trails throughout the park.

Resource and Visitor Protection. The backcountry office provides technical support for backcountry activities undertaken by both park visitors and park employees. The communication center is the central dispatch for all park communications. Corral operations provide practical support for pack animal use and backcountry trips. Law enforcement rangers regularly patrol frontcountry and backcountry areas and are responsible for visitor and resource protection, emergency services, and structural fire response in the developed areas of the park.

River Management Details. The Lewis and Snake rivers are monitored by the Snake River Ranger District, which has offices at the south entrance and Grant Village. Yearly staffing consists of a full-time district ranger and deputy district ranger and four subject-to-furlough rangers. Additional staff is added in the summer season. Distribution for summer is two frontcountry rangers plus five seasonal rangers, one backcountry ranger and four seasonal rangers, and one boat operations ranger and one seasonal boat operations ranger for monitoring Yellowstone Lake outside the wild and scenic river segments. Ranger staff is responsible for emergency management services, wildland and structural fire response, and law enforcement including resource protection.

The wild segment of the Lewis River (between Shoshone and Lewis lakes) is patrolled twice a week on average. During the fall (peak brown trout spawn / fishing period), the river is patrolled three to four times per week, usually a foot patrol of the east shore.

The scenic segment of the Lewis River (between Lewis Falls and the Snake River confluence) is visually scanned by road patrol rangers daily including by snowmobile in winter. It is almost never patrolled on foot due to difficult access.

The wild segment of the Snake River (from Fox Park to Yellowstone National Park boundary) is patrolled on foot and horseback periodically in the core summer and fall hunting season, usually by backcountry rangers traveling to and from cabins and using the trail that parallels the river.

Concessioner Operations. Within the park, Xanterra Parks and Resorts operate lodging, gift shops, and dining and camping facilities in the developed areas of the park. Bridge Bay Marina offers guided tours on Yellowstone Lake, guided fishing trips, and boat and docking slip rentals. They operate year-round tours—by bus during summer and by snowmobile during winter. In 2009, park concessioners provided 1,074,288 overnight stays for park visitors.

Services offered by other concessioners throughout developed areas of the park include retail and grocery stores, food and beverage services, fishing supplies, service stations, and medical clinics.

The National Park Service has also issued approximately 45 commercial use authorizations to concessioners who provide guided fishing trips in the park and approximately 46 certified pack animal outfitters who also provide guided fishing trips into the backcountry. Commercial guided kayak trips are offered by three concessioners on the Lewis River, four concessioners offer guided backpacking trips paralleling the Snake River, and six concessioners offer overnight pack trips along this river segment.

Types and Levels of Development. This section focuses specifically on existing facilities within the wild and scenic river corridors within Yellowstone National Park. It is not intended to be a comprehensive inventory of all park facilities.

Lewis River (wild segment)—As befits its classification, there is limited development in the river corridor along the wild segment of the Snake River. There are several trails in the corridor—South Shore Shoshone Lake Trail, DeLacy Creek Trail, Lewis River Channel Trail, and Dogshead Trail. Structures include a ranger cabin at the south end of Shoshone Lake and the outlet cabin on the north end near the corridor.

Lewis River (scenic segment)—Transportation development along the river corridor of the scenic segment of the Lewis River includes roads, bridges, turnouts, and parking lots. North Park Road (South Entrance Road), an associated bridge, and 18 turnouts/overlooks along North Park Road within the corridor, as well as 6 additional turnouts/overlooks along South Entrance Road, are near the corridor. Many of these turnouts/overlooks are undersized and could

be redesigned. There are parking lots near the corridor at Flagg Canyon and Lewis Lake dock.

Visitor amenities include trails, trailheads, boat launches, a campground, and an interpretive site. Trails in the corridor include the Pitchstone Plateau Trail and South Boundary Trail, and trailhead access for the trail is off the highway. A boat launch, picnic areas, and a campground are at the Lewis Lake dock, adjacent to the river corridor. Structures adjacent to the corridor are the Flagg Canyon entrance station, ranger station, picnic area, employee residences, and horse corral.

Snake River (wild segment, Yellowstone National Park)—The wild segment of the Snake River includes short sections of road and turnouts and overlooks. This segment is paralleled by the South Entrance Road in Yellowstone National Park.

Portions of trails in this segment include a designated unnamed trail along the Snake River between the river access points with associated social trails, adjacent trails—South Boundary Trail, Heart Lake Trail, Snake River Cutoff Trail, Harebell Cutoff Trail, Basin Creek Cutoff Trail, Heart River Trail, Fox Creek Trail—and Glade Creek trail in the vicinity of the river corridor. Trailheads include the South Boundary Trail access point in Yellowstone National Park.

Visitor facilities include picnic areas, including the picnic area at Flagg Canyon and the Snake River picnic area near Flagg Canyon, and a campground. Other structures include historic properties—Fox Creek Cabin, South Entrance Historic District, Harebell Patrol Cabin, and South Entrance Road.

Grand Teton National Park and John D. Rockefeller, Jr. Memorial Parkway

Administration and Management. Grand Teton National Park and John D. Rockefeller, Jr. Memorial Parkway are administered and managed under the Office of the Superintendent at Grand Teton National Park, which oversees the deputy superintendent and six primary divisions—facility management, ranger activities, interpretation, science and resource management, business resources, and administration. The divisions are discussed in the following sections. Approximately 150 permanent employees and 200 seasonal employees work at the park. Seasonal employees primarily work during the summer season.

Facility Management Division. The Facility Management Division is the largest operational unit in the park. The division operates within two districts, the North District based in Colter Bay and the South District based in Moose. Each district is responsible for maintaining roads and facilities.

Ranger Activities Division. The second-largest operational unit in the park is the Ranger Activities Division. Rangers are responsible for providing resource protection, including management of programs such as wildland and structural fire, search and rescue, fee collection, emergency medical services, and a joint fire / law enforcement / dispatch center with the U.S. Forest Service. The division maintains hours of operation 24/7 during the busy summer season; however, hours of operation are reduced at other times of the year when park activities have decreased.

Division of Interpretation. The Division of Interpretation is responsible for operating park visitor centers and providing a wide variety of informational and educational programs. These include guided walks, campfire programs, roving interpretation,

and other services, as well as issuing permits for backcountry camping and boating. The division also manages the planning and design of media-based interpretation, such as brochures, site bulletins, wayside exhibits, and other materials.

Division of Science and Resource Management. The Division of Science and Resource Management performs a wide variety of duties associated with stewardship of the natural and cultural resources of the park. This includes research and monitoring, mitigation of deleterious activities or conditions, restoration of natural systems or historic structures, management of specific resources such as nonnative plants or dangerous animals, and programmatic duties related to ensuring compliance with applicable laws, policies, and regulations.

River Management. The Snake River, Buffalo Fork, Pacific Creek, and the Gros Ventre River are patrolled by park rangers at the Buffalo Fork Subdistrict, which has its office in Moran. Yearly staffing consists of a full-time subdistrict ranger and one full-time ranger and one subject-to-furlough ranger. During the summer, four seasonal rangers are added to the staff. The subdistrict ranger, full-time ranger, and three seasonal river patrol rangers patrol the wild and scenic segments of the Snake River and tributaries by oar-powered raft, on foot, and in motorized vehicles. Ranger staff is responsible for emergency medical services, wildland and structural fire response, and law enforcement including resource protection.

The wild segment of the Snake River (between Yellowstone and Jackson Lake) is patrolled approximately once every two weeks by oar-powered raft. Vehicle patrols around Flagg Ranch and occasional foot patrols into Flagg Canyon are also conducted.

The scenic segment of the Snake River (between Jackson Lake and Moose) is patrolled by oar-powered raft approximately two segments per day during summer and fall. Vehicle patrols along the west side of the Snake River and foot patrols around boat launches are also conducted.

The scenic segments of Buffalo Fork and Pacific Creek are patrolled by oar-powered raft and on foot periodically during the summer months and through the elk reduction program.

Concessioners. Within the park, five concessioners provide overnight lodging, dining facilities, and recreational activities. Three of these concessioners also operate the six campgrounds within the park and parkway. Another concessioner operates a dude ranch within the national park, and the fifth lodging concessioner offers budget "hostel" style accommodations, principally for climbers exploring Teton Range. There are three concession-operated marinas on Jackson Lake. In 2011, park concessioners provided 227,000 overnight room stays for park visitors and collectively generated $50 million in revenue.

Services offered through 22 other concessioners provide opportunities for guided mountain climbing and instruction, guided youth backpacking, and boat shuttles. Four companies offer guided cross-country skiing, while permits managed jointly with Yellowstone National Park authorize guided snowmobile and snow coach tours from Flagg Ranch to points within Yellowstone. Commercial fishing trips are provided by 11 concessioners, while 12 companies currently provide scenic guided interpretive raft trips on the Snake River.

Types and Levels of Development. This section focuses specifically on existing facilities within the wild and scenic river corridors of Grand Teton National Park and John D. Rockefeller, Jr. Memorial Parkway. It is not intended to be a comprehensive inventory of all park facilities.

Snake River (wild segment, John D. Rockefeller, Jr. Memorial Parkway)—The wild segment of the Snake River includes

short sections of road and associated infrastructure. This segment is paralleled by a short section of North Park Road, which is a paved highway with turnouts and overlooks, in John D. Rockefeller, Jr. Memorial Parkway. Grassy Lake Road, which is paved near Flagg Ranch then unpaved soon after, is partially in the river corridor. This segment has a USGS gauging station and one road bridge—Snake River Bridge near Flagg Ranch, which has riprap upstream to protect the bridge structure. A parking area is near the Flagg Canyon boat launch. Numerous turnouts are situated along North Park Road near the boundary of Grand Teton National Park and John D. Rockefeller, Jr. Memorial Parkway.

The Flagg Canyon Trail runs along the west side of the Snake River and provides river access between Flagg Canyon and Flagg Ranch.

Visitor facilities include picnic areas, boat launches, and campgrounds—the Snake River picnic area near Flagg Canyon and the river, and the Snake River picnic area near Flagg Ranch boat launch. There are boat launches with no facilities at Flagg Canyon and Snake River Bridge at Flagg Ranch. Camping opportunities within this segment's corridor include Flagg Ranch campground, four developed campsites along Grassy Lake Road, and dispersed backcountry sites. The Headwaters Lodge and Cabins at Flagg Ranch are largely in the river corridor and include a campground, rental cabins, dining services, a general store, a gas station, and commercial horse operations. Other structures in the corridor include Flagg Canyon entrance station, ranger station, a picnic area, employee residences, and a horse corral.

Snake River (scenic segment)—The scenic segment of the Snake River includes a variety of developments including roads, bridges, trails, and visitor amenities. Roads include Outside Highway; Teton Park Road, which is paved with turnouts/overlooks; River, Bar BC, and RKO roads, which are unpaved four-wheel drive recommended roads; Deadman's Bar Road, which has a combination of paved and gravel sections; and Cattleman's Bridge and Schwabacher Landing roads, which are composed of gravel. Cattleman's Bridge and Schwabacher Landing roads run between Moose and Moran Junctions and are near the river corridor. One bridge at Moose crosses the scenic segment of the Snake River. The turnout/overlook at Oxbow Bend is the only one within the scenic Snake River corridor. Numerous other turnouts/overlooks with views of the Snake River are outside the corridor. Established parking areas within the corridor include those at or near Cattleman's Bridge, Pacific Creek Landing, Oxbow Bend turnout, RKO Road, Deadman's Bar Road, Schwabacher Landing, and Moose (Moose Landing, Craig Thomas Discovery and Visitor Center, and Moose park headquarters complex).

Trails and trailheads along the scenic segment are limited to informal foot and boat access trails at the Cattleman's Bridge, Oxbow Bend, Deadman's Bar, RKO Road, River Road, Bar BC Dude Ranch, Schwabacher Landing, 4 Lazy F Dude Ranch, Menor's Ferry, and Moose. Other visitor amenities in this segment are picnic areas. There are established cook sites (commercial use only) at Deadman's Bar, Triangle X, and Cattleman's Bridge and several small picnic areas within this segment. There are no designated campgrounds and river camping is not permitted along this segment.

In addition to the facilities previously mentioned, other park facilities within the corridor include the Moran entrance station, park housing, and administrative facilities; Snake River Land Company Historic District; Bar BC Dude Ranch Historic District; 4 Lazy F Dude Ranch Historic District; Menor's Ferry Historic District; Moose headquarters complex; Craig Thomas Discovery and Visitor Center; and Murie Ranch Historic District. Nonpark facilities within the corridor include numerous structures within the community of Moran and Dornan's at Moose Junction.

Specific details regarding the types and levels of development at river access points is described under the site-specific management section in chapter 3.

Pacific Creek (scenic segment)—Pacific Creek has some basic infrastructure, mostly closer to the confluence with the Snake River. Roads in the corridor are North Park Road, which is paved and has turnouts/overlooks; Pacific Creek Road, which has paved and unpaved portions; and two unpaved spur roads off Pacific Creek Road. Other transportation infrastructure is a bridge over Pacific Creek on North Park Road; there is a USGS gauge at this bridge.

Emma Matilda trailhead is in the corridor, and there are some social trails near developed areas. Other visitor facilities include a boat launch downstream of the confluence of Pacific Creek and the Snake River.

Buffalo Fork (scenic segment)—The scenic segment of Buffalo Fork has several paved roads—North Park Road, which has turnouts/overlooks; Outside Highway, which has turnouts/overlooks; East Boundary Road; Buffalo Valley Road; and Elk Ranch Road. Parking lots in the area include river access from Elk Ranch Road; and some formal parking about 0.25 mile east of Moran. There is one bridge on Outside Highway and one on East Boundary Road within the corridor. There are existing riverbank stabilization projects to protect East Boundary Road and private landowner riverbank stabilization projects, which includes multiple culverts, steel beams, wire, and concrete. Actions under alternative A could include projects to stabilize the road shoulders and armoring the bank to protect the road from the Snake River to Buffalo Fork. Rusted metal and other debris from past riverbank stabilization projects are a safety concern.

Visitor amenities are limited in this area. There is an unmanaged trail leading from Elk Ranch Road, but no formal trails. There are no formal boat launches and no boating allowed on this segment.

Park-managed facilities within the corridor include the historic Elk Ranch and Snake River Land Company residence and office. Nonpark facilities and infrastructure within the corridor include the community of Moran, Pinto Ranch, a USGS gauging station, and several overhead and underground utilities (e.g., power and telephone).

National Elk Refuge

Administrative Services. The refuge's administrative division is responsible for refuge management, public use programs, visitor center operation, budget and finance, fee collection, payroll, computer support, human resources, procurement, and property. It is headquartered in Jackson, Wyoming, and has 10 full-time staff and over 11,000 annual volunteers.

Biological Program. The refuge conducts a supplemental feeding program for wintering elk and bison and irrigates up to 5,000 acres of land for standing forage production. The refuge biologist collects and monitors data to evaluate refuge management objectives and to plan future management actions. The biologist also oversees the supplemental elk and bison feeding program.

Maintenance and Operations. Refuge operations include maintenance of a visitor center, employee housing and other buildings, water and sewage systems, and roads. Maintenance of the refuge vehicle fleet of cars, trucks, and heavy equipment is performed by refuge personnel. A 5,000-acre irrigation system is operated during the summer season. Maintenance personnel are the primary staffing for the supplemental feeding program.

Resource and Visitor Protection. Refuge lands are closed to public use except for use along road corridors, permitted hunting and

fishing activities, and winter sleigh ride operations. Resource and visitor protection includes one full-time law enforcement officer with additional law enforcement detailed to the refuge from Grand Teton National Park during the bison and elk hunting season. Additional U.S. Fish and Wildlife Service personnel are detailed to the refuge for special events and during antler collection season. The Teton County Sheriff's Office and the Wyoming Game and Fish Department also provide protection services on the refuge.

The multiagency visitor center hosts 300,000 visitors annually with 4,500 angler and 2,000 hunter use days on the refuge. Refuge officers patrol frontcountry and backcountry areas and are responsible for visitor and resource protection; county resources are utilized for emergency medical services, search and rescue, and structural fire responses.

Gros Ventre River (scenic segment). This river segment is jointly managed by the National Park Service and U.S. Fish and Wildlife Service. The development along the Gros Ventre River includes the paved Gros Ventre Road and two private bridges. Trails include access from a road on USFS land, and a social trail provides access to the river for swimming and fishing from lands managed by Bridger-Teton National Forest and Grand Teton National Park. The only legal boat access provided is a boat take-out at the common boundary at the upstream start of this river segment. Boat use from the refuge/park/forest boundary downstream through refuge/park jurisdiction is prohibited. Administrative boat use (refuge/park/Wyoming Game and Fish Department) take-out occurs at a variety of downstream sites, mostly on park-owned lands. Structures near the corridor include the community of Kelly and the former Teton Valley Ranch. Boaters take out near the Bridger-Teton National Forest / Grand Teton National Park boundary.

SOCIAL AND ECONOMIC ENVIRONMENT

This section describes the existing conditions and current trends of the demographics, local and regional economy, and quality of life near the Snake River Headwaters. The major access points for the headwaters and the majority of the proposed changes in development, access, and use are within Grand Teton National Park. However, the proposed actions in alternatives B and C are similar to the current management of the headwaters segments in Yellowstone National Park. Therefore, the majority of the social and economic impacts of this comprehensive river management plan would be in the area around Grand Teton National Park and surrounding communities.

In terms of specific geographic context, this discussion focuses on a three-county region—Teton County, Wyoming; Lincoln County, Wyoming; and Teton County, Idaho. Within this defined project area, the primary focus of this section is on Teton County, Wyoming, and the town of Jackson. The communities of Alpine, Wyoming; and Driggs and Victor, Idaho, also are included in the analysis.

General Description of Project Area

Surrounding Area of the Snake River Headwaters. The three-county region around Grand Teton National Park encompasses the primary economic sphere of the tourism industry in and around the Snake River Headwaters. The town of Jackson serves as the primary gateway community to the area. Jackson provides year-round visitor lodging and other services for Grand Teton and Yellowstone national parks, two of the most popular units in the national park system; the National Elk Refuge; and several other public lands and recreation sites in the area. It is anticipated that the majority of river-based economic impact of the Snake River Headwaters would continue to be

based in the Jackson area, so this is the region of focus for this section of the comprehensive river management plan.

Summer is the peak tourist season. During this time, the area offers many recreational opportunities, such as viewing scenery and wildlife, scenic driving, hiking and back-packing, whitewater rafting and kayaking, fishing, and horseback riding. During the winter, the area provides world-class downhill skiing opportunities at Jackson Hole Mountain Resort, Snow King Resort, and Grand Targhee Resort; and additional recreation in national forests, particularly at Bridger-Teton and Caribou-Targhee National Forests.

In addition to the permanent residents of the three-county region, seasonal residents with second homes in the area represent an important component of visitation and local economy in Teton County, Wyoming, and Jackson.

In the late 1970s, Jackson underwent rapid growth from increased tourism. According to the *Jackson/Teton County Comprehensive Plan* (2012), some of the issues that developed from this growth included sustaining development and growth management, preserving quality of life, maintaining and enhancing community and rural character, balancing community and economy, and ensuring affordable housing. The *Jackson/Teton County Comprehensive Plan* was adopted in 1994 and then updated and approved May 8, 2012.

Operations at Jackson Hole Airport have increased to support the growth in local tourism and the development of the resort industry. Although scheduled passenger service began in 1941, until the 1970s, the airport primarily served local general aviation that used propeller-driven aircraft. However, currently local general aviation represents only about 10% of the airport's operations.

Greater Yellowstone Area. Because some impacts on local communities surrounding Yellowstone National Park may occur from this document, basic information on the Yellowstone National Park area economy is also provided. Yellowstone National Park plays a prominent role in the social and economic life of the Greater Yellowstone Area. The Greater Yellowstone Area economy, which is considered a "wildland economy," has grown and diversified dramatically over the past 40 years. The growth trend has been away from heavy dependence on resource extraction and agriculture and toward a largely service-based tourism economy, with significant growth also coming from retirement and investment income.

Yellowstone National Park extends into three states—Wyoming, Montana, and Idaho. Most of the property surrounding the park is managed by the U.S. Forest Service and a few private landowners. Less than 2% of Yellowstone National Park is developed. Park infrastructure includes utilities, trails, roads, employee housing, administrative headquarters, and visitor services facilities in various areas throughout the park. These developed areas have evolved near popular scenic features of the park.

Gateway communities have developed outside the park's five entrances: Cody, Dubois, and Jackson in Wyoming, and Cooke City/Silver Gate, Gardiner, and West Yellowstone in Montana. The Montana gateway communities are within a few miles of, or at, the park boundary, while the Wyoming gateway communities are an hour drive or longer from the park boundary. The gateway communities are relatively small, with recent populations ranging from less than 150 permanent residents for Cooke City and Silver Gate combined to almost 9,000 for Cody. The population of West Yellowstone is approximately 1,200 and Gardiner has approximately 850 residents. However, the population of these communities increases substantially during the summer months. Jackson is the largest of the gateway communities with a population of roughly 9,500 residents (U.S. Census Bureau 2010).

Recreational opportunities in the Greater Yellowstone Area create a tourism-based economy in communities surrounding the park; however, the availability of services varies from community to community. These communities receive significant income by providing goods and services to park visitors and employees. Local businesses also benefit from annual NPS and concessioner expenditures for salaries, goods, and services.

Gardiner, Montana, is a small community situated at the original entrance to Yellowstone National Park and is one of only two entrances to the park open during the winter. The town is in the Upper Yellowstone Valley, surrounded by national park and forest lands. Gardiner relies on recreation, tourism, and the service industry to support its economy. Primary employers in the area include the National Park Service, Xanterra Parks & Resorts (park concessioner), and the U.S. Forest Service.

Quality of Life Benefits: Importance of the Snake River to Communities

In addition to economic benefits, the Snake River Headwaters, and the passive and active recreation opportunities it provides, is a key attribute to the quality of life in the surrounding communities of northwestern Wyoming and eastern Idaho. Although quality of life is a socioeconomic factor that is difficult to measure, its importance to local communities around the parks cannot be overstated. The significance of this role becomes more evident when considering the following ways parkland and river access opportunities contribute to quality of life.

The Snake River and the surrounding natural landscape of Grand Teton and Yellowstone national parks and the National Elk Refuge are symbolic and iconic to nearby communities and to visitors from around the world. Thus, many local residents (both seasonal and permanent) consider these natural features to be part of their community and part of their identity. Access to these natural features for a wide variety of recreational experiences also helps enhance the area's quality of life by improving the psychological and physiological health of the residents. The Snake River Headwaters contributes to community health by offering residents opportunities for personal fitness, active recreation, and other physical exercise. In addition to the health benefits of physical activity, recreating in the natural world can also improve psychological health by reducing anxiety and stress. As population growth and urban development continues to grow in the three-county area, the preservation of these open lands and waters and the recreation opportunities provided by them would become more valuable to the area's quality of life.

Demographics

Population. Population trends and projections in the three-county area are shown in table 18, and are based on U.S. Census Bureau data. In 2010, the total population of the three-county area was 48,737 people, a 26% increase from the 2000 population. This rate of population growth notably exceeded the rates for Wyoming (14%) and Idaho (21%) during this period. The area also grew at a higher rate (79%) for the period from 1990–2010 when compared to growth of either Wyoming or Idaho.

When compared to the other two counties in the area, Teton County, Idaho, had the greatest relative increase in population (56%) over the last decade. However, the absolute increases in population from 2000 to 2010 were similar in all three counties (3,043 in Teton County, Wyoming; 3,533 in Lincoln County, Wyoming; and 3,338 in Teton County, Idaho). This similarity indicates a change in growth trends from the previous decade (1990–2000), when most of the area growth occurred in Teton County, Wyoming.

TABLE 18. POPULATION TRENDS AND PROJECTIONS

Jurisdictions	1990 Population	2000 Population	2010 Population	Percent Change 2000–2010	Percent Change 1990–2010	2020 Forecast
Counties						
Teton County, WY	11,173	18,251	21,294	17%	91%	21,550
Lincoln County, WY	12,625	14,573	18,106	24%	43%	20,100
Teton County, ID	3,439	5,999	9,337	56%	172%	N/A
Total	**27,237**	**38,823**	**48,737**	**26%**	**79%**	
Towns						
Alpine	200	550	828	51%	314%	950
Driggs	846	1,100	1,439	31%	70%	N/A
Jackson	4,708	8,647	9,577	11%	103%	10,660
Victor	292	840	1,416	69%	385%	N/A
States						
Wyoming	453,588	494,782	563,626	14%	24%	578,730
Idaho	1,006,749	1,293,953	1,567,582	21%	56%	1,741,333

Source: U.S. Census Bureau 2011 and State of Wyoming; population forecasts not available for smaller geographic areas of Idaho.

Jackson more than doubled in population from 1990 to 2010, with most of the growth occurring before 2000. The populations of the much smaller communities of Alpine and Victor more than quadrupled. Part of the population and housing growth in Driggs, Victor, and Alpine is the result of service workers who live in these communities and commute to Jackson.

As shown in table 18, continued population growth is expected in the area. However, future development and population growth in Teton County, Wyoming, would be somewhat constrained because only 3% of the land is in private ownership. The rest of the county is federally owned. Because the U.S. Census is completed in April, resort areas such as Jackson and Teton County typically are undercounted. During this time, seasonal employees have left the resorts, permanent employees may be on vacation, and seasonal residents are living in their primary homes. To address these undercounts, local planners typically use a combination of existing housing units, building permits, and household population factors to more accurately estimate the population. In addition to the resident population, Teton County, Wyoming, can have a tourist population that is more than twice the resident population. Tourists contribute an additional 35,000 or more to the population of this county during the peak summer season.

Housing. There were almost 26,000 housing units in the three-county area in 2010, nearly half of which were in Teton County, Wyoming. The number of housing units increased over the decades from 1990–2000 and 2000–2010 by 40% and 31%, respectively. Most (70%) are single-family residential structures (U.S. Census Bureau

2010). Housing is least available and least affordable, in Teton County, Wyoming. For example, the median value of owner-occupied housing in 2009 was $707,900 in Teton County, Wyoming, compared to $338,100 in Teton County, Idaho, and $195,200 in Lincoln County, Wyoming based on data from the U.S. Census Bureau American Community Survey 2005–2009. In 2010, the average sales price of a single-family home in Teton County, Wyoming, rose to $1,974,629, in contrast to the state of Wyoming average sale price of $250,958 for the same period (Wyoming Community Development Authority 2010).

There has been substantial residential development throughout the three-county area in recent years. Supportive commercial development has occurred, primarily along highways in and near Jackson. The highly desirable scenic, wildlife, and outdoor recreation resources of the area have stimulated development to support seasonal tourism and nonresident and second-home development. The U.S. Census Bureau 2000 census results classified 21% of all housing units in Teton County, Wyoming, as seasonal use units that typically are used by nonresidents as second homes. This residential development has resulted in rapidly rising real estate values, conversion of working ranches to residential developments, and lack of affordable housing.

Economics

Labor Force and Employment. According to the U.S. Bureau of Labor Statistics Quarterly Census of Employment and Wages, based on place of residence, the average annual civilian employment in the three-county area in 2009 was 26,464. In the 10 years from 1999 to 2009, this employment increased by 20%. Employment peaked in 2007 to just over 29,000, with employment slowing as the national recession was felt locally. Over half (65%) of the three-county employment is in Teton County, Wyoming, where monthly employment levels are seasonal and vary widely. June through August is the highest employment period and March through May is the lowest employment period. The percentage of local employment in the accommodation and food services sector in Teton County is almost four times greater than the national level. According to the U.S. Bureau of Economic Analysis–Regional Economic Information System, the percentage of local employment in the accommodation and food services sector in Teton County is almost four times greater than the national level. Based on data from U.S. Bureau of Labor Statistics Local Area Unemployment Statistics, the annual unemployment rate in 2010 for the three-county area was 8.5%, compared to 6.0% and 8.7% for the states of Wyoming and Idaho, respectively.

Table 19 identifies the primary employers in Teton County, Wyoming, in 2006. The resort/tourist industry dominates, and six of the eight largest employers are directly associated with this industry. As shown in the table, employers in this sector have strong seasonal employment peaks and employment during the peak summer tourist season is approximately 50% greater than during the peak winter season.

Income and Tax Revenues. Compensation of employees for each Teton County, Wyoming, industry sector that represented at least 5% of the county total in 2003 is shown in table 20. Accommodations and food services dominated, accounting for almost 20%. Construction, at around 15%, indicates the high degree of development activity. Government, also around 15%, reflects the federal ownership of 97% of land in the county and the presence of land managers and interpretive staff.

Total sales tax generated in 2011 by Teton County, Wyoming, was $51.7 million. The retail trade and accommodations / food services business sectors account for over 70% of total sales tax generation in Teton County, Wyoming (A&I 2011).

TABLE 19. PRIMARY EMPLOYERS IN 2006 FOR TETON COUNTY, WYOMING

Employer	Number of Employees	
	Summer	Winter
Grand Teton Lodge Company	1,000	40
Grand Teton National Park	330	140
St. John's Hospital	500	500
Teton County School District	50	380
Snow King Resort	222	270
Signal Mountain Lodge	140	6
Jackson Hole Mountain Resort	200	940
Grand Targhee Resort	125	325

Source: Jackson Hole Chamber of Commerce 2006; year-round employment at Jackson Hole Airport was about 485 FTEs, but many work for multiple employers, including airport, fixed-base operator, airlines, car rental agencies, stores, and restaurant.

TABLE 20. COMPENSATION OF EMPLOYEES BY INDUSTRY SECTOR IN 2003 FOR TETON COUNTY, WYOMING

Industry Sector	Total Wage/Salary Compensation ($ in millions)	Percent of Total
Accommodations and food services	$127.0	19.7%
Construction	$100.7	15.6%
Government	$98.8	15.3%
Retail Trade	$57.7	9.0%
Professional/technical services	$47.6	7.4%
Finance/insurance	$36.2	5.6%
Total for Teton County, WY	**$642.4***	**100%***

Source: Bureau of Economic Analysis 2004

*Values do not add up to total because smaller industry sectors were omitted.

Property Values. Although some changes in property valuations result from annual reassessments, most cumulative property value increases in Teton County, Wyoming, reflect real property and improvements through new construction of buildings and facilities that are added to the tax rolls. Therefore, property valuation trends are good indicators of construction activity and economic growth in the area.

From 2001 through 2005, Teton County, Wyoming, registered a 35% increase in total real property assessed values or an average of 8% per year. Residential and commercial valuations accounted for virtually the entire

increase during this period. Residential property represents 85% of total real property assessed valuation in the county. These increases in assessed valuation have led to increased property tax revenues for the respective local governments.

Tourism and Recreation. In the three-county area around the Snake River Headwaters and, in particular, Teton County, Wyoming, employment, earnings, and business volumes are dominated by industry sectors that serve tourism. Most of the development in Teton County and Jackson reflects the supportive services associated with the tourist/resort industry and with meeting the needs of nonresidents who are interested in or are establishing seasonal residences. The local national parks, wildlife refuge areas, ski resorts, scenic attractions, and seasonal activities provide passive and active recreational activities and opportunities throughout the year.

The mode of transportation that visitors use to arrive in the region varies. A survey by the National Park Service in summer of 2008 determined that 10% of visitors arrived by commercial airline to the Jackson Hole Airport. Surveys conducted in summer of 2005 and winter of 2004–2005, indicated that approximately 6% of summer visitors to Grand Teton National Park arrived by air, while 90% of winter visitors arrived by air (RRC Associates 2005). The average winter stay in the Jackson area is 5.7 days, compared to an average stay of 7.2 days in summer (RRC Associates 2005).

Tourism and Recreation at Grand Teton National Park. Table 21 portrays annual recreational visitation at Grand Teton National Park during the 2006–2010 period. Visitation has remained relatively stable throughout the period. There are approximately 4 million annual visits to the park, including an average of about 2.5 million recreational visits.

Recreational visits are those with a primary purpose of sightseeing or recreating in the park, and do not include the 1.5 million visits involving through traffic, business purposes, and entrance by residents and employees. More than 90% of the recreational visitors are nonlocal. Annual fluctuations result from factors such as forest fires, drought, fuel prices, and state of the economy. All of these visitors contribute to the local and regional economy, either directly or indirectly, through their spending on services, merchandise, and essentials and the job demands that this activity creates.

As shown in figures 10 and 11, the seasonality of recreational visits, and the associated economic influx, varies considerably at the park. The summer season (June through September) typically accounts for 75% or greater of total annual recreational visits. On average, recreational visits during the six-month period from November through April account for only 10% of the total annual recreational visits. A visitor survey found that 42% of visitors spent less than a day in the park. Just over a quarter of the visitors spent two to three days and about 7% reported staying from 7 to 13 days (Smaldone 2001).

Tourism and Recreation at the Snake River Headwaters. In a 2008 study of park visitation, it was noted that roughly 45% of the park's recreational visitors visit the Snake River, even if it is a brief stop and involves land-based activities (Braak et al. 2010). In addition to contributing to the local and regional economy through spending on lodging, services, food, and merchandise in the surrounding communities such as Jackson, these visitors to the Snake River Headwaters also contribute to the economy by spending and raising service/job demands in the park, primarily through use of the park's recreation concessioners.

In a 2011 study of visitor use patterns (Park and Tucker 2012), visitors identified their primary activity at the Snake River as follows: rafting (48%), kayaking and canoeing (29%), fishing (17%), and boating (3%). When combined, floating and boating accounts for approximately 80% of the primary use of the

Snake River in the park. Other common activities in the park include photography, picnicking, bird-watching, viewing roadside exhibits, viewing other wildlife, camping, and hiking. Some of these activities are also associated with or done in conjunction with floating or boating.

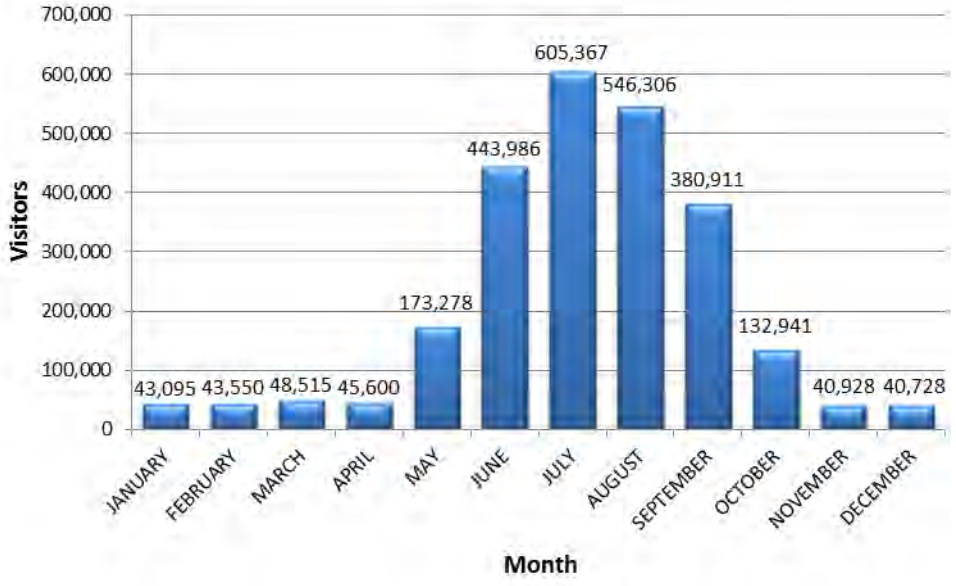
In the 2011 survey, 45% of the Snake River visitors indicated that their trip on or along the Snake River involved commercial services from park concessioners for river recreational activities. In the park, 16 concessioners provide recreation-related services (primarily for fishing and floating) on the Snake River. These concessioners are held to river use limits for their floating and fishing services. Float trips are limited to 133 launches per day and fishing concessioners are limited to 47 trips per day.

In 2010, 63,333 visitors fished or floated on the river via the services and assistance of concessioners at Grand Teton National Park. Nearly 95% of these concessioner-based visitors invested in floating concessioner services. Fishing concessioners account for small portion of the concessioner economy at the river.

TABLE 21. RECREATIONAL VISITORS AT GRAND TETON NATIONAL PARK FOR 2006–2010

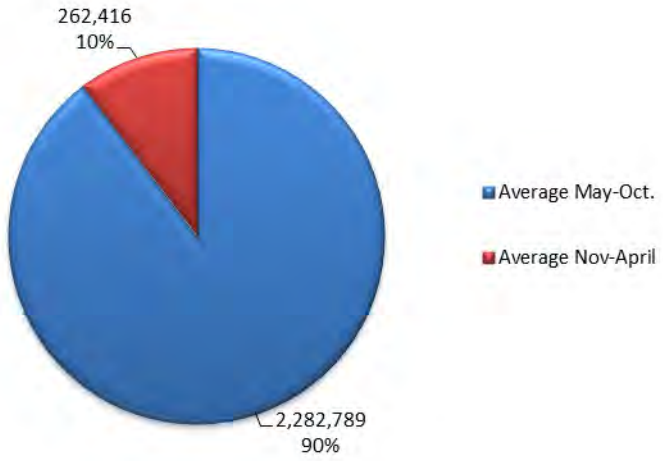
	2006	2007	2008	2009	2010	Average (2006–1010)
January	42,429	45,940	42,940	43,659	40,509	43,095
February	47,055	43,080	43,991	43,129	40,495	43,550
March	44,281	62,337	43,724	44,492	47,742	48,515
April	43,722	49,303	39,193	48,206	47,575	45,600
May	160,378	188,612	178,458	177,624	161,320	173,278
June	427,444	454,382	452,102	435,352	450,650	443,986
July	597,484	591,627	587,324	622,045	628,355	605,367
August	497,403	540,336	527,256	568,122	598,412	546,306
September	344,329	397,285	347,239	393,873	421,830	380,911
October	121,273	126,744	142,499	124,607	149,581	132,941
November	39,656	45,122	42,483	37,574	39,805	40,928
December	41,022	39,534	38,778	41,208	43,100	40,728
Year Total	**2,406,476**	**2,584,302**	**2,485,987**	**2,579,891**	**2,669,374**	**2,545,206**

Source: Jackson Hole Chamber of Commerce 2011



Source: Jackson Hole Chamber of Commerce 2011

FIGURE 10. AVERAGE MONTHLY RECREATIONAL VISITORS AT GRAND TETON NATIONAL PARK FOR 2006–2010



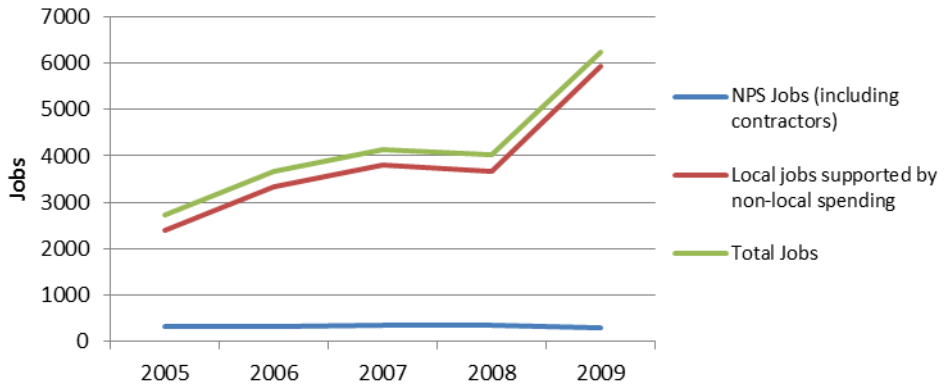
Source: Jackson Hole Chamber of Commerce 2011

FIGURE 11. AVERAGE SEASONAL DISTRIBUTION OF RECREATIONAL VISITORS AT GRAND TETON NATIONAL PARK FOR 2006–2010

Tourism and Economic Effects at Grand Teton National Park. The annual influx of tourists to sites and who recreate in Grand Teton National Park not only brings tourist spending into the area, but also generates the need for jobs to support this influx. The economic viability of the communities in the area depends heavily on the recreation and tourism traffic generated by Grand Teton National Park. In the summer, there are approximately 2,300 employees in the park. Given the substantial drop in visitation from November through April, these employment numbers drop considerably during winter months.

The largest sources of employment are the National Park Service with about 150 permanent employees and 200 seasonal employees; Jackson Hole Airport, which provides year-round employment for about 485 FTE positions; and Grand Teton Lodge Company, which has about 1,000 summer employees (NPS 2006). The remaining summer employment is provided by other park concessioners who provide services that include lodging, food services, retail services, campground operations, service stations, marina, medical clinic, and guide operations that include floating and fishing. In 2004, the concessioners in Grand Teton National Park collectively generated annual gross receipts of $26.5 million. Lodging generates more than 40% of total annual concessioner revenue. Figure 12 provides a tracking of estimated total jobs supported by nonlocal visitation spending.

The communities in the Grand Teton National Park area provide food, lodging, medical services, groceries, gasoline, other automotive supplies/services, gifts, souvenirs, and other goods and services to visitors. Past visitor survey results show that nonlocal park recreational summer visitors spent $77 to $97 per person per day in the Jackson area. Nonlocal recreational winter visitors spent $98 to $113 per person per day. At current visitation levels, this visitor spending (direct and indirect) would generate a total of approximately $590 million annually in the economies of Teton County, Wyoming, and Teton County, Idaho (Loomis and Caughlan 2004).



Source: NPS (MGM2 Model)

FIGURE 12. JOBS RELATED TO GRAND TETON NATIONAL PARK FOR 2005–2009

This level of visitor spending directly accounts for approximately $200 million in personal income and 10,658 jobs in these two counties, representing 19% of total local income and 42% of local employment. Visitor spending accounts for approximately $306 million annually in personal income and 14,200 jobs when both direct and indirect effects of this spending are considered. Thus, current recreational visitation to Grand Teton National Park accounts for almost 30% of total direct and indirect personal income and 56% of direct and indirect employment in the Jackson area (Loomis and Caughlan 2004).

Tourism and Economic Effects at Yellowstone National Park. As noted earlier, the majority of the social and economic effects of the proposed management alternatives in this plan would affect the Grand Teton National Park area much more than the Yellowstone National Park area. However, because portions of the Snake River Headwaters lie within Yellowstone National Park, some information about Yellowstone would be provided. Table 22 lists the annual recreational visitation at Yellowstone National Park during 2006–2010. The park has experienced a gradual increase in recreational tourism over this period. While the five-year average is about 3.3 million annual recreation visits, the recreational visits to Yellowstone National Park peaked at approximately 3.6 million in 2010. As at Grand Teton National Park, all of these visitors contribute to the local and regional economy by increasing local spending and generating needs for jobs.

The seasonality of the recreational visits and related economic catalysts also vary greatly at Yellowstone. As shown in figures 13 and 14, on average, recreational visits to Yellowstone National Park from May through October account for over 3.1 million of the 3.3 million annual visits (approximately 96% of the recreational visits). Roughly, half of the park's recreational visitation occurs in July and August. Figure 15 provides a tracking of estimated total jobs supported by nonlocal visitation spending.

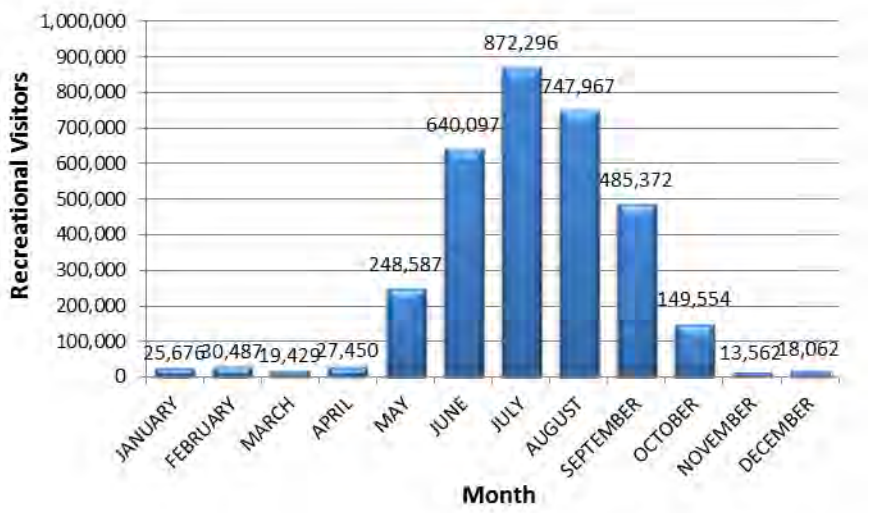
Tourism and Economic Effects at National Elk Refuge. The National Elk Refuge had an average of 850,000 visitors annually during the 1992 through 2001 period, and just over 900,000 annual visitors from 1998 through 2002. A recent exit survey (RRC Associates 2005) of airline passengers indicated that 25% of the respondents visited the National Elk Refuge and/or participated in wildlife viewing. However, actual dollars generated from visitation to the refuge are minor relative to the total local economy. Summer and winter visitor surveys (Loomis and Caughlan 2004; Loomis and Koontz 2005) were conducted to estimate the economic impact of the refuge on the area economy. Surveys were conducted of winter sleigh riders and elk hunters.

During the past several years, an annual average of 20,000 visitors participated in winter sleigh rides; more than 90% of these are estimated to be nonlocal visitors. The results of the above surveys were entered into the impact analysis for planning (IMPLAN) economic impact modeling system to analyze the economic impact of visitor and hunter spending. Based on daily visitor expenditures, it was estimated that winter sleigh rides and elk hunting in the refuge generate approximately $2.25 million in annual visitor expenditures, $1.27 million in direct and indirect personal income, and 61 direct and indirect jobs in the Jackson area (Loomis and Caughlan 2004).

TABLE 22. RECREATIONAL VISITORS AT YELLOWSTONE NATIONAL PARK FOR 2006–2010

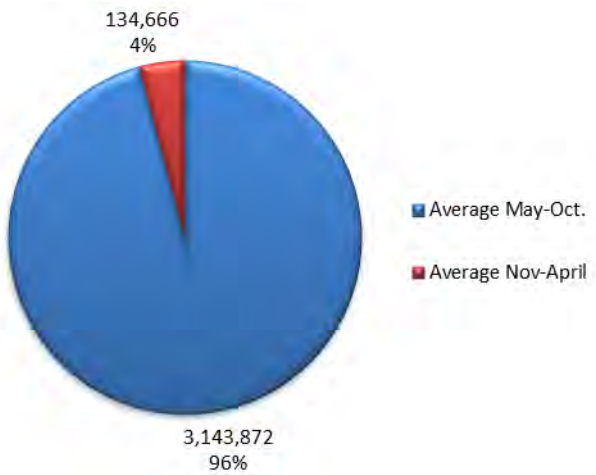
	2006	2007	2008	2009	2010	Average (2006–1010)
January	23,989	25,476	26,864	24,770	25,595	25,676
February	29,011	30,928	33,557	28,355	29,108	30,487
March	18,879	20,225	19,147	17,317	21,028	19,429
April	29,381	27,798	24,433	24,831	32,736	27,450
May	230,762	264,203	217,938	261,763	250,445	248,587
June	557,213	609,606	612,095	643,844	694,841	640,097
July	738,807	822,773	808,110	900,515	957,785	872,296
August	635,666	710,781	731,063	752,983	797,040	747,967
September	428,369	463,994	437,552	489,438	550,504	485,372
October	146,790	139,789	145,488	123,867	189,072	149,554
November	12,382	15,362	12,671	9,397	16,819	13,562
December	19,046	20,408	16,343	18,107	17,388	18,062
Year Total	**2,870,295**	**3,151,343**	**3,085,261**	**3,295,187**	**3,582,361**	**3,278,538**

Source: Jackson Hole Chamber of Commerce 2011



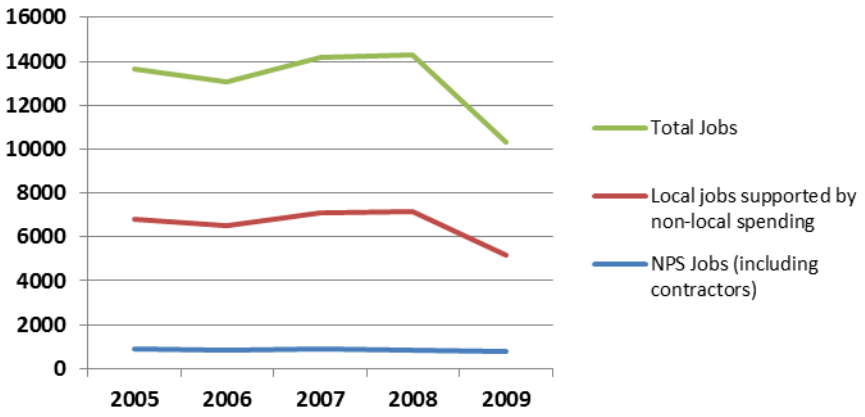
Source: Jackson Hole Chamber of Commerce 2011

FIGURE 13. AVERAGE MONTHLY RECREATIONAL VISITORS AT YELLOWSTONE NATIONAL PARK FOR 2006–2010



Source: Jackson Hole Chamber of Commerce 2011

FIGURE 14. AVERAGE SEASONAL DISTRIBUTION OF RECREATIONAL VISITORS AT YELLOWSTONE NATIONAL PARK FOR 2006–2010



Source: NPS (MGM2 Model)

FIGURE 15. JOBS RELATED TO YELLOWSTONE NATIONAL PARK FOR 2005–2009

Tourism and Economic Effects at National Forests. The Bridger-Teton National Forest is adjacent to Grand Teton National Park on the east and south, and it adjoins the Caribou-Targhee National Forest to the west. Visitors to the area also recreate in the Gallatin and Custer national forests in Montana, Beaverhead-Deerlodge National

Forest in Idaho, and Shoshone National Forest in Wyoming.

According to visitor use monitoring surveys, the top five activities cited by people visiting the area's national forests are (1) viewing natural features and scenery, (2) viewing wildlife, (3) general relaxing, (4) hiking or walking, and (5) scenic driving. Other popular activities include bicycling, developed camping, fishing, hunting, picnicking and family day use, water sports, and visiting resorts and cabins (Greater Yellowstone Coordinating Committee 2006).

While winter activities are increasingly contributing to the total recreation use of the area's national forests, more than 90% of recreational use occurs between April and December (Greater Yellowstone Coordinating Committee 2006). Winter recreation primarily consists of downhill skiing on slopes within the national forest that are associated with developed resorts on adjoining private land.

Outside the ski resorts, popular winter activities include snowmobiling, cross-country skiing, snowshoeing, and snow play.

IMPACT TOPICS CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Some resource impact topics that are commonly considered during planning processes were dismissed from detailed analysis because the management alternatives would have no effect, a negligible effect, or a minor effect on the resource or the resource does not occur within the designated wild and scenic river corridors. For the purpose of this section, an impact of negligible intensity is one that is "at the lowest levels of detection, barely perceptible, and not measurable." An impact of minor intensity is one that is "measurable or perceptible, but is slight, localized, and would result in a limited alteration or would impact a limited area." The rationale for dismissing these specific topics is described below.

WETLANDS

Executive Order 11990, "Protection of Wetlands"; NPS Director's Order 77-1: *Wetland Protection* and its accompanying handbook; and NPS *Management Policies 2006*, section 4.6.5 require the National Park Service to protect and enhance natural wetlands values and to examine impacts on wetlands. It is NPS policy to avoid affecting wetlands and to minimize impacts when they are unavoidable.

Related riparian vegetation is covered under the "Vegetation" topic in this chapter. In all of the alternatives in this plan, facilities proposed for development would be sited to avoid wetland areas. No new developments in the alternatives would be proposed in areas known to contain wetlands. No new uses of water originating from or directly supplying wetlands are being proposed on NPS or USFWS lands. Thus, wetlands were not evaluated as an impact topic.

NIGHT SKIES

NPS *Management Policies 2006* state the National Park Service will preserve, to the greatest extent possible, the natural lightscapes of park units, including natural darkness. The agency strives to minimize the intrusion of artificial light into the night scene by limiting the use of artificial outdoor lighting to basic safety requirements, shielding the lights when possible, and using minimal impact lighting techniques. No new facilities that would necessitate new night-time lighting on NPS or USFWS lands are being proposed in the alternatives. Thus, the topic of night skies was dismissed as an impact topic.

WILDERNESS

Portions of the Snake River corridor pass through "potential wilderness" and "recommended wilderness" in Grand Teton and Yellowstone national parks, respectively. Both of these classification determinations have been made by the president and forwarded to Congress for designation decisions. Recommended wilderness refers to lands that are suitable for wilderness designation, and thus are recommended for designation by the president to Congress. Potential wilderness refers to lands that may qualify for a future wilderness designation, pending the removal of temporary or incompatible conditions or uses. The presence and vehicular use of River Road along the Snake River (in Grand Teton National Park) has been identified as a nonconforming use in the context of wilderness policy. As a result of this use, the lands that surround this portion of the Snake River corridor have been identified as potential wilderness. Under the NPS preferred alternative (alternative C), the

National Park Service would close River Road to public use in the future if portions of the road fail due to the natural migration of the Snake River channel and road repairs and reroutes cannot be accomplished without impact to adjacent sagebrush and other sensitive habitats. Also, if Congress acts to designate this potential wilderness, the National Park Service will act to eliminate this nonconforming use along the Snake River (River Road).

Furthermore, the Wild and Scenic Rivers Act does not preempt more protective provisions or measures that are set forth by other regulatory acts, including the Wilderness Act. More specifically, this comprehensive river management plan does not propose any new developments or uses that are inconsistent with wilderness characteristics or policies. The plan was developed to comply with wilderness standards. Thus, the topic of wilderness was dismissed as an impact topic.

AIR QUALITY

Grand Teton and Yellowstone national parks and John D. Rockefeller, Jr. National Memorial Parkway are class I areas under the Clean Air Act. While the parks and refuge experience relatively good air quality, they are downwind of significant sources of pollution. These include power plants, agricultural areas, industry, and oil and gas development. Visible pollutants rarely diminish the vistas within the parks, though the pollutants emitted from the previously noted sources can harm the parks' natural and scenic resources such as surface waters, vegetation, fish, and visibility. The occasional smoke from forest fires and prescribed burning, within and outside the parks, contribute to air pollution. In all of the alternatives, the National Park Service and U.S. Fish and Wildlife Service would continue to protect air quality as required under the Clean Air Act. No actions are being proposed in the alternatives that would measurably alter the overall air quality of the parks or refuge. Construction and/or redesign of the boat launches would have a short-term, negligible impact on the airshed. Use levels may increase with implementation of the alternatives, but the increase is not expected to be substantial and the emissions from additional vehicles would be negligible compared to current levels.

PRIME AND UNIQUE FARMLANDS

In 1980, the Council on Environmental Quality directed federal agencies to assess the effects of their actions on farmland classified by the Natural Resources Conservation Service as prime or unique. Prime farmlands are defined as lands that have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and are available for these uses. Prime farmlands have the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming methods, including water management. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, an acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. Unique farmlands are lands other than prime farmland that are used for the production of specific high value food and fiber crops.

There are no prime or unique farmlands within the Snake River Headwaters wild and scenic river corridor within Grand Teton and Yellowstone national parks, John D. Rockefeller, Jr. National Memorial Parkway, and the National Elk Refuge. Therefore, none of the management alternatives proposed in this comprehensive river management plan would affect prime and unique farmlands in the area.

NATURAL OR DEPLETABLE RESOURCES REQUIREMENTS AND CONSERVATION POTENTIAL

None of the alternatives being considered in this plan would result in the extraction of natural or depletable resources from the river corridor within Yellowstone or Grand Teton national parks, John D. Rockefeller, Jr. National Memorial Parkway, or the National Elk Refuge. In all of the alternatives, ecological principles would be applied to ensure that the resources within the river corridor of both parks and the parkway are maintained and protected. Therefore, this impact topic has been dismissed from further consideration.

ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL

None of the management alternatives would result in a major change in energy consumption, energy availability, or costs compared to current conditions. The National Park Service and U.S. Fish and Wildlife Service would pursue sustainable practices whenever possible in all decisions regarding operations, facilities management, and development within the river corridors. Whenever possible, the parks and refuge would use energy conservation technologies and renewable energy sources. Overall, the impact on energy requirements and conservation potential would be negligible, and therefore this topic has been dismissed from further consideration.

CARBON FOOTPRINT

For the purpose of this planning effort, "carbon footprint" is defined as the sum of all emissions of carbon dioxide and other greenhouse gases (e.g., methane and ozone) that would result from implementation of the management alternatives. Understanding the carbon footprint of each alternative is important to determine their contribution to climate change. However, a quantitative measurement of each alternative's carbon footprint was determined by the planning team not to be practicable. Instead, a qualitative analysis was used to determine each action alternative's carbon footprint relative to the no-action alternative. Qualitatively analyzing each action alternative's carbon footprint aligns with the goals of both the Greater Yellowstone Coordinating Committee ecosystem-wide greenhouse gas emissions reduction goals and Executive Order 13514, "Federal Leadership in Environmental, Energy, and Economic Performance."

It has been determined that the two action alternatives would only emit slightly more greenhouse gases compared to the baseline emissions of the parks and refuge. This is primarily the result of small increases (less than 3%) in vehicular traffic from visitors, commuters, and concessioner operations—likely the result of increased amenities and recreation opportunities proposed in alternative B. Neither of the action alternatives is expected to have a major boost in visitation. Because of this slight increase in greenhouse gases that may contribute to climate change, this impact topic has been dismissed from detailed analysis.

ENVIRONMENTAL JUSTICE

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing the disproportionately high or adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities.

According to the U.S. Environmental Protection Agency, environmental justice is the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to the

development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

Environmental justice has been dismissed as an impact topic for the following reasons:

- The National Park Service and U.S. Fish and Wildlife Service solicited public participation as part of the planning process and gave equal consideration to all input from persons regardless of age, race, income status, or other socioeconomic or demographic factors.
- The management alternatives would not result in any disproportionate human health or environmental effects on minorities or low-income populations and communities.
- The management alternatives would not result in any effects that would be specific to any minority or low-income population or community.

MUSEUM COLLECTIONS

Museum collections are an assemblage of objects, works of art, historic documents, and/or natural history specimens collected according to a rational scheme and maintained so they can be preserved, studied, and interpreted for public benefit. Museum collections normally are kept in park museums, although they may also be maintained in archeological and historic preservation centers. The museum collections at Grand Teton National Park and John D. Rockefeller, Jr. Memorial Parkway are currently housed and exhibited at five park facilities: (1) Bill Menor Store, (2) Colter Bay Visitor Center, (3) Craig Thomas Discovery and Visitor Center, (4) the transportation shed at Menor's Ferry, and (5) seasonally at the Jenny Lake Visitor Center.

Museum collections for Yellowstone National Park are housed and exhibited at eight park facilities: (1) Albright Visitor Center, (2) Canyon Visitor Center, (3) Fishing Bridge Museum / Visitor Center, (4) Grant Village Visitor Center, (5) Lake Yellowstone Hotel, (6) Mammoth Hot Springs Hotel, (7) Museum of the National Park Ranger, and (8) Old Faithful Inn. Additionally, some park collections are housed outside of the parks at universities, public and private museums, and NPS regional facilities, such as the Midwest Archeological Center in Lincoln, Nebraska, and the Western Archeological and Conservation Center in Tucson, Arizona, for cataloging, conservation treatment, and long-term storage. These museum collections include archeological collections curated per 36 CFR 79.

Actions included in this plan are not anticipated to affect the management of park museum collections, nor substantially contribute to the collection of additional specimens and artifacts requiring expanded or enhanced curatorial storage. Therefore, the topic of museum collections was dismissed from detailed analysis in this plan.

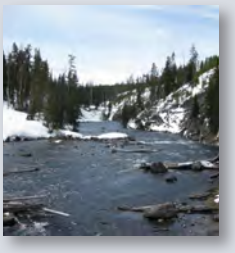
INDIAN TRUST RESOURCES

The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes. Secretarial Order 3175 requires that any anticipated impacts on Indian trust resources from a proposed project or action by U.S. Department of the Interior agencies be explicitly addressed in environmental

documents. Trust resources will not be impacted by the actions contemplated in this plan, therefore this topic has been dismissed from further analysis.

Environmental Consequences

5



INTRODUCTION

OVERVIEW

The National Environmental Policy Act (40 CFR 1500–1508) mandates that environmental assessments disclose the environmental impacts of proposed federal actions. In this case, the proposed federal action is implementation of the *Snake River Headwaters Comprehensive River Management Plan / Environmental Assessment.* As described in chapters 2 and 3, three alternatives were carried forward for analysis in this plan—the no-action alternative (alternative A) and two action alternatives (alternatives B and C). Alternative C was selected as the preferred alternative, providing a comprehensive strategy for guiding the preservation, management, and use of designated wild and scenic rivers in a manner that preserves them unimpaired for future use and enjoyment. Consistent with the provisions of the National Environmental Policy Act, NPS managers would determine if more detailed planning, environmental compliance, or other documentation (e.g., section 7 evaluations) is required before undertaking specific actions that may arise from implementation of the approved plan.

The first sections of this chapter discuss terms and assumptions and the cumulative scenario used in the discussions of impacts, and they are followed by the impacts of the no-action alternative and action alternatives. Each impact topic includes a description of the impacts of the alternative, a discussion of cumulative effects, and a conclusion. The impact analysis for the no-action alternative assesses the foreseeable continuation of current management practices under existing laws and policies. The impacts of the action alternatives describe the difference between implementing the no action alternative and the action alternatives. To understand the consequences of the action alternative, there should be consideration of what would happen if no action was taken (i.e., consider the no-action alternative).

METHODS AND ASSUMPTIONS FOR ANALYZING IMPACTS

The planning team based the impact analyses in this chapter on professional judgment, research of existing studies and literature, opinions from experts within the National Park Service and other agencies, and the study of previous projects that had similar effects. When assessing the potential impacts on the resources and values within the designated wild and scenic river corridors, several impact parameters were analyzed for each alternative. In this chapter, the potential impacts of alternatives A, B, and C are described by four criteria: (1) type, (2) intensity, (3) duration, and (4) context. Explanations and definitions of these criteria are as follows:

- **Type:** *Type* of impact is determined to be either beneficial or adverse. Beneficial and adverse impacts on resources and values are assessed by comparing the anticipated changes that would result from implementing each action alternative to the results of the continuing current management direction (alternative A). Once it is determined if an impact is beneficial or adverse, the other impact measurement criteria—intensity, duration, and context—can be assessed.

- **Intensity:** *Intensity* refers to the degree, level, or strength of the impact on the respective resource or value. Impact intensities for beneficial and adverse effects are quantified as negligible, minor, moderate, and major. Because the definitions of

intensity vary by resource topic, separate intensity definitions are for each impact topic (in individual sections of this chapter).

- **Duration:** *Duration* refers to the length of time the impact affects the resource or value. In this analysis, impact durations are defined as follows (unless otherwise noted in the impact topic section):
  - **Short-term**—impacts would last less than three years
  - **Long-term**—impacts would persist for three or more years, or may be permanent

- **Context:** *Context* refers to the setting or geographic scope of the impact on the particular resource or value. In this analysis, impacts are measured relative to the following two context levels (unless otherwise noted in the impact topic section):
  - **Local**—impacts would be limited to a specific site or relatively small area within the parkway boundaries.
  - **Regional**—impacts would occur over a large, widespread area within and/or beyond the parkway boundaries, or in several areas along the parkway.

CUMULATIVE IMPACTS

The Council on Environmental Quality, which ensures that federal agencies meet their obligations under the National Environmental Policy Act, requires an assessment of cumulative impacts in the decision-making process for all federal projects. Cumulative impacts are described in Council on Environmental Quality regulation 1508.7 as follows:

> Cumulative impacts are the impacts that result from the incremental impacts of the action when added to other past, present, and reasonably foreseeable actions, regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over time.

Cumulative impacts are evaluated separately for the no-action and the two action alternatives by adding the impacts of each alternative with the impacts of other past, present, and reasonably foreseeable actions. To make these determinations, it was necessary to identify other actions in and adjacent to designated wild and scenic river segments in Grand Teton and Yellowstone national parks, John D. Rockefeller, Jr. Memorial Parkway, the National Elk Refuge, as well as upstream on the Bridger-Teton National Forest and private inholdings.

To determine which actions within this area may have cumulative impacts on wild and scenic river resources and values, the National Park Service identified projects and programs that have occurred in the past, are currently being implemented, or would likely be implemented over the next 20 years—the typical life of a comprehensive river management plan. Combined, these actions are referred to as the *cumulative scenario*.

Past, present, and reasonably foreseeable actions have been organized into two main categories: (1) other park infrastructure improvements, and (2) other non-NPS management actions. A summary of these actions that could contribute to cumulative impacts is provided for each category. The evaluation of cumulative impacts, described under each impact topic, is qualitative in nature.

Park Infrastructure Improvements

The National Park Service is undergoing site improvements to the Moose headquarters complex in Grand Teton National Park. A portion of this complex is within the scenic corridor of Snake River. This project involves the complete reconfiguration of vehicle and pedestrian traffic within the administrative and Moose Landing areas, removal of several temporary buildings, and site restoration work targeted to improve stormwater management. The improvements are designed to enhance visitor safety and experience, improve working conditions for employees, improve parking and traffic flow, reduce the built environment, and improve water quality while preserving the character of the area and protecting natural and cultural resources. In addition, Grand Teton National Park plans to pave the upper 0.33 mile of Schwabacher Road, widening it slightly in some places to achieve a standard 16-foot width. The rest of the road would remain gravel.

Grand Teton and Yellowstone national parks are also undergoing or have completed a number of recent planning efforts. These plans have not been used to develop the cumulative scenario. This is because either the actions that result from these plans are not anticipated to impact wild and scenic river resources, or because aspects of these plans have already been incorporated into the no-action and action alternatives. These planning efforts are described under the "Relationship of This Plan to Other Planning Efforts" section in chapter 1.

Non-NPS Management Actions

The following non-NPS actions are among those that could contribute to cumulative impacts on wild and scenic resources and values:

Operation of Jackson Lake Dam. The storage and release of water from the Jackson Lake Dam could have cumulative impacts on wild and scenic resources and values due to the alteration of natural flow regimes of Snake River. Jackson Lake is a natural lake augmented by the Jackson Lake Dam, which was originally constructed by the Bureau of Reclamation in 1907. It was then raised higher in 1916 and again reconstructed in 1989, with a total current storage capacity of 847,000 acre-feet. The Bureau of Reclamation is responsible for operating the dam for the storage and release of water to meet downstream irrigation demands and for flood control.

The target refill at Jackson Lake is generally mid-May to early July and varies with snow conditions. The maximum daily average flood control releases (from June to July) is around 11,500 cfs during a very wet year and around 6,200 cfs during an average year. These maximum releases generally occur in early to mid-June before tapering off to irrigation release levels. There are no releases for flood control in some years.

After the flood control period, irrigation releases begin, usually in late June or July. The Bureau of Reclamation estimates that in 50% of years, flows exceed 2,400 cfs for the July through September period. In this same period, flows exceed 1,500 cfs in 95% of years. The minimum average monthly release during this period is 976 cfs in August.

In 50% of years, the reservoir may be drafted to 635,000 acre-feet active storage by October. The Bureau of Reclamation's assessment predicts minimum average monthly outflows would not drop below 273 cfs. There are no ramping requirements for flow changes at the Jackson Lake Dam, but the Bureau of Reclamation has worked well with affected agencies on the ramping of flows.

Water-Related Resource Projects on Private Inholdings. There are many private inholdings along the designated wild and scenic river corridors within the Snake River Headwaters. The majority of these inholdings are upstream from the boundary of Grand

Teton National Park on Pacific Creek, Buffalo Fork, and the Gros Ventre River. Land uses on these inholdings vary from rural residential to agricultural. Water-related resource projects include in-stream channel modifications for water withdrawals and riverbank stabilizations. Livestock grazing and riparian habitat modifications are also common. Although typically small-scale, the combined effects from these land and water uses could contribute to cumulative impacts on NPS-managed wild and scenic resources and values.

Land Management Activities on Bridger-Teton National Forest. Bridger-Teton National Forest includes more than 3.4 million acres of public land, a large part of which is within the Snake River Headwaters and Greater Yellowstone Ecosystem. Bridger-Teton National Forest manages 1.2 million acres of designated wilderness and 315 miles of designated wild and scenic rivers—the majority of which are upstream from NPS-managed river segments. In addition, the U.S. Forest Service mission of multiuse land management allows for grazing allotments, oil and gas leasing, mining, off-road vehicles, and timber production. Although these land uses have the potential to affect NPS-managed wild and scenic river values downstream, the nondegradation and enhancement requirements of the Wild and Scenic Rivers Act would ensure protection of USFS-managed wild and scenic river segments upstream. Furthermore, any existing uses that may conflict with the protection of newly designated wild and scenic rivers would likely be identified and resolved by the U.S. Forest Service in its comprehensive river management plan. Therefore, it is likely that only the continuing effects of past land use activities on Bridger-Teton National Forest could contribute to cumulative impacts on NPS-managed wild and scenic rivers.

NATURAL RESOURCES

INTRODUCTION

This analysis of the environmental consequences of alternatives A, B, and C on natural resources within the Snake River Headwaters is based on the professional judgment of park and refuge staff, NPS planners, and other specialists in the field of natural resources management. This analysis describes impacts of the management alternatives at three different scales: (1) a headwaters-wide analysis, which describes the overall effect of broad headwaters-wide strategies; (2) a river segment analysis, which describes the overall effect of river-segment specific strategies; and (3) an access area analysis, which looks at more site-specific impacts on the seven segments and nine major access areas.

To provide a thorough analysis of effects on the natural resources of the headwaters, this section has been organized by the following four impact topics, which correspond to the natural resources topics described in "Chapter 4: The Affected Environment." Similar topics have been grouped together to limit redundancy and to present the analysis in a concise, understandable way. For this reason, ethnographic resources, consisting of numerous native plants and nearly all wildlife species found throughout the corridor, have been integrated into the impact analysis for the topics Water Resources and Vegetation, Wildlife, and Fish.

- Water Resources (Water Quality and Free-flowing Conditions)
- Vegetation (including Floodplains), Wildlife, and Fish
- Threatened and Endangered Species
- Soils

WATER-RELATED RESOURCES

This impact topic includes water quality and free-flowing conditions. Wetlands, floodplains, and riparian vegetation are covered under the vegetation section due to similarities between the resources and their interrelationship to each other.

Methods and Assumptions for Analyzing Impacts

Impacts on water-related resources comparing projected changes resulting from the action alternatives (B and C) to those of the no-action alternative (A). The thresholds used to determine impacts on these resources are defined as follows:

- **Negligible:** Water quality or free-flowing condition would not be impacted, or the impacts would be either undetectable or if detected, the effects would be considered slight. Any measurable changes would be within the natural range of variability. Additionally, for analysis of water as an ethnographic resource, impacts would not alter the relationship between the resource and the associated group's body of practices and beliefs. For purposes of section 106, the determination of effect would be *no adverse effect*.
- **Minor:** Impacts on water quality or free-flowing condition would be limited to isolated areas. Natural processes, functions, and integrity would be temporarily affected, but would be within the natural range of variability. The impacts would only affect a few individuals of plant or wildlife species dependent on one or both of these water-related resources, or would only slightly alter the

relationship between the resource and the associated group's body of practices and beliefs. Any changes would require considerable scientific effort to measure and have barely perceptible consequences. For purposes of section 106 for water as an ethnographic resource, the determination of effect would be *no adverse effect.*

- **Moderate:** Impacts on water quality or free-flowing condition would be readily apparent. Natural processes, functions, and integrity would be affected, but would be only temporarily outside the natural range of variability. The impacts would have a measurable effect on plant or wildlife species dependent on one or both of these water-related resources, but all species would remain indefinitely viable within the parks and the relationship between the resource and the associated group's beliefs and practices would survive. For purposes of section 106 for water as an ethnographic resource, the determination of effect would be *no adverse effect.*

- **Major:** Impacts would have drastic and permanent consequences for water quality and free-flowing condition, which could not be mitigated. Species dependent on one or both of these water-related resources would be at risk of extirpation from the parks. Changes would be readily measurable, outside the natural range of variability, and would have substantial consequences. For consideration of water as an ethnographic resource, the relationship between the resource and the associated group's body of beliefs and practices to the extent that the survival of a group's beliefs and/or practices would be jeopardized. For purposes of section 106, the determination of effect would be *adverse effect.*

Alternative A (No Action)

Headwaters-wide. Federal agencies within the Greater Yellowstone Ecosystem coordinate efforts to monitor and manage resources of the parks, national forests, and wildlife refuges where possible, respecting their distinct authorities and mandates. The agencies coordinate efforts to protect fish, hydrological systems, and other aquatic resources through such actions as watershed assessments and aquatic invasive species monitoring and education. The parks collaborate with the U.S. Forest Service, as necessary, for water resources management. Under this alternative, management activities would continue to be coordinated, as necessary, with adjacent federal and state resource management agencies and private landowners. The collaborative management between the parks, federal and state agencies, and private landowners would have long-term, minor, beneficial, local to regional impacts on water resources because having multiple management entities could allow more comprehensive and sustainable management efforts and outcomes.

Under this alternative, there are currently no formal user capacity indicators being monitored for resource protection and no formal standards, except for water quality, are established. Use varies by each river segment; however, each segment is subject to visitor use and the potential impacts that arise from use, such as littering, fecal coliform contamination, and erosion. Such impacts on water quality could result in a slightly altered relationship between the water and practices and beliefs of American Indian tribes. Consequently, a lack of appropriate monitoring, documentation, and subsequent mitigation of identified issues would continue to have long-term, minor to moderate, adverse, local to regional impacts on water-related resources within the parks.

In contrast, the parks would continue to be committed to protecting water-related resources as required by federal law and NPS policy. The parks would continue to evaluate water resources projects to ensure consistency with the wild and scenic river designation (section 7 evaluation guidelines), as well as perform periodic water quality monitoring, and mitigate the effects of snow storage and stormwater runoff at developed areas to avoid water quality degradation. This protection of water quality would help preserve the relationship between the water and tribal practices and beliefs. Because of these aspects of the current management approach, the water-related resources within both parks would continue to be protected, resulting in long-term, minor, beneficial, local to regional impacts.

River Segments.

Lewis River (wild segment)—As befits its wild classification, there are very few existing developments in this river corridor other than several backcountry trails and campsites. Under alternative A, these backcountry trails and campsites would continue to be used and maintained. Due to the low level of current use in this segment, the continued use and maintenance of these developments would have a long-term, negligible, adverse, localized impact on water resources due to erosion and any leakage from maintenance equipment during operations next to the river.

Lewis River (scenic segment)—The majority of visitor use within this segment consists of scenic driving and fishing. Existing transportation development along the canyon rim in this river corridor includes roads, bridges, and turnouts. Other visitor amenities include the Pitchstone Plateau Trail and South Boundary Trail. Under alternative A, all existing developments would continue to be maintained. Due to the transient nature and low levels of visitor use, impacts on river values would be low. Any impacts would likely include runoff from motor vehicle emissions and other related pollutants (e.g., oil, fuel, particulates, or other fluid leaks) and minimal amounts of erosion from the use and maintenance of roads, bridges, turnouts, and trails near the river. These impacts on water resources would be long-term, negligible, adverse, and localized.

Snake River (wild segment, Yellowstone National Park)—Under alternative A, a variety of backcountry-oriented activities would continue to be allowed. These activities include camping, hiking, horseback riding, and fishing. Backcountry camping and pack animal use in this segment are limited by permits. Hiking and fishing uses are not limited but are relatively low in this segment and fishing regulations do apply. Front-country developments include the Yellowstone National Park south entrance station, ranger station, picnic area, employee residences, and a horse corral. Under alternative A, all existing developments would continue to be maintained. These uses and developments would continue to have long-term, negligible, adverse, localized impacts on water resources in this segment from visitor use and maintenance activities—for example, erosion that removes vegetation or compacts soils, runoff and pollution (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage) from maintenance equipment and operations near the river, and use of sensitive thermal features.

Snake River (wild segment, John D. Rockefeller Jr. Memorial Parkway)—Under alternative A, the current kinds of visitor use in the John D. Rockefeller, Jr. Memorial Parkway portion of the segment are slightly more varied than that which exists in the Yellowstone National Park portion. In this portion of the segment, Headwaters Lodge and Cabins at Flagg Ranch offers overnight accommodations and commercial float and fishing trips. Some backcountry camping and hiking occurs, as well as hot-potting in thermal features and nearby streams warmed by thermal runoff. A variety of developments exist in this segment, including paved and unpaved roads, turnouts, overlooks, picnic

areas, campground, trails, and two boat launches. This segment also includes the Snake River Bridge, which has riprap to protect the bridge structure. Headwaters Lodge and Cabins at Flagg Ranch is the largest developed area within this river corridor and includes a campground, rental cabins, dining hall, general store, gas station, and a commercial horse operation. Dispersed campsites are along Grassy Lake Road adjacent to the river downstream from Flagg Ranch. Under alternative A, all existing uses and developments would continue to be allowed and maintained. Currently, 40 of the Flagg Ranch tent sites are being converted to camper cabins. The total capacity at the cabins and RV and tent sites would remain at 171. These uses and developments would continue to have long-term, moderate, adverse, and localized impacts on water resources in this segment from visitor use and maintenance activities—for example, erosion that removes vegetation or compacts soils, runoff and pollution (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage) from maintenance equipment and operations near the river, and use of sensitive thermal features.

Snake River (scenic segment)—Under alternative A, a diversity of recreational activities occur including scenic driving, commercial and private floating and fishing trips, photography and wildlife viewing, picnicking, hiking and bicycling. Recreational activities along this segment are generally easily accessible and characterized by largely natural settings. Use in this segment is also relatively high as compared to the other segments of the Snake River Headwaters. Overall, between 1.2 and 1.4 million visitors per year travel along this corridor. The vast majority of these visitors merely pass through the river corridor. Direct river-related recreation is focused on floating and fishing in this segment. Commercial floating and fishing trips are most common and managed according the agency guidelines. No limits are currently in place for private float and fishing use. Due to the complex, braided nature of the river in this segment, private use is less common. Fishing regulations are in place to ensure this use does not negatively affect river values. The types and level of uses in this segment would continue to have long-term, minor, adverse, localized impacts on water resources in this segment. These impacts are due to erosion from visitor use and maintenance activities that remove vegetation or compact soils, as well as from runoff and pollution (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage) from maintenance equipment and operations near the river.

The scenic segment of the Snake River includes numerous visitor amenities including river access roads, turnouts, overlooks, six boat launch areas, picnic areas, and trails. Under this alternative, River Road would continue to be open for public use. Maintenance and possible rerouting of the road would also continue in response to natural migrations of the Snake River. There are no designated campgrounds and river camping is not allowed along this segment. Other park infrastructure within this river corridor includes the Moran entrance/ranger station and community, Murie Ranch, Craig Thomas Discovery and Visitor Center, a portion of the park headquarters complex, Dornan's, Menor's Ferry Historic District, and Chapel of the Transfiguration. Structures near the corridor are the Moose entrance station, Cunningham Cabin Historic Site, and Jackson Lake Dam. Under alternative A, all existing developments would continue to be maintained. These developments would continue to have long-term, negligible to minor, adverse, localized impacts on water resources in this segment from visitor use and maintenance activities—for example, erosion that removes vegetation or compacts soils, runoff and pollution (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage) from maintenance equipment and operations near the river, and use of sensitive thermal features. Also, the ongoing maintenance and possible rerouting of River Road would continue to cause erosion and sedimentation issues in proximity to the

Snake River at many points along the road corridor.

Pacific Creek (scenic segment)—Under alternative A, the kinds of use that currently occur along this segment would continue. These include scenic driving/viewing scenery, walk-in fishing, hiking, photography, and wildlife viewing. There are also some social trails near access points along the road. Overall, use is low along this segment with approximately 600 visitors per year and a maximum daily use of approximately five people per day (not including vehicular traffic moving through the corridor to reach another destination). Visitor amenities within the Pacific Creek corridor include an access road, seasonal hunting camp, roadside turnouts, and Emma Matilda Lake Trail. Under alternative A, all existing developments would continue to be maintained. These uses and developments would continue to have long-term, negligible to minor, adverse, localized impacts on water resources in this segment. These impacts would be due to erosion from visitor use and maintenance activities that remove vegetation or compact soils, runoff, and pollution (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage) from maintenance equipment and operations, as well as snow removal activities (e.g., sand and gravel deposition, siltation, erosion from vegetation removal and soil compaction, and increasing turbidity) near the river.

Buffalo Fork (scenic segment)—Visitor use in this segment consists of scenic driving/viewing scenery, fishing, some trail access from Elk Ranch Road, and over-snow vehicle use in winter. Generally, as in the Pacific Creek segment, use levels are low along Buffalo Fork. Approximately 500 people per year recreate along this segment with a maximum of approximately five people per day (not including vehicular traffic moving through the corridor to reach another destination). Visitor amenities within the Buffalo Fork corridor include several paved roads, bridges, turnouts, and parking areas. There are no formal trails, but some social trails do exist. Other developments include an overhead utility line and fencing. Pinto Ranch, Snake River Land Company residence and office, and Elk Ranch complex, residence and smaller associated buildings are within the corridor. Under alternative A, all existing developments would continue to be maintained. These uses and developments would continue to have long-term, negligible to minor, adverse, localized impacts on water resources in this segment from visitor use and maintenance activities—for example, erosion that removes vegetation or compacts soils, runoff and pollution (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage) from maintenance equipment and operations near the river, and use of sensitive thermal features.

Gros Ventre River (scenic segment)—Under alternative A, existing visitor uses along this segment would continue to include hiking, fishing, swimming and rock jumping, and photography. Public boat use is prohibited on National Elk Refuge waters. However, there are an estimated 150 boat take-outs at the refuge boundary during the peak whitewater season. Approximately two to five administrative boat trips occur each season on the river through the refuge. Overall, approximately 1,900 people per year use this segment. There are an estimated 1,455 user days along the riverbank (20 people per day). There is a maximum of approximately 675 general users (hiking, photography, etc.), 480 anglers, and 300 people per season along this portion of the river. These visitation figures only represent visitors recreating along the river corridor and do not include vehicular traffic moving through the corridor to reach another destination. Vehicular road traffic within the Gros Ventre corridor is much greater than 1,900 visitors/year. Visitor amenities within the Gros Ventre River corridor include roads, bridges, trails, and an informal visitor access point on the east boundary between Grand Teton National Park and Bridger-Teton National Forest. There are also some social trails near this informal access point. Other developments include private residences and a cemetery on

the east side of the community of Kelly, as well as access routes in the National Elk Refuge, on the south side of the river. Under alternative A, all existing developments would continue to be maintained. These uses and developments would continue to have long-term, minor, adverse, localized impacts on water resources in this segment from visitor use and maintenance activities—for example, erosion that removes vegetation or compacts soils, runoff and pollution (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage) from maintenance equipment and operations near the river, and use of sensitive thermal features.

River Access Points.

Flagg Canyon—The launch is on a smaller channel of the Snake River and just south of the south entrance gate to Yellowstone National Park. During periods of low water, it can be challenging to launch a boat due to shallow water. The development at Flagg Canyon includes a 0.12-mile gravel road, which extends from North Park Road to the parking lot and boat launch. There is a picnic area with two picnic tables to the north of the boat launch. There is no restroom facility. The launch itself is steep and has a wood slide ramp system with steps connecting to the river. Flagg Canyon is the put-in site for commercial and private floating and fishing trip users in smaller boats (10- to 12-foot rafts, 12- to 14-foot drift boats, and whitewater kayaks). The launch receives light use. These uses and developments would continue to have long-term, negligible, adverse, localized impacts on water resources in this segment from visitor use and maintenance activities—for example, erosion that removes vegetation or compacts soils, runoff and pollution (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage) from maintenance equipment and operations near the river, and use of sensitive thermal features.

Flagg Ranch—The Flagg Ranch boat launch site is immediately upriver from a North Park Road bridge over the Snake River. The river is stable in this stretch without significant amounts of sedimentation or erosion. The development at Flagg Ranch includes a 0.08-mile gravel road that extends from North Park Road to the parking lot and boat ramp. There is one natural surface and metal matting ramp for boat launching. There is one picnic table adjacent to the parking lot. The parking lot is approximately 0.75 acre and rarely is full. There is no restroom facility. The Wyoming Department of Environmental Quality maintains a building for monitoring a fuel-contaminated site in the area. There is no restroom facility at this launch, and visitors often mistake the monitoring building as a restroom and subsequently improperly dispose of human waste and toilet paper. Flagg Ranch is the take-out point for private and commercial floating and fishing tours through the canyon. Some boats put in at this site and float to Jackson Lake. Generally, the boats that use this launch are smaller (10- to 12-foot rafts, 12- to 14-foot drift boats, and whitewater kayaks). The launch receives light use. These uses and developments would continue to have long-term, negligible, adverse, localized impacts on water resources in this segment from visitor use and maintenance activities—for example, erosion that removes vegetation or compacts soils, runoff and pollution (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage) from maintenance equipment and operations near the river, and use of sensitive thermal features.

Jackson Lake Dam—This boat launch is not technically within the wild and scenic river corridor because of its proximity to Jackson Lake Dam. This is a highly stable section of river and does not experience much erosion or deposition. The site is a few hundred feet from the outlet of the dam. It consists of a 20- to 30-foot-high earthen berm used for parking, fishing, and launching boats. No formal boat launch facilities or designated areas exist at this site. There is a second gravel parking area (upper parking lot) farther from the river that has a few picnic

tables and restroom facilities; this parking lot does not receive much use. This launch site is popular for private use and commercial fishing trips. The types of boats used at this site include fishing dories, canoes and kayaks, and rafts. Visitors hand carry or slide their boats down the gravel slope. These uses and developments would continue to have long-term, negligible, adverse, localized impacts on water resources in this segment from visitor use and maintenance activities—for example, erosion that removes vegetation or compacts soils, runoff, and pollution (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage) from maintenance equipment and operations near the river and use of sensitive thermal features.

Cattleman's Bridge—A 1.15-mile gravel road extends south from Outside Highway to a small compacted dirt parking lot and primitive boat launch site. Between the highway and the launch site is a cook site that is no longer used. There are no restroom facilities. The river is reasonably stable in this location, although the parking area and sections of the road do experience seasonal flooding. Most years this area has closures because of nesting eagles, making this area inaccessible to boaters. This area also has significant grizzly bear activity and visitor safety is a concern. Cattleman's Bridge has limited use as a launch site; visitors use this area to get closer to the river and particularly to view an alternate side of Oxbow Bend. There is some demand for a put-in at this site by private users with small boats. The use is typically not trailered boats. These uses and developments would continue to have long-term, negligible to minor, adverse, localized impacts on water resources in this segment from visitor use and maintenance activities—for example, erosion that removes vegetation or compacts soils, runoff and pollution (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage) from maintenance equipment and operations near the river, and use of sensitive thermal features.

Oxbow Bend Overlooks—These popular overlooks provide outstanding views of Teton Range with the Oxbow Bend feature of the Snake River in the foreground. Oxbow Bend provides high quality habitat for many species, including moose, trumpeter swans, pelicans, and other birds. The area is a very popular sport for viewing wildlife and photography. Development at the overlooks includes a paved parking area and a paved parking turn-off. Both parking areas often reach capacity during periods of peak visitation or NPS ranger-led interpretive programs. Vegetation (scrubs and trees) at the overlooks obscures some views and visitors often walk down the slope from the parking area to the edge of the river to obtain clearer views. There is no official trail from either parking area and, as a result, there are many social trails leading to the river. These uses and developments would continue to have long-term, negligible to minor, adverse, localized impacts on water resources in this segment from visitor use and maintenance activities—for example, erosion that removes vegetation or compacts soils, runoff and pollution (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage) from maintenance equipment and operations near the river, and use of sensitive thermal features.

Pacific Creek Landing—The hydrological and geomorphological conditions at this location are the most challenging of the boat launch sites due to its position just below the Pacific Creek confluence. This situation results in high levels of sedimentation that require frequent maintenance and adaptive management (e.g., sediment removal, application of temporary matting, etc.) of the ramp to maintain access through the season. This launch site consists of a medium-sized paved parking lot, restroom facility, one-lane road connecting the parking area to the launch, failing log and boulder retaining wall, and boat ramp and associated ramp circulation area. Across from Outside Highway is a gravel parking area. This parking lot is occasionally used for overflow parking from the Pacific Creek parking lot. Pacific Creek Landing is

the most highly used take-out site for private users with mostly fishing dories, canoes, and kayaks. It is also a highly used put-in site for commercial fishing. There is some commercial put-in for rafting. There is a high volume of anglers at this launch site. Anglers predominantly use 14- to 16-foot dories and some 12- to 14-foot rafts. Scenic rafting use is mostly 20-foot Snake River rafts, some 14- to 18-foot rafts, and a few 28-foot snout rig rafts. Most boaters are using trailers at this site. These uses and developments would continue to have long-term, minor to moderate, adverse, localized impacts on water resources in this segment from visitor use and maintenance activities—for example, erosion that removes vegetation or compacts soils, runoff and pollution (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage) from maintenance equipment and operations near the river, and use of sensitive thermal features.

Deadman's Bar—The hydrologic and geomorphic conditions at Deadman's Bar are challenging but reasonably stable, requiring minimal seasonal in-stream maintenance. The boat ramp is on the inside of a bend, on what is essentially a point bar. Unlike most point bars, this bar is relatively stable due to the high, slowly eroding bluff on the other side of the river. The development at Deadman's Bar includes a 0.83-mile gravel and paved road, which extends from Outside Highway to the parking lot and boat ramp. There are two sand ramps and vault toilet facilities adjacent to the gravel parking lot. There is also a 0.25-mile trail leading to a cook site and two picnic sites frequently used by concessioners. A restricted access gravel road also leads to these sites. Deadman's Bar is the most heavily used put-in site for commercial users (mostly scenic). The upstream launch is more heavily used because there is a rock outcropping downstream of this launch site and boats entering the river at the upstream launch site have more time to navigate around the rock outcropping. The anglers predominantly use 14- to 16-foot dories and some 12- to 14-foot rafts. Scenic rafting use is mostly 20-foot Snake River rafts, a few 14- to 18-foot rafts, and a few 28-foot snout rig rafts. These uses and developments would continue to have long-term, negligible to minor, adverse, localized impacts on water resources in this segment from visitor use and maintenance activities—for example, erosion that removes vegetation or compacts soils, runoff and pollution (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage) from maintenance equipment and operations near the river, and use of sensitive thermal features.

Schwabacher Landing—Schwabacher Landing is in a braided section of Snake River. For many years, the main channel of the Snake River was adjacent to the two parking areas. The main channel is currently west of the road and parking area. There is a smaller channel that passes by the parking lot and road areas, but it is often shallow and boat access is limited. The development here includes a 1.1-mile gravel road, small parking area adjacent to the road (0.08 acre), a parking area (0.12 acre) and a short trail to the river, and a larger parking area (0.28 acre) with a single vault toilet. All roads and parking areas are gravel. In a separate approved park action, the 0.33-mile section nearest Outside Highway would be paved in 2014. Schwabacher Landing is a popular site for events (by special use permit) such as weddings, and for fishing, and viewing the Teton Range and wildlife. These uses and developments would continue to have long-term, negligible, adverse, localized impacts on water resources in this segment from visitor use and maintenance activities—for example, erosion that removes vegetation or compacts soils, runoff and pollution (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage) from maintenance equipment and operations near the river, and use of sensitive thermal features.

Moose Landing—This landing is in an unstable section of riverbank where the river is moving swiftly and has created a gravel bar, which requires intensive management and maintenance of the landing. The area is one

of the few reaches of the Snake River with a single thread channel. There is a slight bend to the east; this bend tends to keep much of the flow energy on the west bank. This situation causes bank erosion and the development of submerged bars near the west bank. A gravel bar is dredged approximately every 10 years to maintain access to the boating facilities. It is possible that the bridge downstream also adds complexity to the river processes in this reach. To minimize the rate of erosion on the west bank, it is important to maintain a healthy riparian forest, the roots of which add structural integrity to the bank.

The Moose Landing boat launch facilities are between the park administrative area and Snake River, north of Craig Thomas Discovery and Visitor Center. The boat launch development is scattered along the shore and includes a gravel parking lot and staging area (used by concessioners), several boat turnouts/passenger unloading areas (landing area), new trails, concrete ramp (upper ramp), concrete ramp with overhead hoisting infrastructure (lower ramp), a concrete and steel retaining wall, vault toilet facilities, concessioner rigging area, concessioner client parking area, and a RV and private parking lot for anglers.

Moose Landing is the busiest launch site. This site is primarily a river take-out site and is predominantly used by concessioners removing 20-foot rafts. There are a few 32-foot rafts pulling out at this site, which can become congested with ten to twelve 20-foot rafts trying to take-out at the same time. These uses and developments would continue to have long-term, minor to moderate, adverse, localized impacts on water resources in this segment from visitor use and maintenance activities—for example, erosion that removes vegetation or compacts soils, runoff and pollution (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage) from maintenance equipment and operations near the river, and use of sensitive thermal features.

Generally, across all headwaters, segments, and river access points, alternative A would continue to result in both adverse and beneficial effects on water resources within the headwaters. The adverse impacts would be long-term, minor to moderate, and local to regional. These adverse effects result from the lack of a formalized user capacity monitoring and mitigation program; erosion from visitor use and maintenance activities that remove vegetation or compact soils; pollution from operations, recreation, and maintenance equipment (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage); as well as snow removal activities (e.g., sand and gravel deposition, siltation, erosion from vegetation removal and soil compaction, and increasing turbidity). The beneficial impacts would be long-term, minor, and local to regional, primarily resulting from increased collaborative management—having multiple management entities could allow more comprehensive and sustainable management efforts and outcomes and implementation of section 7 evaluation guidelines that would further promote protection of water-related resources.

Cumulative Effects. Past, present, and reasonably foreseeable actions that impact water resources include site improvements, which are currently in progress, to the Moose headquarters complex in Grand Teton National Park. The site improvement most related to impacts on water resources is the improvement of stormwater management in an effort to protect water quality. These impacts would result in short- and long-term, minor, beneficial, local to regional cumulative effects on water resources.

The operations of Jackson Lake Dam contribute to the cumulative impacts on wild and scenic resources and values due to the alteration of natural flow regimes of Snake River. In addition to its importance to aquatic habitat, a natural flow regime is important for riparian vegetation such as cottonwood regeneration and willow communities sustainability. Dam releases fluctuate by

season, levels of precipitation, and irrigation needs, and thus have varying effects on vegetation, wildlife, and fish. These impacts would result in short- and long-term, minor to moderate, adverse, local to regional cumulative effects on water resources due to regulation of the natural flow regime, which affects water-related resources such as the presence and health of vegetation and aquatic species that perform water pollution filtering activities.

There are private inholdings along the designated wild and scenic river corridors within the Snake River Headwaters. The land uses on these inholdings vary from rural residential to agricultural. Water-related resource projects include in-stream channel modifications for water withdrawals and riverbank stabilizations. Livestock grazing and riparian habitat modifications are also common. These impacts would result in short- and long-term, negligible to minor, local to regional cumulative effects on water resources due to erosion from uses that remove vegetation or compact soils causing riverbank destabilization, siltation, and deposition, as well as from fecal coliform contamination from grazing near waterways.

Continuing effects of past land uses on Bridger-Teton National Forest lands may contribute to cumulative impacts on NPS-managed wild and scenic rivers downstream. Past land uses include grazing allotments, oil and gas leasing, mining, off-road vehicles, and timber production. The U.S. Forest Service is required, through the nondegradation and enhancement clause of the Wild and Scenic Rivers Act, to ensure protection of USFS-managed wild and scenic river segments upstream.

Therefore, it is likely that the U.S. Forest Service would identify and resolve any issues or conflicts on its segments upstream in its comprehensive river management plan. However, the impacts from the U.S. Forest Service implementing its river plan would likely be long-term, minor, and beneficial due to integration of greater resource protection measures as required under the Wild and Scenic Rivers Act.

Overall, the impacts of these past, present, and reasonably foreseeable actions, in combination with those described for the no-action alternative, would result in short- and long-term, moderate, adverse, local to regional cumulative impacts and long-term, minor, beneficial, local to regional cumulative impacts. Continuation of current management under alternative A would contribute a small extent to the beneficial cumulative effects, as well as a small amount to the adverse cumulative effects.

Conclusion. The no-action alternative would have long-term, minor to moderate, adverse, local to regional impacts and long-term, minor, beneficial, local to regional impacts on water resources and free-flowing conditions. Impacts of this alternative, combined with the impacts of other past, present, and reasonably foreseeable actions, would result in short- and long-term, moderate, adverse, local to regional cumulative impacts and long-term, minor, beneficial, local to regional cumulative impacts. Alternative A would contribute a small amount to the beneficial cumulative effects, as well as a small amount to the adverse cumulative effects.

Alternative B

Headwaters-wide. Federal agencies within the Greater Yellowstone Ecosystem coordinate efforts to monitor and manage resources of the parks, national forests, and wildlife refuges, where possible, respecting their distinct authorities and mandates. The agencies coordinate efforts to protect fish, hydrological systems, and other aquatic resources through such actions as watershed assessments and aquatic invasive species monitoring and education. The parks collaborate with the U.S. Forest Service, as necessary, for water resource management. Alternative B, similar to alternative C, would provide an even stronger ecosystem-based, partnership approach to managing the

headwaters' natural resources than the no-action alternative. This would include headwaters-wide strategies that emphasize consistent, ongoing collaboration to protect, restore, and enhance water-related resources. By working together across park divisions and implementing an interdisciplinary approach as well as expanding partnerships with private landowners, local governments, state and federal agencies, and local organizations, the parks and refuge would have greater opportunities to protect the waterways and other habitats that cross management boundaries. The collaborative management between the parks and federal and state agencies would have long-term, minor to moderate, beneficial, local to regional impacts on water resources because having multiple management entities could allow more comprehensive and sustainable management efforts and outcomes.

Under this alternative, formal user capacity indicators and standards for resource management would be established and monitored for each segment, including the continued monitoring of water quality to ensure greater resource protection. Use varies by river segment; however, each segment is subject to visitor use and the potential impacts that can arise from use such as littering, fecal coliform contamination, and erosion. An appropriate variety of monitoring and management strategies used to identify and address impacts from visitor use would have long-term, minor to moderate, beneficial, local to regional impacts on water-related resources within the parks.

Under alternative B, measures would be taken, where feasible, to allow the continuation of natural river processes such as modifying bridges, culverts, riprap, and other developments that impede the free-flowing condition when river channels migrate against roads; and modifying boat launches, access roads, and parking lots as necessary to prevent sedimentation and erosion. These actions would have long-term, minor to moderate, beneficial, and local to regional impacts on water resources and free-flowing conditions within the headwaters. Additionally, alternative B would include an expansion of interpretation and education programs to include the outstandingly remarkable cultural values associated with the Snake River corridor. This could result in greater understanding and awareness of water as an ethnographic resource, and as a consequence, could lead to additional protection of the resource and result in enhancement of the relationship between water and tribal practices and beliefs. The improved interpretive and education program would result in a long-term, minor, beneficial, local to regional impact to water as an ethnographic resource.

River Segments.

Lewis River (wild segment)— Under alternative B, maximum use would remain at the same level as alternatives A and C. Maximum number of overnight visitors would be 164 per night at an established 21 campsites. Day users consist primarily of anglers and a few hikers. A maximum of 1,300 people per year are considered day users along this segment (not including vehicular traffic moving through the corridor to reach another destination). Alternative B would have the addition of interpretive messaging related to river values and the Wild and Scenic Rivers Act. Backcountry trails and campsites would be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. Due to the general low level of current and expected visitor use in this segment, the use and maintenance of these developments would have a long-term, negligible to minor, adverse, localized impact on water resources due to erosion, human waste, and leakage (e.g., oil and fuel) from maintenance equipment during operations next to the river.

Lewis River (scenic segment)—Under alternative B, the general kinds of visitor use would remain similar to what occurs today with the improvement of information related to hiking opportunities in the area (most of

which occur outside the river corridor) and the improvement of scenic turnouts to enhance the experience of the river and related scenery along the road corridor. Maximum use would be expected to be similar to alternative A with current levels below historic highs. Given the current low use levels, the maximum amount of use could increase in the future. Under alternative B, existing developments would be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. Roadside turnouts that provide opportunities for visitors to view Lewis River Canyon could be slightly expanded to reduce traffic congestion and increase visitor safety. Any impacts would likely include runoff from motor vehicle emissions and other related pollutants (e.g., oil, fuel, particulates, or other fluid leaks) and minimal amounts of erosion from the use and maintenance of roads, bridges, turnouts, and trails near the river. These impacts on water resources would be long-term, negligible to minor, adverse, and localized.

Snake River (wild segment, Yellowstone National Park)—The maximum amounts of visitor use in this portion of the river segment would remain the same as under alternative A. Under alternative B, existing developments would be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. Additionally, under this alternative a range of visitor recreation opportunities would be retained with some improvements to enhance visitor experience. These enhancements include grading parking areas, increased ranger patrols to share information, and interpretive signs at trailheads. These uses and developments would have long-term, negligible, adverse, localized impacts on water resources in this segment from visitor use and maintenance activities—for example, erosion that removes vegetation or compacts soils, runoff and pollution (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage) from maintenance equipment and operations near the river, and use of sensitive thermal features.

Snake River (wild segment, John D. Rockefeller, Jr. Memorial Parkway)—Under alternative B, the kinds of use currently available in this segment would remain with some improvements to infrastructure. However, to enhance recreational opportunities in this segment, maximum use levels would be approximately 10% higher than under alternative A, while retaining the current range of recreational opportunities within this segment. An increase in maximum use would allow additional visitor opportunities for enjoyment of the river corridor and enhancement of its recreational values. This increase would be supported by site delineation, use regulation, and other management actions that would ensure the protection of river values. Maximum capacities at Flagg Ranch would remain the same at a total of 97 RV sites, 74 tent sites (40 of which are being converted to camper cabins beyond the scope of this plan), and a 92-room lodge. The maximum number of commercial float trips would be increased to 31 trips per day with an additional 2 fishing trips per day. Private trips would also increase to a maximum of 66 trips per day (33 floating and 33 fishing). These uses and developments would have long-term, minor, adverse, localized impacts on water resources in this segment from visitor use and maintenance activities—for example, erosion that removes vegetation or compacts soils, runoff and pollution (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage) from maintenance equipment and operations near the river, and use of sensitive thermal features.

Snake River (scenic segment)—Under this alternative, the maximum amount of visitors would be approximately 15% higher than alternative A. Visitor use and resource management strategies such as site delineation, fishing regulations, boat checks for aquatic invasive species, and other measures would ensure that increased use is accommodated without adverse impacts on river values. Concession float use would increase to a maximum daily launch of 153 and an expected overall use of 78,974 people

per year. Maximum fishing trips per day would increase to 54 with no more than 763 per month. Meal trips would also increase to 415 trips accommodating a maximum of 4,140 people per season. Private float use would remain less than commercial use and not be limited, though the maximum use expected would be approximately 27,502 per year based on historic use patterns. The increase in maximum visitation would have long-term, minor, adverse, and localized impacts on water resources. These impacts are due to erosion from visitor use and maintenance activities that remove vegetation or compact soils, as well as from runoff and pollution (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage) from maintenance equipment and operations near the river.

The overall kinds of use that currently exist would continue. However, new camping opportunities would be provided for overnight stays along the river. There would be two campsites established along the river allowing overnight float trips. Other recreational enhancements under this alternative include a new viewing area at Oxbow Bend, active interpretation of cultural sites (Menor's Ferry, Bar BC Dude Ranch, and 4 Lazy F Dude Ranch), float trips that stop at Bar BC Dude Ranch for interpretive opportunities, and a new accessible trail from Moose to Menor's Ferry. Limited overnight camping would be provided for visitors including walk-in and boat access camping. These uses would also have long-term, minor, adverse, and localized impacts on water resources in this segment from visitor use and maintenance activities—for example, erosion that removes vegetation or compacts soils, runoff and pollution (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage) from maintenance equipment and operations near the river, and use of sensitive thermal features.

Pacific Creek (scenic segment)—Under alternative B, existing developments would continue to be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act, including better delineation of parking areas and trails. Informal parking areas and social trails would be removed and revegetated. In addition to the existing kinds of visitor use in this river segment, alternative B would allow horseback riding along trails, guided walk-in fishing, and improving the hunting camp within this segment. These new visitor opportunities would enhance enjoyment of the river corridor. Horseback riding trips would consist of a maximum of three groups of approximately 20 participants per day or approximately 2,000 per year. Paired with concessioner-guided fishing equating to approximately 9 anglers daily within this segment, this corridor could maintain a maximum of 34 visitors per day. Overall, the resources within this segment can sustain a maximum 3,270 visitors annually. These visitation figures only represent visitors recreating along the river corridor and do not include vehicular traffic moving through the corridor to reach another destination. These uses would have long-term, minor, adverse, and localized impacts on water resources in this segment. These impacts would be due to erosion from visitor use and maintenance activities that remove vegetation or compact soils, runoff and pollution (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage) from maintenance equipment and operations, as well as snow removal activities (e.g., sand and gravel deposition, siltation, erosion from vegetation removal and soil compaction, and increasing turbidity) near the river.

Buffalo Fork (scenic segment)—Alternative B would maintain the same kinds and amounts of use as alternative A. A maximum of 500 day use visitors annually, or approximately five visitors daily would be permitted within this segment (not including vehicular traffic moving through the corridor to reach another destination). No overnight use would be permitted. Also under alternative B, existing developments would continue to be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act, including better delineation of parking

areas and trails. Fencing materials (associated with ineffective attempts at riverbank stabilization) and informal parking areas would be removed, and social trails would be revegetated. The continued use and maintenance of the existing developments would have long-term, negligible, adverse, and localized impacts on water resources due to erosion from visitor use and maintenance activities that remove vegetation or compact soils, runoff, and pollution (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage) from maintenance equipment and operations, as well as snow removal activities (e.g., sand and gravel deposition, siltation, erosion from vegetation removal and soil compaction, and increasing turbidity) near the river. However, the removal of fencing materials and informal parking areas and the revegetation of social trails would have a long-term, negligible, beneficial, and localized impact on water resources due to the decrease in erosion from the soil stabilization that would result from revegetation.

Gros Ventre River (scenic segment)—Under alternative B, the kinds of use in this segment remains the same as alternative A, with the exception of encouraging anglers to harvest nonnative fish within creel limits established by Wyoming Game and Fish Department to promote a native fishery. Use levels would remain low and of little concern for impact to river values. Also under this alternative, existing developments would continue to be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. Social trails would be removed and revegetated. Grand Teton National Park, National Elk Refuge, and Bridger-Teton National Forest would collaborate on better delineation of parking areas, trails, and signs at the informal visitor access point that overlaps all three agencies' boundaries. The continued use and maintenance of the existing developments would have long-term, negligible, adverse, and localized impacts on water resources due to erosion from visitor use and maintenance activities that remove vegetation or compact soils, runoff, and pollution (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage) from maintenance equipment and operations, as well as snow removal activities (e.g., sand and gravel deposition, siltation, erosion from vegetation removal and soil compaction, and increasing turbidity) near the river. However, the removal and revegetation of social trails would have a long-term, negligible, beneficial, and localized impact on water resources due to the decrease in erosion from soil stabilization that would result from revegetation efforts. The collaborative efforts of federal agencies at this location would result in long-term, minor, beneficial, and localized impacts on water quality in this area due to limiting the amount of erosion from vegetation trampling or removal and soil compaction from random parking and social trailing, and using signs to better direct visitors using the area.

River Access Points. The proposed site planning for the river access points is expected to be about an acre or less of site disturbance, with the exception of the Pacific Creek Landing relocation under alternative B, which would result in a greater extent of disturbed acreage.

Flagg Canyon—A portion of the boat launch access road would be reconstructed to the south to improve visitor safety by reducing the steep grade of the road, which would also increase the efficiency of visitors using the launch. By reducing the angle of the steep grade, vehicles may be less likely to get stuck and unable to navigate the grade, which would reduce the amount of erosion from tires spinning in the gravel and dirt as well as the amount of carbon monoxide being emitted in the effort to get back up the steep incline. The boat launch would have a minimal grade to the river and be properly drained to prevent bank erosion. The vehicle turnaround at the boat launch would be reconfigured for efficiency. The aging boat slide system and steps would be replaced, which would also reduce the amount of erosion. Areas along the bank that are experiencing erosion would be stabilized.

These changes to the Flagg Canyon launch site would have long-term, negligible to minor, beneficial, and localized impacts on water resources due to decreasing the amount of erosion from vegetation trampling or removal and soil compaction, as well as from reducing the amount of potential vehicle emissions (e.g., oil, fuel, and particulates) being discharged into the air and water.

Flagg Ranch—In this alternative, the parking area would be reduced in size to accommodate up to 10 vehicles. The portion of the parking lot that would no longer be used would be restored to natural conditions. The vehicle turnaround and the parking area would be delineated with natural materials to prevent future user-created expansion of the area. "No Parking" signs would be installed in the vehicle turnaround area. Depending on the level of use, a single vault toilet would be added near the parking lot area. One additional picnic table would be added. Over time, vegetation restoration efforts would continue to be implemented on formerly developed areas at Flagg Ranch to enhance the compatibility with the wild classification. Riprap near the Snake River Bridge would be "naturalized" with willow plantings and other vegetation treatments. The National Park Service would coordinate with the Wyoming Department of Environmental Quality to have the fuel-contaminated site monitoring well building removed when contaminant levels are reduced to acceptable levels. These modifications would restore the area with native vegetation and would subsequently increase soil stabilization, thus reducing the amount of erosion and runoff into the river channel. The addition of a restroom facility at this site would eliminate visitor need to deposit human waste behind the monitoring well building. These actions would have long-term, minor to moderate, beneficial impacts on water resources.

Jackson Lake Dam—In alternative B, changes to the Jackson Lake Dam boat launch would enhance recreational opportunities for visitors. To more efficiently accommodate boat launching, two concrete single ramps (or one double-wide ramp) would be built at the far end of the lower parking area. This area would be dedicated to boat launching and staging (including rigging) in an effort to reduce visitor conflicts and improve visitor experience. As a result, parking in the lower parking area would be reduced and limited to passenger vehicles only (no RVs). More vehicles would be using the upper parking lot and pedestrian connections would be improved. Improvements to this site would stay within the existing developed footprint. Consultation with the Bureau of Reclamation would be required prior to any redesign of the area. These modifications would reduce the amount of vehicle emissions, runoff, and pollutants (e.g., leaking fluids such as oil, gas, or particulates) at this site, resulting in long-term, negligible to minor, beneficial, and localized impacts on water resources.

Cattleman's Bridge—To provide a range of visitor opportunities, Cattleman's Bridge Road would be closed and the former cook site would be replaced with a small parking area with a vault toilet facility. A minimally improved boat launch facility for hand-carried boats and pack rafts would be sited near the parking area. A trail would be developed on the remainder of the road and some restoration work completed. The new hiking trail would loop back along the banks of the Snake River. The road closure at the former cook site would decrease the amount of erosion and runoff between the cook site and the former launch site and the restroom facility would greatly decrease the amount of human waste in this area. The restoration work would all result in long-term, minor, beneficial, and localized impacts on water resources in this area by reducing the amount of runoff from oil, fuel, or particulates from motor vehicles; erosion; and fecal coliform contamination in the area. The minimally improved boat launch facility and loop trail would result in long-term, negligible, adverse, and localized impacts on water resources in this area due to increasing the potential for erosion from vegetation trampling or removal and soil compaction.

Oxbow Bend Overlooks—In this alternative, the pavement in the east parking lot would be striped to improve efficiency and increase parking capacity. The parking lot would not be expanded. Signs directing visitors to the restroom facility at Cattleman's Bridge (approximately 0.85 mile east) would also be added. A natural surface loop trail to the river would be added and the social trails would be revegetated. Timber guardrails (replacing existing posts) would be added to the west overlook to keep vehicles from parking in vegetated areas. Social trails and other denuded areas would be revegetated. A loop trail connecting the parking area to the river would be added. The increased parking capacity (even though the lot would not be expanded) and the development of a loop trail would result in long-term, negligible, adverse, and localized impacts on water resources due to runoff and erosion from vegetation trampling or removal and soil compaction. However, the signs directing visitors to the restrooms, revegetation of social trails, and installing timber guardrails would result in long-term, negligible to minor, beneficial, and localized impacts due to reduction the amount of erosion from vegetation compaction or removal and the amount of fecal coliform contamination in the area.

Pacific Creek Landing—To provide improved boat launch access, the site would be moved to a more stable location above the confluence of Pacific Creek. The following infrastructure would be developed at the new site—a 0.75-mile access road, a pedestrian path, a medium-sized parking lot, a double-wide articulated concrete ramp, and vault restroom facilities. While this site is more stable and access would be improved, the banks are 20–30 feet above the river and the ramp would require a large volume of excavation. The current Pacific Creek boat ramp and all associated development, with the exception of the entry gate parking lot, would be removed and restored to natural conditions. The development of a new boat launch in an area upstream would result in short-term, moderate to major, adverse, localized impacts in this area, as it would require extensive removal of vegetation and riverbank destabilization likely resulting in erosion of the bank into the river channel. Conversely, the removal and full restoration of the former Pacific Creek Landing would result in long-term, moderate, beneficial, localized impacts on water resources due to the elimination of consistent in-stream maintenance in that area as well as reduction of the amount of erosion from vegetation trampling or removal and soil compaction and removal, aside from erosion caused by natural processes.

Deadman's Bar—In this alternative, roadside parking would be delineated with natural materials. Parking lot efficiency would be improved through signage and improved delineation using natural materials (buried logs, etc.). The south boat launch would be expanded to two lanes. A new material, such as articulated concrete block, would be used for one or both of the ramps to improve access. The cook site would be maintained and the two picnic areas would be restored to natural conditions. The better delineation of parking as well as the expansion of the south launch to two lanes would have long-term, negligible to minor, adverse, and localized effects on water resources in this area due to increased erosion from vegetation trampling and removal and soil compaction and runoff of vehicle emissions (e.g., oil, fuel, particulates). However, the use of articulated concrete block in the launches and the restoration of the two picnic sites would result in long-term, negligible to minor, beneficial, and localized effects on water resources by reducing the amount of in-stream maintenance required, reducing the number of vehicles being stuck in the launch, and reducing the amount of erosion from vegetation trampling or removal, and soil compaction or removal.

Schwabacher Landing—In this alternative, except for the 0.33-mile section extending from the highway junction that would be paved in 2014 as part of a separate approved park action, the road surface and parking lot

surface would remain gravel. The extents of the parking areas and the spaces would be better delineated with natural materials (logs, etc.) to improve parking efficiency and to deter cars from driving in vegetated areas. Improvements to the trail connecting the middle parking area to the river would be made to improve delineation. The trail would remain a natural surface. Social trails in the vicinity of the trail would be revegetated. Depending on the level of use, a second vault toilet may be added to the northernmost parking area. These actions would result in long-term, negligible to minor, beneficial, and localized impacts on water resources due to the reduction in erosion from vegetation removal or trampling, soil compaction, and fecal coliform contamination near the river.

Moose Landing—This alternative would consolidate boating facilities in one place near the existing visitor parking lot. The new consolidated site would include two double ramps, parking for visitors, boat trailer parking and rigging area, and restroom facilities. The ramps would be designed to create eddies to allow safe access. The previously used boat ramps would be restored while providing bank protection designed to blend with the natural environments (i.e., boulders, fill material, and vegetation). The previously used north parking area and boat pullouts would be restored to natural conditions. The development of a new boat launch site just downstream of what would be the former site, would result in long-term, minor to moderate, adverse, and localized impacts on water resources due to erosion from riverbank destabilization from the removal of vegetation, the removal or compaction of soils, and increased vehicle runoff (e.g., oil, fuel, particulates) due to consolidating the visitor, bus, and boat trailer and rigging into one area near the river. However, restoration of the previously used parking area and boat pullouts would result in long-term, minor to moderate, beneficial, and localized impacts due to decreasing the amount of erosion (from planting native vegetation for riverbank stabilization) and runoff taking place at what would be the former launch site.

Overall, across the entire headwaters, river segments, and river access points, alternative B would result in both adverse and beneficial effects on water resources within the headwaters. The adverse impacts would be short- and long-term, minor to major, and localized, primarily resulting from erosion from visitor use and maintenance activities, as well as boat launch and river access relocation or expansions that remove or trample vegetation and compact soils resulting in increased riverbank destabilization, siltation, deposition, and greater runoff of vehicle and maintenance equipment emissions (e.g., oil, fuel, particulates). The beneficial impacts would be long-term, minor to moderate, and local to regional. At a headwaters-wide level, the beneficial effects would result from a stronger, ecosystem-based partnership approach to managing the natural resources of the headwaters, the use of formal user capacity indicators and standards for resource management, an effort to allow the continuation of natural river processes, and expanded interpretation and education programs. At a river segment and access point level, beneficial effects would result from the restoration and revegetation of social trails, former river access and boat launch sites, and installation of restroom facilities, thereby increasing riverbank stabilization and decreasing the amount of runoff, siltation, deposition, and fecal coliform contamination.

Cumulative Effects. Past, present, and reasonably foreseeable actions that impact water resources include the site improvements, which are currently in progress, to the Moose headquarters complex in Grand Teton National Park. The site improvement most related to impacts on water resources is the improvement of stormwater management in an effort to protect water quality. These impacts would result in short- and long-term, minor, beneficial, local to regional cumulative effects on water resources.

The operations of the Jackson Lake Dam contribute to the cumulative impacts on wild and scenic resources and values due to the alteration of natural flow regimes of Snake River. In addition to its importance to aquatic habitat, a natural flow regime is important for riparian vegetation, such as cottonwood regeneration and willow communities sustainability. Dam releases fluctuate by season, levels of precipitation, and irrigation needs, and thus have varying effects on vegetation, wildlife, and fish. Effects of the managed flow regime on sediment and river flows are moderated by the input from unregulated tributaries, including Pacific Creek, Buffalo Fork, and Spread Creek, beginning about 4 miles downstream from the dam. These impacts would result in short- and long-term, minor to moderate, adverse, local to regional cumulative effects on water resources due to regulation of the natural flow regime, which affects water-related resources such as the presence and health of vegetation and aquatic species that perform water pollution filtering activities.

There are private inholdings along the designated wild and scenic river corridors within the Snake River Headwaters. The land uses on these inholdings vary from rural residential to agricultural. Water-related resource projects include in-stream channel modifications for water withdrawals and riverbank stabilizations. Livestock grazing and riparian habitat modifications are also common. These impacts would result in short- and long-term, negligible to minor, local to regional cumulative effects on water resources due to erosion from uses that remove vegetation or compact soils causing riverbank destabilization, siltation, and deposition as well as from fecal coliform contamination from grazing near waterways.

Continuing effects of past land uses on Bridger-Teton National Forest lands may contribute to cumulative impacts on NPS-managed wild and scenic rivers downstream. Past land uses include grazing allotments, oil and gas leasing, mining, off-road vehicles, and timber production. The U.S. Forest Service is required, through the nondegradation and enhancement clause of the Wild and Scenic Rivers Act, to ensure protection of their wild and scenic river segments upstream. Therefore, it is likely that the U.S. Forest Service would identify and resolve any issues or conflicts on its segments upstream in its comprehensive river management plan. However, the impacts from the U.S. Forest Service implementing its river plan would likely be long term, minor, and beneficial due to integration of greater resource protection measures as required under the Wild and Scenic Rivers Act.

Overall, the impacts of these past, present, and reasonably foreseeable actions, in combination with those described for alternative B, would result in short- and long-term, moderate, adverse, local to regional cumulative impacts and long-term, minor to moderate, beneficial, local to regional cumulative impacts on water resources. Management actions under alternative B would contribute a considerable amount to both the beneficial and adverse cumulative effects.

Conclusion. Alternative B would have short- and long-term, minor to major, adverse, localized impacts and long-term, minor to moderate, beneficial, local to regional impacts on water resources and free-flowing conditions. Impacts of this alternative, combined with the impacts of other past, present, and reasonably foreseeable actions, would result in short- and long-term, moderate, adverse, local to regional cumulative impacts and long-term, minor to moderate, beneficial, local to regional cumulative impacts. Alternative B would contribute a considerable amount to both the beneficial and adverse cumulative effects.

Section 106 Summary. After applying ACHP criteria of adverse effects (36 CFR 800.5, "Assessment of Adverse Effect"), the National Park Service concluded that implementation of alternative B would result in long-term, minor, beneficial, local to regional impacts on water as an ethnographic

resource, which would result in a section 106 finding of *no adverse effect.* For future yet-defined activities or projects that may occur at the nine river access points, park staff would continue to meet the sections 110 and 106 responsibilities as the details of proposed undertakings become known. Park staff would not consider project undertakings that would result in an adverse effect to ethnographic resources under section 106. As a result, the National park Service anticipates that the actions defined under this alternative will result in a *no adverse effect* determination.

Alternative C (Preferred)

Headwaters-wide. Federal agencies within the Greater Yellowstone Ecosystem coordinate efforts to monitor and manage resources of the parks, national forests, and wildlife refuges, where possible, respecting their distinct authorities and mandates. The agencies coordinate efforts to protect fish, hydrological systems, and other aquatic resources through such actions as watershed assessments and aquatic invasive species monitoring and education. The parks collaborate with the U.S. Forest Service, as necessary, for water resource management. Alternative C would provide an even stronger ecosystem-based partnership approach to managing the headwaters' natural resources than the no-action alternative, which would include headwaters-wide strategies that emphasize consistent, ongoing collaboration to protect, restore, and enhance water-related resources. By working together across park divisions and implementing an interdisciplinary approach as well as expanding partnerships with private landowners, local governments, state and federal agencies, and local organizations, the parks and refuge would have greater opportunities to protect the waterways and other habitats that cross management boundaries. The collaborative management between the parks and federal and state agencies would have long-term, minor to moderate, beneficial, local to regional impacts on water resources because having multiple management entities could provide more comprehensive and sustainable management efforts and outcomes.

Under this alternative, formal user capacity indicators and standards for resource protection would be established and monitored for each segment, including the continued monitoring of water quality to ensure greater resource protection. Use varies by river segment; however, each segment is subject to visitor use and the potential impacts that can arise from use such as littering, human waste, and erosion. An appropriate variety of monitoring strategies used to identify and address impacts from visitor use would have long-term, minor to moderate, beneficial, local to regional impacts on water-related resources within the parks.

Under alternative C, measures would be taken, when feasible, to allow the continuation of natural river processes such as modifying bridges, culverts, riprap, and other developments that impede the free-flowing condition when the river channels migrate against roads; and modifying boat launches, access roads, and parking lots as necessary to prevent sedimentation and erosion. These actions would have long-term, minor to moderate, beneficial, local to regional impacts on water resources and free-flowing conditions within the headwaters.

Additionally, alternative C would include an expansion of interpretation and education programs to include the outstandingly remarkable cultural values associated with the Snake River corridor. This could result in greater understanding and awareness of water as an ethnographic resource, and as a consequence, could lead to additional protection of the resource and result in greater preservation of the relationship between the river and tribal practices and beliefs. The enhanced interpretive and education program would result in a long-term, minor, beneficial, local to regional impact to water as an ethnographic resource.

River Segments.

Lewis River (wild segment)—Under this alternative, maximum use would remain at the same level as alternatives A and B in this segment. The maximum number of visitors overnight would be 164 per night at an established 21 campsites. Day users consist of primarily anglers and a few hikers. A maximum of 1,300 people per year are considered day users along this segment (not including vehicular traffic moving through the corridor to reach another destination). More restrictions would be placed on the kinds of visitor use to ensure they do not impact river values. Permits would be required for boating use along with inspections for aquatic invasive species, fisheries would emphasize native species, and interpretive opportunities would be expanded related to river values and the Wild and Scenic Rivers Act. Under alternative C, existing backcountry trails and campsites would be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. The implementation of greater restrictions and permitting in order to protect river values as well as with boating inspections, protection of fisheries, and interpreting the river values to the public, would all result in long-term, minor to moderate, beneficial, and localized impacts on water resources due to greater protection of the river values from invasive aquatic species and inappropriate visitor use (e.g., littering, erosion, disposal of human waste, etc.) The use levels and continued maintenance of trails and campsites would result in long-term, negligible, adverse, and localized impacts on water resources due to erosion and leakage (e.g., oil and fuel) from visitor use and maintenance equipment during operations next to the river.

Lewis River (scenic segment)—Under alternative C, the current kinds of visitor use opportunities available in this segment would remain. Maximum use would remain at the same level as alternative A. In this alternative, existing developments would be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. Roadside turnouts that provide opportunities for visitors to overlook the Lewis River Canyon could be slightly expanded to reduce traffic congestion and increase visitor safety. Due to the transient nature and low levels of visitor use, impacts on river values are not of great concern. Any impacts would likely include runoff from motor-vehicle emissions and other related pollutants (e.g., oil, fuel, particulates, or other fluid leaks) and minimal amounts of erosion from the use and maintenance of roads, bridges, turnouts, and trails near the river. These impacts on water resources would be long-term, negligible, adverse, and localized.

Snake River (wild segment, Yellowstone National Park)—Under alternative C, the overall kinds of visitor use remain the same as currently exists. Some restrictions would be placed on activities to further protect resources. Backcountry camping would be restricted to designated sites. Increased ranger patrols would promote resource protection. Additionally, interpretive messaging would be made available to educate visitors on river values and Wild and Scenic Rivers Act. The maximum amounts of visitor use in this alternative would remain the same as in alternative A (84 people and 106 pack animals per night, no limits on day use). Also, existing developments would be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. Restrictions on activities for resource protection, including restricting backcountry camping to designated sites; increasing ranger patrols for resource protection and educating visitors on the protection river values would all result in long-term, negligible to minor, beneficial, and localized impacts on water resources due to reduction of the amount of erosion and runoff from restrictions placed on various uses and increase in visitor education and subsequent stewardship. Unlimited day use could result in long-term, negligible to minor, adverse, and localized impacts on water resources due to erosion from vegetation trampling or removal as a

result of social trailing, pack animal use, and runoff of fecal coliform contamination.

Snake River (wild segment, John D. Rockefeller Jr. Memorial Parkway)—Under alternative C, the range of visitor activities remains the same as in alternatives A and B. Increased patrols would also promote resource protection and enforce fishing and other park regulations. Finally, other improvements would enhance the visitor experience in this segment including increased interpretation and education at Flagg Canyon and Flagg Ranch related to river values and the Wild and Scenic Rivers Act. Maximum use would remain at the same level as alternative A. Flagg Ranch retains its maximum capacity of 92 rooms, 97 RV sites, and 74 tent sites (40 of which are being converted to camper cabins outside the scope of this plan). Maximum backcountry camping capacity stays at 3 sites / 36 people per night. There would be a maximum of 28 commercial float and 2 fish trips per day along this segment. There are also a maximum of 60 private float trips per day (30 float and 30 fishing). The enforcement of fishing and other park regulations, increased patrols, and visitor education would result in long-term, minor, beneficial, and localized impacts on water resources due to reduction of the amount of erosion and runoff from new soil and vegetation disturbances at dispersed campsites, protection of native fish species, and increase in visitor stewardship through education. The use and maintenance of the developments would have long-term, minor, adverse, localized impacts on water resources in this segment from visitor use and maintenance activities—for example, erosion that removes vegetation or compacts soils, runoff, and pollution (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage) from maintenance equipment and operations near the river, and use of sensitive thermal features.

Snake River (scenic segment)—Under alternative C, the maximum amounts of visitor use would remain the same as alternative A. Maximum daily launches for commercial trips are set at 133 float trips and 47 fishing trips (with no more than 663 fishing trips per month). Meal trips down the river are limited to 360 trips per year. Private use is less common on this segment of the river with an average estimated use of approximately 21,181 people per year (based on 25% of overall river use) and a maximum of 23,915 reported in 2007. The number of cook sites along the river would be reduced to two sites with a maximum capacity of 40 people each (Triangle X and Deadman's Bar). The amount and types of use would result in long-term, negligible to minor, adverse, and localized impacts on water resources due to erosion from vegetation trampling or removal, soil compaction, and runoff (e.g., litter, fecal coliform contamination) from use.

Floating through the Oxbow Bend area would be closely monitored and managed to avoid conflicts with visitors viewing the scenery and would also decrease the potential for impacts on water resources. Other water resource protection measures would include periodic boat checks for aquatic invasive species and the continuation of fishing and other regulations. Under this alternative, vehicle turnouts would be redesigned to minimize impacts on resources, and existing social trails would be revegetated to natural conditions. A portion of the main park road (along the west side of Snake River) near the confluence of Buffalo Fork may be redesigned to allow more natural river processes. Under alternative C, River Road would remain open for public use as road conditions allow. Park management would close the road to public vehicular use in the future if portions of the road fail due to the natural migration of the Snake River channel. Road repairs and reroutes cannot be accomplished without impacts on adjacent sagebrush and other sensitive habitats. Public vehicular access would also continue to be allowed on the RKO and Bar BC roads, which provide access to the north and south ends of River Road. Restrictions for resource protection (including the eventual closure of River Road), revegetation of social trails, and potential redesign of the main park road near

the confluence of Buffalo Fork to allow natural river processes would result in long-term, minor to moderate, beneficial, and localized impacts on water resources. These beneficial impacts are due to the protection of native fisheries, erosion control through revegetation, an eventual termination of ground disturbance in immediate proximity to the Snake River associated with River Road maintenance, limited or restricted uses that would otherwise trample or remove vegetation and compact soils, and protection of free-flowing conditions. However, in the near-term (until closure of River Road), the ongoing vehicular use, maintenance, and possible rerouting of River Road would continue to have short-term, minor, adverse, and localized effects on water resources from erosion and sedimentation issues in proximity to the Snake River at many points along the road corridor.

Pacific Creek (scenic segment)—Under alternative C, recreational activities would remain the same as alternative A with improvements to the hunting camp. Visitor use levels would be expected to remain low and of little concern for impacts on river values. Maximum expected use levels would be five visitors per day equating to approximately 600 day use visitors annually (not including vehicular traffic moving through the corridor to reach another destination). No overnight use is allowed. Under alternative C, existing developments would continue to be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act, including better delineation of parking areas and trails. Informal parking areas and social trails would be removed and revegetated. Recreational activities including improvements to the hunting camp, along with the continued use and maintenance of existing developments would result in long-term, negligible, adverse, and localized impacts on water resources due to erosion and runoff from use and developments from vegetation trampling or removal and soil compaction. However, the removal and revegetation of informal parking areas and social trails, as well as the prohibition on overnight use, would result in long-term, minor, beneficial, and localized impacts on water resources by limiting the amount of erosion from use that would otherwise trample or remove vegetation or compact soils.

Buffalo Fork (scenic segment)—Alternative C would maintain the same kinds and amounts of use as alternatives A and B. A maximum of 500 day use visitors annually (approximately five visitors daily) would be permitted within this segment (not including vehicular traffic moving through the corridor to reach a destination). No overnight use would be permitted. Also under alternative C, existing developments would continue to be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act, including better delineation of parking areas and trails. Fencing materials (associated with ineffective attempts at riverbank stabilization) and informal parking areas would be removed, and social trails would be revegetated. The continued use and maintenance of existing developments would have long-term, negligible, adverse, and localized impacts on water resources due to runoff and erosion from use; however, the removal of fencing materials and informal parking areas and revegetation of social trails would have a long-term, negligible, beneficial, and localized impact on water resources due to the decrease in erosion from soil stabilization that would result from revegetation.

Gros Ventre River (scenic segment)—Under alternative C, the kinds of use in this segment remains the same as alternatives A and B with the exception of encouraging anglers to harvest nonnative fish within creel limits established by Wyoming Game and Fish Department to promote a native fishery (as in alternative B), and the addition of increased interpretation and education for anglers related to river values and the Wild and Scenic Rivers Act. Use levels would remain low and of little concern for impact to river values. Also under this alternative, existing developments would continue to be

maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. Social trails would be removed and revegetated. Grand Teton National Park, the National Elk Refuge, and Bridger-Teton National Forest would collaborate on better delineation of parking areas, trails, and signs at the informal visitor access point that overlaps all three agencies' boundaries. The continued use and maintenance of the existing developments would have long-term, negligible, adverse, and localized impacts on water resources due to runoff and erosion from vegetation trampling or removal and soil compaction from use. However, the removal and revegetation of social trails would have a long-term, negligible, beneficial impact on water resources due to the decrease in erosion from the soil stabilization that would result from revegetation efforts. The collaborative efforts of the federal agencies at this location would result in long-term, minor, beneficial, and localized impacts on the water quality in this area due to limiting the amount of erosion from vegetation trampling or removal and soil compaction from random parking and social trailing, and using signs to direct visitors using the area.

River Access Points. The proposed site planning for the river access points is expected to be about an acre or less of site disturbance.

Flagg Canyon—In this alternative, as in alternative B, A portion of the boat launch access road would be reconstructed to the south to improve visitor safety by reducing the steep grade of the road, which would also increase the efficiency of visitors using the launch. By reducing the angle of the steep grade, vehicles may be less likely to get stuck and unable to navigate the grade, which would reduce the amount of erosion from tires spinning in the gravel and dirt as well as the amount of carbon monoxide being emitted in the effort to get back up the steep incline. The boat launch would have a minimal grade to the river and be properly drained to prevent bank erosion. The vehicle turnaround at the boat launch would be reconfigured for efficiency. The aging boat slide system and steps would be replaced, which would reduce the amount of erosion. Areas along the bank that are experiencing erosion would be stabilized. These changes to the Flagg Canyon launch site would have long-term, negligible to minor, beneficial impacts on water resources due to decreasing the amount of erosion and potential vehicle emissions.

Flagg Ranch—In this alternative, as in alternative B, the parking area would be reduced in size to accommodate up to 10 vehicles. The portion of the parking lot that would no longer be used would be restored to natural conditions. The vehicle turn-around and the parking area would be delineated with natural materials to prevent future user-created expansion of the area. "No Parking" signs would be installed in the vehicle turnaround area. Depending on the level of use, a single vault toilet may be added near the parking lot area. One additional picnic table would be added. Over time, vegetation restoration efforts would continue to be implemented on formerly developed areas at Flagg Ranch to enhance the compatibility with the wild classification. Riprap near the Snake River Bridge would be "naturalized" with willow plantings and other vegetation treatments. The National Park Service would coordinate with the Wyoming Department of Environmental Quality to have the fuel-contaminated site monitoring well building removed when contaminant levels are reduced to acceptable levels. These modifications would restore the area and increase soil stabilization, thus reducing the amount of erosion and runoff into the river channel. The addition of a restroom facility at this site would eliminate visitor need to deposit human waste behind the monitoring well building. These actions would have long-term, minor to moderate, beneficial, and localized impacts on water resources.

Jackson Lake Dam—In alternative C, changes to the Jackson Lake Dam boat launch would enhance resource conditions. A single

concrete ramp would be constructed at the far end of the lower parking area. In the existing lower parking area, the area near the ramp would be designated for boat launching, staging, and rigging use only. There would no longer be parking in this area (existing lower parking area) with the exception of a reserved handicap parking space or two; landscape improvements to enhance the function and natural appearance would be made. Pedestrian connections between the upper parking lot and the new staging area would be improved. The upper parking lot would be studied for redesign if it was determined that additional capacity is needed. Improvements to this site would stay within the existing developed footprint. Consultation with the Bureau of Reclamation would be required prior to any redesign of the area. These modifications would reduce the amount of vehicle emissions, runoff, and pollutants (e.g., leaking fluids) into the river at this site, resulting in long-term, negligible to minor, beneficial, and localized impacts on water resources.

Cattleman's Bridge—To enhance the resource conditions in this high value wildlife habitat area, the majority of the road to Cattleman's Bridge would be closed and the area partially restored to natural conditions. A small parking area (approximately 10 cars) would be constructed south of the intersection with Outside Highway. A vault restroom facility would be added to the parking area. A trailhead would be positioned at the parking area and a hiking trail would be provided along the former road alignment. A portion of the hiking trail would be made accessible for people with disabilities. A new trail connecting the parking area to Oxbow Bend would be created and a primitive boat launch would be provided for hand-carried boats. The cook site area and boat launch parking area would be restored to natural conditions. The road closure at the highway would decrease the amount of erosion and runoff between the parking lot at the highway and the former launch site, the restroom facility would greatly decrease the amount of human waste in this area, and the restoration work would all result in long-term, minor, beneficial, and localized impacts on water resources in this area. These impacts would be due to reduction of the amount of runoff, erosion and human waste deposited into the river. The minimally improved boat launch facility and loop trail would result in long-term, negligible, adverse, and localized impacts on water resources in this area due to the potential for erosion from vegetation removal and soil compaction.

Oxbow Bend Overlooks—In this alternative, as in alternative B, the pavement in the east parking lot would be striped to improve efficiency and increase parking capacity. The parking lot would not be expanded. Signs directing visitors to the restroom facility at Cattleman's Bridge (approximately 0.85 mile east) would also be added. A natural surface loop trail to the river would be added and the social trails would be revegetated. Timber guardrails (replacing existing posts) would be added to the west overlook to deter vehicles from parking in vegetated areas. Social trails and other denuded areas would be revegetated. A loop trail connecting the parking area to the river would be added. The increased parking capacity even though the lot would not be expanded and the development of a loop trail would result in long-term, negligible, adverse, and localized impacts on water resources due to runoff and erosion from vegetation trampling or removal and soil compaction. However, signs directing visitors to the restrooms, revegetation of social trails, and timber guardrails would result in long-term, negligible to minor, beneficial, and localized impacts due to reduction of the amount of erosion from vegetation and soil compaction or removal and the amount of human waste in the area.

Pacific Creek Landing—In this alternative, the boat launch facilities would remain at the current site. Given the rapidly changing conditions and dynamic nature of the river in this location, this site would require regular management and maintenance. The launch would be expanded to two lanes and nonpermanent materials and active

maintenance would be used to maintain ramp access. The circulation area would be minimally expanded to allow new turning movements. For improved safety and circulation, the one-lane road extending to the launch (from the parking lot) would be expanded to accommodate two-way traffic and a pedestrian walkway. The failing retaining wall would be reconstructed and designed to blend with the natural environment. The park staff would evaluate the capacity needs and efficiency of the existing parking lot, which was recently reconfigured. If more parking spaces were needed, the park staff would consider expanding the existing parking lot to the southeast. Park management would also consider reducing the size of the parking lot near the Moran entrance station. Depending on the level of use, an additional vault toilet may be added and the relocation of the existing vault toilet would be considered to improve functionality. The continued need for heavy maintenance of the site, along with expansion of the launch, circulation area, road between the parking lot and the launch, and the parking lot would result in long-term, minor to moderate, adverse, and localized impacts on water resources in the area. These impacts would be due to increased runoff into the river and in-stream manipulation (dredging, sediment removal, etc.). The reconstruction of the retaining wall and possible installation of an additional vault toilet would result in long-term, negligible to minor, beneficial, and localized impacts due to the reduction of the amount of erosion from riverbank stabilization and potential for human waste runoff into the river.

Deadman's Bar—In this alternative, portions of the access road that are gravel would be paved, with some associated road widening. Areas along the road previously used for parking would be restored. The parking lot would be expanded, paved, and striped to improve efficiency and parking capacity. The road widening and paving would increase the area of ground disturbance for the road from 1.50 acres (existing road) to 2.25 acres. The parking lot expansion would increase the area of disturbance from 0.90 acre (existing parking lot) to 1.10 acres. A new material, such as articulated concrete block, would be used for one or both of the ramps to improve access and reduce the amount of in-stream maintenance. The ramps would be expanded to two lanes. The two rustic, commercial picnic sites would be phased out. The expansion of the launches to two lanes, better delineation, and paving of the parking lot would have long-term, negligible to minor, adverse, and localized effects on water resources in this area due to increased erosion from vegetation removal and soil compaction and runoff of vehicle emissions into the river. However, the use of articulated concrete block in the launches and restoration of the two picnic sites and areas along the road previously used for parking would result in long-term, negligible to minor, beneficial, and localized effects on water resources. These impacts would be due to a reduction of the amount of in-stream maintenance required; a reduction in the number of vehicles becoming stuck in the launch and further stirring up and removing soils and increasing siltation and turbidity; and the amount of erosion from vehicles getting stuck or driving on the sides of the ramps, trampling or removing vegetation, and removing or compacting soils.

Schwabacher Landing—In this alternative, parking would be consolidated in the north lot. The two south parking lots would be restored to natural conditions. The trail to the river would be better delineated and extended to the road. Barriers (boulders, posts, etc.) would be installed to prevent vehicle access on the trail. Social trails near the trail to the river would be revegetated. The extents of the north parking area and the parking spaces would be better delineated with natural materials (logs, etc.) to improve parking efficiency to deter cars from driving in vegetated areas. Depending on the level of use, a second vault toilet may be added to the northernmost parking area. The restoration of the two south parking lots, vehicle barriers to protect vegetation, and revegetation of social trails would restabilize soils and result

in long-term, negligible to minor, beneficial, and localized impacts on water resources due to decreasing the amount of runoff and erosion into the river.

Moose Landing—The park staff would consider expanding and redesigning one or both of the boat ramps while maintaining the maximum amount of vegetation. The vegetation is critical to riverbank stabilization, so expansion of the ramp(s) would be carefully balanced with the need to secure the bank. The retaining wall would be redesigned to create an improved eddy for the second ramp. The boat pullouts would be secured with terracing, natural bank protection including vegetation, and improved delineation of use and trail areas to reduce erosion. Due to the dynamic nature of the river in this location, this site would require adaptive management and regular maintenance during the boating season. Trail links to the administrative complex trail would be developed. The expansion of the ramps and continued requirement of seasonal adaptive management and maintenance would result in long-term, minor to moderate, adverse, and localized impacts on water resources. These impacts would be due to the potential for continued erosion from vegetation trampling or removal and soil compaction, as well as disruption of the free-flowing conditions from maintenance activities. However, the redesign of the retaining wall to create an improved eddy, terracing and natural bank protection efforts, as well as improved delineation of the trails would result in long-term, minor to moderate, beneficial, and localized impacts on water resources in a counter effort to reduce the immense amount of erosion occurring at this site.

Generally, across all headwaters, segments, and river access points, alternative C would result in both adverse and beneficial effects on water resources within the headwaters. The adverse impacts would be short- to moderate, localized, and primarily resulting from erosion from visitor use and maintenance activities, as well as boat launch and river access expansions that remove or trample vegetation and compact soils, resulting in increased riverbank destabilization, siltation, deposition, and greater runoff of vehicle and maintenance equipment emissions (e.g., oil, fuel, particulates). The beneficial impacts would be long term, minor to moderate, and local to regional. At a headwaters-wide level, the beneficial effects would result from a stronger, ecosystem-based partnership approach to managing the headwaters' natural resources, the use of formal user capacity indicators and standards for resource management, an effort to allow the continuation of natural river processes, and expanded interpretation and education programs. At a river segment and access point level, the beneficial effects would result from the restoration and revegetation of social trails and areas within boat launch sites and installing restroom facilities, thereby increasing riverbank stabilization and decreasing the amount of runoff, siltation, deposition, and fecal coliform contamination.

Cumulative Effects. Past, present, and reasonably foreseeable actions that impact water resources include the site improvements, which are currently in progress, to the Moose headquarters complex in Grand Teton National Park. The site improvement most related to impacts on water resources is the improvement of stormwater management in an effort to protect water quality. These impacts would result in short- and long-term, minor, beneficial, local to regional cumulative effects on water resources.

The operations of Jackson Lake Dam contribute to the cumulative impacts on wild and scenic resources and values due to the alteration of natural flow regimes of Snake River. In addition to its importance to aquatic habitat, a natural flow regime is important for riparian vegetation such as cottonwood regeneration and willow communities sustainability. Dam releases fluctuate by season, levels of precipitation, and irrigation needs, and thus have varying effects on vegetation, wildlife, and fish. These impacts would result in short- and long-term, minor

to moderate, adverse, local to regional cumulative effects on water resources due to regulation of the natural flow regime, which affects water-related resources such as the presence and health of vegetation and aquatic species that perform water pollution filtering activities.

There are private inholdings along the designated wild and scenic river corridors within the Snake River Headwaters. The land uses on these inholdings vary from rural residential to agricultural. Water-related resource projects include in-stream channel modifications for water withdrawals and riverbank stabilizations. Livestock grazing and riparian habitat modifications are also common. These impacts would result in short- and long-term, negligible to minor, local to regional cumulative effects on water resources due to erosion from uses that remove vegetation or compact soils causing riverbank destabilization, siltation, and deposition, as well as from fecal coliform contamination from livestock grazing near waterways.

Continuing effects of past land uses on Bridger-Teton National Forest lands may contribute to cumulative impacts on NPS-managed wild and scenic rivers downstream. Past land uses include grazing allotments, oil and gas leasing, mining, off-road vehicles, and timber production. The U.S. Forest Service is required, through the nondegradation and enhancement clause of the Wild and Scenic Rivers Act, to ensure protection of USFS-managed wild and scenic river segments upstream. Therefore, it is likely that the U.S. Forest Service would identify and resolve any issues or conflicts on its segments upstream in its comprehensive river management plan. These impacts would result in short- and long-term, negligible to minor, local to regional cumulative effects on water resources. However, the impacts from the U.S. Forest Service implementing its river plan would likely be long-term, minor, beneficial, and local to regional due to integration of greater resource protection measures as required under the Wild and Scenic Rivers Act.

Overall, the impacts of these past, present, and reasonably foreseeable actions, in combination with those described for alternative C, would result in short- and long-term, minor to moderate, adverse, local to regional cumulative impacts and long-term, minor to moderate, beneficial, local to regional cumulative impacts. Management actions under alternative C would contribute a considerable amount to both the beneficial and adverse cumulative effects.

Conclusion. Alternative C would have short- to long-term minor to moderate, adverse, localized impacts and long-term, minor to moderate, beneficial, local to regional impacts on water resources and free-flowing conditions. Impacts of this alternative, combined with the impacts of other past, present, and reasonably foreseeable actions, would result in short- and long-term, minor to moderate, adverse, local to regional cumulative impacts and long-term, minor to moderate, beneficial, local to regional cumulative impacts. Alternative C would contribute a considerable amount to both the beneficial and adverse cumulative effects.

Section 106 Summary. After applying ACHP criteria of adverse effects (36 CFR 800.5, "Assessment of Adverse Effect"), the National Park Service concluded that implementation of alternative C would result in long-term, minor, beneficial, local to regional impact to water as an ethnographic resource, which would result in a section 106 finding of *no adverse effect.* For future yet-defined activities or projects that may occur at the nine river access points, park staff would continue to meet sections 110 and 106 responsibilities as the details of proposed undertakings become known. Park staff would not consider project undertakings that would result in an adverse effect to ethnographic resources under section 106. As a result, the National park Service anticipates that the actions defined under this alternative

will result in a *no adverse effect* determination.

VEGETATION (INCLUDING FLOODPLAINS), WILDLIFE, AND FISH

Vegetation, wildlife, and fish are addressed together in this section because an analysis of potential impacts on wildlife typically involves a discussion of wildlife habitat, which consists of the various vegetation communities found within the parks. Threatened and endangered species associated with these areas are discussed under a separate impact topic. This impact topic also includes floodplains and riparian vegetation because of the similarities of these resources, their interrelationship to each other, and their collective effect on the overall vegetation, wildlife, and fish resources of the headwaters.

Methods and Assumptions for Analyzing Impacts

Impacts on vegetation and wildlife were evaluated comparing projected changes resulting from the action alternatives (B and C) to those of the no-action alternative (A). The thresholds used to determine impacts on these resources are defined as follows:

- **Negligible:** Impacts on native species, their habitats, or the natural processes sustaining them would not be observable or detectable. Any effects would be well within natural fluctuations. Additionally, for analysis of native species as an ethnographic resource, impacts would not alter the relationship between the vegetation and wildlife and the associated group's body of practices and beliefs. For purposes of section 106, the determination of effect would be *no adverse effect.*

- **Minor:** Impacts would be detectable, but they would not be expected to be outside the natural range of variability for native species, their habitats, or the natural processes sustaining them. Population numbers, genetic variability, and other demographic factors for species might have small changes, but they would remain stable and viable. Occasional responses to disturbance by some individuals could be expected. Such impacts would only slightly alter the relationship between the vegetation and wildlife and the associated group's body of practices and beliefs. Sufficient habitat would remain functional to maintain viability of native species. For purposes of section 106, the determination of effect would be *no adverse effect.*

- **Moderate:** Impacts on native species, their habitats, or natural processes sustaining them would be detectable, and they could be temporarily outside the natural range of variability. Population numbers, genetic variability, and other demographic factors for species might change, but would be expected to rebound to pre-impact numbers and remain stable and viable over time and the relationship between the resource and the associated group's beliefs and practices would survive. Frequent responses to disturbance by some individuals could be expected. Sufficient habitat would remain functional to maintain viability of native species. For purposes of section 106 for water as an ethnographic resource, the determination of effect would be *no adverse effect.*

- **Major:** Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, and they would be

expected to be outside the natural range of variability for extended periods of time or permanently. Population numbers, genetic variability, and other demographic factors for species might experience substantial changes. Frequent responses to disturbance by many individuals would be expected. Loss of habitat might affect the viability of at least some native species. For consideration for vegetation and wildlife as an ethnographic resource, the relationship between the resource and the associated group's body of beliefs and practices to the extent that the survival of a group's beliefs and/or practices would be jeopardized. For purposes of section 106, the determination of effect would be *adverse effect*.

Alternative A (No Action)

Headwaters-wide. Federal agencies within the Greater Yellowstone Ecosystem coordinate efforts to monitor and manage resources of the parks, national forests, and wildlife refuges, where possible, respecting their distinct authorities and mandates. The agencies coordinate efforts to protect vegetation as well as fish and wildlife through such actions as habitat mapping, invasive species control, monitoring and managing sensitive species, and associated educational efforts. In many cases, state fish and wildlife agencies also collaborate in these efforts through specific interagency working groups and committees. Native fish populations in the headwaters (including the Yellowstone cutthroat and Snake River fine-spotted cutthroat) would continue to be managed jointly between the National Park Service and the Wyoming Game and Fish Department. These agencies would continue to apply appropriate angling regulations, aquatic habitat restoration and connectivity efforts, and fish population monitoring to ensure the protection of native fish species from ongoing threats, including hybridization with nonnative species. Overall, the collaborative management between the parks and federal and state agencies would have long-term, minor, beneficial, local to regional impacts on vegetation, wildlife, and fish because having multiple management entities could allow more comprehensive and sustainable management efforts and outcomes.

Under this alternative, there are currently no formal user capacity indicators being monitored for resource protection and no formal standards, except for water quality, are established. Use varies by river segment; however, each segment is subject to visitor use and the potential impacts that can arise from use, such as trampling/removal of vegetation, wildlife disturbance from human noise and presence, littering, and fecal coliform contamination. Such impacts could result in a slightly altered relationship between vegetation and wildlife significant to American Indian tribal practices and beliefs. Consequently, a lack of appropriate monitoring, documentation, and subsequent mitigation of identified issues would continue to have long-term, minor to moderate, adverse, local to regional impacts on water-related resources within the parks.

The parks would continue to be committed to protecting vegetation, wildlife, and fish as required by federal law and NPS policy. The parks would continue to evaluate water resource projects to ensure consistency with the wild and scenic river designation (section 7 evaluation guidelines), as well as perform periodic water quality monitoring, and mitigate the effects of snow storage and stormwater runoff at developed areas to avoid changes to vegetation and wildlife and fish habitat. This protection of vegetation, wildlife, and fish habitat would help preserve the relationship between these species and American Indian tribal practices and beliefs. Because of these aspects of the current management approach, the vegetation, wildlife, and fish within both parks would continue to be protected, resulting in long-

term, minor, beneficial, local to regional impacts.

Other resource management activities that would continue under this alternative include promoting appropriate human behavior toward bears, such as food storage requirements and visitor education, in an effort to minimize conflicts, promote Leave No Trace principles, identify species of concern and coordinate monitoring and protection activities in the parks and the region, implement seasonal visitor use closures for nesting bald eagles and peregrine falcons, accommodate wildlife and fish passage with road crossings and culverts or other similar techniques, and implement seasonal fishing closures to protect spawning fish. These activities would result in long-term, minor to moderate, beneficial, local to regional impacts on vegetation, wildlife, and fish due to the reduction of vegetation trampling/removal, introduction of nonnative species, and human-wildlife conflicts; and the protection of wildlife and fish spawning periods.

River Segments.

Lewis River (wild segment)—As befits its wild classification, there are few existing developments in this river corridor other than several backcountry trails and campsites. Under alternative A, these backcountry trails and campsites would continue to be used and maintained. The current use in this segment is low; however, the continued use and maintenance of these developments would have a long-term, negligible, adverse, and localized impact on vegetation and wildlife within the river corridor due to trampling/removal of vegetation as well as wildlife disturbance from human noise and presence from visitor use and maintenance activities.

Lewis River (scenic segment)—The majority of visitor use within this segment consists of scenic driving and fishing. Existing transportation development along the canyon rim in this river corridor includes roads, bridges, and turnouts. Other visitor amenities include the Pitchstone Plateau Trail and South Boundary Trail. Under alternative A, all existing developments would continue to be maintained. Impacts under this alternative would likely include vegetation trampling/removal from vehicles turning off the pavement onto vegetated areas on the side of the road, and possible wildlife-vehicle collisions. These impacts on vegetation, wildlife, and fish would be long-term, negligible to minor, adverse, and localized within the river corridor.

Snake River (wild segment, Yellowstone National Park)—Under alternative A, a variety of backcountry-oriented activities would continue to be allowed. These activities include camping, hiking, horseback riding, and fishing. Backcountry camping and pack animal use in this segment are limited by permits. Hiking and fishing uses are not limited, but are relatively low in this segment and fishing regulations do apply. Front-country developments include the Yellowstone National Park south entrance station, ranger station, picnic area, employee residences, and a horse corral. Under alternative A, all existing developments would continue to be maintained. These uses and developments would continue to have long-term, negligible to minor, adverse, localized impacts on vegetation, wildlife, and fish in this segment due to vegetation trampling/removal from visitor use and maintenance activities, wildlife disturbance from noise and human presence, possible wildlife-vehicle collisions, and runoff and pollution (e.g., littering, fecal coliform contamination, and vehicle emissions and any leakage from maintenance equipment (i.e., oil, fuel, particulates) into the river and affecting fish habitat.

Snake River (wild segment, John D. Rockefeller, Jr. Memorial Parkway)—Under alternative A, the current kinds of visitor use in the John D. Rockefeller, Jr. Memorial Parkway portion of the segment are slightly more varied than exist in the Yellowstone National Park portion. In this portion of the

river segment, Flagg Ranch offers overnight accommodations and commercial floating and fishing trips. There is also some backcountry camping and hiking, as well as hot-potting in thermal features and nearby streams warmed by thermal runoff. A variety of developments exist in this segment, including paved and unpaved roads, turnouts, overlooks, picnic areas, campgrounds, trails, and two boat launches. Headwaters Lodge and Cabins at Flagg Ranch is the largest developed area within this river corridor and includes a campground, rental cabins, dining hall, general store, gas station, and a commercial horse operation. Dispersed backcountry campsites are positioned along Grassy Lake Road adjacent to the river downstream from Flagg Ranch. Under alternative A, all existing uses and developments would continue to be allowed and maintained. These uses and developments would continue to have long-term, minor to moderate, adverse, localized impacts on vegetation, wildlife, and fish in this segment due to vegetation trampling/removal from visitor use and maintenance activities, wildlife disturbance from noise and human presence, and runoff and pollution (e.g., littering, fecal coliform contamination, and vehicle emissions and any leakage from maintenance equipment (i.e., oil, fuel, particulates) into the river and affecting fish habitat.

Snake River (scenic segment)—Under alternative A, a diversity of recreational activities occur including scenic driving, commercial and private floating and fishing trips, photography and wildlife viewing, picnicking, hiking, and bicycling. Recreational activities along this segment are generally easily accessible and characterized by primarily natural settings. Use in this segment is also relatively high as compared to the other segments of the Snake River Headwaters. Overall, between 1.2 and 1.4 million visitors per year travel along this corridor. The vast majority of these visitors merely pass through the river corridor. Direct river-related recreation is focused on floating and fishing in this segment. Commercial floating and fishing trips are most common and managed according the agency guidelines. No limits are currently in place for private floating and fishing use. Due to the complex, braided nature of the river in this segment, private use is less common. Fishing regulations are in place to ensure this use does not negatively affect river values. The implementation of closures along the Snake River from Moose north to Moran Junction and along Buffalo Fork from December 15 to April 1 to avoid disturbance of wildlife would continue under this alternative. The types and level of uses in this segment would continue to have long-term, minor to moderate, adverse, localized impacts on vegetation, wildlife, and fish in this segment due to vegetation trampling/removal from visitor use and maintenance activities, wildlife disturbance from noise and human presence, and runoff and pollution (e.g., littering, fecal coliform contamination, and vehicle emissions and any leakage from maintenance equipment [i.e., oil, fuel, particulates]) into the river and affecting fish habitat. The area closures for wildlife protection during nesting and breeding periods would continue to result in long-term, minor to moderate, beneficial, and localized impacts on wildlife in this segment due to less human noise or presence disturbing important wildlife activity during these times.

This segment of the Snake River includes numerous visitor amenities including river access roads, turnouts, overlooks, six boat launch areas, picnic areas, and trails. Under this alternative, River Road would continue to be open for public use as a primitive road. Maintenance and possible rerouting of the road would also continue in response to natural migrations of the Snake River. There are no designated campgrounds; river camping is not allowed along this segment. Other park infrastructure within this river corridor includes the Moran community and entrance/ranger station, Murie Ranch, Craig Thomas Discovery and Visitor Center, a portion of the park's headquarters complex, Dornan's, Menor's Ferry Historic District,

and Chapel of the Transfiguration. Structures near the corridor are the Moose entrance station, Cunningham Cabin Historic Site, and Jackson Lake Dam. Under alternative A, all existing developments would continue to be maintained. These uses and developments would continue to have long-term, minor to moderate, adverse, localized impacts on vegetation, wildlife, and fish in this segment due to vegetation trampling/removal from visitor use and maintenance activities, wildlife disturbance from noise and human presence, snow removal activities (e.g., sand and gravel deposition, siltation, erosion from vegetation removal and soil compaction) near the river, and runoff and pollution to include littering, fecal coliform contamination, vehicle emissions and any leakage from maintenance equipment (e.g., oil, fuel, particulates) into the river, which would affect fish habitat. The ongoing vehicular use, maintenance, and possible rerouting of River Road would continue to have impacts on wildlife and vegetation, including up to 5 acres of anticipated sagebrush habitat disturbance or displacement when the road needs to be realigned adjacent to the Snake River over the next 20 years.

Pacific Creek (scenic segment)—Under alternative A, the kinds of use that currently occur along this segment would continue. These include scenic driving / viewing scenery, walk-in fishing, hiking, photography, and wildlife viewing. There are also some social trails near access points along the road. Overall, use is low along this segment with approximately 600 visitors per year and a maximum daily use of approximately five people per day (not including vehicular traffic moving through the corridor to reach another destination). Visitor amenities within the Pacific Creek corridor include an access road, seasonal hunting camp, roadside turnouts, and Emma Matilda Lake Trail. Under alternative A, all existing developments would continue to be maintained. These uses and developments would continue to have long-term, negligible to minor, adverse, localized impacts on vegetation, wildlife, and fish in this segment due to vegetation trampling/removal from visitor use and maintenance activities, wildlife disturbance from noise and human presence, snow removal activities (e.g., sand and gravel deposition, siltation, erosion from vegetation removal and soil compaction) near the river, and runoff and pollution to include littering, fecal coliform contamination, vehicle emissions and any leakage from maintenance equipment (e.g., oil, fuel, particulates) into the river and affecting fish habitat.

Buffalo Fork (scenic segment)—Visitor use in this segment consists of scenic driving / viewing scenery, fishing, trail access from Elk Ranch Road, and over-snow vehicle use. Generally, as in the Pacific Creek segment, use levels are low along Buffalo Fork. Approximately 500 people per year recreate along this segment with a maximum of approximately five people per day (not including vehicular traffic moving through the corridor to reach another destination). Visitor amenities within the Buffalo Fork corridor include several paved roads, bridges, turnouts, and parking areas. There are no formal trails, but some social trails do exist. Other developments include an overhead utility line and fencing. The Pinto Ranch; Snake River Land Company residence and office; Elk Ranch complex, residence, and smaller associated buildings are also within the corridor. Under alternative A, all existing developments would continue to be maintained. These uses and developments would continue to have long-term, negligible to minor, adverse, localized impacts on vegetation, wildlife, and fish in this segment due to vegetation trampling/removal from visitor use and maintenance activities, wildlife disturbance from noise and human presence, snow removal activities (e.g., sand and gravel deposition, siltation, erosion from vegetation removal and soil compaction) near the river, and runoff and pollution to include littering, fecal coliform contamination, vehicle emissions and any leakage from maintenance equipment (e.g., oil, fuel, particulates) into the river and affecting fish habitat.

Gros Ventre River (scenic segment)—Under alternative A, existing visitor uses along this segment would continue including hiking, fishing, swimming and rock jumping, and photography. Public boat use is prohibited on National Elk Refuge waters. However, there are an estimated 150 boat take-outs at the refuge boundary during the peak whitewater season. Approximately two to five administrative boat trips occur each season on the river through the refuge. Overall, approximately 1,900 people per year use this segment. There are an estimated 1,455 user days along the riverbank (20 people per day). There is a maximum of approximately 1,150 general users (hiking, photography, etc.), 450 anglers, and 300 people per season along this portion of the river. These visitation figures only represent visitors recreating along the river corridor and do not include vehicular traffic moving through the corridor to reach another destination. Vehicular road traffic within the Gros Ventre corridor is much greater than 1,900 visitors/year. Visitor amenities within the Gros Ventre River corridor include roads, bridges, trails, and an informal visitor access point on the east boundary between Grand Teton National Park and Bridger-Teton National Forest. There are also some social trails near this informal access point. Other developments include private residences and a cemetery on the east side of the community of Kelly, as well as access routes in the National Elk Refuge on the south side of the river. Under alternative A, all existing developments would continue to be maintained. These uses and developments would continue to have long-term, negligible to minor, adverse, localized impacts on vegetation, wildlife, and fish in this segment due to vegetation trampling/removal from visitor use and maintenance activities, wildlife disturbance from noise and human presence, snow removal activities (e.g., sand and gravel deposition, siltation, erosion from vegetation removal and soil compaction) near the river, and runoff and pollution to include littering, fecal coliform contamination, vehicle emissions and any leakage from maintenance equipment (e.g., oil, fuel, particulates) into the river and affecting fish habitat.

River Access Points.

Flagg Canyon—The development at Flagg Canyon includes a 0.12-mile gravel road, which extends from North Park Road to the parking lot and boat launch. There is a picnic area with two picnic tables to the north of the boat launch. Flagg Canyon is the put-in site for commercial and private float and fishing trip users in smaller boats (10- to 12-foot rafts, 12- to 14-foot drift boats, and white-water kayaks). The launch receives light use. The use and maintenance of this launch would continue to result in long-term, negligible to minor, adverse, localized impacts on vegetation, wildlife, and fish in this area mainly due to trampling/removal of vegetation from vehicles getting in and out of the launch area, which is a tight turnaround with a difficult dirt and gravel steep slope with many ruts, and wildlife disturbance from noise and human presence.

Flagg Ranch—The Flagg Ranch boat launch site is immediately upriver from a North Park Road bridge over Snake River. The development at Flagg Ranch includes a 0.08-mile gravel road, which extends from North Park Road to the parking lot and boat ramp. There is one picnic table adjacent to the parking lot. The Wyoming Department of Environmental Quality maintains a building for monitoring a fuel-contaminated site in the area. There is no restroom facility at this launch and visitors often mistake the monitoring building as a restroom and subsequently improperly dispose of human waste and toilet paper. Flagg Ranch is the take-out point for private and commercial floating and fishing tours through the canyon. Generally, the boats that use this launch are smaller in size (10- to 12-foot rafts, 12- to 14-foot drift boats, and whitewater kayaks), and the launch receives light use. The use and maintenance of this launch would continue to result in long-term, negligible, adverse, localized impacts on vegetation, wildlife, and fish in this area mainly due to trampling/removal of

vegetation from some social trailing, wildlife disturbance from noise and human presence, erosion from visitor use and maintenance activities, and runoff and pollution such as littering, fecal coliform contamination, and vehicle emissions and any leakage from maintenance equipment (e.g., oil, fuel, particulates) affecting fish habitat.

Jackson Lake Dam—This boat launch is not technically within the wild and scenic corridor because of its proximity to Jackson Lake Dam. The site is a few hundred feet from the outlet of the dam. It consists of a 20- to 30-foot-high earthen berm used for parking, fishing, and launching boats. There is a second gravel parking area (upper parking lot) farther from the river that has a few picnic tables and restroom facilities; this parking lot does not receive much use. This launch site is popular for private use and commercial fishing trips. The types of boats used at this site include fishing dories, canoes and kayaks, and rafts. Visitors hand carry or slide their boats down the gravel slope. The use and maintenance of this launch would continue to result in long-term, negligible, adverse, localized impacts on vegetation, wildlife, and fish in this area mainly due to trampling/removal of vegetation from some social trailing between the upper parking area and the launch site where there is no walking path and visitors walk within the vegetated area along the road to stay out of the path of vehicles, vehicles attempting to turn around at the launch site and backing into or driving through vegetation at the edge of the road, introduction of nonnative vegetation, wildlife disturbance from noise and human presence, erosion from use, and runoff and pollution (e.g., littering and vehicle emissions) into the river and affecting fish habitat.

Cattleman's Bridge—A 1.15-mile gravel road extends south from Outside Highway to a small gravel parking lot and primitive boat launch site. Between the highway and the launch site is a cook site that is no longer used. There are no restroom facilities here, and subsequently frequent improper disposal of human waste and toilet paper occurs at this launch site. Most years this area has closures because of nesting eagles, making Cattleman's Bridge inaccessible to visitors. This area also has significant grizzly bear activity. Cattleman's Bridge receives minimal use compared to other launch sites along the scenic segment of Snake River. There is some demand for put-in at this site by private users with small boats, and currently the use is typically not trailered boats. The use of this launch site would continue to result in long-term, minor to moderate, adverse, localized impacts on vegetation, wildlife, and fish due mainly to trampling/removal of vegetation from social trailing, introduction of nonnative vegetation, wildlife disturbance from noise and human presence, erosion from use, and runoff and pollution such as littering, fecal coliform contamination, and vehicle emissions and any leakage from maintenance equipment (e.g., oil, fuel, particulates) into the river and affecting fish habitat.

Oxbow Bend Overlooks—These overlooks provide outstanding views of the Teton Range with the Oxbow Bend feature of the Snake River in the foreground and are popular spots for visitors viewing and photographing wildlife. Oxbow Bend provides high quality habitat for many species, including moose, trumpeter swans, pelicans, and other birds. Development at the overlooks includes a paved parking area and a paved parking turnoff. Both parking areas often reach capacity during periods of peak visitation or NPS ranger-led interpretive programs. Vegetation (scrubs and trees) at the overlooks obscures some views— visitors often walk down the slope from the parking area to the edge of the river to obtain clearer views. There is no official trail from either parking area and, as a result, there are many social trails leading to the river. There are no restroom facilities and subsequently some improper disposal of human waste and toilet paper occurs at this location. The use at these overlooks would continue to result in long-term, minor to moderate, adverse, localized impacts on vegetation, wildlife, and fish due to trampling/removal of vegetation from

social trailing, introduction of nonnative vegetation, wildlife disturbance from noise and human presence, erosion from use, and runoff and pollution such as littering, fecal coliform contamination, and vehicle emissions and any leakage from maintenance equipment (e.g., oil, fuel, particulates) into the river and affecting fish habitat.

Pacific Creek Landing—Being downstream of the confluence with Pacific Creek, Pacific Creek Landing receives high levels of sedimentation that requires frequent maintenance and adaptive management (e.g., sediment removal, application of temporary matting, etc.) of the boat ramp to maintain access through the season. This launch site consists of a medium-sized paved parking lot, a restroom facility, a one-lane road connecting the parking area to the launch, a failing log and boulder retaining wall, and a boat ramp and the associated ramp circulation area. Pacific Creek Landing is the most highly used take-out site for private users with mostly fishing dories, canoes, and kayaks. It is also a highly used put-in site for commercial fishing. There is some commercial put-in for rafting. There is a high volume of anglers at this launch site. Anglers predominantly use 14- to 16-foot dories and some 12- to 14-foot rafts. Scenic rafting use is mostly 20-foot Snake River rafts, some 14- to 18-foot rafts, and a few 28-foot snout rig rafts. Most boaters are using trailers at this site. The use at this site would result in long-term, minor to moderate, adverse, localized impacts on vegetation, wildlife, and fish in this area due to trampling/removal of vegetation from social trailing, introduction of nonnative vegetation, wildlife disturbance from noise and human presence, erosion from use, and runoff and pollution such as littering, fecal coliform contamination, and vehicle emissions and any leakage from maintenance equipment (e.g., oil, fuel, particulates) into the river and affecting fish habitat.

Deadman's Bar—The development at Deadman's Bar includes a 0.83-mile gravel and paved road, which extends from Outside Highway to the parking lot and boat ramp. There are two sand ramps and vault toilet facilities adjacent to the gravel parking lot. There is also a 0.25-mile trail leading to a cook site and two picnic sites frequently used by concessioners. A restricted access gravel road also leads to these sites. Deadman's Bar is the most heavily used put-in site for commercial users (mostly scenic). The parking area fills quickly and visitors subsequently park in vegetated areas on both sides of the gravel road. The upstream launch is more heavily used because there is a rock outcropping downstream of this launch site and boats entering the river at the upstream launch site have more time to navigate around the rock outcropping. Vehicles, typically without four-wheel drive, also often become stuck in the boat launches. The cook site at this location is a bear attractant, which requires vigilance and a high level of food storage safety and patrol. The use at this site would result in long-term, minor to moderate, adverse, localized impacts on vegetation, wildlife, and fish due to trampling/removal of vegetation from social trailing and parking in vegetated areas, introduction of nonnative vegetation, wildlife disturbance from noise and human presence, erosion from use, and runoff and pollution such as littering, fecal coliform contamination, and vehicle emissions and any leakage from maintenance equipment (e.g., oil, fuel, particulates) into the river and affecting fish habitat.

Schwabacher Landing—Schwabacher Landing is in a braided section of Snake River. For many years, the main channel of the Snake River was near the two parking areas. The main channel is currently to the west of the road and parking area—there is a smaller channel that passes by the parking lot and road areas, but it is often shallow and boat access is limited. The development here includes a 1.1-mile gravel road, small parking area adjacent to the road (0.08 acre), a parking area (0.12 acre), a short trail to the river, and a larger parking area (0.28 acre) with a single vault toilet. All roads and parking areas are gravel with many ruts,

although a 0.33-mile section extending from the highway junction would be paved in 2014 under a separate approved park action. Many visitors drive through vegetated areas at the side of the road to go around the ruts or to make room for vehicles passing from the opposite direction. Schwabacher Landing is a popular site for events (by special use permit) such as weddings, and for fishing, and viewing the Teton Range and wildlife. The use at this site would result in long-term, negligible to minor, adverse, localized impacts on vegetation, wildlife, and fish in this area due to trampling/removal of vegetation from social trailing and visitors driving in vegetated areas, introduction of nonnative vegetation, and wildlife disturbance from noise and human presence near the river, and runoff and pollution to include littering, fecal coliform contamination, and vehicle emissions and any leakage from maintenance equipment (e.g., oil, fuel, particulates) into the river and affecting fish habitat.

Moose Landing—This landing is in an unstable section of riverbank where the river is moving swiftly and creating a gravel bar, requiring intensive management and maintenance of the landing. A gravel bar is dredged approximately every 10 years to maintain access to the boating facilities. The Moose Landing boat launch facilities are between the park administrative area and Snake River, north of Craig Thomas Discovery and Visitor Center. The boat launch development is scattered along the shore. The development includes a gravel parking lot and staging area (used by concessioners), several boat pullouts/ passenger unloading areas (landing area), new trails, concrete ramp (upper ramp), concrete ramp with overhead hoisting infrastructure (lower ramp), a concrete and steel retaining wall, vault restroom facilities, concessioner rigging area, concessioner client parking area, and a RV and private fishing parking lot. Moose Landing is the busiest of all the launch sites and is primarily used as a take-out site, predominantly by concessioners removing 20-foot rafts. There are a few 32-foot rafts pulling out at this site. This site can become congested with ten to twelve 20-foot rafts trying to take-out at the same time. There is also some social trailing at this site. Use at Moose Landing would result in long-term, negligible to minor, adverse, localized impacts on vegetation, wildlife, and fish due to trampling/removal of vegetation from social trailing, introduction of nonnative vegetation, and wildlife disturbance from noise and human presence, snow removal activities (e.g., sand and gravel deposition, siltation, and erosion from vegetation removal and soil compaction) near the river, and runoff and pollution to include littering, fecal coliform contamination, and vehicle emissions and any leakage from maintenance equipment (e.g., oil, fuel, particulates) into the river and affecting fish habitat.

Generally, across all headwaters, segments, and river access points, alternative A would continue to result in both adverse and beneficial effects on vegetation, wildlife, and fish within the headwaters. The adverse impacts would be long-term, minor to moderate, and localized, primarily resulting from visitor use and maintenance activities that trample/remove vegetation or compact soils and that cause runoff and pollution (e.g., littering, fecal coliform contamination, vehicle emissions, and leakage) from maintenance equipment and operations, as well as snow removal activities (e.g., sand and gravel deposition, siltation, vegetation trampling/removal, soil compaction, and erosion) near the river. The beneficial impacts would be long term, minor to moderate, and local to regional, primarily resulting from increased collaborative management as having multiple management entities could allow more comprehensive and sustainable management efforts and outcomes and implementation of section 7 evaluation guidelines that would further promote protection of water-related resources.

Cumulative Effects. Past, present, and reasonably foreseeable actions that impact

vegetation, wildlife, and fish resources include the site improvements (currently in progress) to the Moose headquarters complex in Grand Teton National Park. The site improvement most related to impacts on these resources is the complete reconfiguration of vehicle and pedestrian traffic within the administrative and Moose Landing areas, removal of several temporary buildings, and improvement of stormwater management. These impacts would result in short- and long-term, minor, adverse and beneficial, local to regional cumulative effects on vegetation, wildlife, and fish.

Along the Snake River, sagebrush habitat has been slowly and incrementally degraded and displaced as a result of several past projects over the years. These projects include pathway construction, past road maintenance and rerouting, and the installation of a variety of underground utility lines (e.g., fiber optic, water). These past projects would result in short- and long-term, minor, adverse, local to regional cumulative effects on vegetation and wildlife.

The operations of Jackson Lake Dam contribute to the cumulative impacts on wild and scenic resources and values due to the alteration of natural flow regimes of the Snake River. In addition to its importance to aquatic habitat, a natural flow regime is important for riparian vegetation, such as cottonwood regeneration and willow communities sustainability. Dam releases fluctuate by season, levels of precipitation, and irrigation needs, and thus have varying effects on vegetation, wildlife, and fish. These impacts would result in short- and long-term, minor, adverse, local to regional cumulative effects on these resources due to regulation of the natural flow regime, which affects water-related resources such as the presence and health of vegetation and aquatic species that perform water pollution filtering activities.

There are private inholdings along the designated wild and scenic river corridors within the Snake River Headwaters. The land uses on these inholdings vary from rural residential to agricultural. Water-related resource projects include in-stream channel modifications for water withdrawals and riverbank stabilizations. Livestock grazing and riparian habitat modifications are also common. These impacts would result in short- and long-term, negligible to minor, local to regional cumulative effects on vegetation, wildlife, and fish due to erosion from uses that remove vegetation or compact soils causing riverbank destabilizations, siltation, and deposition, as well as from fecal coliform contamination from livestock grazing near waterways.

Continuing effects of past land uses on Bridger-Teton National Forest lands may contribute to cumulative impacts on NPS-managed wild and scenic river resources downstream. Past land uses include grazing allotments, oil and gas leasing, mining, off-road vehicles, and timber production. The U.S. Forest Service is required, through the nondegradation and enhancement clause of the Wild and Scenic Rivers Act, to ensure protection of their wild and scenic river segments upstream. Therefore, it is likely that the U.S. Forest Service would identify and resolve any issues or conflicts on its segments upstream in its river management plan. These impacts would result in short- and long-term, negligible to minor, local to regional cumulative effects on vegetation, wildlife, and fish. However, the impacts from the U.S. Forest Service implementing its river plan would likely be long term, minor, and beneficial due to integration of greater resource protection measures as required under the Wild and Scenic Rivers Act.

Overall, the impacts of these past, present, and reasonably foreseeable actions, in combination with those described for the no-action alternative, would result in short- and long-term, minor to moderate, adverse, local to regional cumulative impacts and long-term, minor, beneficial, local to regional cumulative impacts. Continuation of current management under alternative A would contribute a small amount to the beneficial

cumulative effects, as well as a small amount to the adverse cumulative effects.

Conclusion. The no-action alternative would have long-term minor to moderate, adverse, local to regional impacts and long-term, minor to moderate, beneficial, local to regional impacts on vegetation, wildlife, and fish. Impacts of this alternative, combined with the impacts of other past, present, and reasonably foreseeable actions, would result in short- and long-term, minor to moderate, adverse, local to regional cumulative impacts and long-term, minor, beneficial, local to regional cumulative impacts. Alternative A would contribute a small extent to the beneficial cumulative effects, as well as a small amount to the adverse cumulative effects.

Alternative B

Headwaters-wide. Federal agencies within the Greater Yellowstone Ecosystem coordinate efforts to monitor and manage resources of the parks, national forests, and wildlife refuges, where possible, respecting their distinct authorities and mandates. The agencies coordinate efforts to protect vegetation as well as fish and wildlife through such actions as habitat mapping, invasive species control, monitoring and managing sensitive species, and associated educational efforts. In many cases, state fish and wildlife agencies also collaborate in these efforts through specific interagency working groups and committees. Alternative B, similar to alternative C, would provide a stronger, ecosystem-based, and partnership approach to managing the headwaters' natural resources than the no-action alternative. This would include headwaters-wide strategies that emphasize consistent, ongoing collaboration to protect, restore, and enhance water-related resources. By working together across park divisions and implementing an interdisciplinary approach as well as expanding partnerships with private landowners, local governments, state and federal agencies, and local organizations, the parks and refuge would have greater opportunities to protect the waterways and other habitats that cross management boundaries. The collaborative management between the parks and federal and state agencies would have long-term, minor to moderate, beneficial, local and regional impacts on vegetation, wildlife, and fish because having multiple management entities could provide more comprehensive and sustainable management efforts and outcomes.

Under this alternative, formal user capacity indicators and standards for resource protection would be established and monitored for each segment, including the continued monitoring of water quality to ensure greater resource protection. Use varies by river segment; however, each segment is subject to visitor use and the potential impacts that can arise from use, such as trampling/removal of vegetation, wildlife disturbance from human noise and presence, littering, and fecal coliform contamination. An appropriate variety of monitoring, documentation, and subsequent mitigation of identified issues would have long-term, minor to moderate, beneficial, local and regional impacts on vegetation, wildlife, and fish.

Additionally, alternative B would include an expansion of interpretation and education programs to include the outstandingly remarkable cultural values associated with the Snake River corridor. This could result in greater understanding and awareness of vegetation, wildlife, and fish as ethnographic resources, and as a consequence, could lead to additional protection of these resources and result in greater preservation of their relationship with tribal practices and beliefs. The enhanced interpretive and education program would result in a long-term, minor, beneficial, local to regional impact to these species as ethnographic resources.

River Segments.

Lewis River (wild segment)—Under alternative B, maximum use would remain at the same levels as alternatives A and C in this segment. Maximum number of overnight visitors would be 164 per night at an established 21 campsites. Day users consist primarily of anglers and a few hikers. A maximum of 1,300 people per year are considered day users along this segment (not including vehicular traffic moving through the corridor to reach another destination). This alternative would have the addition of interpretive messaging related to river values and the Wild and Scenic Rivers Act. Backcountry trails and campsites would be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. Due to the general low level of expected visitor use in this segment, the use and maintenance of these developments would have a long-term, negligible to minor, adverse, localized impact on vegetation and wildlife within the river corridor due to trampling/removal of vegetation as well as wildlife disturbance from human noise and presence from visitor use and maintenance activities.

Lewis River (scenic segment)—Under alternative B, the general kinds of visitor use would remain similar to what occurs today with the improvement of information related to hiking opportunities in the area (most of which occur outside of the river corridor) and the improvement of scenic turnouts to enhance the experience of the river and related scenery along the road corridor. Maximum use would be expected to be similar to alternative A with current levels below the historic highs. Given the current low use levels, the maximum amount of use could increase into the future. Under alternative B, existing developments would be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. Roadside turnouts that provide opportunities for visitors to view Lewis River Canyon could be slightly expanded to reduce traffic congestion and increase visitor safety. Any impacts would include some vegetation removal and soil compaction from turnout expansion, runoff into the river from motor vehicle emissions and other related pollutants (e.g., oil, fuel, other fluid leaks, or particulates), and minimal amounts of erosion from vegetation trampling/removal and soil compaction from the use and maintenance of roads, bridges, turnouts, and trails. These impacts on vegetation, wildlife, and fish would be long term, negligible to minor, adverse, and localized within the river corridor.

Snake River (wild segment, Yellowstone National Park)—The maximum amounts of visitor use in this portion of the river segment would remain the same as under alternative A. Under alternative B, existing developments would be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. Under this alternative, a range of visitor recreation opportunities would be retained with some improvements to enhance visitor experience. These enhancements include grading parking areas, increased ranger patrols to share information, and interpretive signs at trailheads. These uses and developments would have long-term, negligible, adverse, localized impacts on vegetation, wildlife, and fish in this segment due to erosion from visitor use and maintenance activities and runoff and pollution such as littering, fecal coliform contamination, and vehicles emissions or any leakage from maintenance equipment (e.g., oil, fuel, particulates); however, grading the parking areas would reduce damage to vegetation and soil compaction and increased ranger patrols would provide better resource protection and would result in long-term, negligible, beneficial, and localized impacts on vegetation, wildlife, and fish in this segment.

Snake River (wild segment, John D. Rockefeller, Jr. Memorial Parkway)—Under alternative B, the kinds of use currently available in this segment would remain with some improvements to infrastructure. However, to enhance recreational

opportunities in this segment maximum use levels would be approximately 10% higher than under alternative A, while retaining the current range of recreational opportunities within this segment. An increase in maximum use would allow additional visitor opportunities to enjoy the river corridor and enhance its recreational values. This increase would be supported by site delineation, use regulation, and other management actions that would ensure the protection of river values. Maximum capacities at Flagg Ranch would remain the same—97 RV sites, 74 tent sites (40 of which are currently being converted to camper cabins outside the scope of this plan), and 92-room lodge. Total capacity at the cabins and RV and tent sites would remain at 171. The maximum number of commercial float trips would be increased to 31 trips per day with an additional 2 fishing trips per day. Private trips would also increase to a maximum of 66 trips per day (33 floating and 33 fishing). These uses and developments would continue to have long-term, minor to moderate, adverse, localized impacts on vegetation, wildlife, and fish in this segment due to vegetation trampling/removal from visitor use and maintenance activities, wildlife disturbance from noise and human presence, and runoff and pollution (e.g., littering, fecal coliform contamination, and vehicle emissions and any leakage from maintenance equipment (i.e., oil, fuel, particulates) into the river and affecting fish habitat.

Snake River (scenic segment)—Under this alternative, the maximum amount of visitors would be approximately 15% higher than alternative A. Visitor use and resource management strategies such as site delineation, fishing regulations, boat checks for aquatic invasive species, and continued implementation of closures along the Snake River from Moose north to Moran Junction and along Buffalo Fork from December 15 to April 1 to avoid disturbance of wildlife; other measures would ensure that this use increase is accommodated without adverse impacts on river values. Concession float use would increase to a maximum daily launch of 153 and an expected overall use of 78,974 people per year. Maximum fishing trips per day would increase to 54 with no more than 763 per month. Meal trips would also increase to 415 trips accommodating a maximum of 4,140 people per season. Private float use would remain less than commercial use and not be limited, though the maximum use expected would be approximately 27,502 per year based on historic use patterns. The types and level of uses in this segment would continue to have long-term, minor to moderate, adverse, localized impacts on vegetation, wildlife, and fish in this segment due vegetation trampling/removal from visitor use and maintenance activities, wildlife disturbance from noise and human presence, and runoff and pollution (e.g., littering, fecal coliform contamination, and vehicle emissions and any leakage from maintenance equipment (i.e., oil, fuel, particulates) into the river and affecting fish habitat. The area closures for wildlife protection during nesting and breeding periods would continue to result in long-term, minor to moderate, beneficial, and localized impacts on wildlife in this segment due to less human noise or presence disturbing important wildlife activity during these times.

The overall kinds of use that currently exist would continue. However, new camping opportunities would be provided for overnight stays along the river. There would be two campsites established along the river allowing overnight floating trips. Other recreational enhancements under this alternative include a new viewing area at Oxbow Bend, active interpretation of cultural sites (Menor's Ferry, Bar BC Dude Ranch, and 4 Lazy F Dude Ranch) with floating trips allowed to stop at Bar BC Dude Ranch for interpretive opportunities, and a new accessible trail from Moose to Menor's Ferry. Limited overnight camping would be provided for visitors, including walk-in and boat access camping. These uses and developments would have long-term, minor to moderate, adverse, localized impacts on vegetation, wildlife, and fish in this segment

due to vegetation trampling/removal from visitor use and maintenance activities, wildlife disturbance from noise and human presence, snow removal activities (e.g., sand and gravel deposition, siltation, erosion from vegetation removal and soil compaction) near the river, and runoff and pollution to include littering, fecal coliform contamination, vehicle emissions, and any leakage from maintenance equipment (e.g., oil, fuel, particulates) into the river and affecting fish habitat.

Pacific Creek (scenic segment)—Under alternative B, existing developments would continue to be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act, including better delineation of parking areas and trails. Informal parking areas and social trails would be removed and revegetated. In addition to the existing kinds of visitor use in this river segment, alternative B would allow horseback riding along trails, guided walk-in fishing, and an improved hunting camp within this segment. These new opportunities would enhance visitor enjoyment of the river corridor. Horseback riding trips would consist of a maximum three groups of approximately 20 participants per day or approximately 2,000 per year. Paired with concessioner-guided fishing equating to approximately nine anglers daily within this segment, this corridor could maintain a maximum of 34 visitors per day. Overall, the resources within this segment can sustain a maximum 3,270 visitors annually (not including vehicular traffic moving through the corridor to reach another destination). These uses would have long-term, minor to moderate, adverse, and localized impacts on vegetation, wildlife, and fish in this segment due to vegetation trampling/removal from visitor use and maintenance activities, wildlife disturbance from noise and human presence, and runoff and pollution (snow removal activities (e.g., sand and gravel deposition, siltation, erosion from vegetation removal and soil compaction) near the river, and runoff and pollution to include littering, fecal coliform contamination, vehicle emissions, and any leakage from maintenance equipment (e.g., oil, fuel, particulates) into the river and affecting fish habitat. However, the removal and revegetation of informal parking areas and social trails would have a long-term, negligible, beneficial, and localized impact on vegetation, wildlife, and fish due to the decrease in erosion from the soil stabilization that would result from revegetation, as well as in restoration of wildlife habitat.

Buffalo Fork (scenic segment)—Alternative B would maintain the same kinds and amounts of use as alternative A. A maximum of 500 day use visitors annually (approximately five visitors daily) would be permitted within this segment (not including vehicular traffic moving through the corridor to reach another destination). No overnight use would be permitted. Also under alternative B, existing developments would continue to be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act, including better delineation of parking areas and trails. Fencing materials associated with ineffective attempts at riverbank stabilization and informal parking areas would be removed, and social trails would be revegetated. The continued use and maintenance of existing developments would have long-term, negligible, adverse, and localized impacts on vegetation, wildlife, and fish due to vegetation trampling/removal from visitor use and maintenance activities, wildlife disturbance from noise and human presence, snow removal activities (e.g., sand and gravel deposition, siltation, erosion from vegetation removal and soil compaction) near the river, and runoff and pollution to include littering, fecal coliform contamination, vehicle emissions, and any leakage from maintenance equipment (e.g., oil, fuel, particulates) into the river and affecting fish habitat. However, the removal fencing materials and informal parking areas and the revegetation of social trails would have a long-term, negligible, beneficial, and localized impact on water resources due to the decrease in erosion from the soil stabilization that would result from

revegetation, as well as in restoration of wildlife habitat.

Gros Ventre River (scenic segment)—Under alternative B, the kinds of use in this segment remain the same as alternative A with the exception of encouraging anglers to harvest nonnative fish within creel limits established by the Wyoming Game and Fish Department to promote a native fishery. Use levels would remain low and of little concern for impacts on river values. Also under this alternative, existing developments would continue to be maintained in a manner consistent with requirements of the Wild and Scenic Rivers Act. Social trails would be removed and revegetated. Grand Teton National Park, National Elk Refuge, and Bridger-Teton National Forest would collaborate on better delineation of parking areas, trails, and signs at the informal visitor access point that overlaps all three agencies' boundaries. The continued use and maintenance of the existing developments would have long-term, negligible to minor, adverse, and localized impacts on vegetation, wildlife, and fish due to vegetation trampling/removal from visitor use and maintenance activities, wildlife disturbance from noise and human presence, snow removal activities (e.g., sand and gravel deposition, siltation, erosion from vegetation removal and soil compaction) near the river, and runoff and pollution to include littering, fecal coliform contamination, vehicle emissions, and any leakage from maintenance equipment (e.g., oil, fuel, particulates) into the river and affecting fish habitat. However, the removal and revegetation of social trails would have a long-term, negligible to minor, beneficial, and localized impact on vegetation, wildlife, and fish due to the decrease in erosion from the soil stabilization that would result from revegetation efforts, as well as in restoration of wildlife habitat. The collaborative efforts of the federal agencies at this site would result in long-term, minor, beneficial, and localized impacts on vegetation, wildlife, and fish due to limiting the amount of erosion from random parking and social trailing and using signs to better direct visitors using the area.

River Access Points. The proposed site planning for the river access points is expected to be about 1.0 acre or less of site disturbance, with the exception of the Pacific Creek Landing relocation under alternative B, which would result in a greater extent of disturbed acreage.

Flagg Canyon—In alternative B, signs on north and south sides of North Park Road would be installed to alert visitors to the picnic area and boat launch site as well as the nearest restroom facility (0.25 mile north). A portion of the boat launch access road would be reconstructed to reduce the steep grade of the road. The boat launch would have a minimal grade to the river and be properly drained to prevent bank erosion. The vehicle turnaround at the boat launch would be reconfigured for efficiency. Areas along the bank that are experiencing erosion would be stabilized. These actions would result in long-term, minor to moderate, beneficial, localized impacts on vegetation, wildlife, and fish due to the reduction of fecal coliform contamination; creation of a better turnaround and less steep road grade, which would deter visitors from driving into vegetated areas to turn around and/or in negotiating the steep slope; and reducing erosion by protecting and stabilizing the bank, which would protect fish habitat in the area and immediately downstream. Bank stabilization and the improved boat launch would also reduce adverse water quality effects (e.g., turbidity, siltation) to the population of western pearlshell mussels (*Margaritifera falcate*) that occupy the launch site area. However, the construction activities associated with new boat launch and bank stabilization could have short-term, negligible to minor, adverse, localized effects on the mussels due to possible temporary increases in siltation associated with the construction activity.

Flagg Ranch—In this alternative, the size of the parking area would be reduced to accommodate up to 10 vehicles. The portion of the parking lot that would no longer be used would be restored to natural conditions. The vehicle turnaround and the parking area

would be delineated with natural materials to prevent future user-created expansion of the area. "No Parking" signs would be installed in the vehicle turnaround area. Depending on the level of use, a single vault toilet may be added near the parking lot area. One additional picnic table would be added. The National Park Service would coordinate with the Wyoming Department of Environmental Quality to have the fuel-contaminated site monitoring well building removed when contaminant levels are reduced to acceptable levels. Over time, vegetation restoration efforts would continue to be implemented on formerly developed areas at Flagg Ranch to enhance the compatibility with the wild classification. Riprap near the Snake River Bridge would be "naturalized" with willow plantings and other vegetation treatments. These actions would have long-term, minor to moderate, beneficial, localized effects on vegetation, wildlife, and fish in this area due to reducing the presence of human waste; revegetation of the areas along the bank, formerly developed areas, and extensive and under-utilized parking area would decrease the amount of runoff and provide more habitat availability for wildlife.

Jackson Lake Dam—Alternative B would more efficiently accommodate boat launching. Two concrete single ramps (or one double-wide ramp) would be constructed at the far end of the lower parking area. This area would be dedicated to boat launching and staging (including rigging). As a result, parking in the lower parking area would be reduced and limited to passenger vehicles only (i.e., no RVs). More vehicles would use the upper parking lot and pedestrian connections would be improved. Improvements to this site would stay within the existing developed footprint. These actions would result in long-term, negligible, beneficial, and localized impacts on vegetation, wildlife, and fish in this area by reducing the amount of vegetation trampling/removal in the area of the launch from larger vehicles driving through the vegetation at the launch site while attempting to turn around in this tight space, and the improved pedestrian connections from the upper parking area would create better direction for visitors who are otherwise creating social trails from this parking area.

Cattleman's Bridge—To provide a range of visitor opportunities, Cattleman's Bridge Road would be closed at the former cook site, and a small parking area may be constructed here. Depending on the level of use, a vault toilet facility may also be installed in this area. A minimally improved boat launch facility for hand-carried boats and pack rafts would be situated near the parking area. A trail would be developed on the remainder of the road and some restoration work would be done. The new hiking trail would loop back along the banks of Snake River. The actions in this alternative would result in long-term, negligible to minor, adverse, localized impacts on vegetation, wildlife, and fish due to the trampling/removal of vegetation during the possible installation of a vault toilet, the development of a minimally improved boat launch facility in a new place, and the development of a new hiking trail loop along the bank. Although much of the area where these actions would occur has been previously disturbed, wildlife disturbance from noise and human presence would still occur. However, there would also be long-term, minor, beneficial, localized impacts on vegetation, wildlife, and fish due to restoration of the portion of the road that would be closed, which would provide more habitat availability for wildlife, would help reduce erosion into the river affecting fish habitat, and would also reduce or eliminate the amount of fecal coliform contamination in the area.

Oxbow Bend Overlooks—In this alternative, the pavement of the east parking lot would be striped to improve efficiency and increase parking capacity. The parking lot would not be expanded. Signs directing visitors to the restroom facility at Cattleman's Bridge (approximately 0.85 mile east) would be added. A natural surface loop trail to the river would be added, using previously disturbed areas to the greatest extent possible, and the

social trails would be revegetated. Timber guardrails (replacing existing posts) would be added to the west overlook to keep vehicles from parking in vegetated areas. Social trails and other denuded areas would be revegetated. The actions in this alternative would result in long-term, minor, beneficial, localized impacts on vegetation, wildlife, and fish by reducing the presence of fecal coliform contamination and the amount of vegetation trampling/removal, thus reducing the amount of erosion and runoff into the river and protecting fish habitat, while increasing the amount of available wildlife habitat.

Pacific Creek Landing—To provide improved boat launch access, the site would be moved to a more stable location above the confluence of Pacific Creek. The following infrastructure would be developed at the new site—a 0.75-mile access road, a pedestrian path, a medium-sized parking lot, a double-wide articulated concrete ramp, and vault restroom facilities. While this site is more stable and access would be improved, the banks are 20 to 30 feet above the river and the ramp would require a large volume of excavation. The current Pacific Creek boat ramp and all associated development, with the exception of the entry gate parking lot, would be removed and restored to natural conditions. The actions in this alternative would result in short- and long-term, major, adverse, localized impacts on vegetation, wildlife, and fish due to the extensive removal of vegetation that would be required for this undertaking, which could lead to riverbank destabilization, increased runoff and erosion, and removal of a vast amount of important wildlife habitat, particularly for grizzly bears. However, the closure and restoration of the current Pacific Creek Landing would result in long-term, moderate, beneficial, and localized impacts on vegetation, wildlife, and fish due to the revegetation that would increase riverbank stabilization in the area, as well as increase the amount of available wildlife habitat and decrease the amount of runoff. Closing this landing would also decrease the need for extensive in-stream maintenance activities that would have adverse impacts on water quality, free-flowing conditions, and subsequently on fish habitat.

Deadman's Bar—In this alternative, roadside parking would be delineated with natural materials. Parking lot efficiency would be improved through signage and improved delineation using natural materials (buried logs, etc.) The south boat launch would be expanded to two lanes. A new material, such as articulated concrete block, would be used for one or both of the ramps to improve access. The cook site would be maintained and the two picnic sites would be restored to natural conditions. These actions would mainly result in long-term, minor to moderate, beneficial, localized impacts on vegetation, wildlife, and fish due to the reduction of vegetation trampling/removal by people parking in vegetated areas when the parking lot is full—the articulated concrete block would likely reduce the number of vehicles becoming stuck at the launch site and causing vegetation trampling/removal and riverbank destabilization and erosion into the river—and restoring the two picnic sites, which would increase the amount of available wildlife habitat in the area.

Schwabacher Landing—In this alternative, the parking lot and road surfaces would remain gravel, except for a 0.33-mile section of road nearest the highway that would be paved in 2014 under a separate approved park action. The paved section would occasionally need repair and overlay work. The remaining gravel portion of Schwabacher Road would undergo minimal regrading to address surface ruts or "washboarding." The road surface and parking lot surface would remain gravel. The extents of the parking areas and parking spaces would be better delineated with natural materials (logs, etc.) to improve parking efficiency to deter cars from driving in vegetated areas. Improvements to the trail connecting the middle parking area to the river would be made to improve delineation. The trail would remain a natural surface.

Social trails near the trail would be revegetated. Depending on the level of use, a second vault toilet may be added to the northernmost parking area. The actions under this alternative would result mainly in long-term, beneficial, negligible to minor, localized impacts on vegetation due to reduction in the necessity of vehicles driving into vegetated areas to avoid deep ruts, to allow oncoming vehicles to pass, or to park in vegetated areas; and the removal and restoration of social trails, thus reducing the amount of erosion. The road widening would have long-term, negligible, adverse, and localized impacts on vegetation due to removal of vegetation and further soil compaction; however, much of this area is already previously disturbed.

Moose Landing—This alternative would consolidate boating facilities in one place near the existing visitor parking lot and would seek to create an improved separation between administrative and boating facilities. The new consolidated site would include two double ramps, visitor parking, boat trailer parking and rigging area, and restroom facilities. The previously used boat ramps would be restored, designed to blend with the natural surroundings (i.e., boulders, fill material, and vegetation), while providing bank protection. The previously used north parking lot and boat pullout would be restored to natural conditions. These actions would result in long-term, minor to moderate, adverse, localized impacts on vegetation, wildlife, and fish due to the trampling/removal of vegetation in the development of the new ramps and parking areas, which could also lead to riverbank destabilization, erosion, and increased runoff. However, the restoration of the former launch site and parking area would result in long-term, minor to moderate, beneficial, localized impacts due to restabilization of the bank, decreased erosion, and increased available wildlife habitat in the area.

Generally, across all headwaters, segments, and river access points, alternative B would result in both adverse and beneficial effects on vegetation, wildlife, and fish within the headwaters. The adverse impacts would be short- and long-term, minor to major, and localized, primarily resulting from boat launch and river access relocation projects that displace vegetation and habitat and cause riverbank destabilization, siltation, and greater runoff of vehicle and maintenance equipment emissions (e.g., oil, fuel, particulates). Additional adverse effects include erosion and vegetation trampling from visitor use and maintenance activities. The beneficial impacts would be long term, minor to moderate, and local to regional. At a headwaters-wide level, the beneficial effects would result from a stronger, ecosystem-based partnership approach to managing the headwaters' natural resources, the use of formal user capacity indicators and standards for resource management, an effort to allow the continuation of natural river processes, and expanded interpretation and education programs. At a river segment and access point level, the beneficial effects would result from the restoration and revegetation of social trails, former river access and boat launch sites, and installation of restroom facilities, improving vegetation and wildlife habitat as well as increasing riverbank stabilization and decreasing the amount of runoff, siltation, deposition, and fecal coliform contamination that affect fish habitat.

Cumulative Effects. Past, present, and reasonably foreseeable actions that impact vegetation, wildlife, and fish resources includes site improvements that are currently in progress to the Moose headquarters complex in Grand Teton National Park. The site improvements most related to impacts on these resources are the complete reconfiguration of vehicle and pedestrian traffic within the administrative and Moose Landing areas, removal of several temporary buildings, and improvement of stormwater management. These impacts would result in short- and long-term, minor, adverse and beneficial, local to regional cumulative effects on vegetation, wildlife, and fish.

The operations of Jackson Lake Dam contribute to the cumulative impacts on wild and scenic resources and values due to the alteration of natural flow regimes of Snake River. In addition to its importance to aquatic habitat, a natural flow regime is important for riparian vegetation such as cottonwood regeneration and willow communities sustainability. Dam releases fluctuate by season, levels of precipitation, and irrigation needs, and thus have varying effects on vegetation, wildlife, and fish. These impacts would result in short- and long-term, minor, adverse, local to regional cumulative effects on these resources due to regulation of the natural flow regime, which affects water-related resources such as the presence and health of vegetation and aquatic species that perform water pollution filtering activities.

There are private inholdings along the designated wild and scenic river corridors within the Snake River Headwaters. The land uses on these inholdings vary from rural residential to agricultural. Water-related resource projects include in-stream channel modifications for water withdrawals and riverbank stabilizations. Livestock grazing and riparian habitat modifications are also common. These impacts would result in short- and long-term, negligible to minor, adverse, local to regional cumulative effects on vegetation, wildlife, and fish due to erosion from uses that remove vegetation or compact soils causing riverbank destabilization, siltation, and deposition, as well as from fecal coliform contamination from livestock grazing near waterways.

Continuing effects of past land uses on Bridger-Teton National Forest lands may contribute to cumulative impacts on NPS-managed wild and scenic river resources downstream. Past land uses include grazing allotments, oil and gas leasing, mining, off-road vehicles, and timber production. The U.S. Forest Service is required, through the nondegradation and enhancement clause of the Wild and Scenic Rivers Act, to ensure protection of their wild and scenic river segments upstream. Therefore, it is likely that the U.S. Forest Service would identify and resolve any issues or conflicts on its segments upstream in its comprehensive river management plan. These impacts would result in short- and long-term, negligible to minor, adverse, local to regional cumulative effects on vegetation, wildlife, and fish. However, the impacts from the U.S. Forest Service implementing its river plan would likely be long term, minor, and beneficial due to integration of greater resource protection measures as required under the Wild and Scenic Rivers Act.

Overall, the impacts of these past, present, and reasonably foreseeable actions, in combination with those described for alternative B, would result in short- and long-term, minor to major, adverse, local to regional cumulative impacts and long-term, minor to moderate, beneficial, local to regional cumulative impacts. Implementation of management strategies under alternative B would contribute a substantial amount to the beneficial cumulative effects, as well as a substantial amount to the adverse cumulative effects.

Conclusion. Alternative B would have short- and long-term minor to major, adverse, local to regional impacts and long-term, minor to moderate, beneficial, local to regional impacts on vegetation, wildlife, and fish. Impacts of this alternative, combined with the impacts of other past, present, and reasonably foreseeable actions, would result in short- and long-term, minor to major, adverse, local to regional cumulative impacts and long-term, minor to moderate, beneficial, local to regional cumulative impacts. Alternative B would contribute a substantial amount to both beneficial and adverse cumulative effects.

Section 106 Summary. After applying ACHP criteria of adverse effects (36 CFR 800.5, "Assessment of Adverse Effect"), the National Park Service concludes that implementation of alternative B would result in long-term, minor, beneficial, local to regional impact to vegetation, wildlife, and

fish as ethnographic resources, which would result in a section 106 finding of *no adverse effect.* For future yet-defined activities or projects that may occur at the nine river access points, park staff would continue to meet their section 110 and 106 responsibilities as the details of proposed undertakings become known. Park staff would not consider project undertakings that would result in an adverse effect to ethnographic resources under section 106. As a result, the National Park Service anticipates that actions defined under this alternative would result in a *no adverse effect* determination.

Alternative C (Preferred)

Headwaters-wide. Federal agencies within the Greater Yellowstone Ecosystem coordinate efforts to monitor and manage resources of the parks, national forests, and wildlife refuges, where possible, respecting their distinct authorities and mandates. The agencies coordinate efforts to protect vegetation as well as fish and wildlife through such actions as habitat mapping, invasive species control, monitoring and managing sensitive species, and associated educational efforts. In many cases, state fish and wildlife agencies also collaborate in these efforts, through specific interagency working groups and committees. The parks collaborate with the U.S. Forest Service, as necessary, for water resource management. Alternative C would provide a stronger, ecosystem-based, partnership approach to managing the headwaters' natural resources than the no-action alternative. This would include headwaters-wide strategies that emphasize consistent, ongoing collaboration to protect, restore, and enhance water-related resources. By working together across park divisions and implementing an interdisciplinary approach as well as expanding partnerships with private landowners, local governments, state and federal agencies, and local organizations, the parks and refuge would have greater opportunities to protect the waterways and other habitats that cross management boundaries. The collaborative management between the parks and federal and state agencies would have long-term, minor to moderate, beneficial, local and regional impacts on vegetation, wildlife, and fish because having multiple management entities could allow more comprehensive and sustainable management efforts and outcomes.

Under this alternative, formal user capacity indicators and standards for resource protection would be established and monitored for each segment, including the continued monitoring of water quality, to ensure greater resource protection. Use varies by river segment; however, each segment is subject to visitor use and the potential impacts that can arise from use such as trampling/removal of vegetation, wildlife disturbance from human noise and presence, littering, and fecal coliform contamination. An appropriate variety of monitoring, documentation, and subsequent mitigation of identified issues would have long-term, minor to moderate, beneficial, local and regional impacts on vegetation, wildlife, and fish.

Additionally, alternative C would include an expansion of interpretation and education programs to include the outstandingly remarkable cultural values associated with the Snake River corridor. This could result in greater understanding and awareness of vegetation, wildlife, and fish as ethnographic resources, and as a consequence, could lead to additional protection of the resource and result in greater preservation of the relationship between these species and tribal practices and beliefs. The enhanced interpretive and education program would result in a long-term, minor, beneficial, local to regional impact to vegetation, wildlife, and fish as ethnographic resources.

River Segments.

Lewis River (wild segment)—Under this alternative, maximum use would remain at the same level as alternatives A and B in this

segment. The maximum number of overnight visitors would be 164 per night at an established 21 campsites. Day users consist of primarily anglers and a few hikers. A maximum of 1,300 people per year are considered day users along this segment. More restrictions would be placed on the kinds of visitor use to ensure they do not impact river values. Permits would be required for boating use along with inspections for aquatic invasive species; fisheries would emphasize native species; and interpretive opportunities related to river values and the Wild and Scenic Rivers Act would be expanded. Under alternative C, existing backcountry trails and campsites would be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. Due to the general low level of expected visitor use in this segment, the use and maintenance of these developments would likely have a long-term, negligible to minor, adverse, localized impact on vegetation and wildlife due to trampling/removal of vegetation and disturbance from human noise and presence from visitor use and maintenance activities. The implementation of greater restrictions and permitting to protect river values, as well as boating inspections, protection of fisheries, and interpreting river values to the public, would all result in long-term, negligible to minor, beneficial, and localized impacts on vegetation, wildlife, and fish due to greater protection of the river values and natural resources from invasive aquatic species and inappropriate visitor use (e.g., littering, erosion, fecal coliform contamination, etc.).

Lewis River (scenic segment)—Under alternative C, the current kinds of visitor use opportunities available in this segment would remain. Maximum use would remain at the same level as alternative A. In this alternative, existing developments would be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. Roadside turnouts that provide opportunities for visitors to view Lewis River Canyon could be slightly expanded to reduce traffic congestion and increase visitor safety. Any impacts would likely include runoff from motor vehicle emissions and other related pollutants (e.g., oil, gas, particulates, or other fluid leaks) and minimal amounts of vegetation removal and subsequent erosion from the use and maintenance of roads, bridges, turnouts, and trails within the river corridor. These impacts on vegetation, wildlife, and fish would be long-term, negligible, adverse, and localized.

Snake River (wild segment, Yellowstone National Park)—Under alternative C, the overall kinds of visitor use remains the same as currently exists. Some restrictions to further protect resources would be placed on activities. Backcountry camping would be restricted to designated sites. Increased ranger patrols would promote resource protection. Additionally, interpretive messaging would be made available to educate visitors on river values and the Wild and Scenic Rivers Act. The maximum amounts of visitor use in this alternative would remain the same as in alternative A (84 people and 106 pack animals per night, no limits on day use). Existing developments would be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. Restrictions on activities for resource protection, including restricting backcountry camping to designated sites, increasing ranger patrols for resource protection, and educating visitors on the protection of river values, would result in long-term, negligible to minor, beneficial, and localized impacts on vegetation, wildlife, and fish due to reduction of the amount of area of vegetation trampling/removal, reduction of the amount of erosion and runoff from restrictions placed on various uses, and increased visitor education and subsequent stewardship. Unlimited day use could result in long-term, negligible to minor, adverse, and localized impacts on vegetation, wildlife, and fish due to vegetation trampling/removal and subsequent erosion from social trailing, pack animal use, and runoff of fecal coliform contamination; and wildlife disturbance from human noise and presence.

Snake River (wild segment, John D. Rockefeller, Jr. Memorial Parkway)—Under alternative C, the range of visitor activities remains the same as in alternatives A and B. All existing developments would be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. Increased patrols would also promote resource protection and enforce fishing and other park regulations. Finally, other improvements would enhance visitor experience in this segment including increased interpretation and education at Flagg Canyon and Flagg Ranch related to river values and the Wild and Scenic Rivers Act. Maximum use would remain at the same level as alternative A. Flagg Ranch retains its maximum capacity of 92 rooms, 97 RV sites, and 74 tent sites (40 of which are currently being converted to camper cabins outside the scope of this plan). Maximum backcountry camping capacity remains at 3 sites / 36 people per night. There would be a maximum of 28 commercial floating and 2 commercial fishing trips per day along this segment. There is also a maximum of 60 private floating trips per day (30 floating and 30 fishing). The enforcement of fishing and other park regulations, increased patrols, and visitor education would result in long-term, minor, beneficial, and localized impacts on vegetation, wildlife, and fish by reducing the amount of vegetation trampling/removal and erosion/runoff from new disturbances at dispersed campsites, protecting native fish species, and increasing visitor stewardship through education. The use and maintenance of the developments would have long-term, negligible to minor, adverse, localized impacts on vegetation, wildlife, and fish in this segment due to vegetation trampling/removal; erosion from visitor use and maintenance activities, wildlife disturbance from human noise and presence, and runoff and pollution (e.g., littering, fecal coliform contamination, and vehicle emissions and any leakage from maintenance equipment, i.e., oil, fuel, particulates) into the river and affecting fish habitat.

Snake River (scenic segment)—Under alternative C, the maximum amounts of visitor use would remain the same as alternative A. Maximum daily launches for commercial trips are set at 133 floating trips and 47 fishing trips (with no more than 663 fishing trips per month). Meal trips down the river are limited to 360 trips per year. Private use is less common on this segment of the river with an average estimated use of approximately 21,181 people per year (based on 25% of overall river use) and a maximum of 23,915 reported in 2007. The number of cook sites along the river would be reduced to two sites with a maximum capacity of 40 people each (Triangle X and Deadman's Bar). A trail from Moose to Menor's Ferry would be universally accessible. The amount and types of use would result in long-term, negligible to minor, adverse, and localized impacts on vegetation, wildlife, and fish due to vegetation trampling/removal and subsequent erosion and runoff from use; and wildlife disturbance from human noise and presence.

Resource protection measures would include periodic boat checks for aquatic invasive species and the continuation of fishing and other regulations, and closures would continue to be implemented along the Snake River from Moose north to Moran Junction and along Buffalo Fork from December 15 to April 1 to avoid disturbance of wildlife. Under this alternative, vehicle turnouts would be redesigned to minimize impacts on resources, and existing social trails would be revegetated to natural conditions. These actions would result in long-term, minor to moderate, beneficial, and localized impacts on vegetation, wildlife, and fish due to protection of important nesting and breeding habitat and periods, as well as maintenance of quality fish habitat.

A portion of the main park road (along the west side of Snake River) near the confluence of Buffalo Fork may be redesigned to allow more natural river processes. Under alternative C, River Road would remain open for public use as road conditions allow. Park

management would close the road to public vehicular use in the future if portions of the road fail due to the natural migration of the Snake River channel and road repairs and reroutes cannot be accomplished without impact to adjacent sagebrush and other sensitive habitats. Public vehicular access would also continue to be allowed on RKO and Bar BC roads, which provide access to the north and south ends of River Road. Restrictions for resource protection (including eventual closure of River Road), revegetation of social trails, and potential redesign of the main park road near the confluence of Buffalo Fork to allow natural river processes would result in long-term, minor to moderate, beneficial, and localized impacts on vegetation, wildlife, and fish. These beneficial impacts are due to protection of native fisheries, erosion control through revegetation, an eventual termination of sagebrush habitat disturbance or displacement associated with River Road maintenance, limited or restricted uses, and protection of free-flowing conditions. However, in the near-term (until closure of River Road), the ongoing vehicular use, maintenance, and possible rerouting of River Road would continue to have long-term, minor, adverse, and localized effects on vegetation and wildlife from sagebrush habitat disturbance or displacement at many points along the road corridor (same as no-action alternative). Also, the possible road redesign at the confluence with Buffalo Fork would have long-term, minor to moderate, adverse, localized impacts on vegetation and wildlife in this area due to the amount of vegetation and habitat removal that would be required within the river corridor.

Pacific Creek (scenic segment)—Under alternative C, recreational activities would remain the same as alternative A with improvements to the hunting camp. Visitor use levels would be expected to remain low and of little concern for impacts on river values. Maximum expected use levels would be five visitors per day equating to approximately 600 day use visitors annually (not including vehicular traffic moving through the corridor to reach another destination). No overnight use is allowed. Under alternative C, existing developments would continue to be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act, including better delineation of parking areas and trails. Informal parking areas and social trails would be removed and revegetated. Recreational activities including improvements to the hunting camp, along with the continued use and maintenance of existing developments would result in long-term, negligible, adverse, and localized impacts on vegetation, wildlife, and fish due to vegetation trampling/removal and subsequent erosion and runoff from use and developments, and wildlife disturbance from human noise and presence. However, the removal and revegetation of informal parking areas and social trails and the prohibition on overnight use would result in long-term, minor, beneficial, and localized impacts on vegetation, wildlife, and fish by limiting the amount of vegetation damage and subsequent erosion, and wildlife disturbance from human noise and presence.

Buffalo Fork (scenic segment)—Alternative C would maintain the same kinds and amounts of use as alternatives A and B. A maximum of 500 day use visitors annually (approximately five visitors daily) would be permitted within this segment (not including vehicular traffic moving through the corridor to reach another destination). No overnight use would be permitted. Under alternative C, existing developments would continue to be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act, including better delineation of parking areas and trails. To enhance natural conditions, fencing materials (associated with ineffective attempts at riverbank stabilization and river debris entrapment) and informal parking areas would be removed, and social trails would be revegetated. An overhead utility line would be placed underground to improve natural conditions and scenic quality. The continued use and maintenance of the existing developments would have long-term, negligible, adverse, and localized

impacts on vegetation, wildlife, and fish due to vegetation trampling/removal and subsequent runoff and erosion from use, and wildlife disturbance from human noise and presence. The placement underground of an overhead utility line would have short-term, minor, adverse, localized impacts on vegetation and wildlife due to removal of vegetation to bury the utility line and disturbance to wildlife from human noise and presence during construction. However, the area would be restored after installation of the utility line, and the removal and revegetation of informal parking areas, social trails, and the fence along the riparian area would have a long-term, negligible, beneficial, and localized impact on vegetation, wildlife, and fish due to the decrease in erosion, protection of fish habitat from the soil stabilization, which would result from revegetation, and increase in available wildlife habitat.

Gros Ventre River (scenic segment)—Under alternative C, the kinds of use in this segment remains the same as alternatives A and B with the exception of encouraging anglers to harvest nonnative fish within creel limits established by the Wyoming Game and Fish Department to promote a native fishery (as in alternative B), and the addition of increased interpretation and education related to river values and the Wild and Scenic Rivers Act for anglers. Use levels would remain low. Under this alternative, existing developments would continue to be maintained in a manner consistent with the requirements of the Wild and Scenic Rivers Act. Social trails would be removed and revegetated. Grand Teton National Park, National Elk Refuge, and Bridger-Teton National Forest would collaborate on better delineation of parking areas, trails, and signs at the informal visitor access point that overlaps all three agency boundaries. The continued use and maintenance of existing developments would have long-term, negligible, adverse, and localized impacts on vegetation, wildlife, and fish due to vegetation trampling/removal and subsequent runoff and erosion from use, and disturbance to wildlife from human noise and presence. However, the removal and revegetation of social trails and encouraging the harvest of nonnative fish species within creel limits established by the Wyoming Game and Fish Department would have a long-term, negligible to minor, beneficial, and localized impact on vegetation, wildlife, and fish due to the decrease in erosion and sedimentation of fish habitat because of soil stabilization, which would result from revegetation efforts; better protection of native fish species by removing nonnative competitors; and increased available habitat for terrestrial wildlife. The collaborative efforts of federal agencies at this site would result in long-term, minor, beneficial, and localized impacts on vegetation and fish in this area due to limiting the amount of erosion and sedimentation from random parking and social trailing, and using signs to better direct visitors in the area.

River Access Points. The proposed site planning for the river access points is expected to be about an acre or less of site disturbance.

Flagg Canyon—In this alternative, as in alternative B, signs on north and south sides of North Park Road would be installed to alert visitors to the picnic area and boat launch site and the location of the nearest restroom facility (0.25 mile north). A portion of the boat launch access road would be reconstructed to the south to improve visitor safety by reducing the steep grade of the road. The boat launch would have a minimal grade to the river and be properly drained to prevent bank erosion. The vehicle turnaround at the boat launch would be reconfigured for efficiency and safety. The aging boat slide system and steps would be replaced. A new wayside exhibit with boating and area information would replace the existing sign. Areas along the bank that are eroding would be stabilized. These actions would result in long-term, negligible to minor, beneficial, localized impacts on vegetation, wildlife, and fish due to reduction of the presence of human waste; creation of a better turnaround and less steep road grade, which would deter visitors from driving into

vegetated areas to turn around and in negotiating the otherwise steep slope; and reduction of the amount of erosion by better vegetation protection and stabilization of the bank, which would protect fish habitat in the area and immediately downstream. The bank stabilization and improved boat launch would also reduce adverse water quality effects (e.g., turbidity, siltation) to the population of western pearlshell mussels (*Margaritifera falcate*) that occupy the launch site area. However, construction activities associated with the new boat launch and bank stabilization could have short-term, negligible to minor, adverse, localized effects on the mussels due to possible temporary increases in siltation associated with construction activities.

Flagg Ranch—In this alternative, the parking area would be reduced to accommodate up to 10 vehicles. The portion of the parking lot that would no longer be used would be restored to natural conditions. The vehicle turnaround and parking area would be delineated with natural materials to prevent future user-created expansion of the area. "No Parking" signs would be installed in the vehicle turnaround area. A wayside exhibit providing boating and area information would replace the existing sign. Depending on use levels, a single vault toilet may be added near the parking lot area. To improve safety, the metal matting at the boat launch would be removed. One additional picnic table would be added. Over time, vegetation restoration efforts would continue to be implemented on formerly developed areas at Flagg Ranch to enhance compatibility with the wild classification. Riprap near the Snake River Bridge would be "naturalized" with willow plantings and other vegetation treatments. The National Park Service would coordinate with the Wyoming Department of Environmental Quality to have the fuel-contaminated site monitoring well building removed when contaminant levels are reduced to acceptable levels. These actions would have long-term, minor to moderate, beneficial, localized effects on vegetation, wildlife, and fish in this area due to reducing the presence of human waste; revegetation of the areas along the bank, of the formerly developed areas, and of the extensive and under-utilized parking area would decrease the amount of runoff and provide more habitat availability for wildlife.

Jackson Lake Dam—In alternative C, changes to the Jackson Lake Dam boat launch would enhance resource conditions. A single concrete ramp would be constructed at the far end of the lower parking area. In the existing lower parking lot, the area near the ramp would be designated for boat launching, staging, and rigging use only. There would be no parking allowed in this area (existing lower parking area) with the exception of handicap parking spaces; landscape improvements to enhance the function and natural appearance of the area would be made. Pedestrian connections between the upper parking lot and the new staging area would be improved. The upper parking lot would be studied for redesign if it is determined that additional capacity is needed. Improvements to this site would stay within the existing developed footprint. Consultation with the Bureau of Reclamation would be required prior to any redesign of the area. These actions would result in long-term, negligible to minor, beneficial, and localized impacts on vegetation, wildlife, and fish in this area due to reducing the amount of vegetation trampling/ removal in the area of the launch from vehicles driving through the vegetation at the launch site while attempting to turn around in this restricted space when other vehicles are parked and improved pedestrian connections from the upper parking area would provide better direction for visitors who create social trails between the parking area and the launch.

Cattleman's Bridge—To enhance resource conditions in this high value wildlife habitat area, the majority of the road to Cattleman's Bridge would be closed and the area partially restored to natural conditions. A small parking area (approximately 10 cars) would be constructed south of the intersection with Outside Highway. A vault restroom facility

would be added to the parking area. A trailhead would be positioned at the parking area and a hiking trail would be provided along the former road alignment. A portion of the hiking trail would be made accessible for people with disabilities. A new trail connecting the parking area to Oxbow Bend would be created and a primitive boat launch would be provided for hand-carried boats. The cook site area and boat launch parking lot would be restored to natural conditions. The actions in this alternative would result in long-term, negligible to minor, adverse, localized impacts on vegetation, wildlife, and fish due to the trampling/removal of vegetation during the possible installation of a vault toilet, development of a minimally improved boat launch facility in a new place, and development of a new hiking trail loop along the bank, although much of the area where these actions would occur have been previously disturbed. Additionally, wildlife disturbance from noise and human presence would still occur. However, there would also be long-term, minor to moderate, beneficial, localized impacts on vegetation, wildlife, and fish due to restoration of the road, which would be closed from the highway, and former cook site that would provide more habitat for wildlife and less disturbance from human noise and presence, reduce erosion into the river affecting fish habitat, and reduce or eliminate the amount of fecal coliform contamination in the area.

Oxbow Bend Overlooks—In this alternative, pavement in the east parking lot would be striped to improve efficiency and increase parking capacity. The parking lot would not be expanded. A wayside exhibit with wild and scenic river interpretation would be added to the overlook. Signs directing visitors to the restroom facility at Cattleman's Bridge (approximately 0.85 mile east) would also be added. A natural surface loop trail to the river would be added and social trails would be revegetated. Barriers (replacing existing posts) would be added to the west overlook to deter vehicles from parking in vegetated areas. Social trails and other denuded areas would be revegetated. A loop trail connecting the parking area to the river would be added. The actions in this alternative would result in long-term, minor, beneficial, localized impacts on vegetation, wildlife, and fish by reducing the presence of fecal contamination as well as the amount of vegetation trampling/removal, thus reducing the amount of erosion and runoff into the river and protecting fish habitat and increasing the amount of available wildlife habitat.

Pacific Creek Landing—In this alternative, the boat launch facilities would remain at the current site. Given the rapidly changing conditions and dynamic nature of the river in this location, this site would require intensive management and maintenance. The launch would be expanded to two lanes and nonpermanent materials and active maintenance would be used to maintain ramp access. The circulation area would be minimally expanded to allow new turning movements. For improved safety and circulation, the one-lane road extending to the launch (from the parking lot) would be expanded to accommodate two-way traffic and a pedestrian walkway. The failing retaining wall would be reconstructed and designed to blend with the natural environment. The park staff would evaluate capacity needs and the efficiency of the existing parking lot, which was recently reconfigured. If more parking is needed, park staff would consider expanding the existing parking lot to the southeast. Park management would also consider reducing the size of the parking lot near the Moran entrance station. Depending on the level of use, an additional vault toilet may be added and relocation of the existing vault toilet would be considered to improve functionality. The use at this site would result in long-term, minor to moderate, adverse, localized impacts on vegetation, wildlife, and fish in this area due to removal of vegetation because of widening the ramps, turning area, and road from the parking area to the launch; potential expansion of the parking lot and possible installation of an additional vault toilet facility; wildlife disturbance from noise and human presence and maintenance activities; and erosion from use, runoff, and

pollution (e.g., littering, vehicle emissions and any leakage from maintenance equipment such as oil, fuel, or particulates) into the river affecting fish habitat.

Deadman's Bar—In this alternative, the gravel portions of the access road would be paved, with some associated road widening. Areas along the road that were previously used for parking would be restored. The parking lot would be expanded, paved, and striped to improve efficiency and parking capacity. The road widening and paving would increase the area of disturbance to vegetation and habitat from 1.50 acres (existing road) to 2.25 acres. The parking lot expansion would increase vegetation and habitat disturbance from 0.90 acre (existing parking lot) to 1.10 acres. A new material, such as articulated concrete block, would be used for one or both of the ramps to improve access. The ramps would be expanded to two lanes. The cook site would be improved to reduce wildlife/human interactions. The two rustic, commercial picnic sites would be phased out. Parking lot expansion and paving and expanding the ramps to two lanes would result in short- and long-term, minor to moderate, adverse, localized impacts on vegetation, wildlife, and fish in this area due to vegetation removal; wildlife disturbance from noise and human presence, especially during construction activities; limited habitat removal; and limited increase to erosion and runoff because of the increased impermeable surface. The ramp expansion and access improvements, cook site improvements, parking efficiencies and restoration of previous roadside parking area, and phasing out commercial picnic sites would all result in long-term, minor to moderate, beneficial, localized impacts on vegetation, wildlife, and fish due to decreasing the amount of vegetation trampling and subsequent erosion from inefficient and improper parking, as well as from vehicles getting stuck in the ramp causing vegetation damage upon removal, and reducing wildlife-human interactions at the cook site.

Schwabacher Landing—In this alternative, parking would be consolidated in the north lot. The two south parking lots would be restored to natural conditions. The gravel road would experience selective regrading to address isolated areas with surface ruts. The 0.33-mile portion of road nearest the highway would be paved in 2014 under a separate approved park action and would occasionally need repair and overlay work. The two south parking lots would be restored to natural conditions. The trail to the river would be better delineated and extended to the road. Barriers (boulders, posts, etc.) would be installed to prevent vehicle access on the trail. Social trails near the trail to the river would be revegetated. The extents of the north parking area and parking spaces would be better delineated with natural materials (e.g., logs) to improve parking efficiency to deter cars from driving into vegetated areas. Depending on the level of use, a second vault toilet may be added to the northernmost parking area. The actions under this alternative would result mainly in long-term, minor to moderate, beneficial, localized impacts on vegetation by preventing vehicles from driving into the vegetated areas to avoid ruts, to allow oncoming vehicles to pass, or to park in vegetated areas and removing and restoring the south parking areas and social trails, thus reducing the amount of erosion and increasing the amount of available wildlife habitat. The possible addition of a vault toilet would have long-term, negligible, adverse, and localized impacts on vegetation due to removal of vegetation to accommodate the facility.

Moose Landing—Park staff would consider expanding and redesigning one or both boat ramps while maintaining the maximum amount of vegetation. Vegetation is critical to riverbank stabilization, so expansion of the ramp(s) would be carefully balanced with the need to secure the bank. The boat pullouts would be secured with terracing, natural bank protection including vegetation, and improved delineation of use and trail areas to reduce erosion. Due to the dynamic nature of the river in this place, the site would require

adaptive management and regular maintenance during the boating season. Trail links to the administrative complex trail would be developed. These actions would result in short- and long-term, minor, adverse, localized impacts on vegetation, wildlife, and fish due to the minimal removal of vegetation in expanding and redesigning the boat ramps and developing a trail link to the administrative complex and wildlife disturbance from construction and maintenance activities and in-stream siltation and sedimentation from maintenance activities, which may affect fish habitat. However, the natural bank protection and improved delineation of use and trail areas would have long-term, minor, beneficial, localized impacts on vegetation and fish due to improved stabilization decreasing the amount of erosion into the river in the long term.

Generally, across all headwaters, segments, and river access points, alternative C would result in both adverse and beneficial effects on vegetation, wildlife, and fish within the headwaters. The adverse impacts would be short- and long term, minor to moderate, and localized, primarily resulting from boat launch and river access modification projects that displace vegetation and habitat and cause riverbank destabilization, siltation, and greater runoff of vehicle and maintenance equipment emissions (e.g., oil, fuel, particulates). Additional adverse effects include erosion and vegetation trampling from visitor use and maintenance activities. The beneficial impacts would be long term, minor to moderate, and local to regional. At a headwaters-wide level, the beneficial effects would result from a stronger, ecosystem-based partnership approach to managing the headwaters' natural resources, the use of formal user capacity indicators and standards for resource management, an effort to allow the continuation of natural river processes, and expanded interpretation and education programs. At a river segment and access point level, the beneficial effects would result from the eventual termination of ongoing maintenance and rerouting of River Road, the restoration and revegetation of social trails, former river access, and boat launch sites, and installation of restroom facilities improving vegetation and wildlife habitat as well as increasing riverbank stabilization and decreasing the amount of runoff, siltation, deposition, and fecal coliform contamination that affect fish habitat.

Cumulative Effects. Past, present, and reasonably foreseeable future actions that impact vegetation, wildlife, and fish resources include site improvements, which are currently in progress to the Moose headquarters complex in Grand Teton National Park. The site improvement most related to impacts on these resources is the complete reconfiguration of vehicle and pedestrian traffic within the administrative and Moose Landing areas, removal of several temporary buildings, and improvement of stormwater management. These impacts would result in short- and long-term, minor, adverse and beneficial, local to regional cumulative effects on vegetation, wildlife, and fish.

Along the Snake River, sagebrush habitat has been slowly and incrementally degraded and displaced as a result of several past projects over the years. These projects include pathway construction, past road maintenance and rerouting, and installation of a variety of underground utility lines (e.g., fiber optic, water). These past projects would result in short- and long-term, minor, adverse, local to regional cumulative effects on vegetation and wildlife.

The operations of Jackson Lake Dam contribute to the cumulative impacts on wild and scenic resources and values due to the alteration of natural flow regimes of Snake River. In addition to its importance to aquatic habitat, a natural flow regime is important for riparian vegetation such as cottonwood regeneration and willow communities sustainability. Dam releases fluctuate by season, levels of precipitation, and irrigation needs, and thus have varying effects on vegetation, wildlife, and fish. These impacts would likely result in short- and long-term, minor, adverse, local to regional cumulative

effects on these resources due to regulation of the natural flow regime, which affects water-related resources such as the presence and health of vegetation and aquatic species that perform water pollution filtering activities. The National Park Service and Bureau of Reclamation would continue to work closely together to mitigate likely impacts on river values.

There are private inholdings along the designated wild and scenic river corridors within the Snake River Headwaters. The land uses on these inholdings vary from rural residential to agricultural. Water-related resource projects include in-stream channel modifications for water withdrawals and riverbank stabilizations. Livestock grazing and riparian habitat modifications are also common. These impacts would result in short- and long-term, negligible to minor, adverse, local to regional cumulative effects on vegetation, wildlife, and fish due to erosion from uses that remove vegetation or compact soils causing riverbank destabilizations, siltation, and deposition, as well as from fecal coliform contamination from livestock grazing near waterways.

Continuing effects of past land uses on Bridger-Teton National Forest lands may contribute to cumulative impacts on NPS-managed wild and scenic river resources downstream. Past land uses include grazing allotments, oil and gas leasing, mining, off-road vehicles, and timber production. The U.S. Forest Service is required, through the nondegradation and enhancement clause of the Wild and Scenic Rivers Act, to ensure protection of USFS-managed wild and scenic river segments upstream. Therefore, it is likely that the U.S. Forest Service would identify and resolve any issues or conflicts on its segments upstream in its comprehensive river management plan. These impacts would result in short- and long-term, negligible to minor, adverse, and local to regional cumulative effects on vegetation, wildlife, and fish. However, the impacts from the U.S. Forest Service implementing its river plan would likely be long-term, minor, beneficial, and local to regional due to integration of greater resource protection measures as required under the Wild and Scenic Rivers Act.

Overall, the impacts of these past, present, and reasonably foreseeable future actions, in combination with those described for alternative C, would result in short- and long-term, minor to moderate, adverse, local to regional cumulative impacts and long-term, minor to moderate, beneficial, local to regional cumulative impacts. Under this alternative, the eventual closure of River Road to public vehicular use would eliminate the need for ongoing road maintenance and rerouting that displaces sagebrush habitat. Therefore, upon future road closures, this activity would no longer contribute to adverse cumulative effects on vegetation and habitat. Implementation of management strategies under alternative C would contribute a substantial amount to the beneficial cumulative effects, as well as a substantial amount to the adverse cumulative effects.

Conclusion. Alternative C would have short- and long-term, minor to moderate, adverse, localized impacts and long-term, minor to moderate, beneficial, local to regional impacts on vegetation, wildlife, and fish. Impacts of this alternative, combined with the impacts of other past, present, and reasonably foreseeable future actions, would result in short- and long-term, minor to moderate, adverse, local to regional cumulative impacts and long-term, minor to moderate, beneficial, local to regional cumulative impacts. Alternative C would contribute a considerable amount to both the beneficial and adverse cumulative effects.

Section 106 Summary. After applying ACHP criteria of adverse effects (36 CFR 800.5, "Assessment of Adverse Effect"), the National Park Service concludes that implementation of alternative C would result in long-term, minor, beneficial, local to regional impacts on vegetation, wildlife, and fish as ethnographic resources, which would

result in a section 106 finding of *no adverse effect*. For future yet-defined activities or projects that may occur at the nine river access points, park staff would continue to meet their section 110 and 106 responsibilities as the details of proposed undertakings become known. Park staff would not consider project undertakings that would result in an adverse effect to ethnographic resources under section 106. As a result, the National Park Service anticipates that the actions defined under this alternative will result in a *no adverse effect* determination.

THREATENED AND ENDANGERED SPECIES

This impact topic includes threatened, endangered, and federal candidate species.

Methods and Assumptions for Analyzing Impacts

Federally and state listed threatened and endangered species are addressed together in this section because many of these species (1) have dual federal and state special status, (2) occur together in the same habitats, or (3) would be impacted similarly under each alternative. However, for federally listed and candidate species, impact thresholds are defined separately based on terminology from section 7 of the Endangered Species Act:

- **No effect:** When a proposed action would not affect a federally listed species, candidate species, or designated critical habitat.

- **May affect / not likely to adversely affect:** Effects on federally listed or candidate species are discountable (i.e., extremely unlikely to occur and are unable to be meaningfully measured, detected, or evaluated) or are completely beneficial.

- **May affect / likely to adversely affect:** Adverse effects on a federally listed or candidate species may occur as a direct or indirect result of proposed actions and the effects are either not discountable or completely beneficial.

- **Is likely to jeopardize proposed species / adversely modify proposed critical habitat (impairment):** The appropriate conclusion when the National Park Service or the U.S. Fish and Wildlife Service identifies situations in which the proposal could jeopardize the continued existence of a federally listed or candidate species or adversely modify critical habitat to a species within or outside park boundaries.

The following impact threshold definitions are used to describe the severity and magnitude of changes to federally and state listed species under each alternative. Each threshold definition references the Endangered Species Act determinations described above for federally listed species. Separate threshold definitions are provided for both adverse and beneficial impacts on provide additional details about the susceptibility and response of at-risk species to alternative management actions.

No Effect

- The action would have no effect on the special status species or critical habitat. This effect intensity equates to a section 7 *no effect* determination under the Endangered Species Act.

Negligible

- **Adverse:** There would be no observable or measurable impacts on federal or state listed species, their habitats (including critical habitat designated under the Endangered

Species Act), or the natural processes sustaining them. For federally listed species, this impact intensity would equate to a determination of *may affect / not likely to adversely affect* under section 7 of the Endangered Species Act.

- **Beneficial:** There would be no observable or measurable impacts on federally listed species, their habitats, or the natural processes sustaining them. For federally listed species, this impact intensity would equate to a determination of *may affect / not likely to adversely affect* under section 7 of the Endangered Species Act.

Minor

- **Adverse:** Impacts would not affect critical periods of lifecycle processes (e.g., reproduction) or their habitat. Individuals may temporarily avoid areas. Essential features of critical habitat would not be impacted. For federally listed species, this impact intensity would equate to a determination of *may affect / not likely to adversely affect* under section 7 of the Endangered Species Act.
- **Beneficial:** Impacts would result in slight increases to the viability of the species. Limiting factors (e.g., habitat loss, competition, and mortality) are kept in check. Nonessential features of critical habitat would be slightly improved. For federally listed species, this impact intensity would equate to a determination of *may affect / not likely to adversely affect* under section 7 of the Endangered species act.

Moderate

- **Adverse:** Individuals may be impacted by disturbances that interfere with critical lifecycle processes or their habitat; however, the level of impact would not result in a physical injury, mortality, or extirpation from the park. Some essential features of designated critical habitat would be reduced; however, the integrity of the habitat would be maintained. For federally listed species, this impact intensity would equate to a determination of *may affect / likely to adversely affect* under section 7 of the Endangered Species Act.
- **Beneficial:** Impacts would result in slight increases to viability of the species. Limiting factors (e.g., habitat loss, competition, and mortality) are reduced. Some essential features of critical habitat would be improved. For federally listed species, this impact intensity would equate to a determination of *may affect / not likely to adversely affect* under section 7 of the Endangered Species Act.

Major

- **Adverse:** Individuals may suffer physical injury or mortality or populations may be extirpated from the park. Essential features of designated critical habitat would be reduced, affecting the integrity of the designated unit. For federally listed species, this impact intensity would be considered a "take" situation and would equate to a determination of *likely to adversely affect* under section 7 of the Endangered Species Act.
- **Beneficial:** Impacts would result in highly noticeable improvements to species viability, population structure, and population levels. Limiting factors (e.g., habitat loss, competition, and mortality) are eliminated. All essential features of critical habitat would be improved. For federally listed species, this impact intensity would equate to a determination of *not likely to adversely affect* under section 7 of the Endangered Species Act.

Alternative A (No Action)

Headwaters-wide. Under the no-action alternative, the parks would continue to strive to protect federally and state listed threatened and endangered species. In many locations, these species would not be directly impacted under current management because they occur away from existing developments and visitor use areas. Additionally, the protection of prime, critical, or important habitats in select areas within the river corridor would continue at locations such as, but not limited to, areas along the Snake River scenic segment immediately within and surrounding Cattleman's Bridge; the area between Pacific Creek Landing and Oxbow Bend; and areas along Pacific Creek, Buffalo Fork, and the Gros Ventre river corridors. Because these and other ongoing management strategies, many threatened and endangered species would continue to be protected, resulting in long-term, minor to moderate, beneficial, and local to regional impacts.

The parks would also continue the commitment to protect threatened and endangered species as required by federal law and NPS policy. The parks would continue to evaluate water resource projects to ensure consistency with the wild and scenic river designation (section 7 evaluation guidelines), as well as perform periodic water quality monitoring, and mitigate the effects of snow storage and stormwater runoff at developed areas to avoid changes to vegetation, wildlife, and fish habitat. Because of these aspects of the current management approach, the threatened and endangered species and their habitats within both parks would continue to be protected, resulting in long-term, minor, beneficial, local to regional impacts.

Other resource management activities that would continue under the no-action alternative include promoting appropriate human behavior toward bears, such as food storage requirements and visitor education, in an effort to minimize conflicts, promote Leave No Trace principles, identify species of concern and coordinate monitoring and protection activities in the parks and the region, implement seasonal visitor use closures for nesting bald eagles and peregrine falcons, accommodate wildlife and fish passage with road crossings and culverts or other similar techniques, and implement seasonal fishing closures to protect spawning fish. These activities would result in long-term, minor to moderate, beneficial, local to regional impacts on vegetation, wildlife, and fish due to the reduction of vegetation trampling/removal, introduction of nonnative species, and human-wildlife conflicts, and the protection of wildlife and fish breeding periods.

However, under the no-action alternative, potential adverse impacts on federally and state listed species would also continue. These impacts would be similar to those described in the "Vegetation, Wildlife, and Fish" section. This is because many of the parks' threatened and endangered species use the same habitat discussed in that section. These and other impacts are further discussed under the following categories, which are used to assess environmental consequences of the alternatives—habitat alteration, habitat loss and fragmentation, and sensory-based disturbances.

Habitat Alteration. Habitat alterations are changes made to the environment that adversely affect ecosystem function although not completely or permanently. An example of this type of impact specific to the parks is the trampling of vegetation when hiking off trail or camping in undesignated areas. This trampling can lead to the loss of one or more individuals of a species, which can in turn further impact the remaining population by making the habitat less suitable. Not only can this adversely impact plant communities, but also wildlife dependent on these habitats for survival. Under the no-action alternative, the following threatened and endangered species may continue to experience long-term, negligible to minor, adverse, and localized impacts from repeated vegetation trampling and other possible habitat alteration at

multiple local sites within the parks—greater sage grouse (including areas of the Greater Sage Grouse Core Area), and yellow-billed cuckoo.

Habitat Loss and Fragmentation. Habitat loss is defined as the complete elimination of a local or regional ecosystem leading to the total loss of its former biological function. Development of the boat launches and other visitor and administrative facilities within the river corridor are examples of local habitat loss. Habitat fragmentation is a secondary effect of habitat loss. It occurs when populations of plants or animals are isolated because the links between their habitats have been destroyed. Road developments are a common example of habitat fragmentation, and the original construction of the park roads is no exception. Under the no-action alternative, there are no current or future plans to expand the extent of these developments within the river corridor. Therefore, no additional adverse impacts would occur beyond what took place during the initial construction of the boat launches and roads.

Sensory-based Disturbances. Disturbances to wildlife that are from noise, sights, or scents associated with visitor use are referred to as sensory-based disturbances. If these types of disturbances are intense or prolonged, they could lead to a population-level response such as displacement or reduced reproductive success. An example of a sensory-based disturbance is frequent noise from passing vehicles that causes a bird species to abandon nearby nesting sites.

Threatened and endangered wildlife species that occur in proximity to recreation developments within the river corridor would continue to be affected by human-caused disturbances from park operations, vehicular traffic, and visitor use. Noise disturbances include maintenance equipment, motor vehicles, generators, music, and human voices. Sight disturbances within the river corridor occur primarily in the form of light pollution. Artificial light from vehicles and campsites at nighttime can cause varying levels of disturbance to wildlife. Under the no-action alternative, the following threatened and endangered species would continue to be subject to long-term, minor to moderate, adverse, and local to regional impacts from these sensory-based disturbances within the river corridor—grizzly bear, gray wolf, Canada lynx, wolverine, greater sage grouse (including areas of the Greater Sage Grouse Core Area), and yellow-billed cuckoo.

Generally, across all headwaters, segments, and river access points, alternative A would continue to result in both adverse and beneficial effects on federally and state listed species within the headwaters. The adverse impacts would be short- to long-term, minor to moderate, and local to regional, primarily resulting from habitat alteration and sensory-based disturbances caused by recreational use and park operations and from other proposed actions noted under alternative A in the "Vegetation, Wildlife, and Fish" section. The beneficial impacts would be long term, minor to moderate, and local to regional, primarily resulting from continued efforts to protect prime, critical, or important habitats in select areas of the river corridors and from other habitat management efforts noted under alternative A in the "Vegetation, Wildlife, and Fish" section.

Cumulative Effects. Past, present, and reasonably foreseeable future actions that could impact threatened and endangered species include site improvements, which are currently in progress, to the Moose headquarters complex in Grand Teton National Park. The site improvement most related to impacts on these resources is the complete reconfiguration of vehicle and pedestrian traffic within the administrative and Moose Landing areas, removal of several temporary buildings, and improvement of stormwater management. These impacts would result in short- and long-term, negligible to minor, adverse and beneficial, local to regional cumulative effects on threatened and endangered species.

The operations of Jackson Lake Dam contribute to the cumulative impacts on wild and scenic resources and values due to the alteration of natural flow regimes of Snake River. Releases fluctuate by season, levels of precipitation, and irrigation needs. Generally, threatened and endangered species are not greatly impacted by the dam releases. These impacts would result in short- and long-term, negligible to minor, adverse, local to regional cumulative effects on threatened and endangered species due to regulation of the natural flow regime, which affects water-related resources such as the presence and health of vegetation, habitat requirements, and aquatic species that perform water pollution filtering activities further protecting riparian area water and vegetation.

There are private inholdings along the designated wild and scenic river corridors within the Snake River Headwaters. The land uses on these inholdings vary from rural residential to agricultural. Water-related resource projects include in-stream channel modifications for water withdrawals and riverbank stabilizations. Livestock grazing and riparian habitat modifications are also common. These impacts would result in short- and long-term, negligible to minor, adverse, local to regional cumulative effects on threatened and endangered species due to habitat alteration from uses that remove vegetation, as well as from fecal coliform contamination of habitat and water resources from livestock grazing near waterways.

Continuing effects of past land uses on Bridger-Teton National Forest lands may contribute to cumulative impacts on NPS-managed wild and scenic river resources downstream. Past land uses include grazing allotments, oil and gas leasing, mining, off-road vehicles, and timber production. The U.S. Forest Service is required, through the nondegradation and enhancement clause of the Wild and Scenic Rivers Act, to ensure protection of USFS-managed wild and scenic river segments upstream. Therefore, it is likely that the U.S. Forest Service would identify and resolve any issues or conflicts on its segments upstream in its comprehensive river management plan. These impacts would result in short- and long-term, negligible to minor, adverse, local to regional cumulative effects on threatened and endangered species. However, the impacts from the U.S. Forest Service implementing its river plan would likely be long term, minor, beneficial, and local to regional due to integration of greater resource protection measures as required under the Wild and Scenic Rivers Act.

Overall, the impacts of these past, present, and reasonably foreseeable future actions, in combination with those described for the no-action alternative, would result in short- and long-term, minor to moderate, adverse, local to regional cumulative impacts and long-term, minor to moderate, beneficial, local to regional cumulative impacts. Continuation of current management under alternative A would contribute a small extent to the beneficial cumulative effects, as well as a small amount to the adverse cumulative effects.

Conclusion. The no-action alternative would have short- to long-term, minor to moderate, adverse, local to regional impacts and long-term, minor to moderate, beneficial, local to regional impacts on federally and state listed species within the headwaters. Impacts of this alternative, combined with the impacts of other past, present, and reasonably foreseeable future actions, would result in short- and long-term, minor to moderate, adverse, local to regional cumulative impacts and long-term, minor to moderate, beneficial, local to regional cumulative impacts. Alternative A would contribute a small amount to the beneficial cumulative effects, as well as a small amount to the adverse cumulative effects.

Alternative B

The proposed site planning for the river access points is expected to be about one acre or less of site disturbance, with the exception

of the Pacific Creek Landing relocation under alternative B, which would result in a greater extent of disturbed acreage.

Headwaters-wide. Under alternative B, federally and state listed threatened and endangered species would have many of the same broad effects described under the "Vegetation, Wildlife, and Fish" section for this alternative. For example, this alternative's increased collaborative and interdisciplinary approach to ecosystem management would include headwaters-wide and regional strategies that emphasize multiyear and multiagency (federal and state) projects, as well as working more closely with private landowners within the river corridor to protect, restore, and enhance natural communities. This would also benefit threatened and endangered species that rely on these natural communities for their habitat.

Under this alternative, formal use capacity indicators and standards for resource protection would be established and monitored for each segment, including the continued monitoring of water quality, to ensure greater resource protection. Use varies by river segment; however, each segment is subject to visitor use and the potential impacts that can arise from use, such as littering, fecal coliform contamination, and erosion from vegetation trampling/removal and soil compaction. An appropriate variety of monitoring, documentation, and mitigation of identified issues would have long-term, minor to moderate, beneficial, local to regional impacts on threatened and endangered species.

Habitat Alteration. Under alternative B, backcountry trails and campsites would continue to be maintained, and there would be some minimal modifications made to several boat launches and some new trails or existing trails for better delineation, which could inadvertently alter habitats essential for threatened and endangered species. Additional hikers, horseback riders, and campers could also alter these habitats by repeatedly trampling vegetation from off-trail use. For example, invasive species could be spread unintentionally during construction or recreational use. Under this alternative, the following federally and state listed threatened and endangered species would be most vulnerable to these types of habitat alterations, potentially resulting in short- and long-term, minor to moderate, localized impacts—grizzly bears, wolves, Canada lynx, wolverine, greater sage grouse (including areas of the Greater Sage Grouse Core Area), and yellow-billed cuckoo.

Under alternative B, several areas such as the large parking lot at the Flagg Ranch launch site and other informal parking areas and trails, as well as a portion of the road at Cattleman's Bridge would be closed and fully restored to natural conditions. These actions would have long-term, minor to moderate, beneficial, localized impacts on threatened endangered species and their habitats, particularly on grizzly bears, wolves, Canada lynx, wolverine, greater sage grouse (including areas of the Greater Sage Grouse Core Area), and yellow-billed cuckoo.

Habitat Loss and Fragmentation. Under alternative B, strategies to expand recreational developments could result in the loss or fragmentation of habitats essential to threatened and endangered species. For example, the development of a new boat launch facility along the Snake River scenic segment just before the confluence with Pacific Creek would disrupt the natural movement of species in that area. The majority of the other boat launch site modifications and trail development and delineation are unlikely to directly impact the habitats of threatened and endangered species because these developments would not expand greatly, if at all, beyond their current footprint and would avoid affecting sensitive habitats. However, there is still a potential for such effects. Under this alternative, the following listed species could potentially be subject to long-term, moderate, adverse, and localized impacts if new developments and uses are not considered

before implementation: grizzly bears, wolves, Canada lynx, and wolverine.

Sensory-based Disturbances. Under alternative B, sensory-based disturbances to threatened and endangered species would be greatest in portions of the river corridor that would offer expanded recreational opportunities in proximity to their habitats. These areas would in turn attract greater numbers of visitors, resulting in heightened levels of noise and sight disturbance, which could cause species to avoid areas, especially during peak periods of visitor use. Under this alternative, grizzly bears, wolves, Canada lynx, wolverines, greater sage grouse (including areas of the Greater Sage Grouse Core Area), and yellow-billed cuckoos could potentially be subject to long-term, minor to moderate, adverse, and localized impacts due to their use of areas where recreation and visitor services and amenities such as boat launches are located.

Generally, across all headwaters, segments, and river access points, alternative B would result in both adverse and beneficial effects on federally and state listed species within the headwaters. The adverse impacts would be short to long term, minor to moderate, and localized, primarily resulting from habitat alteration, habitat loss, and sensory-based disturbances caused by proposed alterations and relocations of river access points, increases in recreational use and maintenance activities, and from other proposed actions noted under alternative B in the "Vegetation, Wildlife, and Fish" section. The beneficial impacts would be long-term, minor to moderate, and local to regional, primarily resulting from enhanced habitat management strategies noted under alternative B in the "Vegetation, Wildlife, and Fish" section.

Cumulative Effects. Past, present, and reasonably foreseeable future actions that impact threatened and endangered species includes the site improvements, which are currently in progress, to the Moose headquarters complex in Grand Teton National Park. The site improvement most related to impacts on these resources is the complete reconfiguration of vehicle and pedestrian traffic within the administrative and Moose Landing areas, removal of several temporary buildings, and improvement of stormwater management. These impacts would result in short- and long-term, negligible to minor, adverse and beneficial, local to regional cumulative effects on threatened and endangered species.

The operations of the Jackson Lake Dam contribute to the cumulative impacts on wild and scenic resources and values due to the alteration of natural flow regimes of Snake River. Releases fluctuate by season, levels of precipitation, and irrigation needs. Generally, threatened and endangered species are not greatly impacted by the dam releases. These impacts would result in short- and long-term, negligible to minor, adverse, local to regional cumulative effects on threatened and endangered species due to regulation of the natural flow regime, which affects water-related resources such as the presence and health of vegetation, habitat requirements, and aquatic species that perform water pollution filtering activities further protecting riparian area water and vegetation.

There are private inholdings along the designated wild and scenic river corridors within the Snake River Headwaters. The land uses on these inholdings vary from rural residential to agricultural. Water-related resource projects include in-stream channel modifications for water withdrawals and riverbank stabilizations. Livestock grazing and riparian habitat modifications are also common. These impacts would result in short- and long-term, negligible to minor, adverse, local to regional cumulative effects on threatened and endangered species due to habitat alteration from uses that remove vegetation, as well as from fecal coliform contamination of habitat and water resources from grazing near waterways.

Continuing effects of past land uses on Bridger-Teton National Forest lands may

contribute to cumulative impacts on NPS-managed wild and scenic river resources downstream. Past land uses include grazing allotments, oil and gas leasing, mining, off-road vehicles, and timber production. The U.S. Forest Service is required, through the nondegradation and enhancement clause of the Wild and Scenic Rivers Act, to ensure protection of USFS-managed wild and scenic river segments upstream. Therefore, it is likely that the U.S. Forest Service would identify and resolve any issues or conflicts on its segments upstream in its comprehensive river management plan. These impacts would result in short- and long-term, negligible to minor, adverse, local to regional cumulative effects on threatened and endangered species. However, the impacts from the U.S. Forest Service implementing its river plan would likely be long term, minor, beneficial, and local to regional due to integration of greater resource protection measures as required under the Wild and Scenic Rivers Act.

Overall, the impacts of these past, present, and reasonably foreseeable future actions, in combination with those described for alternative B, would result in short- and long-term, minor to major, adverse, local to regional cumulative impacts and long-term, minor to moderate, beneficial, local to regional cumulative impacts. Implementation of management strategies under alternative B would contribute a substantial extent to the beneficial cumulative effects, as well as a substantial amount to the adverse cumulative effects.

Conclusion. Alternative B would have short- to long-term, minor to moderate, adverse, local to regional impacts and long-term, minor to moderate, beneficial, local to regional impacts on threatened and endangered species. Impacts of this alternative, combined with the impacts of other past, present, and reasonably foreseeable future actions, would result in short- and long-term, minor to moderate, adverse, local to regional cumulative impacts and long-term, minor to moderate, beneficial, local to regional cumulative impacts. Alternative B would contribute a substantial amount to both the beneficial and adverse cumulative effects.

Alternative C (Preferred)

The proposed site planning for the river access points is expected to be about one acre or less of site disturbance.

Headwaters-wide. Under alternative C, federally and state listed threatened and endangered species would have many of the same broad effects described under the "Vegetation, Wildlife, and Fish" section for this alternative. For example, this alternative's increased collaborative and interdisciplinary approach to ecosystem management would include headwaters-wide and regional strategies that emphasize multiyear and multiagency (federal and state) projects, as well as working more closely with private landowners within the river corridor to protect, restore, and enhance natural communities. This would also benefit threatened and endangered species that rely on these natural communities for their habitat.

Under this alternative, formal user capacity indicators and standards for resource protection would be established and monitored for each segment, including the continued monitoring of water quality, to ensure greater resource protection. Use varies by river segment; however, each segment is subject to visitor use and the potential impacts that can arise from use, e.g., littering, fecal coliform contamination, and erosion from vegetation trampling/removal and soil compaction. An appropriate variety of monitoring, documentation, and mitigation of identified issues would have long-term, minor to moderate, beneficial, local to regional impacts on threatened and endangered species. Therefore, the preferred alternative *may affect / is not likely to adversely affect* threatened and endangered species.

Habitat Alteration. Under alternative C, backcountry trails and campsites would continue to be maintained, and there would be some minimal modifications made to several boat launches and some new trails or existing trails for better delineation, and the redesign of the park road at the confluence with Buffalo Fork, which could inadvertently alter habitats essential for threatened and endangered species. Additional hikers and campers could also alter these habitats by repeatedly trampling vegetation from off-trail use. For example, invasive species could be spread unintentionally during construction or recreational use. Under this alternative, the following federally and state listed threatened and endangered species would be most vulnerable to these types of habitat alterations, potentially resulting in short- and long-term, adverse, minor, localized impacts—grizzly bears, wolves, Canada lynx, wolverine, greater sage grouse (including areas of the Greater Sage Grouse Core Area), and yellow-billed cuckoo. Therefore, the preferred alternative *may affect / is not likely to adversely affect* grizzly bears, wolves, Canada lynx, wolverine, greater sage grouse, and yellow-billed cuckoo.

Under alternative C, several areas such as the large parking lot at the Flagg Ranch launch site and other informal parking areas and trails, as well as the road at Cattleman's Bridge would be closed and partially restored to natural conditions. These actions would have long-term, minor to moderate, beneficial impacts on threatened endangered species, particularly on grizzly bears, wolves, Canada lynx, wolverine, greater sage grouse (including areas of the Greater Sage Grouse Core Area), and yellow-billed cuckoo. Therefore, the preferred alternative *may affect / is not likely to adversely affect* grizzly bears, wolves, Canada lynx, wolverine, greater sage grouse, and yellow-billed cuckoo.

Habitat Loss and Fragmentation. Under alternative C, there are no strategies to expand recreational developments that could result in the loss or fragmentation of habitats essential to threatened and endangered species. The strategies under this alternative generally focus on ways to reduce impacts on natural resources, including threatened and endangered species. For example, several parking areas within the corridor would be consolidated and fully restored (mainly at Flagg Ranch, along the road at Deadman's Bar, and at Schwabacher Landing), and the closure of the road at Cattleman's Bridge would reduce fragmentation and increase important grizzly bear habitat. The future closure of River Road would also eliminate the need for continual road maintenance and rerouting (and related habitat displacement) along the Snake River in this area. The closure would allow some habitat restoration to occur as well. The majority of the other boat launch site modifications and trail developments and delineations are unlikely to directly impact the habitats of threatened and endangered species because these developments would not expand greatly, if at all, beyond their current footprint and would avoid affecting sensitive habitats. However, there is still a small potential for minor, localized effects. Under this alternative, the following listed species would mainly be subject to long-term, minor to moderate, beneficial, and localized impacts from habitat restoration—grizzly bears, wolves, Canada lynx, and wolverine. Therefore, the preferred alternative *may affect / is not likely to adversely affect* grizzly bears, wolves, Canada lynx, and wolverine.

Sensory-based Disturbances. Under alternative C, sensory-based disturbances to threatened and endangered species would be greatest in portions of the river corridor that would offer few expanded recreational opportunities in proximity to their habitats. These areas would in turn attract greater numbers of visitors, resulting in heightened levels of noise and sight disturbance, which could cause species to avoid areas, especially during peak periods of visitor use. Under this alternative, grizzly bears, wolves, Canada lynx, wolverine, greater sage grouse (including areas of the Greater Sage Grouse Core Area), and yellow-billed cuckoo could

potentially be subject to long-term, negligible to minor, adverse, and localized impacts due to use of areas where recreation and visitor services and amenities, such as boat launches, are located. Therefore, the preferred alternative *may affect / is not likely to adversely affect* threatened and endangered species.

Generally, across all headwaters, segments, and river access points, alternative B would result in both adverse and beneficial effects on federally and state listed species within the headwaters. The adverse impacts would be short to long term, minor to moderate, and localized, primarily resulting from habitat alteration, habitat loss, and sensory-based disturbances caused by proposed alterations and relocations of river access points, increases in recreational use and maintenance activities, and from other proposed actions noted under alternative B in the "Vegetation, Wildlife, and Fish" section. The beneficial impacts would be long-term, minor to moderate, and local to regional, primarily resulting from enhanced habitat management strategies noted under alternative B in the "Vegetation, Wildlife, and Fish" section.

Cumulative Effects. Past, present, and reasonably foreseeable future actions that impact threatened and endangered species include site improvements, which are currently in progress, to the Moose headquarters complex in Grand Teton National Park. The site improvement most related to impacts on these resources is the complete reconfiguration of vehicle and pedestrian traffic within the administrative and Moose Landing areas, removal of several temporary buildings, and improvement of stormwater management. These impacts would result in short- and long-term, negligible to minor, adverse and beneficial, local to regional cumulative effects on threatened and endangered species. Therefore, the preferred alternative *may affect / is not likely to adversely affect* threatened and endangered species.

The operations of Jackson Lake Dam contribute to the cumulative impacts on wild and scenic resources and values due to the alteration of natural flow regimes of Snake River. Releases fluctuate by season, levels of precipitation, and irrigation needs. Generally, threatened and endangered species are not greatly impacted by the dam releases. These impacts would result in short- and long-term, negligible to minor, adverse, local to regional cumulative effects on threatened and endangered species due to regulation of the natural flow regime, which affects water-related resources such as the presence and health of vegetation, habitat requirements, and aquatic species that perform water pollution filtering activities further protecting riparian area water and vegetation. Therefore, the preferred alternative *may affect / is not likely to adversely affect* threatened and endangered species.

There are private inholdings along the designated wild and scenic river corridors within the Snake River Headwaters. The land uses on these inholdings vary from rural residential to agricultural. Water-related resource projects include in-stream channel modifications for water withdrawals and riverbank stabilizations. Livestock grazing and riparian habitat modifications are also common. These impacts would result in short- and long-term, negligible to minor, local to regional cumulative effects on threatened and endangered species due to habitat alteration from uses that remove vegetation, as well as from fecal coliform contamination of habitat and water resources from grazing near waterways. Therefore, the preferred alternative *may affect / is not likely to adversely affect* threatened and endangered species.

Continuing effects of past land uses on Bridger-Teton National Forest lands may contribute to cumulative impacts on NPS-managed wild and scenic river resources downstream. Past land uses include grazing allotments, oil and gas leasing, mining, off-road vehicles, and timber production. The U.S. Forest Service is required, through the

nondegradation and enhancement clause of the Wild and Scenic Rivers Act, to ensure protection of USFS-managed wild and scenic river segments upstream. Therefore, it is likely that the U.S. Forest Service would identify and resolve any issues or conflicts on its segments upstream in its comprehensive river management plan. These impacts would result in short- and long-term, negligible to minor, local to regional cumulative effects on threatened and endangered species. However, the impacts from the U.S. Forest Service implementing its river plan would likely be long term, minor, and beneficial due to integration of greater resource protection measures as required under the Wild and Scenic Rivers Act.

Overall, the impacts of these past, present, and reasonably foreseeable future actions, in combination with those described for alternative C, would result in short- and long-term, minor to moderate, adverse, local to regional cumulative impacts and long-term, minor to moderate, beneficial, local to regional cumulative impacts. Implementation of management strategies under alternative C would contribute a substantial extent to the beneficial cumulative effects, as well as a small amount to the adverse cumulative effects. Therefore, the preferred alternative *may affect / is not likely to adversely affect* threatened and endangered species.

Conclusion. Table 23 summarizes the determinations of effect for alternative C on federally listed species under the Endangered Species Act. This table is included to help fulfill NPS obligations under section 7 of the Endangered Species Act to complete species-specific determinations of effect of the actions of the preferred alternative.

Alternative C would have short- to long-term, minor, adverse, localized impacts and long-term, minor to moderate, beneficial, local to regional impacts on threatened and endangered species. Impacts of this alternative, combined with the impacts of other past, present, and reasonably foreseeable future actions, would result in short- and long-term, minor to moderate, adverse, local to regional cumulative impacts and long-term, minor to moderate, beneficial, local to regional cumulative impacts. Alternative C would contribute a considerable amount to the beneficial, cumulative effects and a small amount to adverse cumulative effects.

SOILS

Introduction

Soil can be affected by development, ecological restoration, and visitor use. Because alternatives presented in this comprehensive river management plan include actions that would affect soil resources, this section has been included.

Methods and Assumptions for Analyzing Impacts

The effects of the management alternatives on geologic resources and soils of the headwaters are analyzed based on impacts resulting from visitor use patterns and levels of development associated with each alternative. The thresholds to determine the intensity of impacts are defined as follows:

- **Negligible:** The impact is barely detectable and/or would result in no measurable or perceptible changes to geologic resources or soils.

TABLE 23. SUMMARY OF FEDERALLY LISTED SPECIES DETERMINATIONS FOR THE PREFERRED ALTERNATIVE

Federally Listed Species[1]	Endangered Species Act Determination of Effect
Grizzly bear	MA / NLAA[2]
Gray wolf	MA / NLAA
Canada lynx	MA / NLAA
North American wolverine	MA / NLAA
Greater sage grouse	MA / NLAA
Yellow-billed cuckoo	MA / NLAA
Whitebark pine	NE[3]

1. See Table 10 in chapter 4 for scientific names of these species; 2. May affect/ not likely to adversely affect; 3. No effect: Some species are included on this table because they are federally listed in the area, but the plan will have no effect (see chapter 4, "Threatened and Endangered Species").

- **Minor:** The impact is slight but detectable and/or would result in small but measurable changes to geologic resources or soils.
- **Moderate:** The impact is readily apparent and/or would result in easily detectable changes to geologic resources or soils.
- **Major:** The impact is severely adverse or exceptionally beneficial and/or would result in appreciable changes to geologic resources or soils.

Alternative A (No Action)

Headwaters-wide. Federal agencies within the Greater Yellowstone Ecosystem coordinate efforts to monitor and manage resources of the parks, national forests, and wildlife refuges, where possible, respecting their distinct authorities and mandates. The parks collaborate with the U.S. Forest Service as necessary for natural resource management, especially in fire management. Under this alternative, management activities would continue to be coordinated as necessary with other federal and state agencies. The collaborative management between the parks and federal and state agencies would have long-term, minor, beneficial, and local to regional impacts on soils because having multiple management entities could allow more comprehensive and sustainable management efforts and outcomes.

Visitor activities that would continue to impact soils within the headwaters include hiking, backcountry camping, horseback riding, recreating along the banks, picnicking, and parking in undesignated areas. Ongoing impacts from existing developments along the river corridors, e.g., trails, can also occur if they are improperly designed or unmaintained. The lack of adequate developments to support varying types and levels of visitation can also lead to soil-related impacts, such as the lack of parking areas and trail delineation to prevent parking in undesignated areas and off-trail use. Maintenance activities that would also continue to impact soils within the headwaters include road, bridge, culvert, riprap, parking area, and other facility maintenance and repairs. River Road would continue to be open for public vehicular use. Maintenance and possible rerouting of the road would also continue in response to natural migrations of the Snake River. Under

the no-action alternative, these activities and developments would continue to cause short- and long-term, minor to moderate, adverse, localized impacts on soils. These impacts would primarily result from soil disturbance, erosion, and compaction from maintenance activities and from routine visitation to designated areas within the river corridors. The ongoing maintenance and possible rerouting of River Road would continue to displace native soil strata and cause erosion at various points along the road corridor, including up to 5 acres of anticipated land disturbance when the road needs to be realigned adjacent to the Snake River over the next 20 years.

Under this alternative, there are currently no formal user capacity indicators being monitored for resource protection and no formal standards are established except for water quality. Use varies by river segment; however, each segment is subject to visitor use and the potential impacts that can arise from use, such as soil removal, compaction, and erosion. Consequently, a lack of appropriate monitoring, documentation, and subsequent mitigation of identified issues would continue to have long-term, minor to moderate, adverse, local to regional impacts on soils within the parks.

River Segments. Individual river segments would experience similar impacts on soils as those described under the headwaters-wide section and are therefore not described in detail.

River Access Points.

Flagg Canyon— The boat launch is on a smaller channel of Snake River. During periods of low water, it can be challenging to launch a boat due to shallow water. The development at Flagg Canyon includes a 0.12-mile gravel road, which extends from North Park Road to the parking lot and boat launch. There is a picnic area with several picnic tables to the north of the boat launch. The boat launch is steep and has a wood slide ramp system with steps connecting to the river. Flagg Canyon is the put-in site for commercial and private float and fishing trip users in smaller boats (10- to 12-foot rafts, 12- to 14-foot drift boats, and whitewater kayaks). The boat launch receives light use. The use at this boat launch would result in long-term, minor, adverse, localized impacts on soils due to compaction, removal, and erosion from visitor use and maintenance activities.

Flagg Ranch—The boat launch site is immediately upriver from a North Park Road bridge over Snake River. The river is stable in this segment without significant amounts of sedimentation or erosion. The development at Flagg Ranch includes a 0.08-mile gravel road that extends from North Park Road to the parking lot and boat ramp. There is one natural surface and metal matting ramp for boat launching. There is one picnic table adjacent to the parking lot. The parking lot is approximately 0.75 acre and rarely is full. The Wyoming Department of Environmental Quality maintains a building for monitoring a fuel-contaminated site in the area. There is no restroom facility at this boat launch, and visitors often mistake the monitoring building as a restroom and subsequently improperly dispose of human waste and toilet paper. Flagg Ranch is the take-out point for private and commercial float and fishing tours through the canyon. Generally, the boats that use this launch are smaller in size (10- to 12-foot rafts, 12- to 14-foot drift boats, and whitewater kayaks). The boat launch receives light use. The use at this boat launch would result in long-term, minor, adverse, localized impacts on soils due to compaction, removal, and erosion from visitor use and maintenance activities.

Jackson Lake Dam—The boat launch site is not technically within the wild and scenic river corridor because of its proximity to the Jackson Lake Dam. The boat launch site occurs at a highly stable section of river that does not experience much erosion or deposition. The boat launch site is within a few hundred feet of the outlet of the dam. It consists of a 20- to 30-foot-high earthen

berm used for parking, fishing, and launching boats. No formal boat launch facilities or designated areas exist at this site. There is a second gravel parking area (upper parking lot) farther from the river that has a few picnic tables and restroom facilities; this parking lot does not receive much use. This launch site is popular for private use and commercial fishing trips. The types of boats used at this site include fishing dories, canoes, kayaks, and rafts. Visitors hand carry or slide their boats down the gravel slope. The use at this launch would result in long-term, negligible to minor, adverse, localized impacts on soils due to compaction, removal, and erosion, mainly from larger vehicles attempting to turn around at the launch site when it is crowded, and from social trailing between the upper parking lot and the launch site where there is currently no trail and visitors walk on the vegetated area to stay off the road when vehicles are entering the launch site.

Cattleman's Bridge—A 1.15-mile gravel road extends south from Outside Highway to a small gravel parking lot and primitive boat launch site. Between the highway and the launch site is a cook site that is no longer used. At the parking lot and launch area, there is a large sign marking the former location of Cattleman's Bridge. There are no restroom facilities and therefore the improper disposal of human waste is prevalent in this area. The river is reasonably stable in this site, although the parking area and sections of the road do experience seasonal flooding. Most years this area has closures because of nesting eagles, making the area inaccessible to boaters. There is some demand for put-in at this site by private users with small boats. The use is typically not trailered boats. The use in this area would result in long-term, minor to moderate, adverse, localized impacts on soils due to compaction, removal, and erosion from visitor use and maintenance activities.

Oxbow Bend Overlooks—These popular overlooks provide outstanding views of Teton Range with the Oxbow Bend feature of the Snake River in the foreground. Oxbow Bend provides high quality habitat for many species, including moose, trumpeter swans, pelicans, and other birds. The area is a popular spot for viewing wildlife and photography. Development at the overlooks includes a paved parking area and a paved parking turn-off. Both parking areas often reach capacity during periods of peak visitation or NPS ranger-led interpretive programs. Vegetation (scrubs and trees) at the overlooks obscures some views and visitors often walk down the slope from the parking area to the edge of the river to obtain clearer views. There is no official trail from either parking area and as a result, there are many social trails leading to the river. There are also no restroom facilities. Visitor use in this area would continue to result in long-term, minor to moderate, adverse, localized impacts on soils due to vegetation removal and riverbank destabilization, as well as soil compaction and erosion from the creation and use of social trails.

Pacific Creek Landing—The hydrological and geomorphological conditions at this location are the most challenging of the boat launch sites due to its location just below the Pacific Creek confluence. This location results in high levels of sedimentation that require frequent maintenance and adaptive management (e.g., sediment removal, application of temporary matting) of the ramp to maintain access throughout the season. This launch site consists of a medium-sized paved parking lot, restroom facility, one-lane road connecting the parking area to the launch, failing log and boulder retaining wall, and boat ramp and the associated ramp circulation area. Across Outside Highway is a gravel parking area. This parking lot is occasionally used for overflow parking from the Pacific Creek parking lot. Pacific Creek Landing is the most highly used take-out site for private users with mostly fishing dories, canoes, and kayaks. It is also a highly used put-in site for commercial fishing. There is some commercial put-in for rafting. There is a high volume of anglers at this launch site. Anglers

predominantly use 14- to 16-foot dories and 12- to 14-foot rafts. Scenic rafting use is mostly 20-foot Snake River rafts, some 14- to 18-foot rafts, and a few 28-foot snout rig rafts. Most boaters are using trailers at this site. The visitor use and maintenance of this site would continue to result in long-term, moderate, adverse, localized impacts on soils due to compaction, removal, and erosion from the extensive amount of in-stream sediment removal that is required to maintain access, e.g., the one-lane road to the launch and small turning radius at the launch often cause visitors to drive off the paved areas; social trailing; and lack of riverbank stabilization.

Deadman's Bar—The hydrologic and geomorphic conditions at Deadman's Bar are challenging, but reasonably stable. The boat ramp is on the inside of a bend, on what is essentially a point bar. Unlike most point bars, this bar is relatively stable due to the high, slowly eroding bluff on the other side of the river. The development at Deadman's Bar includes a 0.83-mile gravel and paved road that extends from Outside Highway to the parking lot and boat ramp. There are two sand ramps and vault restroom facilities adjacent to the gravel parking lot. There is also a 0.25-mile trail leading to a cook site and two picnic sites frequently used by concessioners. A restricted access gravel road also leads to these sites. Deadman's Bar is the most heavily used put-in site for commercial users (mostly scenic). The upstream launch is more heavily used because there is a rock outcropping downstream of this launch site and boats entering the river at the upstream launch site have more time to navigate around the rock outcropping. The anglers predominantly use 14- to 16-foot dories and some 12- to 14-foot rafts. Scenic rafting use is mostly 20-foot Snake River rafts, a few 14- to 18-foot rafts, and a few 28-foot snout rig rafts. The visitor use at this site would continue to result in long-term, moderate, adverse, localized impacts on soils due to compaction, removal, and erosion—including the trampling or removal of vegetation, which causes greater soil destabilization—from parking inefficiencies causing visitors to park in undesignated areas alongside the road, vehicles becoming stuck in the launch, boaters disembarking in the areas just north of the official launches to avoid the rock outcropping, and use of the cook site and picnic sites.

Schwabacher Landing—Schwabacher Landing is in a braided section of Snake River. For many years, the main channel of the Snake River was near the two parking areas. The main channel is currently west of the road and parking area. There is a smaller channel that passes by the parking lot and road areas, but it is often shallow and boat access is limited. The development here includes a 1.1-mile gravel road, small parking area adjacent to the road (0.08 acre), a parking area (0.12 acre) and short trail to the river, and a larger parking area (0.28 acre) with a single vault toilet. All roads and parking areas are gravel, although a 0.33-mile section of road nearest the highway would be paved in 2014 under a separate approved park action. Schwabacher Landing is a popular place for events (by special use permit) such as weddings, and for fishing, and viewing the Teton Range and wildlife. The use in this area would continue to result in long-term, minor, adverse, localized impacts on soils resources due to compaction, removal, and erosion—including the trampling or removal of vegetation, which causes greater soil destabilization—from vehicles driving off the side of the road to either avoid ruts or allow other vehicles to pass, social trailing, and large numbers of visitors attending special events.

Moose Landing—River conditions in this area require some periodic maintenance to facilitate safe boat landings. There is a slight bend to the east and it tends to keep much of the flow energy on the west bank. This situation causes bank erosion and the development of submerged bars near the west bank. A gravel bar is dredged approximately every 10 years to maintain access to the boating facilities. To minimize

the rate of erosion on the west bank, it is important to maintain a healthy riparian forest, the roots of which add structural integrity to the bank. The Moose Landing boat launch facilities are between the park administrative area and Snake River, north of Craig Thomas Discovery and Visitor Center. The boat launch development is scattered along the shore. The development includes a gravel parking lot and staging area (used by concessioners), several boat pullouts/ passenger unloading areas (landing area), new trails, concrete ramp (upper ramp), concrete ramp with overhead hoisting infrastructure (lower ramp), a concrete and steel retaining wall, vault restroom facilities, concessioner rigging area, concessioner client parking area, and a RV and private fishing parking lot. Moose Landing is the busiest of the launch sites under study in this comprehensive river management plan. This site is primarily used as a take-out point used predominantly by concessioners removing 20-foot rafts. There are a few 32-foot rafts pulling out at this site. This site can become congested with up to ten to twelve 20-foot rafts trying to get off the river at the same time. The visitor use and maintenance of this site would continue to result in long-term, moderate, adverse, localized impacts on soils due to compaction, removal, and erosion—including the trampling or removal of vegetation, which causes greater soil destabilization—from the extensive amount of in-stream sediment removal that is required to maintain access, the natural bank erosion exacerbated by boat disembarking activities, lack of riverbank stabilization, and social trailing between administrative facilities and the launch.

Overall, across the entire headwaters, segments, and river access points, alternative A would continue to result in both adverse and beneficial effects on soils within the headwaters. The adverse impacts would be short- to long term, minor to moderate, and local to regional, primarily resulting from soil disturbance, compaction, and erosion from visitor use and maintenance activities that remove vegetation or compact soils. Other impacts from maintenance equipment and operations, such as snow removal activities, would also contribute to these adverse effects (e.g., sand and gravel deposition, siltation). The beneficial impacts would be long-term, minor, and local to regional, primarily resulting from increased collaborative management as having multiple management entities could allow more comprehensive and sustainable management efforts and outcomes.

Cumulative Effects. Past, present, and reasonably foreseeable future actions that impact soils include site improvements, which are currently in progress, to the Moose headquarters complex in Grand Teton National Park. The site improvement most related to impacts on soils is the complete reconfiguration of vehicle and pedestrian traffic within the administrative and Moose Landing areas, removal of several temporary buildings, and improvement of stormwater management. These impacts would result in short- and long-term, minor to moderate, adverse, localized, cumulative effects on soils.

The operations of the Jackson Lake Dam contribute to the cumulative impacts on wild and scenic resources and values due to the alteration of natural flow regimes of Snake River. Releases fluctuate by season, levels of precipitation, and irrigation needs. These impacts would result in long-term, minor, adverse, localized cumulative effects on soils due to regulation of the natural flow regime, which affects water-related resources such as the presence and health of vegetation stabilization.

There are private inholdings along the designated wild and scenic river corridors within the Snake River Headwaters. The land uses on these inholdings vary from rural residential to agricultural. Water-related resource projects include in-stream channel modifications for water withdrawals and riverbank stabilizations. Livestock grazing and riparian habitat modifications are also common. These impacts would result in long-term, minor, adverse, and localized

cumulative effects on soils due to erosion from uses that remove vegetation or compact soils causing riverbank destabilization, siltation, and deposition, as well as from fecal coliform contamination from livestock grazing near waterways.

Continuing effects of past land uses on Bridger-Teton National Forest lands may contribute to cumulative impacts on NPS-managed wild and scenic river resources downstream. Past land uses include grazing allotments, oil and gas leasing, mining, off-road vehicles, and timber production. The U.S. Forest Service is required, through the nondegradation and enhancement clause of the Wild and Scenic Rivers Act, to ensure protection of USFS-managed wild and scenic river segments upstream. Therefore, it is likely that the U.S. Forest Service would identify and resolve any issues or conflicts on its segments upstream in its comprehensive river management plan. These impacts would result in long-term, negligible to minor, adverse, and localized cumulative effects on soils. However, the impacts from the U.S. Forest Service implementing its river plan would likely be long term, minor, beneficial, and local to regional due to integration of greater resource protection measures as required under the Wild and Scenic Rivers Act.

Overall, the impacts of these past, present, and reasonably foreseeable future actions, in combination with those described for the no-action alternative, would result in long-term, minor to moderate, adverse, local to regional cumulative impacts and long-term, minor, beneficial, local to regional cumulative impacts. Continuation of current management under alternative A would contribute a small amount to the beneficial cumulative effects, as well as a considerable amount to the adverse cumulative effects.

Conclusion. The no-action alternative would have short- to long-term, minor to moderate, adverse, local to regional impacts and long-term, minor, beneficial, local to regional impacts on soils. Impacts of this alternative, combined with the impacts of other past, present, and reasonably foreseeable future actions, would result in long-term, minor to moderate, adverse, local to regional cumulative impacts and long-term, minor, beneficial, local to regional cumulative impacts. Alternative A would contribute a small extent to the beneficial cumulative effects, as well as a considerable amount to the adverse cumulative effects.

Alternative B

Headwaters-wide. Federal agencies within the Greater Yellowstone Ecosystem coordinate efforts to monitor and manage resources of the parks, national forests, and wildlife refuges, where possible, respecting their distinct authorities and mandates. The parks collaborate with the U.S. Forest Service, as necessary, for resource management. Alternative B, similar to alternative C, would provide a stronger, ecosystem-based, and partnership approach to managing the headwaters' natural resources than the no-action alternative. This would include headwaters-wide strategies that emphasize consistent, ongoing collaboration to protect, restore, and enhance water-related resources. By working together across park divisions and implementing an interdisciplinary approach as well as expanding partnerships with private landowners, local governments, state and federal agencies, and local organizations, the parks and refuge would have greater opportunities to protect the natural resources across management boundaries. The collaborative management between the parks and federal and state agencies would have long-term, minor, beneficial, local to regional impacts on soils because having multiple management entities could allow more comprehensive and sustainable management efforts and outcomes.

Visitor activities could slightly increase under this alternative and could increase impacts on soils within the headwaters. Such activities include hiking, backcountry camping,

horseback riding, recreating along the river banks, and parking in undesignated areas. Impacts from existing developments along the river corridors, such as trails, can also occur if they are improperly designed or unmaintained. Under this alternative, these activities and developments would cause short- and long-term, minor, adverse, localized impacts on soils, primarily from small increases in visitation to designated areas within the river corridors.

However, under this alternative, strategies would be implemented to alleviate some of these issues and to ensure that increases in use could be accommodated without impacting river values and resources. Examples include better delineation of trails and parking areas, grading unpaved parking areas, restoring informal parking areas and social trails, improvement of scenic turnouts, and designating a backcountry camping area rather than allowing dispersed camping. Interpretive and informational messaging would also be provided to visitors promoting Leave No Trace principles by educating visitors about the harmful effects of social trailing along the rivers that can destabilize riparian vegetation and lead to bank erosion. The utilization of area closures of geothermal features as necessary to protect sensitive resources would be implemented in this alternative. These actions would reduce the amount of soil compaction, removal, and erosion from visitor use and maintenance activities, resulting in long-term, minor to moderate, beneficial, localized impacts on soils. The development necessary to accomplish some of these strategies would result in long-term, negligible to minor, adverse, localized impacts on soils as extending turnouts, formalizing parking areas and trails, and the repeated use of newly designated backcountry campsites would result in soil compaction or removal and would occur mainly in areas that have been previously disturbed (i.e., informal parking, social trailing, previously used campsites).

Under this alternative, formal user capacity indicators and standards for resource protection would be established and monitored for each segment, including the continued monitoring of water quality, to ensure greater resource protection. Use varies by river segment; however, each segment is subject to visitor use and the potential impacts that can arise from use, such as soil compaction, removal, and erosion, including the trampling or removal of vegetation, which causes greater soil destabilization. An appropriate variety of monitoring strategies used to identify and address impacts from visitor use would have long-term, minor to moderate, beneficial, localized impacts on soils within the parks.

River Segments. Individual river segments, with the exception of the Snake River scenic segment, would experience similar impacts on soils, as those described under the headwaters-wide section, and are therefore not described in detail.

Snake River (scenic segment)—The overall kinds of use that currently exist would continue. However, new camping opportunities would be provided for overnight stays along the river. There would be two campsites established along the river allowing overnight float trips. Other recreational enhancements under this alternative include a new viewing area at Oxbow Bend, active interpretation of cultural sites—Menor's Ferry, Bar BC Dude Ranch, and 4 Lazy F Dude Ranch, with float trips allowed to stop at Bar BC Dude Ranch for interpretive opportunities—and a new accessible trail from Moose to Menor's Ferry. River Road (along the west side of Snake River) would remain open to public vehicular access (including bicycles). Limited overnight camping would be provided for visitors, including walk-in and boat access camping. These uses would also have long-term, minor, adverse, localized impacts on soils in this segment due to compaction, removal, and erosion in areas where new opportunities would be provided.

River Access Points. The proposed site planning for the river access points is

expected to be about one acre or less of site disturbance, with exception of the Pacific Creek Landing relocation under alternative B, which would result in a greater extent of disturbed acreage.

Flagg Canyon—In alternative B, signs on north and south sides of North Park Road would be installed to alert visitors to the picnic area and boat launch site as well as the nearest restroom facility (0.25 mile north). A portion of the boat launch access road would be reconstructed to the south to reduce the steep grade of the road. The boat launch would have a minimal grade to the river and be properly drained to prevent bank erosion. The vehicle turnaround at the boat launch would be reconfigured for efficiency. Areas along the bank that are experiencing erosion would be stabilized. These activities would result in long-term, minor to moderate, beneficial, localized impacts on soils by greatly increasing soil stability through eliminating the occurrences of visitors becoming stuck on the road at the launch site due to the grade and improving the turnaround so vehicles can avoid driving outside the designated roadway.

Flagg Ranch—In this alternative, the parking area would be reduced in size to accommodate up to 10 vehicles. The portion of the parking lot that would no longer be used would be restored to natural conditions. The vehicle turnaround and the parking area would be delineated with natural materials to prevent future user-created expansion of the area. "No Parking" signs would be installed in the vehicle turnaround area. A wayside exhibits providing boating and area information would replace the existing sign. Depending on the level of use, a single vault toilet may be added near the parking lot area. The metal matting at the boat launch would be removed. One additional picnic table would be added. Over time, vegetation restoration efforts would continue to be implemented on formerly developed areas at Flagg Ranch to enhance the compatibility with the wild classification. Riprap near the Snake River Bridge would be "naturalized" with willow plantings and other vegetation treatments. The National Park Service would coordinate with the Wyoming Department of Environmental Quality to have the fuel-contaminated site monitoring well building removed when contaminant levels are reduced to acceptable levels. These activities would result in long-term, moderate, beneficial, localized impacts on soils due to reducing or eliminating the amount of soil compaction, removal, and erosion, including the trampling or removal of vegetation, which causes greater soil destabilization, thus providing increased soil stabilization.

Jackson Lake Dam—To more efficiently accommodate boat launching, two concrete single ramps (or one double-wide ramp) would be constructed at the far end of the lower parking area. This area would be dedicated to boat launching and staging (including rigging). As a result, parking in the lower parking area would be reduced and limited to passenger vehicles only (no RVs). More vehicles would end up using the upper parking lot and pedestrian connections would be improved. Improvements to this site would stay within the existing developed footprint. The pedestrian connections from the upper parking area to the launch site would be developed in previously disturbed areas. These actions would result in long-term, negligible to minor, beneficial, localized impacts on soils due to reducing or eliminating the amount of soil compaction, removal, and erosion, including the trampling or removal of vegetation, which causes greater soil destabilization.

Cattleman's Bridge—To provide a range of visitor opportunities, Cattleman's Bridge Road would be closed at the former cook site. A small parking area with a vault restroom facility would be constructed at the former cook site. A minimally improved boat launch facility for hand-carried boats and pack rafts would be positioned near the parking area. A trail would be developed on the remainder of the road and some restoration work would be done. The new hiking trail would loop back along the banks of Snake River. The

installation of a vault restroom facility, new hiking trail, and minimally improved boat launch facility would result in long-term, minor, adverse, localized impacts on soils due to the amount of soil removal and compaction that would be required. The remaining actions for this site under this alternative would result in long-term, minor to moderate, beneficial, localized impacts on soils due to reducing or eliminating the amount of compaction, removal, and erosion, including trampling or removal of vegetation, which causes greater soil destabilization.

Oxbow Bend Overlooks—In this alternative, the pavement in the east parking lot would be striped to improve efficiency and increase parking capacity. The parking lot would not be expanded. A wayside exhibit with wild and scenic river interpretation would be added to the overlook. Signs directing visitors to the restroom facility at Cattleman's Bridge (approximately 0.85 mile east) would also be added. A natural surface loop trail to the river would be added and the social trails would be revegetated. Timber guardrails (replacing existing posts) would be added to the west overlook to keep vehicles from parking in vegetated areas. Social trails and other denuded areas would be revegetated. A loop trail connecting the parking area to the river would be added and would be developed within the alignment as much as possible within previously disturbed areas. These actions would have an overall, long-term, minor, beneficial, localized impact on soils by reducing the amount of compaction, removal, and erosion taking place due to the revegetation of social trails and adding guardrails to protect natural resources.

Pacific Creek Landing—To provide improved boat launch access, the site would be moved to a more stable site above the confluence of Pacific Creek. The following infrastructure would be developed at the new site: a 0.75-mile access road, a pedestrian path, a medium-sized parking lot, a double-wide articulated concrete ramp, and vault restroom facilities. While this site is more stable and access would be improved, the banks are 20 to 30 feet above the river and the ramp would require a large volume of excavation. The current Pacific Creek boat ramp and all associated development, with the exception of the entry gate parking lot, would be removed and restored to natural conditions. The development of a new launch site in this location would result in long-term, major, adverse, localized impacts on soils in this area due to the level of removal and compaction of stable soils as well as the removal of soil-stabilizing vegetation that would be required.

Deadman's Bar—In this alternative, roadside parking would be delineated with natural materials. Parking lot efficiency would be improved through signage and improved delineation using natural materials (e.g., buried logs). The south boat launch would be expanded to two lanes. A new material, such as articulated concrete block, would be used for one or both of the ramps to improve access. A phased approach would be used to better understand the potential advantages of a new material. The cook site would be maintained and the two picnic sites would be restored to natural conditions. The better delineation of parking areas, use of a more hardened surface in-stream, and the restoration of the picnic sites would result in long-term, minor, beneficial, localized impacts on soils due to reducing the amount of compaction, removal, and erosion from informal parking and maintenance activities. The expansion of the south boat launch to two lanes would result in long-term, negligible to minor, adverse, localized impacts on soils due to removal and compaction, including the trampling or removal of vegetation, which causes greater soil destabilization.

Schwabacher Landing—In this alternative, the parking lot and road surfaces would remain gravel except for a 0.33-mile section of road nearest the highway that would be paved under a separate approved park action in 2014. The paved section would occasionally need repair and overlay work. The remaining portion of Schwabacher Road

would have minimal regrading to address surface ruts or "washboarding." The road surface and parking lot surface would remain gravel. The extents of the parking areas and the spaces would be better delineated with natural materials (e.g., logs) to improve parking efficiency to deter cars from driving in vegetated areas. Improvements to the trail connecting the middle parking area to the river would be made to improve delineation. The trail would remain a natural surface. Social trails near the trail would be revegetated. Depending on the level of use, a second vault toilet may be added to the northernmost parking area. The road regrading, better parking delineation, and restoration of social trails would result in long-term, minor, beneficial, and localized impacts on soils due to reducing the amount of removal, compaction, and erosion. Installation of a vault restroom facility would result in long-term, minor, adverse, localized impacts on soils due to removal and compaction including the trampling or removal of vegetation, which causes greater soil destabilization.

Moose Landing—This alternative would consolidate boating facilities in one place near the existing visitor parking lot. The new consolidated site would include two double ramps, parking for visitors, boat trailer parking and rigging area, and restroom facilities. The previously used boat ramps would be restored while providing bank protection designed to blend with the natural environments (i.e., boulders, fill material, and vegetation). The previously used north parking area and boat pullouts would be restored to natural conditions. The actions under this alternative would result in long-term, moderate, adverse, and localized impacts on soils due to the amount of soil removal and compaction that would be necessary to develop the new launch facility and parking areas. However, the restoration of the previous launch site would result in long-term, moderate, beneficial, and localized impacts on soils due to reducing the amount of removal, compaction, and erosion, including trampling or removal of vegetation, which causes greater soil destabilization.

Generally, across all headwaters, segments, and river access points, alternative B would result in both adverse and beneficial effects on soils within the headwaters. The adverse impacts would be long-term, minor to major, and localized, primarily resulting from the soil erosion and compaction associated with small increases in visitor use and maintenance activities, as well as boat launch and river access relocation or expansions that disturb and erode native soil strata, remove or trample vegetation, and compact soils. The beneficial impacts would be long term, minor to moderate, and local to regional. At a headwaters-wide level, the beneficial effects would result from a stronger, ecosystem-based partnership approach to managing the headwaters' natural resources, the use of formal user capacity indicators and standards for resource management, new mitigation strategies for soil resource protection, and expanded interpretation and education programs. At a river segment and access point level, the beneficial effects would primarily result from the restoration and revegetation of social trails, former river access and boat launch sites. These efforts would help restore soil-stabilizing vegetation, increase riverbank stabilization, and decrease the amount of surface erosion and soil deposition.

Cumulative Effects. Past, present, and reasonably foreseeable future actions that impact soils includes the site improvements, which are currently in progress, to the Moose headquarters complex in Grand Teton National Park. The site improvement most related to impacts on these resources is the complete reconfiguration of vehicle and pedestrian traffic within the administrative and Moose Landing areas, removal of several temporary buildings, and improvement of stormwater management. These impacts would result in long-term, minor to moderate, adverse, localized cumulative effects on soils.

The operations of Jackson Lake Dam contribute to the cumulative impacts on wild and scenic resources and values due to the alteration of natural flow regimes of Snake River. Releases fluctuate by season, levels of precipitation, and irrigation needs. These impacts would result in long-term, minor, adverse, localized cumulative effects on soils due to regulation of the natural flow regime, which affects water-related resources such as the presence and health of vegetation.

There are private inholdings along the designated wild and scenic river corridors within the Snake River Headwaters. The land uses on these inholdings vary from rural residential to agricultural. Water-related resource projects include in-stream channel modifications for water withdrawals and riverbank stabilizations. Livestock grazing and riparian habitat modifications are also common. These impacts would result in long-term, minor, adverse, localized cumulative effects on soils due to erosion from uses that remove vegetation or compact soils causing riverbank destabilization, siltation, and deposition, as well as from fecal coliform contamination from grazing near waterways.

Continuing effects of past land uses on Bridger-Teton National Forest lands may contribute to cumulative impacts on NPS-managed wild and scenic river resources downstream. Past land uses include grazing allotments, oil and gas leasing, mining, off-road vehicles, and timber production. The U.S. Forest Service is required, through the nondegradation and enhancement clause of the Wild and Scenic Rivers Act, to ensure protection of its wild and scenic river segments upstream. Therefore, it is likely that the U.S. Forest Service would identify and resolve any issues or conflicts on its segments upstream in its comprehensive river management plan. These impacts would result in long-term, negligible to minor, adverse, localized cumulative effects on soils. However, the impacts from the U.S. Forest Service implementing its river plan would likely be long term, minor, beneficial, and local to regional due to integration of greater resource protection measures as required under the Wild and Scenic Rivers Act.

Overall, the impacts of these past, present, and reasonably foreseeable future actions, in combination with those described for alternative B, would result in long-term, minor to major, adverse, localized, cumulative impacts and long-term, minor to moderate, beneficial, local to regional, cumulative impacts. Implementation of management strategies under alternative B would contribute a substantial amount to the beneficial cumulative effects, as well as a substantial amount to the adverse cumulative effects.

Conclusion. Alternative B would have long-term, minor to major, adverse, localized impacts and long-term, minor to moderate, beneficial, local to regional impacts on soils. Impacts of this alternative, combined with the impacts of other past, present, and reasonably foreseeable future actions, would result in long-term, minor to major, adverse, localized, cumulative impacts and long-term, minor to moderate, beneficial, local to regional, cumulative impacts. Alternative B would contribute a substantial extent to both the beneficial and adverse cumulative effects.

Alternative C (Preferred)

Headwaters-wide. Federal agencies within the Greater Yellowstone Ecosystem coordinate efforts to monitor and manage resources of the parks, national forests, and wildlife refuges, where possible, respecting their distinct authorities and mandates. The parks collaborate with the U.S. Forest Service as necessary for resource management. Alternative C would provide a stronger, ecosystem-based, and partnership approach to managing the headwaters' natural resources than the no-action alternative. This would include headwaters-wide strategies that emphasize consistent, ongoing collaboration to protect, restore, and enhance water-related resources. By working

together across park divisions and implementing an interdisciplinary approach as well as expanding partnerships with private landowners, local governments, state and federal agencies, and local organizations, the parks and refuge would have greater opportunities to protect the natural resources across management boundaries. The collaborative management between the parks and federal and state agencies would have long-term, minor, beneficial, local and regional impacts on soils because having multiple management entities could allow more comprehensive and sustainable management efforts and outcomes.

Under this alternative, strategies would be implemented to alleviate visitation and maintenance effects on soils (as noted in the headwaters-wide analysis of alternative A) and to ensure that increases in use can be accommodated without impacting river values and resources. Examples include better delineation of trails and parking areas, grading unpaved parking areas, restoration of informal parking areas and social trails, improvement of scenic turnouts, and designating a backcountry camping area rather than allowing dispersed camping. Interpretive and informational messaging would also be provided to visitors promoting Leave No Trace principles by educating visitors about the harmful effects of social trailing along rivers that can destabilize riparian vegetation and lead to bank erosion. The utilization of area closures of geothermal features as necessary to protect sensitive resources would be implemented in this alternative. These actions would reduce the amount of soil compaction, removal, and erosion from visitor use and maintenance activities resulting in long-term, minor to moderate, beneficial, localized impacts on soils. The development necessary to accomplish some of these strategies would result in long-term, negligible to minor, adverse, localized impacts on soils as extending turnouts, formalizing parking areas and trails, and the repeated use of newly designated backcountry campsites would result in soil compaction or removal and would occur mainly in areas that have been previously disturbed (i.e., informal parking, social trailing, previously used campsites).

Formal user capacity indicators and standards for resource protection would be established and monitored for each segment, including the continued monitoring of water quality, to ensure greater resource protection. Use varies by river segment; however, each segment is subject to visitor use and the potential impacts that can arise from use, such as soil compaction, removal, and erosion including the trampling or removal of vegetation, which causes greater soil destabilization. An appropriate variety of monitoring strategies used to identify and address impacts from visitor use would have long-term, minor to moderate, beneficial, local to regional impacts on soils within the parks.

River Segments. Individual river segments, with the exception of the Snake River scenic segment, would experience similar impacts on soils as those described under the headwaters-wide section and are therefore not described in detail.

Snake River (scenic segment)—A portion of the main park road (along the west side of Snake River) near the confluence of Buffalo Fork may be redesigned to allow more natural river processes. Under alternative C, River Road would remain open for public use as road conditions allow. Park management would close the road to public vehicular use in the future if portions of the road fail due to the natural migration of the Snake River channel and road repairs and reroutes cannot be accomplished without impact to adjacent sagebrush and other sensitive habitats. Public vehicular access would also continue to be allowed on RKO and Bar BC roads, which provide access to the north and south ends of River Road. Limited overnight camping would be provided for visitors, including walk-in and boat access camping. The restrictions for resource protection (including the eventual closure of River Road) and revegetation of social trails would

result in long-term, minor to moderate, beneficial, localized impacts on soils. These beneficial effects would result from the reduction in soil compaction, soil removal, and soil erosion, including a reduction in the trampling or removal of vegetation, which causes greater soil destabilization. The future termination of the soil disturbance associated with River Road maintenance and rerouting would contribute to these benefits. However, the amount of use and limited overnight camping and potential redesign of the main park road near the confluence of Buffalo Fork would result in long-term, minor to moderate, adverse, localized impacts on soils due to soil removal and compaction, which would be required, mainly for the road redesign. Also, in the near-term (until closure of River Road), the ongoing vehicular use, maintenance, and possible rerouting of River Road would continue to have short-term, minor, adverse, and localized effects on soils resulting from ground disturbance and erosion.

River Access Points. The proposed site planning for the river access points is expected to be about an acre or less of site disturbance.

Flagg Canyon—In alternative B, signs on north and south sides of North Park Road would be installed to alert visitors to the picnic area and boat launch site as well as the nearest restroom facility (0.25 mile north). A portion of the boat launch access road would be reconstructed to the south to reduce the steep road grade. The boat launch would have a minimal grade to the river and be properly drained to prevent bank erosion. The vehicle turnaround at the boat launch would be reconfigured for efficiency. Areas along the bank that are experiencing erosion would be stabilized. These activities would result in long-term, minor to moderate, beneficial, localized impacts on soils by greatly increasing soil stability by eliminating the occurrences of visitors being trapped on the road at the launch site due to the steep grade and improving the turnaround so vehicles could avoid driving outside the designated roadway.

Flagg Ranch—In this alternative, the parking area would be reduced in size to accommodate up to 10 vehicles. The portion of the parking lot that would no longer be used would be restored to natural conditions. The vehicle turnaround and the parking area would be delineated with natural materials to prevent future user-created expansion of the area. "No Parking" signs would be installed in the vehicle turnaround area. A wayside exhibit providing boating and area information would replace the existing sign. Depending on the level of use, a single vault toilet may be added near the parking lot area. The metal matting at the boat launch would be removed. One additional picnic table would be added. Over time, vegetation restoration efforts would continue to be implemented on formerly developed areas at Flagg Ranch to enhance the compatibility with the wild classification. Riprap near the Snake River Bridge would be "naturalized" with willow plantings and other vegetation treatments. The National Park Service would coordinate with the Wyoming Department of Environmental Quality to have the fuel-contaminated site monitoring well building removed when contaminant levels are reduced to acceptable levels. These activities would result in long-term, moderate, beneficial, localized impacts on soils due to reducing or eliminating the amount of soil compaction, removal, and erosion, including trampling or removal of vegetation, which causes greater soil destabilization, providing increased soil stabilization.

Jackson Lake Dam—In alternative C, changes to the Jackson Lake Dam boat launch would enhance resource conditions. A single concrete ramp would be constructed at the far end of the lower parking area. In the existing lower parking area, the area near the ramp would be designated for boat launching, staging, and rigging use only. There would no longer be parking in this area (existing lower parking area) with the exception of handicap parking spaces;

landscape improvements to enhance the function and natural appearance would be made. Pedestrian connections between the upper parking lot and the new staging area would be improved. The upper parking lot would be studied for redesign if it were determined that additional capacity was needed. Improvements to this site would stay within the existing developed footprint. Consultation with the Bureau of Reclamation would be required prior to any redesign of the area. These actions would result in long-term, negligible to minor, beneficial, localized impacts on soils due to reducing or eliminating the amount of soil compaction, removal, and erosion including the trampling or removal of vegetation, which causes greater soil destabilization.

Cattleman's Bridge—To enhance the resource conditions in this high value wildlife habitat area, the majority of the road to Cattleman's Bridge would be closed and the area partially restored to natural conditions. A small parking area (approximately 10 cars) would be constructed south of the intersection with Outside Highway. A vault restroom facility would be added to the parking area. A trailhead would be sited at the parking area and a hiking trail would be provided along the former road alignment. A portion of the hiking trail would be made accessible for people with disabilities. A new trail connecting the parking area to Oxbow Bend would be created and a primitive boat launch would be provided for hand-carried boats. The cook site area and boat launch parking area would be restored to natural conditions. The installation of a small parking area at the highway, vault restroom facility, and new trail and primitive launch to Oxbow Bend would result in long-term, minor, adverse, localized impacts on soils due to removal and compaction that would be necessary for these actions. These remaining actions for this site under this alternative would result in long-term, moderate, beneficial, localized impacts on soils due to reducing or eliminating the amount of compaction, removal, and erosion, including trampling or removal of vegetation, which causes greater soil destabilization.

Oxbow Bend Overlooks—In this alternative, the pavement in the east parking lot would be striped to improve efficiency and increase parking capacity. The parking lot would not be expanded. A wayside exhibit with wild and scenic river interpretation would be added to the overlook. Signs directing visitors to the restroom facility at Cattleman's Bridge (approximately 0.85 mile east) would also be added. A natural surface loop trail to the river would be added and the social trails would be revegetated. Timber guardrails (replacing existing posts) would be added to the west overlook to keep vehicles from parking in vegetated areas. Social trails and other denuded areas would be revegetated. A loop trail connecting the parking area to the river would be added and would be developed within the alignment as much as possible with previously disturbed areas. These actions would have an overall, long-term, minor, beneficial, localized impact on soils by reducing the amount of compaction, removal, and erosion taking place due to the revegetation of social trails and adding guardrails to protect natural resources.

Pacific Creek Landing—In this alternative, the boat launch facilities would remain at the current site. Given the rapidly changing conditions and dynamic nature of the river in this location, this site would require intensive management and maintenance. The launch site would be expanded to two lanes, and nonpermanent materials and active maintenance would be used to maintain ramp access. The circulation area would be minimally expanded to allow new turning movements. For improved safety and circulation, the one-lane road extending to the launch (from the parking lot) would be expanded to accommodate two-way traffic and a pedestrian walkway. The failing retaining wall would be reconstructed and designed to blend in with the natural environment. The park staff would evaluate the capacity needs and efficiency of the existing parking lot, which was recently

reconfigured. If more parking were needed, the park staff would consider expanding the existing parking lot to the southeast. The park management would also consider reducing the size of the parking lot near the Moran entrance station. Depending on the level of use, an additional vault toilet may be added and the relocation of the existing vault toilet would be considered to improve functionality. The actions in this alternative for this site would result in long-term, minor to moderate, adverse, localized impacts on soils due to the amount of removal and compaction, including trampling or removal of vegetation, which causes greater soil destabilization, which would be required for these developments as well as for the continued maintenance of in-stream sedimentation.

Deadman's Bar—In this alternative, the portions of the access road that are gravel would be paved, with some associated road widening. Areas along the road previously used for parking would be restored. The parking lot would be expanded, paved, and striped to improve efficiency and parking capacity. The road widening and paving would increase the area of soil disturbance, from 1.50 acres (existing road) to 2.25 acres. The parking lot expansion would increase the area of soil disturbance from 0.90 acre (existing parking lot) to 1.10 acres. A new material, such as articulated concrete block, would be used for one or both of the ramps to improve access. The ramps would be expanded to two lanes. A phased approach would be used to better understand the potential advantages of a new material. The cook site would be improved to reduce wildlife/human interactions. The two rustic, commercial picnic sites would be phased out. The better delineation of parking areas, restoration of the roadside parking areas, utilization of a more hardened surface in-stream, and the phasing out of the picnic sites would result in long-term, minor, beneficial, localized impacts on soils due to reducing the amount of compaction, removal, and erosion from informal parking and maintenance activities. The expansion and paving of the parking area and the expansion of both ramps to two lanes would result in long-term, minor to moderate, adverse, localized impacts on soils due to removal and compaction, including the trampling or removal of vegetation, which causes greater soil destabilization.

Schwabacher Landing—In this alternative, parking would be consolidated in the north lot. The two south parking lots would be restored to natural conditions. The gravel road would experience selective regarding to address isolated areas with surface ruts. The 0.33-mile portion of road nearest the highway would be paved in 2014 under a separate approved park action and would occasionally need repair and overlay work. The trail to the river would be better delineated and extended to the road. Barriers (e.g., boulders, posts) would be installed to prevent vehicle access on the trail. Social trails near the trail would be revegetated. The extents of the north parking area and the parking spaces would be better delineated with natural materials (e.g., logs) to improve parking efficiency to deter cars from driving in vegetated areas. Depending on the level of use, a second vault toilet may be added to the northernmost parking area. The selective regrading and delineation of the road, consolidated parking, and restoration of the south parking lots and social trails would result in long-term, moderate, beneficial, localized impacts on soils due to reducing the amount of removal, compaction, and erosion. The installation of a vault restroom facility would result in long-term, minor, adverse, localized impacts on soils due to removal and compaction, including the trampling or removal of vegetation, which causes greater soil destabilization.

Moose Landing—The park staff would consider expanding and redesigning one or both of the boat ramps while maintaining the maximum amount of vegetation. The vegetation is critical to riverbank stabilization, so expansion of the ramp(s) would be carefully balanced with the need to secure the bank. The boat pullouts would be secured with

terracing, natural bank protection including vegetation, and improved delineation of use and trail areas to reduce erosion. Due to the dynamic nature of the river in this location, this site would require adaptive management and regular maintenance during the boating season. Trail links to the administrative complex trail would be developed. The expansion of one or both of the boat ramps, continued adaptive management and regular maintenance of the in-stream sedimentation, and developed trail links would result in long-term, minor to moderate, adverse, localized impacts on soils due to compaction and removal. However, the carefully balanced riverbank stabilization efforts and improved delineation of trails would result in long-term, minor, beneficial, localized impacts on soils due to the limiting the amount of erosion and compaction taking place.

Generally, across all headwaters, segments, and river access points, alternative C would result in both adverse and beneficial effects on soils within the headwaters. The adverse impacts would be long term, minor to moderate, and localized, primarily resulting from the erosion from visitor use and maintenance activities, as well as boat launch and river access relocation or expansions that remove or trample vegetation and compact soils, resulting in increased riverbank destabilization, siltation, and deposition. The beneficial impacts would be long term, minor to moderate, and local to regional. At a headwaters-wide level, the beneficial effects would result from a stronger, ecosystem-based partnership approach to managing the headwaters' natural resources, the use of formal user capacity indicators and standards for resource management, new mitigation strategies for soil resource protection, and expanded interpretation and education programs. At a river segment and access point level, the beneficial effects would primarily result from the restoration and revegetation of social trails, former river access and boat launch sites, and installation of restroom facilities, improving soil-stabilizing vegetation and increasing riverbank stabilization and decreasing the amount of runoff, siltation, and deposition.

Cumulative Effects. Past, present, and reasonably foreseeable future actions that impact soils include site improvements, which are currently in progress, to the Moose headquarters complex in Grand Teton National Park. The site improvement most related to impacts on these resources is the complete reconfiguration of vehicle and pedestrian traffic within the administrative and Moose Landing areas, removal of several temporary buildings, and improvement of stormwater management. These impacts would result in long-term, minor to moderate, adverse, localized cumulative effects on soils.

The operations of Jackson Lake Dam contribute to the cumulative impacts on wild and scenic resources and values due to the alteration of natural flow regimes of Snake River. Releases fluctuate by season, levels of precipitation, and irrigation needs. These impacts would result in long-term, minor, adverse, localized cumulative effects on soils due to regulation of the natural flow regime, which affects water-related resources such as the presence and health of vegetation.

There are private inholdings along the designated wild and scenic river corridors within the Snake River Headwaters. The land uses on these inholdings vary from rural residential to agricultural. Water-related resource projects include in-stream channel modifications for water withdrawals and riverbank stabilizations. Livestock grazing and riparian habitat modifications are also common. These impacts would result in long-term, minor, adverse, localized cumulative effects on soils due to erosion from uses that remove vegetation or compact soils causing riverbank destabilization, siltation, and deposition, as well as from fecal coliform contamination from livestock grazing near waterways.

Continuing effects of past land uses on Bridger-Teton National Forest lands may

contribute to cumulative impacts on NPS-managed wild and scenic river resources downstream. Past land uses include grazing allotments, oil and gas leasing, mining, off-road vehicles, and timber production. The U.S. Forest Service is required, through the nondegradation and enhancement clause of the Wild and Scenic Rivers Act, to ensure protection of USFS-managed wild and scenic river segments upstream. Therefore, it is likely that the U.S. Forest Service would identify and resolve any issues or conflicts on its segments upstream in its comprehensive river management plan. These impacts would result in long-term, negligible to minor, adverse, localized cumulative effects on soils. However, the impacts from the U.S. Forest Service implementing its river plan would likely be long term, minor, beneficial, and local to regional due to integration of greater resource protection measures as required under the Wild and Scenic Rivers Act.

Overall, the impacts of these past, present, and reasonably foreseeable future actions, in combination with those described for alternative C, would result in long-term, minor to moderate, adverse, localized cumulative impacts and long-term, minor to moderate, beneficial, local to regional cumulative impacts. Implementation of management strategies under alternative C would contribute a substantial amount to the beneficial cumulative effects, as well as a substantial amount to the adverse cumulative effects.

Conclusion. Alternative C would have long-term, minor to moderate, adverse, localized impacts and long-term, minor to moderate, beneficial, local to regional impacts on soils. Impacts of this alternative, combined with the impacts of other past, present, and reasonably foreseeable future actions, would result in long-term, minor to moderate, adverse, localized cumulative impacts and long-term, minor to moderate, beneficial, local to regional cumulative impacts. Alternative C would contribute a considerable amount to both the beneficial and adverse cumulative effects.

CULTURAL RESOURCES

INTRODUCTION

Section 106, National Historic Preservation Act and Impacts on Cultural Resources

In this environmental assessment, impacts on cultural resources are described in terms of type, context, duration, and intensity, which is consistent with the regulations of the Council on Environmental Quality that implement the National Environmental Policy Act. In accordance with ACHP regulations implementing section 106 of the National Historic Preservation Act (36 CFR 800), "Protection of Historic Properties," impacts on historic structures were identified and evaluated by (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effect that were either listed in or eligible to be listed in the National Register of Historic Places; (3) applying the criteria of adverse effect to affected cultural resources either listed in or eligible to be listed in the National Register of Historic Places; and (4) considering ways to avoid, minimize, or mitigate adverse impacts.

Under ACHP regulations, a finding of either *adverse effect* or *no adverse effect* must also be made for affected national register-eligible cultural resources. An adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the national register (e.g., diminishing the integrity of the location, design, setting, materials, workmanship, feeling, or association of the resource). Adverse effects also include reasonably foreseeable effects caused by the action alternative that would occur later in time, be further removed in distance, or be cumulative (36 CFR 800.5, "Assessment of Adverse Effects"). A finding of no adverse effect means there is an effect, but the effect would not diminish in any way the characteristics of the cultural resources that qualify it for inclusion in the national register.

CEQ regulations and the National Park Service Director's Order 12: *Conservation Planning, Environmental Impact Analysis and Decision-making* also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact from major to moderate or minor. However, any resultant reduction in intensity of impact due to mitigation is an estimate of the effectiveness of mitigation under the National Environmental Policy Act only. It does not suggest that the level of effect as defined by section 106 is similarly reduced. Although adverse effects under section 106 may be mitigated, the effect remains adverse.

A section 106 summary is included in the impact analysis sections for the action alternatives. The section 106 summary is an assessment of the effects of the undertaking (implementation of the alternative) on cultural resources, based on the criteria of adverse effect found in ACHP regulations.

SECTION 106 COMPLIANCE FOR FUTURE IMPLEMENTATION OF THIS COMPREHENSIVE RIVER MANAGEMENT PLAN

Because this comprehensive river management plan is long-range in scope and would be implemented over the next 15 to 20 years, it includes a conceptual framework for section 106 compliance for the life of the plan. This framework outlines any cultural resources-related impacts that could be caused by the actions analyzed in the plan. For future yet-defined activities or projects

that may occur under the action alternatives in this plan, park staff would continue to meet their sections 110 and 106 responsibilities when the details of future proposed undertakings become known. Thus, a full section 106 assessment of effect would be conducted in the future when the undertakings associated with this plan are planned in greater detail and when information concerning the type and intensity of impacts on cultural resources become known. At that time, intensive survey, resource identification, determinations of national register eligibility, and an assessment of the effect of the future undertakings associated with this plan would occur. This approach would allow the section 106 assessment of effects concerning future undertakings of the plan to be more timely and accurate.

Moreover, the National Park Service has developed a nationwide programmatic agreement with the Advisory Council on Historic Preservation and the National Conference of State Historic Preservation Officers for compliance with section 106 of the National historic Preservation Act, which provides two paths for 106 compliance: a streamlined review for qualifying actions and standard review for all other actions. In order to use the streamlined review, projects must meet three specified criteria, including the requirement that all cultural resources have been previously identified and that the park has determined that the activities or undertakings would result in *no adverse effects* to historic properties. The future implementation of this plan would follow the stipulations outlined in the nationwide programmatic agreement.

It is understood that, per NPS policy and in compliance with 36 CFR part 800.3(c), park staff would continue to conduct section 106-related cultural resources inventory and evaluation on a project-by-project basis to ensure that undertakings within the corridor avoid impacts on national register-eligible and -listed cultural resources. Park superintendents would ensure that the section 106 process is initiated early in the planning stages of any given undertaking. In circumstances where impacts on cultural resources cannot be avoided, NPS staff would consult with the Wyoming State Historic Preservation Office and the Advisory Council on Historic Preservation to come to a consensus on appropriate mitigation measures that would reduce the intensity of the adverse impact.

IMPACTS ON CULTURAL RESOURCES

To provide a thorough analysis of cultural resources of the corridor, this section has been organized by the following two impact topics, which are described as cultural resources topics described in "Chapter 4: The Affected Environment":

- Archeological Resources
- Historic Structures and Cultural Landscapes

Because ethnographic resources in the wild and scenic river corridor include numerous native plants and nearly all wildlife species found throughout the Snake River Headwaters, ethnographic resources are analyzed above under the impact topics of Water Resources and Vegetation, Wildlife, and Fish in an effort to reduce redundancy in this document.

Methods and Assumptions for Analyzing Impacts

Impacts are analyzed for archeological resources, historic structures, and cultural landscapes, which are collectively referred to as cultural resources for the purposes of this document. Historic structures include all historic buildings, structures, and districts in "Chapter 4: The Affected Environment." As features within the planning area, all of these cultural resources would be similarly impacted by the alternatives. Therefore, they

are addressed together in this analysis to avoid repetition.

The National Park Service describes potential impacts on contributing elements or character-defining features of a resource in terms of whether they would be direct or indirect, as well as their context (site-specific, regional, or national), duration, intensity, and type (beneficial or adverse).

Context: The geographic extent of impacts could be site-specific, regional, or national, as defined below:

- **Site-specific:** The impact would only be perceptible in the immediate vicinity of the resource.
- **Regional:** The impact would be perceived to affect a larger area, such as parkwide.
- **National**: The impact would be perceived as being important to a national audience, such as an impact affecting a national icon.

Duration: Impacts could be temporary, short term, long term, or permanent.

- **Temporary**: The impact would usually last for a few hours or up to two days, such as a road closure for a day or less or limited access to an area during a demonstration.
- **Short term:** The impact would generally last up to one year or the life of a construction project.
- **Long term:** The impact would last longer than one year or for the life of the plan (up to 50 years).
- **Permanent:** The impact would be enduring forever without change.

Intensity: The following impact thresholds were defined for impacts on cultural resources:

- **Adverse Impacts**
  - **Negligible:** Disturbance of an archeological site or impacts on character-defining features, elements, or patterns of structures and landscapes would be barely perceptible and not measurable.
  - **Minor:** The impact on archeological sites is measurable or perceptible, but it is slight and affects a limited area of a site or group of sites. The impact does not affect the character-defining features of a National Register of Historic Places eligible or listed archeological site and would not have a permanent effect on the integrity of any archeological sites. Impacts on character-defining features, elements, or patterns of structures and landscapes would be perceptible or measurable, but would be slight and localized, resulting in little, if any, loss of integrity.
  - **Moderate:** The impact is measurable and perceptible. The impact changes one or more character-defining feature(s) of an archeological resource, but does not diminish the integrity of the resource to the extent that its national register eligibility is jeopardized. Impacts would alter character-defining features, elements, or patterns of structures and landscapes, but would not diminish the integrity of the structure or landscape to the extent that its national register eligibility is jeopardized.
  - **Major:** The impact on archeological sites is substantial, noticeable, and permanent. The impact is severe or of exceptional benefit. For national register-eligible or -listed archeological sites, the impact changes one or more character-defining

features(s) of an archeological resource, diminishing the integrity of the resource to the extent that it is no longer eligible for listing in the national register. Impacts would alter character-defining features, elements, or patterns of structures and landscapes to the extent that they are no longer eligible for national register listing.

- **Beneficial Impacts**
  - **Minor:** Site(s), features, elements, or patterns are stabilized and preserved in accordance with NPS *Management Policies 2006*, Chapter 5: Cultural Resources, and following *The Secretary of the Interior's Standards for the Treatment of Historic Properties*.
  - **Moderate:** Site(s), features, elements, or patterns are rehabilitated in accordance with NPS *Management Policies 2006*, Chapter 5: Cultural Resources, and following *The Secretary of the Interior's Standards for the Treatment of Historic Properties*.
  - **Major:** Site(s), features, elements, or patterns are restored in accordance with NPS *Management Policies 2006*, Chapter 5: Cultural Resources, and following *The Secretary of the Interior's Standards for the Treatment of Historic Properties* or active intervention for the preservation of an archeological site occurs.

Alternative A (No Action)

Alternative A represents the continuation of current management strategies for the designated portions of the wild and scenic river segments in Grand Teton and Yellowstone national parks, and John D. Rockefeller, Jr. Memorial Parkway. NPS staff would continue to manage cultural resources within these areas in compliance with management policies and Director's Order 28: *Cultural Resource Management*. Limited interpretation of select cultural resources within the river corridor would continue. The interpretive program is not likely to directly or indirectly impact cultural resources.

Ongoing visitor use-related deterioration to cultural resources in the form of low-level wear and tear can be expected under alternative A. This may be caused by social trails in areas where undiscovered archeological sites or other cultural resources types could be unintentionally disturbed by foot traffic, causing integrity loss to archeological resources. Current monitoring data of park cultural resources indicate that this could continue to cause potential negligible to minor impacts on cultural sites. Continuation of park staff monitoring practices of cultural resources would keep staff alerted to these types of potential impacts, which would help keep adverse impacts on a minimum. Therefore, the result of ongoing visitor use-related impacts on cultural resources would be adverse, negligible to minor, and site-specific. These impacts would be permanent to archeological resources because such cultural sites are nonrenewable resources and deterioration to their integrity cannot be reversed or replaced. Similar visitor-caused impacts could be long term for historic structures and cultural landscapes if the impact occurs to character-defining elements or features of these resource types.

Alternative A does not include river segments or site-specific actions concerning cultural resources management that differ from the overall management approach of the headwaters.

Cumulative Impacts. Ongoing site improvements to the Moose headquarters complex are expected to cause no impacts on cultural resources. Changes in the operation

of Jackson Lake Dam would not impact cultural resources. The dam structure has been determined not eligible for listing in the national register. Other water-related resource projects on private inholdings are also not expected to have impacts on cultural resources.

The variety of land management activities at Bridger-Teton National Forest, such as oil and gas leasing, mining, off-road vehicle use, and timber production, would be managed under the wild and scenic rivers designation for the Snake River Headwaters, for which the U.S. Forest Service is currently preparing a comprehensive river management plan. Potential direct or indirect impacts on cultural resources on USFS lands adjacent to NPS-managed lands are not yet known; such impacts would likely be identified and resolved by the forthcoming comprehensive river management plan. The contribution of beneficial or adverse impacts, if any, to cultural resources at Bridger-Teton National Forest would be included in this cumulative scenario analysis when these impacts become known.

Additionally, Grand Teton National Park is in the early stages of preparing a comprehensive plan for management of the park's historic properties for the next 20 years. The plan would provide general management guidance and site-specific treatment planning for some properties, including 4 Lazy F Dude Ranch, Bar BC Dude Ranch, and Snake River Land Company residence and office that are within the designated Snake River Headwaters wild and scenic corridor. Although the actions of the plan have not yet been determined, they would likely further the preservation and maintenance of the park's cultural resources, and result in a minor to moderate, beneficial impact to these resources.

As described above, implementation of alternative A could result in negligible to minor adverse, permanent, site-specific impacts on cultural resources if unintentional visitor use impacts continue within the corridor. The negligible to minor, permanent, site-specific, adverse impacts of the no-action alternative, in combination with the beneficial and the negligible to minor, permanent, site-specific, adverse impacts of other past, present, and reasonably foreseeable future actions, plus the contribution of alternative A, would result in an overall negligible to minor, permanent, site-specific adverse cumulative effect to cultural resources.

Alternative A does not include actions for the river segments or site-specific areas concerning cultural resources management that differ from the overall management approach of the headwaters.

Conclusion. Alternative A would cause negligible to minor, permanent, site-specific adverse impacts on cultural resources within the wild and scenic-designated river corridor. Cumulative impacts would be site-specific, permanent, negligible to minor, and adverse.

Alternative B

Headwaters-wide. Under alternative B, recreational experiences would be enhanced within the river corridors through new or improved access and facilities for a variety of river-based recreational activities. This action would result in a slight increase in use levels within the corridor overall, while providing for the protection of cultural resources. The increase in visitor use that would occur under alternative B could cause adverse impacts on the cultural resources in all river segments by inadvertent wear and tear to historic structures or cultural landscape features in these areas. Archeological resources would be vulnerable to surface disturbance and vandalism and a loss of surface archeological materials, alteration of artifact distribution, and a reduction of contextual evidence could result. However, alternative B also includes ongoing monitoring efforts to help ensure that the kinds and amounts of visitor uses do not degrade corridor resources including cultural resources. Increased monitoring efforts by park management to protect

cultural resources would include keeping inadvertent visitor use-caused impacts on cultural resources to a minimum. These efforts would effectively mitigate the deterioration caused by unintentional visitor use and keep potential adverse impacts on cultural resources negligible to minor. Such adverse impacts would be site-specific and permanent to archeological resources because they are nonrenewable resources and deterioration to the integrity of cultural sites cannot be reversed. Similar visitor-caused impacts could be site-specific and long term for historic structures and cultural landscapes if the impact occurs to character-defining elements or features of these resource types.

In addition to the best management practices and preservation activities of maintaining all cultural resources within the river corridor, alternative B includes coordination with partner agencies to develop a prehistoric and historic resources study on the history of human occupation and use of the Snake River Headwaters. The research and survey necessary for the historic resources study are a prerequisite for understanding the significance of the archeological resources, structures, and landscapes, as well as the basis of informed decision making in the future regarding how the resources should be managed. The study would enhance the understanding of the river and would best aid cultural resources managers. It would also assist the development of interpretive and educational tools. The preparation of the historic resources survey would therefore be a minor, beneficial, long-term impact to all cultural resources.

River Segments.

All Scenic Segments (Lewis River, Snake River, Pacific Creek, Buffalo Creek, and the Gros Ventre River)—Alternative B would introduce on-site interpretation and education of river values in all river segments classified as scenic. This program would include the easily accessible historic sites, such as Bar BC Dude Ranch and 4 Lazy F Dude Ranch. The purpose of this program is to enhance visitor understanding and appreciation of the history and cultural resources of the Snake River Headwaters by using ranger-led interpretation, wayside exhibits, or signs. This form of educational messaging and interpretation could be used to improve visitor behaviors with regard to visitor contact with cultural resources in these river segments. Although on-site interpretation could increase visitor use of these interpreted sites, which could result in wear and tear or other unintended disturbance to the cultural resources, the educational messaging regarding visitor behavior and encouragement of visitor etiquette would keep such use-related impacts negligible to minor. These visitor use-related impacts would be adverse, site-specific, and permanent.

All Wild Segments (Lewis River and Snake River)—Alternative B would include off-site cultural resources interpretation of river segments classified as wild. Conducting off-site interpretation would ensure that the undeveloped character of these wild river corridors would be preserved and it would avoid visitor use disturbance to cultural resources by foot traffic. As a result, this interpretive program would result in no impacts on cultural resources in these wild segments.

River Access Points. The site-specific management strategies proposed for the nine access points along the Snake River under alternative B are not anticipated to adversely impact cultural resources in these areas because these resources would be avoided when the individual actions included this plan are planned in greater detail. Careful design of activities at these access points would ensure that such actions would minimally affect the scale and visual relationships among cultural landscape features or circulation patterns and features. The topography, native vegetation patterns, and land use patterns of cultural landscapes in or near these sites would remain largely unaltered. For historic structures, character-

defining features would remain intact and unaltered by these activities. Archeological resources would be identified and avoided by nearby ground disturbance to ensure the protection of these resources.

Any archeological resources, historic structures, or cultural landscapes present in the vicinity of the access points would be identified through section 110 identification and evaluation for national register eligibility when the activities at each of the river access points are planned in greater detail. For all national register-eligible cultural resources identified by this survey, a full section 106 assessment of effect concerning the undertakings associated with the river access point projects would be conducted when the information concerning the type and intensity of impacts on cultural resources becomes known.

Cumulative Impacts. Ongoing site improvements to the Moose headquarters complex are expected to cause no impacts on cultural resources. Changes in the operation of the Jackson Lake Dam would not impact cultural resources. The dam structure has been determined not eligible for listing in the national register. Other water-related resource projects on private inholdings are also not expected to have impacts on cultural resources.

The variety of land management activities at Bridger-Teton National Forest, such as oil and gas leasing, mining, off-road vehicle use, and timber production, would be managed under wild and scenic rivers act designation for the Snake River Headwaters, for which the U.S. Forest Service is currently preparing a comprehensive river management plan. Potential direct or indirect impacts on cultural resources on USFS lands adjacent to the NPS-managed lands are not yet known at this time; such impacts would likely be identified and resolved by the forthcoming plan. The contribution of beneficial or adverse impacts, if any, to cultural resources at Bridger-Teton National Forest would be included in this cumulative scenario analysis when these impacts become known.

Additionally, Grand Teton National Park is currently in the early stages of preparing a comprehensive plan for management of historic properties of the park for the next 20 years. This plan would provide general management guidance and also site-specific treatment planning for some properties, including the historic 4 Lazy F Dude Ranch, Bar BC Dude Ranch, and Snake River Land Company residence and office that are within the designated Snake River Headwaters wild and scenic corridor. Although the actions of this plan have not yet been determined, they would likely further the preservation and maintenance of the cultural resources of the park and result in a minor to moderate, beneficial impact to these resources.

As described above, implementation of alternative B could result in negligible adverse, permanent, site-specific impacts on cultural resources related to unintentional visitor use impacts that could occur within the corridor. The negligible, permanent, site-specific, adverse impacts of alternative B, in combination with the beneficial and the negligible to minor, permanent, site-specific, adverse impacts of other past, present, and reasonably foreseeable future actions, plus the contribution of alternative B, would result in an overall negligible to minor, permanent, site-specific adverse cumulative effect to cultural resources.

Conclusion. Alternative B would cause negligible to minor, permanent, site-specific adverse impacts on cultural resources within the designated wild and scenic river corridor. Cumulative impacts would be site-specific, permanent, negligible to minor, and adverse.

Section 106 Summary. After applying ACHP criteria of adverse effect (36 CFR 800.5, "Assessment of Adverse Effect"), the National Park Service concludes that implementation of alternative B would result in only negligible to minor, adverse impacts on cultural resources, which would result in a

section 106 finding of *no adverse effect*. For future yet-defined activities or projects that may occur at the nine river access points, park staff would continue to meet their section 110 and 106 responsibilities as the details of proposed undertakings become known. Park staff would not consider project undertakings that would result in an adverse effect under section 106. As a result, the National park Service anticipates that the actions defined under this alternative will result in a *no adverse effect* determination.

Alternative C (Preferred)

Headwaters-wide. Under alternative C, visitor use levels of the headwaters are not anticipated to rise from the current levels. Moreover, the preservation of the river resources, including cultural resources, would be carefully protected to enhance the river values. Alternative C also includes ongoing monitoring efforts to help ensure that the kinds and amounts of visitor uses do not degrade the corridor's resources, including cultural resources. Visitor uses could cause inadvertent wear and tear to the character-defining features of historic structures or the features or patterns of cultural landscapes. Archeological resources would be vulnerable to surface disturbance and vandalism and a loss of surface archeological materials, alteration of artifact distribution, and a reduction of contextual evidence could result. Increased monitoring efforts by park management to protect cultural resources would include keeping inadvertent visitor use-caused impacts on cultural resources to a minimum. These efforts would mitigate the deterioration caused by unintentional visitor use. These effects would keep potential adverse impacts negligible to minor. Such impacts on archeological resources would be site-specific and permanent because they are nonrenewable resources and deterioration to the integrity of cultural sites cannot be reversed. Similar visitor-caused impacts could be site-specific and long term for historic structures and cultural landscapes if the impact occurs to character-defining elements or features of these resource types.

In addition to best management practices and the preservation activities of maintaining the cultural resources within the river corridor, as in alternative B, alternative C includes coordination with partner agencies to develop a prehistoric and historic resources study on the history of human occupation and use of the Snake River Headwaters. The research and survey necessary for the historic resource study are a prerequisite for understanding the significance of archeological resources, structures, and landscapes, as well as the basis of informed decision making in the future regarding how the resources should be managed. This study would thus enhance understanding of the river and would best aid cultural resources managers. It would assist the development of interpretive and educational tools. The preparation of the historic resource survey would therefore be a minor, beneficial, long-term impact to all cultural resources.

River Segments.

All scenic segments (Lewis River, Snake River, Pacific Creek, Buffalo Creek, and the Gros Ventre River)—As in alternative B, alternative C would introduce on-site interpretation and education of the river values in all river segments classified as scenic. This program would include the easily accessible historic sites, such as Bar BC Dude Ranch and 4 Lazy F Dude Ranch. The purpose of this program is to enhance visitor understanding and appreciation of the history and cultural resources of the Snake River Headwaters by using ranger-led interpretation, wayside exhibits, signs, or online and virtual media. This form of educational messaging and interpretation can be used to improve visitor behaviors with regard to visitor contact with cultural resources in these river segments. Although on-site interpretation could increase visitor use of these interpreted sites, which could result in wear and tear or other unintended disturbance to these cultural resources, the educational messaging

regarding visitor behaviors and encouragement of visitor etiquette would help keep such use-related impacts negligible to minor. These visitor use-associated impacts would be adverse, site-specific, and permanent.

All Wild Segments (Lewis River and Snake River)— Like alternative B, alternative C would include off-site cultural resources interpretation of river segments classified as wild. Conducting off-site interpretation would ensure that the undeveloped character of these wild river corridors would be preserved and avoid visitor use disturbance to cultural resources by foot traffic during interpretive activities. As a result, this interpretive program would result in no impacts on cultural resources in these wild segments.

River Access Points. The site-specific management strategies proposed for the nine access points along the Snake River under alternative C are not anticipated to adversely impact cultural resources in these areas because the resources would be avoided when the individual actions included in this plan are developed in greater detail. Careful design of activities at these access points would ensure that such actions would minimally affect the scale and visual relationships among cultural landscape features or circulation patterns and features. The topography, native vegetation patterns, and land use patterns of cultural landscapes in or near these sites would remain largely unaltered. For historic structures, character-defining features would remain intact and unaltered by these activities. Archeological resources would be identified and avoided by nearby ground disturbance to ensure the protection of these resources.

A full section 106 assessment of effect for all cultural resources would be conducted at each of the nine access points when the information concerning the type and intensity of impacts on cultural resources becomes known. At that time, intensive survey, resource identification, determinations of national register eligibility, and an assessment of the effect of the undertakings associated with this plan would occur.

Cumulative Impacts. Ongoing site improvements to the Moose headquarters complex are expected to cause no impacts on cultural resources. Changes in the operation of Jackson Lake Dam would also not impact cultural resources. The dam structure has been determined not eligible for listing in the national register. Other water-related resource projects on private inholdings are also not expected to have impacts on cultural resources.

The variety of land management activities at Bridger-Teton National Forest, such as oil and gas leasing, mining, off-road vehicle use, and timber production, would be managed under the Wild and Scenic Rivers Act designation for Snake River Headwaters, for which the U.S. Forest Service is currently preparing a comprehensive river management plan. Potential direct or indirect impacts on cultural resources on USFS lands adjacent to the NPS-managed lands are not yet known at this time; such impacts would likely be identified and resolved by the forthcoming plan. The contribution of beneficial or adverse impacts, if any, to cultural resources at Bridger-Teton National Forest would be included in this cumulative scenario analysis when these impacts become known.

Additionally, Grand Teton National Park is currently in the early stages of preparing a comprehensive plan for management of historic properties of the park for the next 20 years. This plan would provide general management guidance and site-specific treatment planning for some properties, including the historic 4 Lazy F Dude Ranch, Bar BC Dude Ranch, and Snake River Land Company residence and office, that are within the designated Snake River Headwaters wild and scenic corridor. Although the actions of this plan have not yet been determined, they would likely further the preservation and maintenance of the cultural

resources of the park and result in a minor to moderate, beneficial impact to these resources.

As described above, implementation of alternative C could result in negligible adverse, permanent, site-specific impacts on cultural resources related to unintentional visitor use impacts that could occur within the corridor. The negligible, permanent, site-specific, adverse impacts of alternative B, in combination with the beneficial and the negligible to minor, permanent, site-specific, adverse impacts of other past, present, and reasonably foreseeable future actions, plus the contribution of alternative C, would result in an overall negligible to minor, permanent, site-specific adverse cumulative effect to cultural resources.

Conclusion. Alternative C would cause negligible to minor, permanent, site-specific adverse impacts on cultural resources within the designated wild and scenic river corridor. Cumulative impacts would be site-specific, permanent, negligible to minor, and adverse.

Section 106 Summary. After applying ACHP criteria of adverse effects (36 CFR 800.5, "Assessment of Adverse Effect"), the National Park Service concludes that implementation of alternative C would result in only negligible to minor adverse impacts on cultural resources, which would result in a section 106 finding of *no adverse effect*. For future yet-defined activities or projects that may occur at the nine river access points, park staff would continue to meet their sections 110 and 106 responsibilities as the details of proposed undertakings become known. Park staff would not consider project undertakings that would result in an adverse effect under section 106. As a result, the National Park Service anticipates that the actions defined under this alternative will result in a *no adverse effect* determination.

VISITOR USE AND EXPERIENCE

INTRODUCTION

This section describes the effects of alternatives A, B, and C on visitor use and experience (this includes the effects to the recreation value) within the Snake River Headwaters. Analysis of these components is based on the best professional judgment of Grand Teton and Yellowstone national parks and John D. Rockefeller, Jr. Memorial Parkway staff, NPS planners, and research results from other specialists. This section is organized by first describing the models and assumptions for analyzing impacts, which determine whether an impact is *beneficial* or *adverse*. These models and assumptions are described within the context of *duration* and *intensity* of a given impact. Lastly, they are summed up within the cumulative impacts and conclusion sections for each alternative.

Methods and Assumptions for Analyzing Impacts

The following impact thresholds have been developed for analyzing the effects of the alternatives on visitor use and experience (including the recreational value). The intensity refers to the significance or degree of the impact to visitor use and experience. The impact intensities would be measured as *negligible, minor, moderate,* and *major*. To provide a metric for quantifying the intensity of the impacts, the definitions for the impact intensity and thresholds are as follows:

- **Negligible:** Most visitors would likely be unaware of any effects associated with implementation of the alternative.

- **Minor:** Changes in visitor opportunities and/or setting conditions would be slight but detectable, would affect a few visitors, and would not appreciably limit or enhance experiences identified as fundamental to the purpose and significance of the river.

- **Moderate:** Changes in visitor opportunities and/or setting conditions would be noticeable, would affect many visitors, and would result in some changes to experiences identified as fundamental to the purpose and significance of the river.

- **Major:** Changes in visitor opportunities and/or setting conditions would be highly apparent, would affect most visitors, and would result in several changes to experiences identified as fundamental to the purpose and significance of the river.

Impacts on visitor use and experience (recreational values) within the Snake River Headwaters corridors were determined through an assessment of changes in access and opportunities to river uses, as well as the character of visitor experience while recreating in the river corridors. These were addressed by evaluating the following visitor uses and associated experiences:

- **Recreational Access and Opportunities:** These include impacts on the level of access and types of recreational opportunities that can be experienced within the Snake River Headwaters. These can include activities such as boating, fishing, scenic driving, and camping conducted either privately or through concessioners.
- **Quality of the Experience:** These include impacts on characteristics

associated with visitor experience within the headwaters, and consist of elements pertaining to perceived crowding, satisfaction with facilities and services, and opportunities to experience solitude and natural quiet.

- **Interpretation and Education:** These include impacts on the opportunities for visitors to experience interpretation and education about river values within the headwaters.

- **Safety:** These include impacts on visitor safety within the headwaters.

ALTERNATIVE A (NO ACTION)

Headwaters-wide

Recreational/Access and Opportunities. As introduced in the chapter on affected environment, recreational opportunities that may be impacted under alternative A include boating, fishing, trail-based recreation, scenic driving and travel, photography and wildlife viewing, picnicking, camping, lodging and other concessioner services, and orientation, interpretation, and education opportunities offered within the headwaters corridors. The variety of recreational access and opportunities within these river segments provides long-term, major, beneficial impacts for visitors recreating within the headwaters. However, under alternative A, no systematic visitor use management or monitoring of resource and social conditions associated with visitor use occurs within the headwaters. Without proper monitoring and adaptive visitor use management, visitor opportunities and associated access within portions of specific river segments may be diminished due to the proliferation of visitor use-related impacts, vegetation impacts, wildlife displacement, and social deterioration (e.g., crowding), aesthetic impacts and safety concerns. These actions may result in long-term, moderate, adverse impacts on recreational opportunities and access headwaters-wide.

Quality of Experience. Impacts on the quality of visitor experience within the headwaters include elements pertaining to perceived crowding and conflict, satisfaction with facilities and services, and opportunities to experience solitude and natural quiet. Currently, research and park monitoring have begun to address these issues and have determined that visitors are largely satisfied with the experiences they have while recreating within the headwaters (Park and Tucker 2012; Univ. of Idaho 2008). Ninety-five percent of Americans have indicated that one of the most important reasons for preserving national parks is to provide opportunities to experience natural sounds, i.e., wind, water, and natural quiet (Haas and Wakefield 1998; Driver et al. 1991; Mace et al. 2003; McDonald et al. 1995). However, anthropogenic sounds, i.e., loud voices, cell phones, radios, and motorized equipment have been found to be annoying and unacceptable by Grand Teton National Park visitors at places near the headwaters (Pilcher et al. 2006). Locations that have recently been monitored and recorded include the area just west of the scenic segment of Snake River, between the Pacific Creek and Deadman's Bar boat launches and an area just north of the scenic segment of the Gros Ventre River. At the monitoring site on the scenic segment of the Snake River, monitoring equipment detected aircraft sounds approximately 6% of the time and road vehicle sounds approximately 2% of the time during the summer 2006 sampling period (S. Burson, pers. comm., 2012). At the scenic Gros Ventre River site, monitoring equipment detected aircraft sounds approximately 10% of the time and road vehicle sounds approximately 29% of the time during the summer 2011 sampling period (S. Burson, pers. comm., 2012). Increases in visitation and external factors, such as increased aircraft traffic, could contribute to noise impacts that affect visitor experience. Research suggests that under current conditions, most visitors do not feel crowded while recreating on the

Snake River (Park and Tucker 2012). However, the opportunity to experience fewer visitors is preferable by many recreationists. Without additional monitoring of use resources and social conditions pertaining to visitor use, the quality of visitor experience may be diminished in the future. If visitor use increased substantially, perceived crowding and sound-related impacts may occur, aesthetic impacts could intensify, and satisfaction may decrease. These actions may result in long-term, moderate, adverse impacts on visitor experience.

Interpretation and Education. There are currently many opportunities to experience interpretation and education within and surrounding the headwaters. These include elements such as roadside and trailhead signage, interpretive displays, visitor centers, museums and learning structures, park staff, and concessioner services. These provide opportunities for visitors to learn about the history and natural processes that occur within the area, while gaining understanding of proper behavioral ethics to protect resources. Research suggests that the majority of visitors seek and receive information from these sources, suggesting that these dissemination methods are an important component of visitor use and experience (Univ. of Idaho 2008). Under current conditions, these elements could be improved by adding additional structures, signage, and education strategies, which would improve wayfinding, decrease depreciative behaviors, increase visitor safety, and enhance overall visitor experience. However, under alternative A, interpretation and education opportunities would remain the same, likely leading to long-term, negligible, adverse impacts on the visitor experience.

Safety. Research suggests that the majority of visitors to the areas that encompass the headwaters feel safe while recreating in those areas (Univ. of Idaho 2008). However, results from visitor surveys suggest that many visitors have safety concerns pertaining to vehicle-related accidents and wildlife interactions (Univ. of Idaho 2008). Under current conditions, potentially hazardous factors, including elements such as limited parking and lack of wayfinding and river access, have led to safety concerns. For example, in some places limited designated parking has resulted in visitors parking along roadsides, which leads to potentially dangerous situations in which visitors enter and exit their vehicles alongside busy roadways. Additionally, human and wildlife interactions are prevalent in some headwaters areas and this prevalence may lead to increased visitor safety concerns without additional educational efforts and site management. Under alternative A, visitor safety would likely remain the same. These actions could result in long-term, minor adverse impacts on visitor safety within the headwaters.

River Segments

Only those headwaters segments that would experience more specific impacts than those under the headwaters-wide section are described as follows:

Snake River (scenic segment). This segment receives the highest amount of direct, river-related visitor use, most of which is boaters or floaters recreating privately or under the guidance of a concessioner. This segment provides these recreationists with long-term, moderate, beneficial recreational access and opportunities. However, because of the high level of use many areas within this segment have sustained resources impacts such as vegetation loss and soil compaction resulting in social trails within the corridor and bank erosion on the river. Additionally, high visitation to this segment has created occasional crowding at boat launch sites, leading to additional resource damage, safety concerns for visitors, and impacts on the overall visitor experience. Under alternative A, these impacts would most likely continue and worsen if visitation increases. These actions would result in long-term, moderate, adverse

impacts on the scenic segment that would potentially decrease the quality of visitor experience.

River Access Points

Only those sites that would experience more specific impacts than those under the headwaters-wide section are described as follows:

Flagg Canyon. The Flagg Canyon area is difficult to find because it lacks effective signage indicating the turnoff from the park road to access this site. The entrance road only allows one-way traffic and visitors have degraded roadside vegetation by driving off the road when oncoming traffic approaches. The lack of interpretive information and infrastructure would likely continue to cause resources impacts, as well as negative social effects such as directional confusion, frustration with oncoming drivers, and potential safety issues because drivers must negotiate and anticipate oncoming drivers' actions. These actions could result in long-term, minor, adverse impacts on visitor use and experience.

Flagg Ranch. The Flagg Ranch site currently serves as a take-out site for visitors taking short trips down the river from Flagg Canyon. This area contains a large lot to accommodate visitor parking, yet this site is not heavily used. Currently, the site lacks aesthetic appeal because of the human-modified infrastructure encompassing the site (e.g., large parking lot beside highway and prevalent traffic sounds). There is rusted metal matting at the launch site, which could potentially cause safety issues for boaters and recreationists in the area. Under alternative A, this site would remain the same and there would likely be long-term, minor, adverse effects to visitor experience quality at this location.

Jackson Lake Dam. While this boat launch is not technically within the designated river corridor, it provides many visitors with access to the river, and therefore the impacts associated with this site under alternative A are discussed. Occasional crowding at this launch site has displaced some visitors, creating social trails and vehicle parking in undesignated places, typically on vegetation, causing trampling and soil compaction. Furthermore, the lack of a designated launch site requires visitors to hand-carry boats down a steep gravel embankment to access the river, resulting in potential safety issues. Under alternative A, these conditions may continue to cause additional aesthetic impacts, perceived crowding, and visitor safety issues leading to long-term, moderate, adverse effects to visitor experience.

Cattleman's Bridge. This area provides easy access to the popular Oxbow Bend area of the river, and therefore receives moderate amounts of use. There are currently a few social trails at this launch site and at a former concessioner cook site within this area. There is also evidence of vehicle parking in undesignated places and erosion at the riverbank from trailers being lowered into the river when launching boats. These actions have caused trampling and aesthetic impacts. There are no restrooms at this boat launch. Under alternative A, these conditions may continue to cause social impacts, leading to long-term, minor, adverse effects to visitor experience. There is significant wildlife activity in this area, e.g., grizzly bears, and visitor and wildlife safety is of concern. Increased visitation may lead to more negative human-wildlife interactions. Under alternative A, these issues could intensify, potentially resulting in long-term, moderate, adverse impacts on the quality of visitor experience and safety conditions.

Oxbow Bend Overlooks. This popular viewing area lacks delineated parking areas and trails, resulting in traffic congestion and creation of many social trails. These conditions result in long-term, minor, adverse impacts on visitor safety and experience.

Pacific Creek Landing. Pacific Creek Landing is a popular take-out site for private users, mostly with fishing dories, canoes, and kayaks. Because of the site popularity, crowding occasionally occurs, possibly diminishing visitor experience, which could continue, if not worsen, if visitation increases. There are several social trails at this launch site, as well as evidence of vehicle parking in undesignated places leading to aesthetic and resource impacts. Additionally, the launch area is constricted, leading to congestion and long wait times for put-in and take-out. Under alternative A, these conditions may continue to cause impacts, leading to long-term, moderate, adverse effects on visitor use and experience.

Deadman's Bar. Deadman's Bar is the most heavily used put-in site for commercial scenic float recreationists. This site contains two boat launches. There are several social trails from the upper launch site and to/from cook sites, causing visibly denuded landscape areas. These resources and social impacts are likely to continue under alternative A. Occasional crowding at this launch site has displaced some visitors, causing visitors to park vehicles alongside the roadway, resulting in vegetation trampling and aesthetic impacts. This action also causes potential safety hazards for visitors when they park alongside busy roadways. Crowding and safety concerns and associated resources impacts are expected to continue, if not worsen, if visitation increases. There is also significant wildlife activity in this area, e.g., grizzly bears, and visitor and wildlife safety is of concern. Under alternative A, these conditions may continue to cause congestion and long wait times at the launch site, leading to long-term, moderate, adverse effects on the quality of visitor experience and safety conditions.

Schwabacher Landing. Lack of delineated parking and trails at this site has led to access and circulation issues and creation of social trails, resulting in long-term, minor, adverse impacts on visitor use and experience.

Moose Landing. Moose Landing is primarily used as a take-out site for exiting the river, predominantly by concessioners removing rafts. At peak times, this site can become congested with up to twelve 20-foot rafts trying to leave the river at the same time, leading to crowding, safety concerns, and resources impacts. This alternative would continue to cause long-term, moderate, adverse impacts on visitor access and recreational opportunities and safety.

Cumulative Impacts. The diversification of recreational access and opportunities offered within the headwaters corridors under alternative A, provide visitors with long-term, moderate, beneficial impacts pertaining to visitor use and experience. However, no systematic visitor use management or monitoring of resources and social conditions associated with visitor use occur within the headwaters under this alternative. Without proper visitor use management and monitoring, visitor opportunities and associated access may be diminished due to proliferation of visitor use-related impacts such as vegetation impacts, wildlife displacement, and social deterioration, i.e., crowding, aesthetic impacts, and safety concerns. These actions may result in long-term, moderate, adverse impacts on recreational opportunities and access.

Empirical research and park monitoring suggest that visitors are largely satisfied with the experiences they have while recreating within the headwaters. This indicates that the visitor experience under alternative A is moderate and beneficial for the majority of visitors to the headwaters. However, crowding has been experienced at some of the busier boat launches and viewpoints, and anthropogenic noise intrusions have been found to detract from visitor experience at sites near the headwaters. If visitor use increased substantially, perceived crowding may occur, aesthetic impacts could intensify, and satisfaction may decrease. These actions may result in long-term, moderate, adverse impacts on visitor experience.

The various dissemination sources for education and interpretation under alternative A provide opportunities for visitors to learn about the history and natural processes that occur within the headwaters, while gaining understanding of proper behavioral ethics that help protect the resources. These provide long-term, moderate, beneficial effects on visitor use and experience. However, these elements could be improved by adding additional structures, signage, and education strategies, which would improve wayfinding, decrease depreciative behaviors, improve visitor safety, and enhance overall experience. Interpretation and education opportunities under this alternative would remain the same, likely leading to long-term, negligible, adverse impacts on visitor use and experience.

Under alternative A, potential hazards to visitor safety, including elements such as limited vehicle infrastructure leading to unmanaged and unsafe parking, lack of wayfinding, precarious river access, and negligent visitor behaviors, could cause potentially dangerous wildlife interactions. Under alternative A, visitor safety would maintain its current state. These actions could result in long-term, moderate, adverse impacts on visitor safety within the headwaters.

The National Park Service is undertaking site improvements to the Moose headquarters complex, located within the scenic segment of Snake River. This project involves redesigning vehicle and pedestrian traffic within the administrative and Moose Landing areas, and removing several temporary facilities and restoring the associated site to improve stormwater management. The improvements would enhance aesthetics of the area by reducing the built environment and improving resources conditions to a more natural state. Access within the area would be easier for visitors, allowing greater visitor use and enhanced experiences. Short term, this project would have noise impacts from machinery and construction processes, as well as visual resources impacts while the project is being completed, which would likely result in moderate, adverse impacts. Overall, this action would likely result in long-term, moderate beneficial effects on visitor use and experience within this area.

Improvements to Schwabacher Road scheduled for 2014, which include paving the 0.33-mile section nearest Outside Highway and widening sections to a 16-foot standard width, would enhance visitor experience by improving road conditions and road safety. Short-term noise impacts during construction and occasional overlay work would occur. Overall, this action would result in long-term, minor, beneficial effects on visitor use and experience at this site.

The Bureau of Reclamation manages water storage and release from Jackson Lake Dam, monitoring water levels for flood control, and sending downstream for irrigation needs. These actions could have cumulative impacts on visitor use and experience within the headwaters because they alter the natural flow patterns of Snake River. Management of the dam may affect river water levels, which could result in dangerously high levels that would be unsafe for recreational activities. Similarly, low releases may negate opportunities for river recreation. Variations in water releases may impact wildlife and vegetation within the corridors, impacting opportunities to see wildlife or be able to fish. These actions have the potential to result in long-term, moderate, adverse impacts on visitor use and experience within the headwaters. However, the likelihood of these changes is unknown at this time due to the uncertainty of future factors that would affect water level, i.e., weather and climate, and upstream and downstream population fluctuation.

There is the possibility of a slight increase in visitation or a change in visitor interests and demand due to potential changes in regional populations or national recreation trends, although these effects are unknown at this time. If visitation were to increase, it would

increase the potential for visitor use-related impacts on resources and perceived crowding, which may lead to additional impacts such as lack of solitude and increased anthropogenic noise masking the sounds of nature. Changes in recreation trends may result in social conflicts among visitors. For example, if alternative types of watercraft, such as river boards or paddleboards, become more popular, they may affect other boaters or anglers. At this time, uncertainty prevents accurate descriptions of the associated impacts that may exist with alterations in recreation trends.

Other changes that could result in impacts on visitor use and experience include population fluctuation on adjacent lands and climate change. If surrounding populations and associated developments increase, they may impact opportunities to access the headwaters by affecting traffic flows in and out of the surrounding protected areas. This could also affect visitor abilities to see wildlife due to habitat and migration alterations that may occur from exterior population fluctuations. Developments associated with population growth would likely impact the visibility of the night sky by introducing more light pollution and decreasing air quality. Additionally, climate change may transform the current environment, modifying wildlife habitat and migration patterns and visitor access and recreational opportunities.

Conclusion. Alternative A would continue to provide a variety of recreational opportunities prevalent within the segments such as boating, fishing, trail-based recreation, scenic driving and travel, photography and wildlife viewing, picnicking, camping, lodging and other concession services, and orientation, interpretation, and education. These activities provide long-term, minor to moderate, beneficial impacts on visitor use and experience. However, no systematic visitor use management or monitoring of resource and social conditions associated with visitor use occurs within the headwaters under this alternative. Without proper visitor use management and monitoring, visitor opportunities and experience may be diminished due to the proliferation of visitor use-related impacts on resources and social deterioration, e.g., crowding, aesthetic impacts, and safety concerns. These actions may result in long-term, minor to moderate adverse impacts on visitor use and experience. Any effects resulting from changes in population, recreation trends, or climate change may result in additional minor to moderate adverse effects on visitor use and experience, but the ability to predict the type or intensity of these impacts is limited at this time.

ALTERNATIVE B

Headwaters-wide

Recreational Access and Opportunities. This alternative would allow slightly more use and implementation of other recreational access and opportunities such as camping along the river. Existing boat launch sites would be improved and additional launches would be constructed to allow greater river access. This action would likely produce long-term moderate, beneficial impacts on those recreationists who overnight camp or use additional or improved launch sites. However, this action may negatively affect visual experience, induce crowding, and increase anthropogenic noise and resources impacts that could result in long-term, moderate, adverse impacts on visitor use and experience. Under alternative B, a visitor use management and monitoring program would be implemented, which would have moderate, beneficial, long-term effects on recreational access and opportunities within the headwaters.

Quality of Experience. Under alternative B, increased visitor access and opportunities may enhance some visitor experience. For example, those visitors who could camp along the river would likely experience long-term, moderate, beneficial effects from that particular experience. However, because this alternative allows for greater use, impacts on

the quality of visitor experience may be degraded by potentially increasing crowding, decreasing satisfaction, and lessening opportunities to experience solitude and natural quiet. These actions may result in long-term, moderate, adverse effects on visitor use and experience. Also under this alternative, implementation of a visitor use management and monitoring effort would assist management in measuring and addressing these potential impacts. For example, crowding would be monitored by evaluating the number of visitor group encounters experienced while boating on Snake River. These adaptive visitor use management actions would have moderate, beneficial, long-term effects on the quality of visitor experience within the headwaters.

Interpretation and Education. Under alternative B, interpretive opportunities would be increased and implemented and would emphasize river values and resource protection. These elements could improve wayfinding, decrease depreciative behaviors and potentially negative human-wildlife interactions, and improve visitor experience. This action would likely result in long-term, moderate, beneficial impacts on visitor opportunities to experience interpretation and education.

Safety. Under alternative B, elements like limited parking, wayfinding, interpretation opportunities, and river access sites would be enhanced and expanded. Additional interpretation and education to mitigate negative human-wildlife interactions would increase visitor safety. These actions could result in long-term, minor, beneficial impacts on visitor safety within the headwaters. However, by introducing more visitor opportunities and access, visitor safety on the river may be compromised due to crowding. For example, a boater may take a potentially unsafe river line to avoid hitting boats backed up in the safer river line. These actions could result in long-term, minor, adverse impacts for some visitor safety.

River Segments

Only those segments that would experience more specific impacts than those under the headwaters-wide section are described as follows:

Lewis River (wild segment). Under alternative B, the kinds of direct river-related activities would be similar to alternative A. Direct river-related visitor use levels would likely remain low in this segment and would not pose a concern for river values. Under this alternative, visitor experience may be enhanced by the expansion of wild and scenic river interpretive information aimed at increasing visitor understanding about river values and encourage behavior that aligns with the preservation of the outstandingly remarkable values within this river segment. This would likely lead to long-term, minor, beneficial impacts on resources and social elements within this segment.

Lewis River (scenic segment). This scenic segment is heavily used by visitors traveling along North Park Road, which parallels the river. Under this alternative, improvement and expansion of scenic turnouts would be considered during the next major road reconstruction project, creating more opportunities for visitors to experience the river. This would also enable visitors to enter and exit the roadway in a safer manner. Under alternative B, the kinds of direct river-related visitor use would be similar to alternative A. Direct river-related visitor use levels would likely remain low in this segment and would not pose a concern for river values. Under this alternative, visitor experience may be enhanced by the expansion of interpretation and education emphasizing preservation of resources and social conditions within the segment. Together, these actions would likely have long-term, moderate, beneficial effects on visitor use and experience within this segment.

Snake River (wild segment, Yellowstone National Park). Under alternative B, the

range of recreational opportunities would remain the same as in alternative A (i.e., camping, hiking, fishing, horseback riding, and pack animal use). Direct river-related visitor use levels would likely remain low in this segment and would not pose a concern for river values. Interpretive information would be expanded to emphasize resource and social conditions preservation within the segment. This would likely improve understanding of river values and could prevent some resource degradation such as human modification at hot springs features. These actions would likely result in long-term, minor, beneficial impacts on this segment.

Snake River (wild segment, John D. Rockefeller, Jr. Memorial Parkway). Under alternative B, the range of recreational opportunities would remain the same as in alternative A (i.e., boating, camping, hiking, fishing, horseback riding, pack animal use, and hunting) although access would be improved by grading parking lots and improving boat launches. However, to enhance recreational opportunities in this segment maximum use levels would be approximately 10% higher than under alternative A. Allowing for a slight increase in use would lead to long-term, minor, beneficial impacts on visitor access and opportunities to enjoy recreational values on this segment. Additionally, implementation of visitor use monitoring would assist managers with determining if standards, such as numbers of encounters with other boaters within this section, have been violated so that appropriate management actions could be taken to mitigate crowding. These adaptive management actions would likely have long-term, major, beneficial impacts on visitor experience within this segment.

Snake River (scenic segment). Under alternative B, recreational access and opportunities within this segment would increase, as camping would be allowed along the river for overnight boating and floating trips. This action would likely result in long-term, moderate, beneficial impacts for visitors who would participate in these activities. Although for the majority of visitors who would not participate in these camping opportunities, the sights, sounds, and anthropogenic presence of campers within this segment may degrade their experience. Overall, camping within this segment would likely cause both resource impacts and social impacts leading to long-term, moderate, adverse impacts on visitor experience within this segment. Food storage and waste management at river cook sites would be improved, leading to the protection of resources, mitigation of potential human-wildlife encounters, and increased visitor safety.

Under alternative B, Pacific Creek and Deadman's Bar launch sites would be relocated and redesigned. Long-term effects of this action would likely result in moderate, beneficial impacts by mitigating resource and social impacts that occur at the sites under alternative A. Access to River Road would be open to vehicles on either end of the road (RKO and Bar BC Roads) and to bicyclists and pedestrians in the middle section, while only limited access would be granted to concessioners. This action would provide recreational opportunities for visitors using several kinds of transportation modes, likely resulting in long-term, moderate, beneficial impacts on recreational access and opportunities. However, integration of vehicular traffic with bicycle and pedestrian traffic could pose some safety concerns along this roadway. A new viewing area and expansion of the existing vehicle turnout at Oxbow Bend would provide more visual opportunities and likely make the area safer for vehicles trying to access the viewing area. Creation of an accessible trail from Moose to Menor's Ferry would also allow individuals with accessibility needs to access additional recreational opportunities. These alterations would likely cause long-term, moderate, beneficial impacts on this river segment.

Under this alternative, interpretive efforts would be increased, allowing commercial floating trip visitors to stop at Bar BC during

their river trip to learn about the area. In addition to current interpretation at Menor's Ferry and the wayside exhibit at Bar BC Dude Ranch, other interpretive efforts would be implemented at Menor's Ferry, Bar BC Dude Ranch, and 4 Lazy F Dude Ranch. These actions would provide additional educational opportunities for visitors to this segment, likely leading to long-term, moderate, beneficial impacts. Implementation of visitor use monitoring would assist managers with determining if standards, such as numbers of encounters with other boaters within this section, have been violated so that appropriate management actions could be taken to mitigate crowding. These monitoring actions would likely have long-term, major, beneficial impacts within this segment.

Pacific Creek (scenic segment). Under alternative B, current recreational access and opportunities would continue to be available. In addition, guided horseback riding would be allowed, likely resulting in an increase in this visitor activity. This action would benefit those visitors who value that recreational opportunity and experience, resulting in long-term, minor, beneficial impacts on visitor experience. Conversely, increased horse use may cause user conflict between those visitors who do not value horse-related activities, leading to long-term, minor, adverse impacts on visitor experience. Also under alternative B, the existing elk reduction camp would be refurbished (e.g., added vault toilet) to prevent additional resource impacts, and improve the aesthetics of the area. This action would likely cause long-term, minor, beneficial impacts on visitor use and experience at this site. Under this alternative, existing social trails and informal parking areas would be revegetated and formal trails would be designated to prevent additional resource and social impacts. Better delineation of parking areas and trails would improve visitor access and circulation, resulting in long-term, minor, beneficial impacts.

Buffalo Fork (scenic segment). Under alternative B, existing social trails and informal parking areas would be revegetated and formal trails would be designated to prevent additional resource and social impacts. Better delineation of parking areas and trails would improve visitor access and circulation, resulting in long-term, minor, beneficial impacts.

Gros Ventre River (scenic segment). Under alternative B, existing social trails would be revegetated and formal trails would be designated to prevent additional resource and social impacts. This action would lead to long-term, moderate, beneficial impacts on visitors within this segment. Also under this alternative, anglers would be encouraged to harvest nonnative fish within creel limits established by the Wyoming Game and Fish Department. This action would likely benefit anglers, leading to long-term, negligible, beneficial impacts. Increases in visitor use within this segment may result in user conflicts, particularly between anglers and swimmers jumping off the rocks into the river, which may degrade visitor experience within this segment. If recreational use increased, this action would likely result in long-term, minor, adverse effects on visitor experience within this segment.

River Access Points

Only those sites that would experience more specific impacts than those under the headwaters-wide section are described as follows:

Road maintenance and reconfiguration and boat ramp improvements would enhance access and circulation for visitors. These modest improvements would ensure the primitive character and experience of the site is maintained for visitors. Updated interpretive waysides would provide visitors with increased opportunities for education related to wild and scenic river values.

Flagg Ranch. Under alternative B, the Flagg Ranch boat launch parking lot would be reduced in size; however, based on current

low levels of use, reduction in size would not likely affect access for visitors. Updated interpretive waysides would provide visitors with increased opportunities for education related to wild and scenic river values. Boat launch improvements would improve access and safety for visitors. Other site improvements such as an additional toilet and picnic table would further enhance visitor experience at this site. This would likely lead to long-term, minor, beneficial, moderate, adverse effects to visitor use and experience.

The addition of a pedestrian access trail from the upper parking lot to the boat launch area would improve visitor safety and reduce congestion at the launch. The conversion of the lower parking lot to a staging area and construction of two boat ramps would further reduce congestion and improve access and circulation. Retaining a portion of the lower parking lot adjacent to the boat launch would maintain the quality of visitor access to the boat ramps. These actions would likely have a long-term, moderate, beneficial effect to visitor experience.

Cattleman's Bridge. Under alternative B, Cattleman's Bridge Road would be closed at the former cook site and a small vault restroom may be constructed. Additionally, the former cook site would be removed and the area revegetated. These site improvements would lead to long-term, minor, moderate, beneficial effects on the quality of visitor experience at this site. The road closure and hand carry to new launch site may cause long-term, minor, negligible, adverse impacts on some visitors that would like to access this site by car; however, a trail would be developed in its place. The new trail would loop back along the banks of the Snake River, creating a new experience for visitors that would like to participate in passive recreation along the river (e.g., hiking, photography, bird watching, etc.). Development of the trail would lead to long-term, minor, moderate, beneficial effects on the quality of the recreation experience for visitors at this site. Additionally, the new wild and scenic river interpretive wayside would provide visitors with increased opportunities for education related to wild and scenic river values, creating long-term, minor, moderate, beneficial impacts on visitor opportunities for interpretation of river values.

Oxbow Bend Overlooks. Under this alternative, better delineation of roadside parking and formal trails, along with the addition of interpretive waysides, would reduce parking congestion, social trails, and increase opportunities for visitors to learn about wild and scenic river values. Formal designation of trails and parking areas will improve visitor safety and provide increased opportunities for access to the river by a wider range of visitors with varying physical abilities. These site improvements would create long-term, minor to moderate, beneficial impacts on visitor use and experience.

Pacific Creek Landing. Under alternative B, Pacific Creek Landing would be relocated to a more stable part of the river. This new site would consist of an approximately 0.75-mile access road, boat ramp, pedestrian access trail, and parking lot. The long-term effects of this project would likely improve access and circulation leading to long-term, moderate, beneficial effects for visitors. This area is also known grizzly bear habitat and human-bear encounters may increase as a result, leading to long-term, moderate, adverse impacts on visitor safety. During the construction process, machinery would likely cause short-term, minor, adverse aesthetic impacts on visitors floating the river.

Deadman's Bar. Deadman's Bar is the most heavily used river access point for commercial users. Under alternative B, the parking lot and roadside parking would be better delineated resulting in improved access and circulation for visitors. Improvements to the boat launch would reduce congestion and wait times at the launch site. These actions would likely result in long-term, moderate, beneficial impacts on visitor use and experience. Removal and restoration of the two picnic sites would slightly decrease

visitor opportunities for access; however, due to relative low use levels of these picnic sites this would likely result in long-term, negligible, adverse impacts on visitor experience.

Schwabacher Landing. Under this alternative, better delineation of parking areas and trails and minor road improvements would improve visitor access and circulation. The potential addition of a vault toilet would provide basic needed amenities for visitors. Revegetation of social trails would further enhance the natural aesthetics of the site. Combined, these actions would result in long-term, minor, beneficial effects to visitor use and experience.

Moose Landing. Under this alternative, all parking and boat ramps would be consolidated between the bridge and existing ramp, which would likely increase congestion from concentrating private visitors and concessioners into one location, having long-term, minor to moderate, adverse effects on visitor use and experience. Under alternative B, the launch area would be relocated downstream, adjacent to the consolidated parking lot. The current launch site would be restored and revegetated. The launch area would be redesigned and expanded to improve safe access to and from the river. These actions would likely result in long-term, moderate, beneficial impacts on visitor use and experience.

Cumulative Impacts. Alternative B would allow more visitor use and implementation of other recreational access and opportunities such as camping along the river. Existing infrastructure would be modified or improved, and additional structures would be developed to accommodate increased use. This action would likely result in long-term, moderate, beneficial impacts on those visitors that can take advantage of improved access and opportunities. However, this action may negatively affect visitor visual experience and perceptions of crowding and noise intrusion, diminishing aspects of the river experience that some visitors seek. These impacts could result in long-term, moderate, adverse impacts on visitor use and experience for some visitors. Implementation of monitoring resources and social conditions that would occur under this alternative would have moderate, beneficial, long-term effects on recreational access and opportunities within the headwaters. Increased interpretive opportunities emphasizing river values and resource protection would likely improve wayfinding, decrease depreciative behaviors, and enhance visitor experience. This action would likely result in long-term, moderate, beneficial impacts on visitor opportunities to experience interpretation and education. Improved access, such as additional parking, vehicle turnouts, and boat launches, as well as increased interpretive opportunities would likely result in long-term, minor to moderate, beneficial impacts on visitor safety within the headwaters. However, by introducing more visitor opportunities and access, visitor safety on the river may be compromised due to crowding or displacement. These actions could result in long-term, minor, adverse impacts on visitor safety.

As mentioned under alternative A, under alternative B the National Park Service would continue site improvements to the Moose headquarters complex, which would involve redesigning vehicle and pedestrian traffic within the administrative and Moose Landing areas, as well as removing several temporary facilities and restoring the associated site to improve stormwater management. These improvements would enhance the aesthetics of the area by reducing the built environment and improving resource conditions to a more natural state. Access within the area would be easier for visitors, allowing greater visitor use and enhanced experience. Short term, this project would have noise impacts from machinery and construction processes, as well as visual resources impacts, while the project is being completed that would likely result in moderate adverse impacts. Overall, this action would likely result in long-term, moderate, beneficial effects on visitor use and experience within this area.

Improvements to Schwabacher Road scheduled for 2014, which includes paving the 0.33-mile section nearest Outside Highway and widening sections to a 16-foot standard width, would enhance visitor experience by improving the road condition and road safety. Short-term noise impacts during construction and occasional overlay work would occur. Overall, this action would result in long-term, minor, beneficial effects on visitor use and experience at this site.

Under alternative B, potential actions associated with the storage and release of waters from Jackson Lake Dam by the Bureau of Reclamation could have cumulative impacts on visitor use and experience within the headwaters by altering the natural flow patterns of Snake River. Depending on water needs and availability, management of the dam could result in dangerously high river levels that would be unsafe for recreational activities. Similarly, low releases may negate opportunities for river recreation. Variations in water releases may impact wildlife and vegetation within the corridors, impacting opportunities to fish and see wildlife. These actions have the potential to result in long-term, moderate, adverse impacts on visitor use and experience within the headwaters. However, the likelihood of these changes is unknown at this time due to the uncertainty of future factors that would affect water levels, i.e., weather and climate and upstream and downstream population fluctuations.

Other changes that could result in impacts on visitor use and experience include population fluctuations on adjacent lands and climate change. If surrounding populations and associated developments increase, this may impact opportunities to access the headwaters by affecting traffic flows in and out of the surrounding protected areas. This could also affect visitor abilities to see wildlife due to habitat and migration alterations that may occur from exterior population fluctuation. Developments associated with population growth would likely impact the visibility of the night sky by introducing more light pollution and decreasing air quality.

Additionally, climate change may transform the current environment, modifying wildlife habitat and migration patterns, and visitor access and recreational opportunities. Changes in recreation trends may result in social conflicts among visitors. While uncertainty prevents accurate descriptions of the associated impacts that may exist with these changes, under this alternative monitoring would assist with understanding these impacts, and implementation of adaptive management actions would help mitigate negative effects.

Conclusion. Alternative B would provide long-term, minor to moderate, beneficial impacts on recreational access and opportunities, but likely result in minor to moderate, adverse impacts on aspects pertaining to visitor experience. Implementation of systematic monitoring of resources and social conditions associated with visitor use within the headwaters would result in long-term, moderate, beneficial effects on visitor use and experience. Any effects resulting from changes in population, recreation trends, or climate change may result in additional minor to major, adverse effects on visitor use and experience. While the ability to predict the type or intensity of these impacts is limited at this time, under this alternative monitoring would assist with understanding these impacts, and implementation of adaptive management actions would help mitigate negative effects.

ALTERNATIVE C (PREFERRED)

Headwaters-wide

Recreational Access and Opportunities. Under alternative C, the recreational access and opportunities would largely remain the same as under alternative A. Alternative C would improve recreational access and opportunities at some locations by providing infrastructure and interpretation that would assist with resources protection. This action would likely produce long-term, moderate, beneficial impacts on recreational access and

opportunities within the headwaters. Additionally, under alternative C a monitoring program for visitor use would be implemented, which would have moderate, beneficial, long-term effects on recreational access and opportunities within the headwaters.

Quality of Visitor Experience. Under alternative C, improved access and interpretation would likely enhance the quality of visitor experience. For example, increased educational focus about river values would likely cause long-term, moderate, beneficial effects for visitor experience. Additionally, enhanced interpretation and education measures would likely result in improved visitor behaviors, potentially leading to increased visitor satisfaction regarding other visitors to the headwaters. These actions may result in long-term, moderate, beneficial impacts on visitor experience. Also under this alternative, implementation of a visitor use management and monitoring effort would assist management in measuring and addressing potential impacts on visitor experience. By reducing user conflicts and/or resource impacts that affect visitor enjoyment, this action would have moderate, beneficial, long-term effects on the quality of visitor experience within the headwaters.

Interpretation and Education. Under alternative C, interpretive opportunities would be increased and implemented, emphasizing river values and resource protection. These elements could improve wayfinding, decrease depreciative behaviors, and improve visitor experience. This action would likely result in long-term, moderate, beneficial impacts on visitor opportunities to experience interpretation and education.

Safety. Under alternative C, enhanced interpretive messaging, increased ranger presence, improved resource protection at sites, and modified parking and access to river segments would increase visitor safety. Overall, these actions could result in long-term, moderate, beneficial impacts on visitor safety within the headwaters. However, it is possible that there could be a decrease in safety due to swimming in the thermal features at Yellowstone National Park, which would cause a long-term, moderate, adverse impact in localized areas.

River Segments

Only those headwaters segments that would experience more specific impacts than those under the headwaters-wide section are described as follows:

Lewis River (wild segment). Under alternative C, the kinds of direct river-related visitor use would be similar to alternative A. Direct river-related visitor use levels would likely remain low in this segment and would not pose a concern for river values.

Boating would continue to be restricted and require a permit. These actions would continue to maintain low levels of use, resulting in long-term, minor, beneficial impacts on those visitors seeking a less crowded backcountry experience. Under this alternative, interpretive and educational information emphasizing protection of river values would be implemented to assist with preservation of resources and social conditions. Education and outreach concerning bears and safety would be enhanced to reduce negative human-wildlife interactions and increase visitor safety. These actions would likely lead to long-term, moderate, beneficial impacts on the resources and social elements within this segment.

Lewis River (scenic segment). This scenic segment is heavily used by visitors traveling along North Park Road, which parallels the rim of the Lewis River canyon. Under this alternative, improvement and expansion of scenic turnouts would be considered during the next major road reconstruction project, creating more opportunities for visitors to view the river. This would also enable visitors to enter and exit the roadway in a safe

manner. Under alternative C, the kinds of direct river-related visitor use would be similar to alternative A. Direct river-related visitor use levels, such as fishing, would likely remain low in this segment and would not pose a concern for river values. Under this alternative, visitor experience may be enhanced by the expansion of interpretation and education emphasizing preservation of resources and social conditions within the segment. Together, these actions would likely have long-term, minor, beneficial effects on visitor use and experience within this segment.

Snake River (wild segment, Yellowstone National Park). Under alternative C, the range of recreational opportunities would remain the same as in alternative A (i.e., camping, hiking, fishing, horseback riding, and pack animal use). Direct river-related visitor use levels would likely remain low in this segment and would not pose a concern for river values. Interpretive information would be expanded to emphasize preservation of resources and social conditions. This would likely improve understanding of river values and could prevent some resource impacts such as human modification at hot springs features. These actions would likely result in long-term, minor, beneficial impacts on this segment.

Snake River (wild segment, John D. Rockefeller, Jr. Memorial Parkway). Under alternative C, the range of recreational opportunities would remain the same as in alternative A (i.e., boating, camping, hiking, fishing, horseback riding, pack animal use, and hunting) although access would be improved by grading parking lots and improving boat launches. Additionally, implementation of visitor use monitoring would assist managers in determining whether standards, such as numbers of encounters with other boaters within this section are exceeded, so appropriate management actions could be taken to mitigate crowding. These monitoring actions would likely have long-term, minor, beneficial impacts within this segment.

Snake River (scenic segment). Under alternative C, recreational access and opportunities within this segment would remain restricted to promote resource protection goals. Dispersed boat launching sites would be eliminated and current launches would be redesigned or relocated to protect corridor resources. Vehicle turnouts would be redesigned and improved and existing social trails would be revegetated. These alterations would improve recreational access, opportunities, aesthetics, and safety within this segment. Boating and floating opportunities in the Oxbow Bend area would continue to be monitored over time. If use levels become problematic, restrictions may be put in place that would likely result in long-term, minor, adverse effects on access and opportunity for visitors wishing to participate in these activities. On the other hand, this action would likely have long-term, moderate, beneficial impacts on visitors seeking unobstructed scenic views from Oxbow Bend.

Under alternative C, River Road eventually be closed if it fails due to natural river migration. Visitors would continue to be able to access River Road by vehicle until this time, resulting in short-term, moderate, beneficial impacts for visitors desiring vehicular access to this area. Yet, over the long-term, eventual closure of the road would lead to moderate, adverse impacts for visitors desiring motorized access. Conversely, the road closure would provide long-term, moderate, beneficial impacts for visitors seeking a more primitive nonmotorized experience.

Educational opportunities would be increased under this alternative because interpretation of historic ranch sites would be implemented. Additionally, a visitor use management and monitoring program would be put into practice to assist managers with determining if standards, such as numbers of encounters with other boaters, have been

violated within this section, so appropriate management actions could be taken to mitigate crowding. These monitoring actions would likely have long-term, moderate, beneficial impacts within this segment.

Pacific Creek (scenic segment). Under alternative C, the types of direct river-related visitor use would remain the same as with alternative A. Visitor use levels would be expected to remain low and of little concern for impacts on river values. Existing social trails and informal parking areas would be revegetated and formal trails would be designated to prevent additional resource and social impacts. Better delineation of parking areas and trails would improve visitor access and circulation.

The existing elk reduction camp would be refurbished (e.g., vault toilet added) to prevent additional resource impacts and improve the aesthetics of the area. Combined, these actions would likely cause long-term, minor, beneficial impacts on visitor use and experience within this segment.

Buffalo Fort (scenic segment). Under alternative C, existing social trails and informal parking areas would be revegetated and formal trails would be designated to prevent additional resource and social impacts. Better delineation of parking areas and trails would improve visitor access and circulation, resulting in long-term, minor, beneficial impacts.

Gros Ventre River (scenic segment). Under this alternative, existing social trails would be revegetated and formal trails would be designated to prevent additional resource and social impacts. Also under this alternative, enhanced education and interpretation emphasizing the significance of wild and scenic river designation would be implemented. This action would lead to long-term, moderate, beneficial effects to resources and social conditions within this segment. Also under this alternative, Grand Teton National Park, the National Elk Refuge, and Bridger-Teton National Forest would collaborate on better delineation of parking areas, trails, and signs at the informal visitor access point that overlaps all three agency boundaries. These actions would lead to long-term, moderate, beneficial impacts on visitors within this segment.

River Access Points

Only those sites that would experience more specific impacts than those under the headwaters-wide section are described as follows:

Flagg Canyon. Under this alternative, road maintenance and reconfiguration and boat ramp improvements would improve access and circulation for visitors. These modest improvements would ensure the primitive character and experience of the site is maintained for visitors. Updated interpretive waysides would provide visitors with increased opportunities for education related to wild and scenic river values. This would likely add long-term, minor, beneficial effects to this site.

Flagg Ranch. Under alternative C, the Flagg Ranch boat launch parking lot would be reduced in size; however, based on current low levels of use reduction in size would not likely affect visitor access. Updated interpretive waysides would provide visitors with increased opportunities for education related to wild and scenic river values. Boat launch improvements would improve access and safety for visitors. Other site improvements, such as an additional toilet and picnic table, would further enhance visitor experience at this site, which would likely lead to long-term, minor, beneficial effects to visitor use and experience.

Jackson Lake Dam. Under alternative C, addition of a pedestrian access trail from the upper parking lot to the boat launch area would improve visitor safety and reduce congestion at the launch. Designation of a single hardened boat ramp would also

improve ease of access for those launching boats. Landscape improvements to enhance the natural aesthetics of this river access point would be made. Combined, these actions would likely have long-term, minor, beneficial effects to visitor experience.

Cattleman's Bridge. Under alternative C, the majority of Cattleman's Bridge Road would be closed and partially restored to natural conditions. A new parking area, boat launch, and pedestrian access trail would be established closer to Oxbow Bend. Additionally a small vault restroom may be constructed. These site improvements would lead to long-term, minor, beneficial effects on the quality of the visitor experiences at this site. The Cattleman's Bridge river access point is currently the least used of all nine river access points; therefore, the road closure and hand carry to new launch site would cause long-term, negligible, adverse impacts on visitor access and circulation. However, visitors that would like to access this site by car or who desire to use large boats may experience long-term, minor, adverse impacts from more limited access opportunities. A portion of the new trail would be made accessible for people with disabilities. The development of the trail would lead to long-term, minor, beneficial effects on the quality of the recreation experience for visitors at this site. Additionally, a new wild and scenic river interpretive wayside would create long-term, minor, beneficial impacts on visitor opportunities for interpretation of river values. The relocation of this river access point, under alternative C, may have long-term, minor, adverse impacts on visitors using the Oxbow Bend Overlooks, due to an increase in boaters and pedestrians along the river access point within viewshed experienced at the overlooks.

Oxbow Bend Overlooks. Under this alternative, better delineation of roadside parking and formal trails, along with the addition of interpretive waysides would reduce parking congestion, social trailing, and increase opportunities for visitors to learn about wild and scenic river values. Formal designation of trails and parking areas would improve visitor safety and provide increased opportunities for access to the river by a wider range of visitors with varying physical abilities. These site improvements would create long-term, minor to moderate, beneficial impacts on visitor use and experience.

Pacific Creek Landing. Under alternative C, the Pacific Creek landing would remain in the same site as in alternative A, but would be redesigned to improve visitor access, safety, and circulation. The boat ramp would be enlarged to reduce congestion and wait times. The road extending to the boat launch from the parking lot would be expanded to accommodate two-way traffic. The parking lot on the northeast side of the highway would be closed and revegetated. The parking area on the southwest side of the highway would be enlarged to accommodate more parking closer to the boat launch. This reconfiguration of parking along with the creation of a pedestrian access trail to the boat launch would eliminate the need for visitors to cross the highway or walk along the road to the boat launch. Overall, the effects of these actions would improve access and circulation, and visitor safety, leading to long-term, moderate, beneficial effects for visitor use and experience. During the construction process, machinery would likely cause short-term, minor, adverse aesthetic impacts on visitors floating the river.

Deadman's Bar. Deadman's Bar is the most heavily used river access point for commercial river-related use. Under alternative C, portions of the gravel access road would be paved and the parking lot would be paved and slightly expanded with better space delineation resulting in improved access and circulation for visitors. Parking along the road leading to the launch site would be prohibited under this alternative, but is not expected to deter visitor access due to increased and better delineated parking within the parking lot. Improvements to the boat launch would

reduce congestion and wait times at the launch site. Under alternative C, the cook site would be enhanced with appropriate food storage in order to reduce human-wildlife interactions. These actions would likely result in long-term, moderate, beneficial impacts on visitor use and experience. Removal and restoration of the two picnic sites would slightly decrease visitor opportunities for access, however due to relative low use levels of these picnic sites this would likely result in long-term, negligible, adverse impacts on visitor experience.

Schwabacher Landing. Under alternative C, better delineation of the north parking lot and trail to the river, along with minor road improvements would improve access and circulation for visitors. Potential addition of a vault restroom would provide basic needed amenities for visitors. Revegetation of social trails and the two south parking lots would further enhance the natural aesthetics of the site, but would slightly decrease access for visitors. Combined, these actions would result in long-term, negligible, beneficial effects to visitor use and experience.

Moose Landing. Under this alternative, the circulation pattern for concessioners would be retained to minimize congestion at launch sites and in parking lots. Boat launches would be redesigned to provide easier put-ins and take-outs for improved visitor access and safety. These actions would likely result in long-term, moderate, beneficial impacts on visitor use and experience.

Cumulative Impacts. Alternative C would improve recreational access and opportunities at many headwaters access sites by providing infrastructure and interpretation that would assist with resources protection. This action would likely produce long-term, moderate, beneficial impacts on recreational access and opportunities within the headwaters. However, other actions under this alternative would restrict some visitor access and opportunities in an effort to better protect resources and social experiences. This action would likely cause long-term, minor, adverse effects for a small population of visitors. During modification of sites, construction may lead to short-term, minor, adverse noise and aesthetic impacts that may negatively affect some visitor use and experience. Implementation of monitoring of resources and social conditions that would occur under this alternative would have moderate, beneficial, long-term effects on visitor use and experience. Increased interpretive opportunities emphasizing river values and resources protection would likely improve wayfinding, decrease depreciative behaviors, and enhance visitor experience. These actions would likely result in long-term, moderate, beneficial impacts on visitor opportunities to experience interpretation and education. Increased interpretive messaging, increased ranger presence, improved resource protection at sites, and modified parking and access to river segments would increase visitor safety, resulting in long-term, moderate, beneficial impacts on visitor safety within the headwaters.

As mentioned with alternative A and B, under alternative C, the National Park Service would continue site improvements to the Moose headquarters complex, which would involve redesigning vehicle and pedestrian traffic within the administrative and Moose Landing areas, as well as removing several temporary facilities and restoring the associated site to improve stormwater management. These improvements would enhance the aesthetics of the area by reducing the built environment and improving resources conditions to a more natural state. Access within the area would be easier for visitors, allowing for greater visitor use and enhanced experience. Short term, this project would have noise impacts from machinery and construction processes, as well as visual resources impacts while the project is being completed that would likely result in moderate, adverse impacts. Overall, this action would likely result in long-term, moderate, beneficial effects on visitor use and experience within this area.

Improvements to Schwabacher Road scheduled for 2014, which include paving the 0.33-mile section nearest Outside Highway and widening sections to a 16-foot standard width, would enhance visitor experience by improving the road condition and road safety. Short-term noise impacts during construction and occasional overlay work would occur. Overall, this action would result in long-term, minor, beneficial effects on visitor use and experience at this site.

The potential actions associated with the storage and release of the waters of Jackson Lake Dam by the Bureau of Reclamation could have cumulative impacts on visitor use and experience within the headwaters under alternative C, by altering the natural flow patterns of Snake River. Depending on water needs and availability, management actions could result in dangerously high water levels that would be unsafe for recreational activities. Similarly, low releases may limit opportunities for river recreation. Variations in water releases may impact wildlife and vegetation within the corridors, impacting opportunities to see wildlife and participation in angling. These actions have the potential to result in long-term, moderate, adverse impacts on visitor use and experience within the headwaters. However, the likelihood of these changes is unknown at this time due to the uncertainty of future factors that would affect water levels such as weather and climate, and upstream and downstream population fluctuation.

There is the possibility of a slight increase in visitation or a change in visitor interests and demand due to potential changes in regional populations or national recreation trends. At this time, uncertainty prevents accurate descriptions of the associated impacts that may exist with alterations in visitation or recreation trends. However, if visitation were to increase, the monitoring and associated adaptive management actions that would be implemented under alternative C would mitigate and prevent some resources and social impacts. Additionally, changes in recreation trends may result in social conflicts among visitors, but monitoring actions would also provide input to NPS and land managers so that adaptive management could be applied to alleviate user conflicts.

Other changes that could result in impacts on visitor use and experience include population fluctuation on adjacent lands and climate change. If surrounding populations and associated developments increase, they may impact opportunities to access the headwaters by affecting traffic flows in and out of the surrounding protected areas. This could also affect visitor abilities to see wildlife due to habitat and migration alterations that may occur from exterior population fluctuations. Developments associated with population growth would likely impact visibility of the night sky by introducing more light pollution and decrease air quality. Additionally, climate change may transform the current environment, modifying plant and wildlife habitat and migration patterns, as well as visitor access and recreational opportunities.

Conclusion. Alternative C would likely result in long-term, moderate, beneficial impacts on visitor use and experience within the headwaters by providing improved infrastructure and interpretation that would assist with resource protection, while maintaining recreational opportunities in a safer environment. Some visitors would likely experience long-term, minor, adverse effects because this alternative would restrict some visitor access and opportunities, in an effort to better protect resource and social experiences. Under this alternative, short-term, minor, adverse impacts associated with improvement of sites may affect some visitor access, opportunity, and experience. Implementation of monitoring of resources and social conditions would have moderate, beneficial, long-term effects on visitor use and experience. Any effects resulting from changes in population, recreation trends, or climate change may result in additional minor to major adverse effects on visitor use and experience. While the ability to predict the type or intensity of these impacts is limited at

this time, under this alternative monitoring would assist with understanding these impacts, and implementation of adaptive management actions would help mitigate negative effects.

VISUAL RESOURCES

INTRODUCTION

This analysis of environmental consequences of the alternatives A, B, and C on the visual resources of the Snake River Headwaters is based on the professional judgment of staff at Grand Teton and Yellowstone national parks and John D. Rockefeller, Jr. Memorial Parkway, NPS planners and research data from other specialists. Each alternative would affect scenery and viewsheds similarly across the entire planning area. Therefore, this analysis describes impacts of the management alternatives at the headwaters-wide level, since river segments and access points are not expected to have more specific impacts.

As introduced in the affected environment discussion, the visual resources being analyzed are the scenic landscape areas viewed from the river, roadways, turnouts and scenic overlooks, and landscapes viewed while participating in the numerous recreational activities prevalent within the headwaters. The scenic landscapes of the headwaters include views of the flora, fauna, geologic formations, mountains, plains, and historic structures during the daylight hours, as well as under the darkness of the night sky.

METHODS AND ASSUMPTIONS FOR ANALYZING IMPACTS

This analysis looks at the effect of management strategies primarily related to scenery conservation, resource management and partnerships, on the quality of the visual resources viewed from river, roadways, turnouts, and scenic overlooks within the headwaters. The impact analyses for cultural resources and visitor use and experience also include aspects of visual resources.

- **Negligible:** Effects to the visual quality of the landscape would be at or below the level of detection; changes would be so slight that they would not be of any measurable or perceptible consequence to the observer.

- **Minor:** Effects to the visual quality of the landscape would be detectable, local, and would be small and of little consequence to the observer.

- **Moderate:** Effects to the visual quality of the landscape would be readily detectable, local, with consequences over a relatively large area.

- **Major:** Effects to the visual quality of the landscape would be obvious, with substantial consequences in the region.

ALTERNATIVE A—NO-ACTION

There is no formal guidance for protecting scenic viewsheds within the river corridors, but some protective measures are taken to conserve scenery. Under the no-action alternative, managers would continue to protect scenic views within the river corridors by not placing structures and other intrusions within scenic viewsheds. Maintenance of select scenic vistas and overlooks would also continue when conditions warrant. The continued management of invasive flora would help maintain the quality of viewsheds. NPS and USFWS managers would continue to partner to accomplish these management strategies. These measures would continue to have long-term, minor, beneficial impacts on the overall scenic quality of visual resources within the headwaters.

Because no formal protection guidance for scenery exists, there is the potential for continued impacts on outstanding scenic resources of the headwaters. Current impacts include intrusions to scenic viewsheds from vehicles parking in undesignated turnouts and along roadsides. Informal social trails also intrude on the natural scenic landscape. Some structures within river access points, like bridges, utility lines, and other developments, are visible from the river and diminish natural vistas for visitors. Direct river-related visitor use, such as boating on the Snake River in Grand Teton National Park, also impacts scenic quality, but these uses are so well established the majority of visitors expect to see others recreating on and along the river. The persistence of the actions mentioned above would continue to cause long-term, minor, adverse impacts on visual resources within the headwaters.

Cumulative Effects. The lack of formal guidance for protecting scenic viewsheds within the corridors may jeopardize the protection of these resources in the future. Under alternative A, there is a possibility that visual resources would incur long-term, minor, adverse impacts in the future.

The National Park Service is undergoing site improvements to the Moose headquarters complex, a portion of which is within the scenic segment of Snake River. This project involves reconfiguration of vehicle and pedestrian traffic areas, as well as removal of some buildings and selected site restoration. This project would diminish visual resources in the short term from the presence of construction machinery and equipment. However, in the long term these actions would likely result in minor beneficial effects to visual resources within this river segment by reducing the built environment and restoring resource conditions to a more natural state.

If surrounding populations and associated developments grow, light pollution could increase, resulting in long-term, minor, adverse impacts on views of the night sky (NPS 2004, 2011a). There is the possibility of a slight increase in visitation or a change in visitor interests and demand due to potential changes in regional populations or national recreation trends, although these effects are unknown at this time. If visitation were to grow, it would increase the potential for visitor use-related impacts on resources and perceived crowding, which may diminish scenic viewsheds.

An element of visual resource effect that is difficult to assess, but could have substantial implications, is the air quality status of the headwaters, as it's included in the class I air quality designation of Grand Teton and Yellowstone national parks. The potential for increased regional air pollution could affect the quality of the views within the headwaters, including reduced visibility and damage to vegetation. Class I air quality designation within the headwaters allows superintendents to participate in and comment on projects that could impact air quality conditions. Given the unparalleled scenery of the Snake River Headwaters, it has been identified as an outstandingly remarkable value. The ability of headwater management to influence regional projects affecting air quality would continue to have a long-term, minor, beneficial impact on overall visual resource conditions.

The Bureau of Reclamation manages the storage and release of water from Jackson Lake Dam so that water levels can be moderated for flood control and sent downstream for irrigation needs. These actions could have cumulative impacts on visual resources within the headwaters because they alter the natural flow patterns of Snake River. Management of the dam may affect river water levels and therefore alter the aesthetics of the headwaters. These actions have the potential to result in long-term, negligible to minor, adverse impacts on visual resources within the headwaters. These past, present, and reasonably foreseeable future actions would result in long-term, minor, adverse and beneficial effects on visual resources. The continuation

of the no-action alternative, when considered in combination with these other past, present, and reasonably foreseeable future actions, would result in long-term, minor adverse and beneficial cumulative effects on regional visual resources. This alternative's contribution to these effects would be small.

Conclusion. There are current management activities that contribute to ongoing protection of the headwaters visual resources. These include efforts to manage invasive species, maintenance of select vistas when warranted, continuing to not place structures and other intrusions within scenic viewsheds, and continued partnership efforts. These management activities have long-term, minor, beneficial impacts on protection of the quality of visual resources within the Snake River Headwaters. The cumulative impacts would be long term, minor, adverse, and beneficial on visual resources on a regional scale. This alternative's contribution to these effects would be small.

ALTERNATIVE B

Alternative B emphasizes visitor experience and increases access and developments for a diversity of recreational activities. Higher levels of direct river-related visitor use allowed under this alternative for some river segments may diminish the quality of scenic resources due to the increased likelihood of seeing other visitors within the river corridor. Higher river-related use would result in long-term, minor, adverse impacts on visual resources within the headwaters.

Under alternative B, managers would continue to protect scenic views within the river corridors by not placing structures and other intrusions within scenic viewsheds. Maintenance of select scenic vistas and overlooks would also continue when conditions warrant. The continued management of invasive flora would help maintain the quality of viewsheds. NPS and USFWS managers would continue to partner to accomplish these management strategies. These measures would continue to have long-term, minor, beneficial impacts on overall scenic quality of visual resources within the headwaters.

The unparalleled scenery of the Snake River Headwaters has been identified as an outstandingly remarkable value. To ensure protection of this iconic scenic landscape, the following scenery conservation measures would be implemented under alternative B, and would have long-term, minor, beneficial impacts on the protection of visual resources within the headwaters.

Under this alternative, existing and newly proposed developments would be evaluated for compatibility to protect scenic river values. Facilities and structures would be designed, sited, and constructed to avoid or minimize visual intrusion to the maximum extent possible, consistent with section 7 of the Wild and Scenic Rivers Act. Vegetation treatments would be used to screen and blend structures with the natural landscape. The use of natural materials would be emphasized for erosion control and river-bank stabilization efforts to maintain the natural appearance of the river corridor. Under alternative B, developed and dispersed recreation sites would be designed and maintained to reduce visibility from designated rivers. The use of signs would be minimized within the designated river corridors. When signs are necessary, a consistent sign theme would be maintained and signs would be placed in areas that minimize visual impacts. Where appropriate, facilities such as designated trails, board-walks, and directional fencing would be used to route people away from sensitive natural and cultural resources, while permitting access to important viewpoints.

Under this alternative, social trails would be revegetated to enhance viewing of more pristine natural settings. Vehicle parking would be consolidated to better delineated and formally designated areas. Parking along roadways would be prohibited in certain

areas, improving the integrity of scenic resources in those areas. Historic vistas and other remarkable views would be maintained to the extent possible (i.e., vegetation pruning) to allow visitors the opportunities to experience a variety of scenic settings without disrupting the integrity of the natural ecosystem.

Cumulative Effects. The Snake River Headwaters offer stunning scenic resources that provide long-term, moderate, beneficial effects for visitors. Under alternative B, formalized guidance and associated management strategies would be implemented to protect this outstandingly remarkable value. These protection measures would result in long-term, minor, beneficial impacts on scenic resources in the future.

The past, present, and reasonably foreseeable future actions described under cumulative effects for alternative A would be the same under this alternative, resulting in long-term, minor adverse and beneficial effects on visual resources within the headwaters. Alternative B, when considered in combination with these other past, present, and reasonably foreseeable future actions, would result in long-term, minor adverse and beneficial cumulative effects on regional visual resources. This alternative's contribution to these effects would be small.

Conclusion. Under alternative B, current management activities that are contributing to ongoing protection of visual resources within the headwaters would continue. These include efforts to manage invasive species, maintenance of select vistas when warranted, continuing to not place structures and other intrusions within scenic viewsheds, and continued partnership efforts. Additional protection measures implemented under alternative B would have long-term, minor, beneficial impacts on visual resources within the headwaters. However, higher levels of direct river-related visitor use allowed under this alternative would result in long-term, minor, adverse impacts on visual resources due to the increased likelihood of seeing other visitors within the river corridor. The cumulative impacts would be long term, minor, adverse, and beneficial on regional visual resources. This alternative's contribution to these effects would be small.

ALTERNATIVE C (NPS PREFERRED)

Alternative C focuses on a more primitive, undeveloped natural setting with modest improvements to enhance resource conditions and visitor experience. This alternative strives to maintain current use levels to avoid further diminishing visual resources that would come from increased likelihood of seeing other visitors within the river corridor. Maintaining direct river-related visitor use levels similar to alternative A would result in continued long-term, minor, beneficial impacts on visual resources within the headwaters.

Under alternative C, managers would continue to protect scenic views within the river corridors by not placing structures and other intrusions within scenic viewsheds. Maintenance of select scenic vistas and overlooks would also continue when conditions warrant. The continued management of invasive flora would help maintain the quality of viewsheds. NPS and USFWS managers would continue to partner to accomplish these management strategies. These measures would continue to have long-term, minor, beneficial impacts on overall scenic quality of the visual resources within the headwaters.

The unparalleled scenery of the Snake River Headwaters has been identified as an outstandingly remarkable value. To ensure protection of this iconic scenic landscape, the following scenery conservation measures would be implemented under alternative C, and would have long-term, minor, beneficial impacts on the protection of the scenic resources within the headwaters.

Under this alternative, existing and newly proposed developments would be evaluated

for compatibility to protect scenic river values. Facilities and structures would be designed, sited, and constructed to avoid or minimize visual intrusion to the maximum extent possible, consistent with section 7 of the Wild and Scenic Rivers Act. Vegetation treatments would be used to screen and blend structures with the natural landscape. The use of natural materials would be emphasized for erosion control and riverbank stabilization efforts to maintain the natural appearance of the river corridor.

Under alternative C, developed and dispersed recreation sites would be designed and maintained to reduce visibility from designated rivers. The use of signs would be minimized within the designated river corridors. When signs are necessary, a consistent sign theme would be maintained and signs would be placed in areas that minimize visual impacts. Where appropriate, facilities such as designated trails, boardwalks, and directional fencing would be used to route people away from sensitive natural and cultural resources while permitting access to important viewpoints.

Under this alternative, social trails would be revegetated to enhance viewing of more pristine natural settings. Vehicle parking would be consolidated to better delineated and formally designated areas. Parking along roadways would be prohibited in certain areas, improving the integrity of scenic resources in those areas. Historic vistas and other remarkable views would be maintained to the extent possible (i.e., vegetation pruning) to allow visitors the opportunities to experience a variety of scenic settings without disrupting the integrity of the natural ecosystem.

Cumulative Effects. The Snake River Headwaters offer stunning scenic resources that provide long-term, moderate, beneficial effects for visitors. Under alternative C, formalized guidance and associated management strategies would be implemented to protect this outstandingly remarkable value. These protection measures would result in long-term, minor, beneficial impacts on scenic resources in the future.

The past, present, and reasonably foreseeable future actions described under cumulative effects for alternative A would be the same under this alternative, resulting in long-term, minor, adverse, and beneficial effects on visual resources within the headwaters. Alternative C, when considered in combination with these other past, present, and reasonably foreseeable future actions, would result in long-term, minor, adverse, and beneficial cumulative effects on regional visual resources. This alternative's contribution to these effects would be small.

Conclusion. Alternative C has greater potential to more proactively protect visual resources within the headwaters when compared to alternative A, due to implementation of additional scenery protection measures while maintaining current use levels. Under this alternative, current management activities that are contributing to ongoing protection of visual resources within the headwaters would continue. These include efforts to manage invasive species; maintenance of select vistas when warranted; continuing to not place structures and other intrusions within scenic viewsheds; and continued partnership efforts. Additional protection measures implemented under alternative C would enhance ongoing protection actions, resulting in long-term, minor, beneficial impacts on visual resources within the headwaters. The cumulative impacts would be long term, minor adverse and beneficial on regional visual resources. This alternative's contribution to these effects would be small.

PARK OPERATIONS

INTRODUCTION

The analysis of impacts on park operations from the comprehensive river management plan for the Snake River Headwaters is based on the topic research and professional judgment of planners who have experience with similar projects. Park operations consist of National Park Service and National Elk Refuge operations, which encompass protection of visitors and cultural and natural resources; and maintenance of roads, trails, buildings and other structures in a safe and aesthetically pleasing condition and prevention of deterioration that would render them unsightly, unsafe, or beyond efficient repair.

Methods and Assumptions for Analyzing Impacts

Impacts on park operations comparing projected changes resulting from the action alternatives (B and C) to those of the no-action alternative (A). The thresholds used to determine impacts on these resources are defined as follows:

- **Negligible:** The effect would be at or below the lower levels of detection and would not have an appreciable effect on park operations and management.

- **Minor:** The effects would be detectable, but would be of a magnitude that would not have an appreciable effect on park operations and management.

- **Moderate:** The effects would be readily apparent and would result in a change in park operations and management in a manner noticeable to staff and the public.

- **Major:** The effects would be readily apparent and would result in a substantial change in park operations and management in a manner noticeable to staff and the public. The change would produce conditions that would be markedly different from existing operations.

ALTERNATIVE A (NO ACTION)

Under the no-action alternative, the National Park Service would continue to manage the Snake River Headwaters to the same way as it is currently managed. Some elements of management may be enhanced or broadened as financial and staffing resources become available. By continuing to preserve wild and scenic river values and provide several opportunities for outdoor recreation, interpretation, and education in the headwaters area, Grand Teton and Yellowstone national parks and National Elk Refuge would continue to provide the same level of protection, monitoring, and visitor services for the parks and refuge. This continued management would result in impacts on park operations that are long-term, minor, and beneficial.

The no-action alternative would generally call for the continuation of programs, operations, funded construction projects, and current levels of annual operating funds. Park operations would continue to provide operational support for natural area preservation, protection of the river corridor, numerous recreation opportunities, and facilities and park settings to appreciate and access the river.

Staffing levels would continue at current levels. Resources Division staffing levels prevent the park from completing some of the desired baseline studies and monitoring

necessary to guide the park's cultural and natural resources preservation efforts in the future. Limited ranger patrols combined with high levels of visitation have resulted in some adverse impacts on resources in the river corridor. This would result in continued long-term, minor to moderate, adverse impacts on operations.

The inadequate parking at overlooks and boat launch areas would continue to require ranger assistance in managing parking areas to protect resources and to address occasional visitor conflicts. Several boat launch facilities require ongoing maintenance due to design, location, and river conditions, which in some cases require USACE permits. No significant changes would be made to overlooks or boat launches in this alternative. This results in continued long-term, moderate, and adverse impacts on operations.

The continued efforts of the park at developing and maintaining partnerships and volunteer support would continue to provide long-term, minor to moderate, beneficial impacts on park operations related to managing the Snake River Headwaters.

Cumulative Effects. Given the past, present, and reasonably foreseeable projects and actions described in the cumulative scenario, the most likely impact to park operations would be an increase in efficiency and ease of communication from relocation and consolidation of a considerable portion of staff into one permanent building at Moose headquarters in Grand Teton National Park. This would have a long-term, minor, beneficial impact to park operations.

When the likely effects of implementing the actions contained in this alternative are added to the effects of the action described above, it could result in long-term, minor, adverse, beneficial impacts on park operations. The impacts of these actions on park operations would comprise a medium portion of the overall cumulative effect.

Conclusion. The no-action alternative would sustain the river corridor, but may result in a strain on operational resources; this would continue to result in an overall impact of the no-action alternative would be long term, minor, and adverse. Some minor, beneficial impacts would come from a cumulative action of consolidating staff at Moose headquarters in Grand Teton National Park.

ALTERNATIVE B

A key component of alternative B is providing new and upgraded river access amenities that would increase and improve the opportunities for visitors to enjoy the headwaters and its many resources and values. Given this priority, alternative B would result in additional maintenance requirements. The projects would include the construction, relocation, redevelopment, and/or restoration of boat launches, restrooms, picnic areas, parking lots, interpretive exhibits, roadway turnouts, campsites, trailheads, and other facilities. Many of these projects would require either additional work by park staff or by local and regional contractors. In the long term, addressing facility needs to adequately support visitor use should result in increased operational efficiency by reducing staff time associated with managing visitor conflicts and resource damage; nevertheless, there may still be some additional maintenance requirements for enhanced facilities. The collective result of these actions would result in an impact to park operations that is long term, minor to moderate, and beneficial, but also short term, moderate, and adverse due to construction.

The Wild and Scenic Rivers Act requires managing kinds and amounts of use along the river corridor to protect river values. Monitoring protocols would need to be established, which would require increased effort by park staff during the initial implementation and would result in short-term, minor to moderate, adverse impacts on park operations. However, the attainment of consistent data from these monitoring efforts

would allow staff to adaptively manage use to ensure resource protection, which would improve operational efficiency in responding to changes in the condition of river values. In the long term, this would result in moderate, beneficial impacts on park operations.

There are also several elements common to both action alternatives that would positively influence park management in alternative B by addressing problems associated with operations and maintenance, resulting in long-term, minor to moderate, beneficial impacts. Examples of such strategies include

- Continued use of seasonal closures for wildlife protection would reduce visitor-wildlife interactions.
- Implementation of development and recreation management guidelines would benefit park operations. Although development of these guidelines would require staff time initially, implementation of the guidelines would reduce the planning and review effort for individual projects and actions.
- Implementation of a formal review process for projects covered by section 7 of the Wild and Scenic Rivers Act would provide guidance for park staff regarding projects affecting the river. While it may initially take time for staff to get familiar with the process, over time this should result in a more efficient review of projects.
- Park commitment to working with partners would have a continued impact on the park's ability to complete projects and programs in all areas of park operations. Increased collaboration and coordination with Bridger-Teton National Forest, State of Wyoming, and the Bureau of Reclamation, among others, would provide additional efficiencies in managing the wild and scenic river corridor to achieve the objectives of this comprehensive river management plan.

Cumulative Effects. Given the past, present, and reasonably foreseeable projects and actions described in the cumulative scenario, the most likely impact to park operations would be an increase in efficiency and ease of communication from relocation and consolidation of a considerable portion of staff into one permanent building at Moose headquarters at Grand Teton National Park. This would have a long-term, minor, beneficial impact to park operations.

When the likely effects of implementing the actions contained in this alternative are added to the effects of the action described above, a long-term, moderate, beneficial impact on park operations would occur. The impacts of the actions on park operations would comprise a large portion of the overall cumulative effect.

Conclusion. The long-term impacts of alternative B on park operations would range from minor to moderate and would be beneficial overall. Short-term impacts, however, would be minor to moderate and adverse due to construction efforts and implementation of new procedures.

ALTERNATIVE C (PREFERRED)

A key component of alternative C is providing visitor connections to the natural world and providing more primitive recreational experiences. River access points would be consolidated by removing, relocating, and/or redesigning poorly sited and/or less sustainable facilities and infrastructure. New developments would only be considered to benefit resources if they would increase and improve the opportunities for visitors to enjoy the headwaters and its many resources and values. Given this priority, alternative C would include limited new and expanded park facilities, which would result in fewer

maintenance requirements. The projects would include construction, relocation, redevelopment, and/or restoration of boat launches, restrooms, picnic areas, parking lots, interpretive exhibits, roadway turnouts, trailheads, and other facilities. In the long term, addressing facility needs to adequately support visitor use would result in increased operational efficiency. The collective result of these actions would result in an impact to park operations that are long term, minor to moderate, and beneficial, but also short term, moderate, and adverse due to construction.

The Wild and Scenic Rivers Act requires managing kinds and amounts of use along the river corridor to protect the rivers' values. Monitoring protocols would need to be established, which would require increased effort by park staff during the initial implementation and would result in short-term, minor to moderate, adverse impacts on park operations. However, the attainment of consistent data from these monitoring efforts would allow staff to adaptively manage use to ensure resource protection, which would improve operational efficiency in responding to changes in the condition of river values. In the long term, this would result in moderate, beneficial impacts on park operations.

There are also many elements common to both action alternatives that would positively influence park management, operations, and facilities in alternative C. For examples of such strategies, see the analysis of alternative B.

Cumulative Effects. Given the past, present, and reasonably foreseeable projects and actions described in the cumulative scenario, the most likely impact to park operations would be an increase in efficiency and ease of communication from relocation and consolidation of a considerable portion of staff into one permanent building at Moose headquarters at Grand Teton National Park. This would have a long-term, minor beneficial impact to park operations.

When the likely effects of implementing the actions contained in this alternative are added to the effects of the action described above, a long-term, moderate, beneficial impact on park operations. The impacts of the actions on park operations would comprise a large portion of this overall cumulative effect.

Conclusion. The long-term impacts of alternative C on park operations would range from minor to moderate and would be beneficial overall. Short-term impacts, however, would be minor to moderate and adverse due to construction efforts and implementation of new procedures.

SOCIOECONOMICS

INTRODUCTION

The analysis of impacts on the socio-economic environment from this comprehensive river management plan for the Snake River Headwaters is based on the topic research and professional judgment of planners who have experience with similar projects. To help identify the impacts of the various alternatives, two contributing factors of the socioeconomic environment are assessed: (1) quality of life, and (2) local or regional economy. In terms of geographic scope, the impact analyses in this section primarily focus on the socioeconomic conditions of the local communities (primarily Jackson, Wyoming) and the three adjacent counties (Teton County and Lincoln County, Wyoming, and Teton County, Idaho) because this is where the majority of impacts would be most noticeable.

Methods and Assumptions for Analyzing Impacts

Impacts on the socioeconomic environment comparing projected changes resulting from the action alternatives (B and C) to those of the no-action alternative (A). The thresholds used to determine impacts on these resources are defined as follows:

Context: The context refers to the setting or geographic scope of the impact to the socioeconomic conditions. In this analysis, impacts would be measured relative to the following two levels:

- **Local**: Individual gateway communities in immediate proximity to park sites
- **Regional:** Three-county area around headwaters (Teton County and Lincoln County, Wyoming; and Teton County, Idaho)

Intensity: The definitions for the impact intensity and thresholds are as follows:

- **Negligible**: No effects occur or the effects on socioeconomic conditions would be unnoticeable. The action would not yield any noticeable or measureable changes to quality of life and/or local or regional economy.
- **Minor**: The effects on socioeconomic conditions would be detectable, but only slight and limited to a small segment of the surrounding community and local or regional economy. The action would minimally influence the quality of life and/or local or regional economy.
- **Moderate**: The effects on socioeconomic conditions would be readily apparent and would influence multiple segments of the community or economy. The action would yield changes that are noteworthy or modest to the quality of life and/or local or regional economy.
- **Major**: The effects on socioeconomic conditions would be very apparent, significant, and/or widespread throughout the community and economy. The action would yield considerable changes to the quality of life and local or regional economy.

Socioeconomic Environmental Factors

- Quality of life in the three-county area (Teton County and Lincoln

County, Wyoming, and Teton County, Idaho)
  - Community-building/identity
  - Health benefits (physiological and psychological)
  - Community value due to surrounding land development

- Local and regional economy
  - Contributions to local and regional economy from visitor expenditures
  - Contributions to local economy from NPS management such as employee salaries, project contracting, operational costs, and purchases
  - Contributions to local and regional economy from NPS concessioners and other park partners

ALTERNATIVE A (NO ACTION)

Under the no-action alternative, the National Park Service would continue to manage the Snake River Headwaters in the same way that it is currently managed. Some elements of management may be enhanced or broadened as financial and staffing resources become available. By continuing to preserve wild and scenic river values and provide several opportunities for outdoor recreation, interpretation, and education in the headwaters area, Grand Teton and Yellowstone national parks would continue to contribute to the high quality of life for local residents of the three-county area. As other private land outside the park boundaries continues to be developed into the future, the preserved headwaters would become exponentially more valuable to nearby communities and the quality of life of the residents. This continued NPS management and preservation would result in a quality of life impact to the socioeconomic environment that is long term, minor to moderate, beneficial, and regional.

In a general sense, the park's overall intrinsic contribution to the economy of the three-county area would also be maintained by the no-action alternative. By continuing to provide natural area preservation, numerous recreation opportunities, facilities, and park settings for organized group activities, the park would continue to help make the area an attractive place for both residents and businesses to call home. In turn, the area's quality of life becomes a draw for business and economic growth with the help from places like Grand Teton National Park and the Snake River Headwaters. The no-action alternative would sustain this economic value to the area. This would continue to result in an impact that would be long term, minor to moderate, beneficial, and regional.

In terms of direct effects on the economy, the continued management of the headwaters would also continue to provide benefits. As noted above, the no-action alternative would generally maintain the current level of recreation facilities, access opportunities, and visitation attractions in the headwaters area. Thus, current levels, patterns, and trends of headwaters visitation would likely continue. This annual visitation would continue to have various direct and indirect effects on the local and regional economy. More specifically, the millions of annual visitors to the Snake River Headwaters contribute hundreds of millions of dollars to the economy of the three-county area each year. This injected money directly sustains the revenue stream and jobs at hotels, restaurants, bars, stores, park concessioners, and other commercial service operations that serve park visitors. The private businesses of the three-county area are the primary and direct beneficiaries of this economic contribution. The local communities also benefit directly via the sales tax generated by this spending. In addition, the park visitor money stream can also have other indirect, or secondary, effects. For example, this injected money that directly

supports local businesses and jobs eventually recirculates further into the local and regional economy and beyond. This recirculation happens when the local businesses buy products or services from other sources (e.g., wholesale suppliers), or when employees of the local businesses use their income earned at the local gateway business at other businesses in the area to sustain their lifestyle (e.g., grocery shopping, entertainment). This secondary effect is often referred to as an economic "multiplier" because one dollar injected into the local economy often has more than one dollar of effect in the local economy. The overall value of the park visitation contribution to the economy would continue to have substantial positive effects on the local and regional economy in the surrounding communities and three-county area. The continuation of the current management direction would have a long-term, moderate, beneficial, and regional impact from annual visitation and tourism.

The employment offered by the National Park Service and NPS concessioners at Grand Teton and Yellowstone national parks to manage the headwaters and provide visitor services has a two-fold effect on the local and regional economy. First, the jobs made available by the parks to manage the headwaters in these parks provide several residents with steady income that helps sustain their lives and the lives of their families. Under alternative A, the NPS staffing would involve 18.5 permanent staff. Secondly, similar to the economic effects of revenue generated by park visitation (as explained above), the income earned by NPS employees and concessioner staff also has both direct and indirect effects on the local and regional economy. These employees contribute to the local economy by spending the money they earn on goods and services in the community. This spending directly supports local businesses and their growth. Due to the multiplier effect, secondary economic benefits are realized when this money eventually recirculates further throughout the local economy and beyond.

Under the no-action alternative, the overall value of NPS employment contribution to the economy would continue to have a long-term, minor, beneficial, and local to regional impact on the socioeconomic environment.

Similarly, the current levels of NPS operations spending, NPS contract work, and occasional site-specific or program-specific improvements (at Grand Teton and Yellowstone national parks) would continue under the no-action alternative. The current NPS annual operating costs (spending) for managing the headwaters would remain at roughly $1.278 million per year. These management and operations activities involve purchases of services and materials for NPS management of the headwaters would continue to be a relatively consistent injection of money into the local economy (though year-to-year variations would occur due to annual variations in NPS funding). This commercial activity generated by NPS facility and program management would continue to yield a long-term, minor, beneficial, and local to regional impact on the socioeconomic environment.

Cumulative Effects. The action area for evaluating cumulative impacts on the socioeconomic environment is the three-county area of Teton County and Lincoln County, Wyoming, and Teton County, Idaho. The likely effects of other past, present, and reasonably foreseeable actions are described in the following. This description of the socioeconomic effects addresses two general effect categories: (1) quality of life and (2) local and regional economy. Following the description of these effects, a measurement of the cumulative effect of these other actions combined with alternative A is provided.

Areas of Grand Teton and Yellowstone national parks that are beyond the headwater lands as well as other local, state, and non-NPS federal parklands contribute substantially to the quality of life for community residents. For example, the adjacent presence and accessibility of public lands such as Bridger-Teton National Forest,

Caribou-Targhee National Forest, and National Elk Refuge are important for residents' physiological health (i.e., from exercise), residents' psychological health, community-building, community identity, and landscape aesthetics (e.g., open space and natural backdrop to developed areas). The current and future management policies and actions of the local, state, and federal agencies that manage these other public lands would continue to accommodate public access and use in this region. In some cases, management actions would increase the accessibility to some of these lands, which would provide even more opportunities for improved quality of life in neighboring communities. As other private land continues to be developed and urbanized into the future in the three-county area, these parklands would become exponentially more valuable to the local communities and the quality of life of their residents. These other land management agencies would likely continue to manage the existing parklands in a way that contributes to quality of life.

To effectively manage and maintain Grand Teton and Yellowstone national parks, the National Park Service implements ongoing site improvement and restoration projects in the parks. The site improvement project at the Moose headquarters complex in Grand Teton National Park is one example. This project involves the reconfiguration of vehicle and pedestrian parking/traffic, removal of several temporary buildings, site restoration work, and water quality improvement efforts. NPS projects such as this often involve the procurement of construction-related contractor services and materials. Projects such as this have the potential to generate economic activity via visitation increases, project contracting, program and facility development and expansion, job growth, NPS staff living in local communities, or other sources. These projects inject money into the local economic engine. Due to the multiplier effect, this money continues to have secondary effects on the economy as it circulates. Many of these projects are triggered by other planning efforts in Grand Teton and Yellowstone national parks, which are described under the "Relationship of This Plan to Other Planning Efforts" section in chapter 1. The future management actions of other federal land management agencies that manage land in the three-county area (e.g., U.S. Forest Service and U.S. Fish and Wildlife Service) would also contribute to the local and regional economy in a similar fashion.

In addition to the direct economic contributions from land management projects on these federal lands, these actions could also result in a large volume of indirect economic contributions that come in the form of tourism spending. For example, if any of these federal land agencies make decisions to manage these lands in a way that allows or encourages increases in visitation in the future, increased visitor spending in the local gateway communities (e.g., goods and services) could be expected to increase as well. A reverse effect could occur if these agencies pursue policies or actions that reduce the opportunities for tourism spending.

Numerous actions and policies in the local communities around the parks also contribute to the local regional economy. This diverse local economic activity is driven and guided by town and county comprehensive plans, land use policies, zoning ordinances, and other community development efforts. These plans and policies can guide and encourage direct economic activity such as commercial business growth (e.g., retail, professional, and hotel/ restaurant), housing growth, tourism, and industrial growth. In turn, the resulting growth and development of residential, commercial, and industrial sectors of these communities contribute directly to the local economy (i.e., via construction projects, commercial sales, housing sales, municipal taxation). If these economic attributes are planned and guided wisely, many of these local actions could yield self-sustaining economic growth in these communities, and, concurrent to the private land development and economic

growth, the municipal infrastructure would be expanded to keep up with the development in the local communities and surrounding counties. The construction of several infrastructure projects that would serve these communities would also have direct effects on the local economy. Roadway projects, water utility projects, and gas and electric supply projects are just a few examples of these other actions that would generate economic activity in area. The breadth and intensity of this economic influence varies as the context shifts from the local gateway communities to the overall three-county area. However, given the multiplier effect of economic activity, money spent or earned in one locality or economic sector typically circulates to and from other localities or sectors, respectively.

Overall, the effects of these other past, present, and reasonably foreseeable future actions associated with quality of life and economy would have a short-term to long-term, moderate to major, beneficial, and local to regional impact on the socioeconomic environment.

When the likely effects of implementing alternative A are combined with the effects of other past, present, and reasonably foreseeable actions described above, the cumulative effects on the socioeconomic environment in would be short term to long term, moderate to major, beneficial, and local to regional. Alternative A would contribute a small, long-term, beneficial increment to this cumulative impact.

Conclusion. The overall impact to the socioeconomic environment from the no-action alternative would be long term, minor to moderate, beneficial, and local to regional. The beneficial impacts would result from maintaining the park's contribution to the local economy and quality of life from ongoing park visitor spending for local services and goods, NPS employment, NPS contracting, and concessioner activity and employment.

ALTERNATIVE B

Under alternative B, the continued preservation of the wild and scenic river values of the headwaters and increased and improved opportunities for outdoor recreation, interpretation, and education (relative to alternative A) would continue and increase its contribution to the high quality of life for local residents of the three-county area. Furthermore, as with alternative C, alternative B would ensure the fulfillment of the Craig Thomas Snake Headwaters Legacy Act, which would preserve access to and traditional uses of the Snake River Headwaters into perpetuity. In turn, this would ensure that the resources and values of the headwaters would be maintained, preserved, and kept with the natural character of the area, resulting in a long-term preservation of quality of life for local and regional residents. As other private land outside the park boundaries continues to be developed into the future, the preserved headwaters would become exponentially more valuable to the nearby communities and the quality of life of the residents. Overall, and relative to the no-action alternative, these key elements of alternative B would result in a long-term, minor to moderate, beneficial, and local to regional impact.

The headwaters' overall intrinsic contribution to the economy of the three-county area would also be maintained by alternative B. By continuing to provide natural area preservation, numerous recreation opportunities, facilities and park settings for organized group activities, the park would continue to help make the area an attractive place for both residents and businesses to call home. In turn, the area's quality of life is a draw for business and economic growth with the help from places like Grand Teton National Park and the Snake River Headwaters. Alternative B would sustain this general economic value to the area. However, relative to the no-action alternative, this would result in an impact that would be long-term, negligible, beneficial, and regional.

A key component of alternative B is providing new and upgraded river access amenities that would increase and improve the opportunities for visitors to enjoy the headwaters and its many resources and values. Given this priority, alternative B would include many new and expanded park facilities. These projects would include expansions and/or installations of visitor interpretation and education amenities (e.g., interpretive panels, waysides, and brochures) that would involve a one-time NPS cost of approximately $41,000. In addition, several physical facility access improvements would occur under alternative B, including construction improvements to nine river access points along the Snake River and various minor facility improvements along the Buffalo Fork, Pacific Creek, and the Gros Ventre River tributaries. These facility improvements would have an estimated one-time cost of $3.069 million under alternative B. Although these improvements and expansions would primarily only involve one-time costs, many of these projects would generate new work for local and regional companies in the area, including engineering consultants, construction contractors, landscape architects, and environmental consultants. These projects would not only support these businesses and their employees directly, but the economic multiplier effect would circulate this contract money through the local economy. The collective result of these actions relative to the no-action alternative would be an economic contribution that is short-term, minor to moderate, beneficial, and local to regional.

By improving and increasing visitor access to portions of the rivers (relative to alternative A), alternative B would likely increase the annual visitation numbers to the headwaters area. This could mean that a higher number of people would be attracted to the park from afar, or it could mean that visitors may stay in the area for longer periods, or both. Either way, this increased access to the rivers in the headwaters could generate increased economic activity in the three-county area, resulting in various direct and indirect effects on the local and regional economy. The National Park Service could see an increase in revenue, which may fund future park improvement work, local contracts with area-wide business, and expanded park programs. This funding would also have an economic multiplier effect on the local economy as income circulates throughout the surrounding communities. In addition, as more visitors travel en route to the headwaters, they would spend money at the many local businesses and concessioners in and around the park sites (e.g., eateries, hotels, services). This increased revenue would directly support the local businesses and their employees directly. In addition, this money would eventually circulate further through the local and regional economy due to the multiplier effect and possibly lead to more economic growth in the local communities (as additional revenue monies move through the local economy). Overall, this money inflow into the economy from increased visitation and tourist spending under alternative B (relative to alternative A) would result in a long-term, minor to moderate, beneficial, and local to regional impact on the socioeconomic environment.

Under alternative B, the anticipated increase in employment offered by the National Park Service at Grand Teton and Yellowstone national parks would only increase slightly to manage the headwaters and implement alternative B actions. Under alternative B, the NPS staffing to manage the headwaters would involve 19.25 permanent staff. This employment would have a two-fold effect on the local and regional economy. First, the jobs made available by the parks provide hundreds of residents with a steady income that helps sustain their lives and the lives of their families. Secondly, similar to the economic effects of revenue generated by park visitation (as explained above), the income earned by NPS employees and concessioner staff also has both direct and indirect effects on the local and regional economy. These employees contribute to the local economy by spending the money they earn on goods and services in the community.

This spending directly supports local businesses and their growth. Due to the multiplier effect, secondary economic benefits are realized when this money eventually recirculates further throughout the local economy and beyond. However, because the anticipated NPS staffing under alternative B (19.25 employees) would be only slightly above the alternative A staffing (18.5 employees), the overall value of NPS employment contribution to the economy would be a long-term, negligible, beneficial, and local to regional impact on the socioeconomic environment.

Similarly, under alternative B, the levels of NPS operations spending, ongoing NPS contract work, and occasional site-specific or program-specific improvements (at Grand Teton and Yellowstone national parks) would increase from $1.278 million per year under the no-action alternative to an estimated $1.454 million per year for annual operating costs under alternative B. These NPS annual operating costs (spending) include management and operations activities involving purchases of services and materials for NPS management of the headwaters and would continue to be a relatively consistent injection of money into the local economy (though year-to-year variations would occur due to annual variations in NPS funding). This commercial activity generated by NPS facility and program management would continue to benefit the local and regional economy. However, when compared to the no-action alternative, the effect would only be a long-term, negligible to minor, beneficial, and local to regional impact on the socioeconomic environment.

Cumulative Effects. The other past, present, and reasonably foreseeable future actions described under cumulative effects of the no-action alternative would be the same under this alternative, resulting in short-term to long-term, moderate to major, beneficial, and local to regional impacts on the socioeconomic environment.

When the likely effects of alternative B are added to the effects of these other past, present, and reasonably foreseeable future actions, there would be a short-term to long-term, moderate to major, beneficial, and local to regional cumulative impact on the socioeconomic environment. Alternative B would contribute a small to appreciable, short-term to long-term, beneficial increment to the cumulative effect.

Conclusion. The overall impact to the socioeconomic environment from alternative B would be short term to long term, minor to moderate, beneficial, and local to regional. The beneficial impacts would result from maintaining, improving, and increasing accessibility to and experience opportunities at the headwaters. These actions would increase the park's contribution to the local economy and quality of life from park visitor spending for local services and goods, NPS employment, NPS contracting, and concessioner activity and employment.

ALTERNATIVE C (PREFERRED)

Under alternative C, the preservation of the wild and scenic river values of the headwaters and opportunities for outdoor recreation, interpretation, and education would continue (as in alternative A), and continue to contribute to the high quality of life for local residents of the three-county area. Some modest improvements to the visitor experience in the headwaters (via river access point improvements and enhanced education/interpretation amenities) would increase the area's contribution to the quality of life for local residents. Furthermore, as with alternative B, alternative C would ensure the fulfillment of the Craig Thomas Snake Headwaters Legacy Act, which would preserve access to and traditional uses of the Snake River Headwaters into perpetuity. In turn, this would ensure that the resources and values of the headwaters would be maintained, preserved, and kept with the natural character of the area, resulting in a long-term preservation of quality of life for

local and regional residents. As other private land outside the park boundaries continues to be developed into the future, the preserved headwaters would become exponentially more valuable to the nearby communities and the quality of life of the residents. Overall, and relative to the no-action alternative, these key elements of alternative C would result in a long-term, minor to moderate, beneficial, and local to regional impact.

The headwaters' overall intrinsic contribution to the economy of the three-county area would also be maintained by alternative C. By continuing to provide natural area preservation, numerous recreation opportunities, facilities, and park settings for organized group activities, the park would continue to help make the area an attractive place for both residents and businesses to call home. In turn, the area's quality of life is a draw for business and economic growth with the help from places like Grand Teton National Park and the Snake River Headwaters. Alternative C would sustain this general economic value to the area. However, relative to the no-action alternative, this would result in an impact that would be long term, negligible, beneficial, and regional.

Under alternative C, river access and interpretation/education amenities would improve visitor experience at the headwaters. Although access to the rivers would not be increased, alternative C would include expansions and/or installations of visitor interpretation and education amenities (e.g., interpretive panels, waysides, and brochures). These improvements would involve a one-time NPS cost of approximately $101,000. In addition, other facility improvements at some existing river access points would be built. This modest level of minor facility access enhancements under alternative C would have an estimated one-time cost of $1.357 million. Via a cost-sharing effort with other entities, alternative C would include an NPS expenditure of $187,000 to bury the existing overhead utility line along Buffalo Fork. Although these improvements would primarily only involve one-time costs, many of these projects would generate new work for local and regional companies in the area, including engineering consultants, construction contractors, landscape architects, and environmental consultants. These projects would not only support these businesses and their employees directly, but the economic multiplier effect would circulate this contract money through the local economy. The collective result of these actions relative to the no-action alternative would be an economic contribution that is short term, minor to moderate, beneficial, and local to regional.

Because the number of visitor access points to the Snake River Headwaters would be the same as alternative A, the expected visitation to the headwaters is not expected to vary much when compared to alternative A. Regardless, as described under alternative A, this visitor spending at the parks and in the local communities would continue to feed the local and regional economy. These visitors en route to the headwaters would spend money at the many local businesses and concessioners in and around the park sites (e.g., eateries, hotels, services). This revenue would directly support the local businesses and their employees directly. In addition, this money would eventually circulate further through the local and regional economy due to the multiplier effect and possibly lead to more economic growth in the local communities (as additional revenue monies move through the local economy). However, relative to the no-action alternative, this money inflow into the economy from tourist spending under alternative C would result in an impact that is long term, negligible, beneficial, and local to regional on the socioeconomic environment.

Under alternative C, the anticipated increase in employment offered by the NPS at Grand Teton and Yellowstone national parks would only increase slightly to manage the headwaters and implement alternative C actions. Under alternative C, the NPS staffing to manage the headwaters would involve 19.25 permanent staff. This employment would

have a two-fold effect on the local and regional economy. First, the jobs made available by the parks provide hundreds of residents with a steady income that helps sustain their lives and the lives of their families. Secondly, similar to the economic effects of revenue generated by park visitation (as explained above), the income earned by NPS employees and concessioner staff also has both direct and indirect effects on the local and regional economy. These employees contribute to the local economy by spending the money they earn on goods and services in the community. This spending directly supports local businesses and their growth. Due to the multiplier effect, secondary economic benefits are realized when this money eventually recirculates further throughout the local economy and beyond. However, because the anticipated NPS staffing under alternative C (19.25 employees) would be only slightly above the alternative A staffing (18.5 employees), the overall value of NPS employment contribution to the economy would be a long-term, negligible, beneficial, and local to regional impact on the socioeconomic environment.

Similarly, under alternative C, the levels of NPS operations spending, ongoing NPS contract work, and occasional site-specific or program-specific improvements (at Grand Teton and Yellowstone national parks) would increase from $1.278 million per year under the no-action alternative to an estimated $1.458 million per year for annual operating costs under alternative C. These NPS annual operating costs (spending) include management and operations activities involve purchases of services and materials for NPS management of the headwaters and would continue to be a relatively consistent injection of money into the local economy (though year-to-year variations would occur due to annual variations in NPS funding). This commercial activity generated by NPS facility and program management would continue to benefit the local and regional economy. However, when compared to the no-action alternative, the effect would only be a long-term, negligible to minor, beneficial, and local to regional impact on the socioeconomic environment.

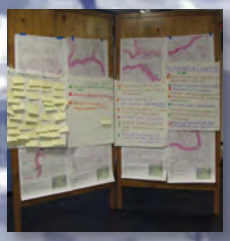
Cumulative Effects. The other past, present, and reasonably foreseeable future actions described under cumulative effects of the no-action alternative would be the same under this alternative, resulting in short-term to long-term, moderate to major, beneficial, and local to regional impacts on the socioeconomic environment.

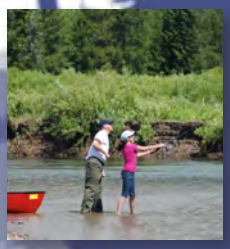
When the likely effects of alternative C are added to the effects of these other past, present, and reasonably foreseeable future actions, there would be a short-term to long-term, moderate to major, beneficial, and local to regional cumulative impact on the socioeconomic environment. Alternative C would contribute a small, short-term to long-term, beneficial increment to the cumulative effect.

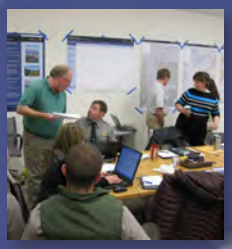
Conclusion. The overall impact to the socioeconomic environment from alternative C would be short term to long term, minor to moderate, beneficial, and local to regional. The beneficial impacts would result from maintaining and enhancing the access points and experience opportunities at the headwaters. These actions would generate modest increases to the park's contribution to the local economy and quality of life from park visitor spending for local services and goods, NPS employment, NPS contracting, and concessioner activity and employment.

Consultation and Coordination

6







PUBLIC INVOLVEMENT

Public involvement for this planning effort began during the scoping phase, which is an early and open process requesting the public to submit comments, concerns, and suggestions relating to the scope of project and preliminary issues.

As part of public scoping for the *Snake River Headwaters Comprehensive River Management Plan / Environmental Assessment*, 600 newsletters were mailed to stakeholders in October 2010. Additional copies of the newsletter were available for the visiting public at visitor and contact centers and it was posted on the project's website (http://parkplanning.nps.gov/snakeriver). The newsletter provided notification of the commencement of the planning process and identified the following elements of the comprehensive river management plan:

- purpose of the plan
  - to clearly identity river boundaries, classifications, and outstandingly remarkable river values
  - establish a management program that protects outstandingly remarkable values, free-flowing condition, and water quality of the rivers
  - address user capacity by establishing the types and levels of visitor use appropriate in the river corridor
- summary of the Wild and Scenic Rivers Act and Craig Thomas Snake Headwaters Legacy Act
  - key components
  - define and identify outstandingly remarkable values in the river segments
  - establish the wild and scenic river boundary
  - goals and desired conditions for protecting river values
  - development of lands and facilities
  - user capacity and monitoring framework
  - evaluation of water projects
  - in-stream flows
  - monitoring strategy
- collaborative planning approach
- schedule of the planning effort identifying milestones and opportunities for public input, including an invitation to public meetings held in December 2010

On December 7 and 8, 2010, the National Park Service and U.S. Forest Service hosted two joint public meetings in Jackson, Wyoming, and in Bozeman, Montana. The purpose of the meetings was to gather public input on our two planning efforts—one plan for portions of the Snake River Headwaters on NPS and USFWS lands and another plan for river segments on USFS lands.

The public were encouraged to share their comments via a comment card or by using the project website. A mail-back comment form was included with the newsletter, providing an opportunity for respondents to inform the NPS planning team of the respondent's activities and experiences related to the Snake River Headwaters; feedback concerning the outstanding remarkable values; recommendations for visitor opportunities, visitor services, experiences, and facilities; issues concerning protection of river values; and other relevant issues and

topics. Respondents were also encouraged to complete the form on the project's website. The public comment period extended from late October to December 31, 2011.

The following issues and concerns were among those submitted by commenters (in no particular order):

- impact of human activities on resources
- too many visitors, traffic, and development
- types of recreation and limits on boating/paddling
- overuse by commercial/concessioner groups
- allowing more access to all river segments
- conflict between motorized, wheeled, and mechanized equipment in wild areas
- downstream irrigation and impacts on fish or riparian areas
- improved interagency collaboration
- streambank stabilization
- climate change impacts
- invasive species
- public acquisition of private inholdings to protect river resources
- public education using signs
- water-based recreation and conflicts between boating and fishing
- size of rafts and impacts on scenery
- waste management

Internal scoping included participation from staff at Grand Teton and Yellowstone national parks, NPS Denver Service Center, NPS Intermountain Regional Office, USFWS National Elk Refuge, USFS Bridger-Teton National Forest, and Wyoming Game and Fish Department. The planning team initially conducted at an outstandingly remarkable values workshop at Grand Teton National Park in May 2010. The outstandingly remarkable values were developed for subsequent use in shaping management alternatives. The team gathered pertinent information about the designated wild and scenic rivers of the parks; drafted narrative descriptions of the outstandingly remarkable values of the parks; identified site-specific issues and opportunities; and identified stakeholders and their interests. The workshop provided the foundation for this comprehensive river management plan.

A second planning team workshop was held February 15–17, 2011, at Grand Teton National Park to develop a range of alternatives for the protection and enhancement of the designated wild and scenic rivers. Team members focused on developing and refining goals and objectives, desired future conditions, and a monitoring framework.

A user capacity and alternatives refinement workshop was held April 12–14, 2011, at Grand Teton National Park. The purpose of this workshop was to develop a long-term strategy for managing user capacity at the Snake River Headwaters as well as to refine management alternatives. The user capacity portion of the workshop helped park staff and planners understand the outstandingly remarkable values of the Snake River Headwaters and draft the set of desired conditions for natural and cultural resources and visitor experience; understand the existing state of knowledge related to visitor influences on outstandingly remarkable values, free-flowing condition, and water quality; identify the critical elements of desired visitor experience and resource conditions that may serve as user capacity indicators and would inform the potential kinds and amounts of visitor use to be considered in the plan; prioritize the list of potential user capacity indicators and develop a range of standards for inclusion in the plan; and identify a tool kit of management strategies that could be applied for each priority user capacity indicator. The outstandingly remarkable values and

alternative refinement portion of the workshop allowed for further discussion and refinement of ORV statements based on public and agency comments; on management alternatives based on Grand Teton and Yellowstone national parks and Wyoming Game and Fish Department comments; on the site-planning approach and follow-up workload needs for the boat launch site planning effort; and on the inconsistencies of the boundary delineation with the boundary of Bridger-Teton National Forest.

Last, a choosing by advantages workshop was held September 27–29, 2011, at Grand Teton National Park. The purpose of this workshop was to identify the preferred alternatives through a CBA process. This workshop helped team members understand the advantages and costs of the alternatives, identify the preferred alternative based on each alternative's advantages and costs, identify the preferred alternative for nine river access points along Snake River, and develop a list of actions to include in the cumulative impact scenario of the environmental assessment.

CONSULTATION AND COORDINATION WITH OTHER AGENCIES, OFFICES, AND ASSOCIATED TRIBES

Consultation with federal and state agencies and American Indian tribes for this comprehensive river management plan was initiated by the National Park Service during public scoping, and then reaffirmed in February 2012. Scanned copies of letters received from other agencies, offices, and associated tribes are included in the appendixes.

CONSULTATION WITH U.S. FISH AND WILDLIFE SERVICE AND WYOMING GAME AND FISH DEPARTMENT

Grand Teton National Park, on behalf of Grand Teton and Yellowstone national parks and National Elk Refuge, initiated informal consultation with the U.S. Fish and Wildlife Service in a letter dated August 25, 2011, notifying the U.S. Fish and Wildlife Service that the parks were in the process of developing a comprehensive river management plan for the Snake River Headwaters wild and scenic rivers. The Endangered Species Act requires in section 7 (a)(2) that each federal agency, in consultation with the Secretary of the Interior, ensure that any action the agency authorizes, funds, or carries out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. The parks requested a current list of federally listed plant and animal species and any designated critical habitat for such species that might occur within the designated wild and scenic river corridors in both parks.

Grand Teton National Park also notified the Wyoming Game and Fish Department that it, along with Yellowstone National Park, was in the process of developing a comprehensive river management plan for the Snake River Headwaters wild and scenic rivers in a letter date August 25, 2011. The National Park Service requested a current list of state listed or other special status species that might occur within the designated wild and scenic river corridors in both parks.

The information provided by the U.S. Fish and Wildlife Service and Wyoming Game and Fish Department was used to develop the list of special status species found in "Chapter 4: The Affected Environment." The U.S. Fish and Wildlife Service and the Wyoming Game and Fish Department were also sent copies of the scoping newsletter, and a copy of this document has been be sent to them for their review.

CONSULTATION WITH TRADITIONALLY ASSOCIATED TRIBES

In letters dated June 8, 2012, the park notified various offices of traditionally associated tribes that preparation of this comprehensive river management plan had been initiated. The tribes were invited to consult and participate in the planning process on a government-to-government basis. Consultation with American Indian tribes is carried out in accordance with various federal laws, executive orders, regulations, and policies (e.g., Executive Order 13175, "Consultation and Coordination with Indian Tribal Governments;" Executive Order 13007, "Indian Sacred Sites;" section 106 of the National Historic Preservation Act).

Copies of the comprehensive river management plan will be sent to each associated tribe for review and comment. Tribes will have opportunities to identify any subsequent issues or concerns, and the park will continue to consult during preparation/implementation of the plan and as part of its

ongoing commitment to maintain open tribes-NPS communications. Information and recommendations conveyed to the park by associated tribes with regard to river management or other concerns would be considered and addressed as appropriate, and the park would undertake measures to protect, and maintain traditional access to, culturally important resources and places.

SECTION 106 CONSULTATION WITH WYOMING STATE HISTORIC PRESERVATION OFFICE

The park notified the Wyoming State Historic Preservation Office of the commencement of this comprehensive river management plan in a letter dated February 17, 2012, and invited the State Historic Preservation Office to participate in the consultation and planning process to assist with the preservation management of historic properties in the wild and scenic river corridors of the parks. A copy of this plan will be sent to the Wyoming State Historic Preservation Office for review and comment. The parks will consult with the State Historic Preservation Office in accordance with section 106 of the National Historic Preservation Act with regard to specific undertakings that may arise from the comprehensive river management plan to assess potential effects on historic properties and to seek ways to avoid or limit adverse effects as necessary.

LIST OF AGENCIES, ORGANIZATIONS, AND INDIVIDUALS RECEIVING A COPY OF THIS DOCUMENT

Federal Agencies

Advisory Council on Historic Preservation
U.S. Department of Agriculture
U.S. Forest Service, Bridger-Teton National Forest
Natural Resources Conservation Service
U.S. Department of the Interior
U.S. Fish and Wildlife Service, Wyoming Ecological Services Field Office
U.S. Environmental Protection Agency
U.S. Bureau of Reclamation, Snake River Area Office

U.S. Senators and Representatives
Honorable John Barrasso, Senator
Honorable Michael B. Enzi, Senator
Honorable Cynthia Lummis, Representative

State Agencies

Wyoming Game and Fish Department
Wyoming Department of Environmental Quality
Wyoming State Parks
Wyoming State Historic Preservation Office

State Officials (Park and Teton Counties)

Honorable Matt Mead, Governor
State Senator Leland Christensen (Teton/Fremont Counties)
State Senator Henry H.R. “Hank” Coe (Park County)
State Senator Dan Dockstader (Lincoln/Sublette/Teton Counties)
State Senator Gerald Geis (S Big Horn/Hot Springs/SE Park/ Washakie Counties)
State Senator R. Ray Peterson (Big Horn/E Park Counties)
State Representative Dave Bonner (Park County)
State Representative Pat Childers (Park County)
State Representative Keith Gingery (Fremont/Teton Counties)
State Representative Samuel Krone (Park County)
State Representative Ruth Petroff (Teton County)
State Representative Jim Roscoe (Lincoln/Sublette/Teton Counties)
State Representative Lorraine Quarberg (S Big Horn/Hot Springs/SE Park Counties)

American Indian Tribes Traditionally Associated with Park Lands

Apache Tribe of Oklahoma
Arapaho Tribe of the Wind River Reservation
Assiniboine and Sioux Tribes of the Fort Peck Indian Reservation
Blackfeet Tribe of the Blackfeet Indian Reservation of Montana
Burns Paiute Tribe
Cheyenne River Sioux Tribe of the Cheyenne River Reservation
Coeur D'Alene Tribe
Comanche Nation
Confederated Salish & Kootenai Tribes of the Flathead Reservation
Confederated Tribes of the Colville Reservation
Confederated Tribes of the Umatilla Indian Reservation
Confederated Tribes and Bands of the Yakama Nation
Crow Tribe of Montana
Crow Creek Sioux Tribe of the Crow Creek Reservation
Flandreau Santee Sioux Tribe of South Dakota
Fort Belknap Assiniboine and Gros Ventre Tribes
Kiowa Indian Tribe of Oklahoma
Lower Brule Sioux Tribe of the Lower Brule Reservation
Nez Perce Tribe
Northern Cheyenne Tribe of the Northern Cheyenne Indian Reservation
Oglala Sioux Tribe
Rosebud Sioux Tribe of the Rosebud Indian Reservation
Shoshone-Bannock Tribes of the Fort Hall Reservation
Shoshone Tribe of the Wind River Reservation
Sisseton-Wahpeton Oyate of the Lake Traverse Reservation
Spirit Lake Tribe
Standing Rock Sioux Tribe of North & South Dakota
Turtle Mountain Band of Chippewa Indians of North Dakota
Yankton Sioux Tribe of South Dakota

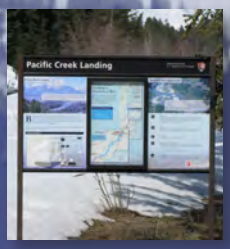
Organizations and Businesses

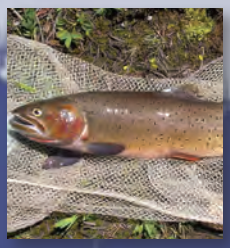
American Rivers
American Whitewater
Barker-Ewing Scenic Tours
Boy Scouts of America
Circle EW
Dornan's, Moose Enterprises, Inc.
Flagg Ranch Resort
Grand Fishing Adventures
Grand Teton Foundation
Grand Teton Lodge Company
Jack Dennis Fishing Trips
Lost Creek Ranch
Moosehead and Pinto Ranches
Murie Center
National Park Float Trips
O.A.R.S. West, Inc.
Pinto Ranch Float Trips
R Lazy S Ranch
Signal Mountain Lodge
Snake River Angler and Float Trips
Snake River Fund
Solitude Float Trips
Triangle X Ranch

Individuals

The list of individuals is available from park headquarters.

Appendixes, References, Preparers, and Index





APPENDIX A: CRAIG THOMAS SNAKE HEADWATERS LEGACY ACT OF 2008

APPENDIX A
THE CRAIG THOMAS SNAKE HEADWATERS LEGACY ACT

PUBLIC LAW 111–11—MAR. 30, 2009

123 STAT. 991

Public Law 111–11
111th Congress

An Act

To designate certain land as components of the National Wilderness Preservation System, to authorize certain programs and activities in the Department of the Interior and the Department of Agriculture, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE; TABLE OF CONTENTS.

(a) SHORT TITLE.—This Act may be cited as the ''Omnibus Public Land Management Act of 2009''.

(b) TABLE OF CONTENTS.—The table of contents of this Act is as follows:

Sec. 1. Short title; table of contents.

TITLE I—ADDITIONS TO THE NATIONAL WILDERNESS PRESERVATION SYSTEM

Subtitle A—Wild Monongahela Wilderness

Sec. 1001. Designation of wilderness, Monongahela National Forest, West Virginia. Sec. 1002. Boundary adjustment, Laurel Fork South Wilderness, Monongahela National Forest.
Sec. 1003. Monongahela National Forest boundary confirmation. Sec. 1004. Enhanced Trail Opportunities.

Subtitle B—Virginia Ridge and Valley Wilderness

Sec. 1101. Definitions.
Sec. 1102. Designation of additional National Forest System land in Jefferson National Forest as wilderness or a wilderness study area.
Sec. 1103. Designation of Kimberling Creek Potential Wilderness Area, Jefferson National Forest, Virginia.
Sec. 1104. Seng Mountain and Bear Creek Scenic Areas, Jefferson National Forest, Virginia.
Sec. 1105. Trail plan and development.
Sec. 1106. Maps and boundary descriptions. Sec. 1107. Effective date.

Subtitle C—Mt. Hood Wilderness, Oregon

Sec. 1201. Definitions.
Sec. 1202. Designation of wilderness areas.
Sec. 1203. Designation of streams for wild and scenic river protection in the Mount Hood area.
Sec. 1204. Mount Hood National Recreation Area.
Sec. 1205. Protections for Crystal Springs, Upper Big Bottom, and Cultus Creek. Sec. 1206. Land exchanges.
Sec. 1207. Tribal provisions; planning and studies.

Subtitle D—Copper Salmon Wilderness, Oregon

Sec. 1301. Designation of the Copper Salmon Wilderness.
Sec. 1302. Wild and Scenic River Designations, Elk River, Oregon. Sec. 1303. Protection of tribal rights.

Subtitle E—Cascade-Siskiyou National Monument, Oregon

Sec. 1401. Definitions.

Mar. 30, 2009 [H.R. 146]

Omnibus Public Land Management Act of 2009.
16 USC 1 note.

TITLE V—RIVERS AND TRAILS

Subtitle A—Additions to the National Wild and Scenic Rivers System

SEC. 5001. FOSSIL CREEK, ARIZONA.

Section 3(a) of the Wild and Scenic Rivers Act (16 U.S.C. 1274(a)) (as amended by section 1852) is amended by adding at the end the following:

''(205) FOSSIL CREEK, ARIZONA.—Approximately 16.8 miles of Fossil Creek from the confluence of Sand Rock and Calf Pen Canyons to the confluence with the Verde River, to be administered by the Secretary of Agriculture in the following classes:

''(A) The approximately 2.7-mile segment from the con- fluence of Sand Rock and Calf Pen Canyons to the point where the segment exits the Fossil Spring Wilderness, as a wild river.

''(B) The approximately 7.5-mile segment from where the segment exits the Fossil Creek Wilderness to the boundary of the Mazatzal Wilderness, as a recreational river.

''(C) The 6.6-mile segment from the boundary of the Mazatzal Wilderness downstream to the confluence with the Verde River, as a wild river.''.

SEC. 5002. SNAKE RIVER HEADWATERS, WYOMING.

(a) SHORT TITLE.—This section may be cited as the ''Craig Thomas Snake Headwaters Legacy Act of 2008''. (b) FINDINGS; PURPOSES.—

(1) FINDINGS.—Congress finds that—

(A) the headwaters of the Snake River System in north- west Wyoming feature some of the cleanest sources of freshwater, healthiest native trout fisheries, and most intact rivers and streams in the lower 48 States;

(B) the rivers and streams of the headwaters of the Snake River System—

(i) provide unparalleled fishing, hunting, boating, and other recreational activities for—

(I) local residents; and

(II) millions of visitors from around the world; and

(ii) are national treasures;

(C) each year, recreational activities on the rivers and streams of the headwaters of the Snake River System generate millions of dollars for the economies of—

(i) Teton County, Wyoming; and

(ii) Lincoln County, Wyoming;

(D) to ensure that future generations of citizens of the United States enjoy the benefits of the rivers and streams of the headwaters of the Snake River System, Congress should apply the protections provided by the Wild and Scenic Rivers Act (16 U.S.C. 1271 et seq.) to those rivers and streams; and

(E) the designation of the rivers and streams of the headwaters of the Snake River System under the Wild and Scenic Rivers Act (16 U.S.C. 1271 et seq.) will signify to the citizens of the United States the importance of maintaining the outstanding and remarkable qualities of the Snake River System while—

(i) preserving public access to those rivers and streams;

(ii) respecting private property rights (including existing water rights); and

(iii) continuing to allow historic uses of the rivers and streams.

(2) PURPOSES.—The purposes of this section are—

(A) to protect for current and future generations of citizens of the United States the outstandingly remarkable scenic, natural, wildlife, fishery, recreational, scientific, his- toric, and ecological values of the rivers and streams of the headwaters of the Snake River System, while continuing to deliver water and operate and maintain valuable irrigation water infrastructure; and

(B) to designate approximately 387.7 miles of the rivers and streams of the headwaters of the Snake River System as additions to the National Wild and Scenic Rivers System.

(c) DEFINITIONS.—In this section:

(1) SECRETARY CONCERNED.—The term ''Secretary concerned'' means—

(A) the Secretary of Agriculture (acting through the Chief of the Forest Service), with respect to each river segment described in paragraph (205) of section 3(a) of the Wild and Scenic Rivers Act (16 U.S.C. 1274(a)) (as added by subsection (d)) that is not located in—

(i) Grand Teton National Park; (ii) Yellowstone National Park;
(iii) the John D. Rockefeller, Jr. Memorial Park- way; or
(iv) the National Elk Refuge; and

(B) the Secretary of the Interior, with respect to each river segment described in paragraph (205) of section 3(a) of the Wild and Scenic Rivers Act (16 U.S.C. 1274(a)) (as added by subsection (d)) that is located in—

(i) Grand Teton National Park; (ii) Yellowstone National Park;
(iii) the John D. Rockefeller, Jr. Memorial Park- way; or
(iv) the National Elk Refuge.

(2) STATE.—The term ''State'' means the State of Wyoming.

(d) WILD AND SCENIC RIVER DESIGNATIONS, SNAKE RIVER HEADWATERS, WYOMING.—Section 3(a) of the Wild and Scenic Rivers Act (16 U.S.C. 1274(a)) (as amended by section 5001) is amended by adding at the end the following:

''(206) SNAKE RIVER HEADWATERS, WYOMING.—The following segments of the Snake River System, in the State of Wyoming:

''(A) BAILEY CREEK.—The 7-mile segment of Bailey Creek, from the divide with the Little Greys River north to its confluence with the Snake River, as a wild river.

''(B) BLACKROCK CREEK.—The 22-mile segment from its source to the Bridger-Teton National Forest boundary, as a scenic river.

''(C) BUFFALO FORK OF THE SNAKE RIVER.—The portions of the Buffalo Fork of the Snake River, consisting of—

''(i) the 55-mile segment consisting of the North Fork, the Soda Fork, and the South Fork, upstream from Turpin Meadows, as a wild river;

''(ii) the 14-mile segment from Turpin Meadows to the upstream boundary of Grand Teton National Park, as a scenic river; and

''(iii) the 7.7-mile segment from the upstream boundary of Grand Teton National Park to its confluence with the Snake River, as a scenic river.

''(D) CRYSTAL CREEK.—The portions of Crystal Creek, consisting of—

''(i) the 14-mile segment from its source to the Gros Ventre Wilderness boundary, as a wild river; and

''(ii) the 5-mile segment from the Gros Ventre Wilderness boundary to its confluence with the Gros Ventre River, as a scenic river.

''(E) GRANITE CREEK.—The portions of Granite Creek, consisting of—

''(i) the 12-mile segment from its source to the end of Granite Creek Road, as a wild river; and

''(ii) the 9.5-mile segment from Granite Hot Springs to the point 1 mile upstream from its confluence with the Hoback River, as a scenic river.

''(F) GROS VENTRE RIVER.—The portions of the Gros Ventre River, consisting of—

''(i) the 16.5-mile segment from its source to Darwin Ranch, as a wild river;

''(ii) the 39-mile segment from Darwin Ranch to

the upstream boundary of Grand Teton National Park, excluding the section along Lower Slide Lake, as a scenic river; and

''(iii) the 3.3-mile segment flowing across the southern boundary of Grand Teton National Park to the Highlands Drive Loop Bridge, as a scenic river.

''(G) HOBACK RIVER.—The 10-mile segment from the point 10 miles upstream from its confluence with the Snake River to its confluence with the Snake River, as a rec- reational river.

''(H) LEWIS RIVER.—The portions of the Lewis River, consisting of—

''(i) the 5-mile segment from Shoshone Lake to Lewis Lake, as a wild river; and

''(ii) the 12-mile segment from the outlet of Lewis Lake to its confluence with the Snake River, as a scenic river.

"(I) PACIFIC CREEK.—The portions of Pacific Creek, con- sisting of—

''(i) the 22.5-mile segment from its source to the Teton Wilderness boundary, as a wild river; and

''(ii) the 11-mile segment from the Wilderness boundary to its confluence with the Snake River, as a scenic river.

''(J) SHOAL CREEK.—The 8-mile segment from its source to the point 8 miles downstream from its source, as a wild river.

''(K) SNAKE RIVER.—The portions of the Snake River, consisting of—

"(i) the 47-mile segment from its source to Jackson Lake, as a wild river;

"(ii) the 24.8-mile segment from 1 mile downstream of Jackson Lake Dam to 1 mile downstream of the Teton Park Road bridge at Moose, Wyoming, as a scenic river; and

''(iii) the 19-mile segment from the mouth of the Hoback River to the point 1 mile upstream from the Highway 89 bridge at Alpine Junction, as a rec- reational river, the boundary of the western edge of the corridor for the portion of the segment extending from the point 3.3 miles downstream of the mouth of the Hoback River to the point 4 miles downstream of the mouth of the Hoback River being the ordinary high water mark.

''(L) WILLOW CREEK.—The 16.2-mile segment from the point 16.2 miles upstream from its confluence with the Hoback River to its confluence with the Hoback River, as a wild river.

"(M) WOLF CREEK.—The 7-mile segment from its source to its confluence with the Snake River, as a wild river.''.

(e) MANAGEMENT.—

(1) IN GENERAL.—Each river segment described in para- graph (205) of section 3(a) of the Wild and Scenic Rivers Act (16 U.S.C. 1274(a)) (as added by subsection (d)) shall be man- aged by the Secretary concerned.

(2) MANAGEMENT PLAN.—

(A) IN GENERAL.—In accordance with subparagraph (A), not later than 3 years after the date of enactment of this Act, the Secretary concerned shall develop a manage- ment plan for each river segment described in paragraph (205) of section 3(a) of the Wild and Scenic Rivers Act (16 U.S.C. 1274(a)) (as added by subsection (d)) that is located in an area under the jurisdiction of the Secretary concerned.

(B) REQUIRED COMPONENT.—Each management plan developed by the Secretary concerned under subparagraph (A) shall contain, with respect to the river segment that is the subject of the plan, a section that contains an anal- ysis and description of the availability and compatibility of future development with the wild and scenic character of the river segment (with particular emphasis on each river segment that contains 1 or more parcels of private land).

(3) QUANTIFICATION OF WATER RIGHTS RESERVED BY RIVER SEGMENTS.—

(A) The Secretary concerned shall apply for the quan- tification of the water rights reserved by each river segment designated by this section in accordance with the proce- dural requirements of the laws of the State of Wyoming. (B) For the purpose of the quantification of water rights under this subsection, with respect to each Wild and Scenic

River segment designated by this section—

(i) the purposes for which the segments are designated, as set forth in this section, are declared to be beneficial uses; and

(ii) the priority date of such right shall be the date of enactment of this Act.

(4) STREAM GAUGES.—Consistent with the Wild and Scenic Rivers Act (16 U.S.C. 1271 et seq.), the Secretary may carry out activities at United States Geological Survey stream gauges that are located on the Snake River (including tributaries of the Snake River), including flow measurements and operation, maintenance, and replacement.

(5) CONSENT OF PROPERTY OWNER.—No property or interest in property located within the boundaries of any river segment described in paragraph (205) of section 3(a) of the Wild and Scenic Rivers Act (16 U.S.C. 1274(a)) (as added by subsection (d)) may be acquired by the Secretary without the consent of the owner of the property or interest in property.

(6) EFFECT OF DESIGNATIONS.—

(A) IN GENERAL.—Nothing in this section affects valid existing rights, including—

(i) all interstate water compacts in existence on the date of enactment of this Act (including full development of any apportionment made in accordance with the compacts);

(ii) water rights in the States of Idaho and Wyoming; and

(iii) water rights held by the United States.

(B) JACKSON LAKE; JACKSON LAKE DAM.—Nothing in this section shall affect the management and operation of Jackson Lake or Jackson Lake Dam, including the storage, management, and release of water.

(f) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated such sums as are necessary to carry out this section.

APPENDIX B: DEPENDENCY OF RIVER VALUES ON IN-STREAM FLOWS

DEPENDENCY OF RIVER VALUES ON IN-STREAM FLOWS

The following describes the dependency of river values on in-stream flows and provides the basis for filing for a future water right under Wyoming state law, as required by the Craig Thomas Snake Headwaters Legacy Act of 2008.

OVERVIEW

The Snake River Headwaters is a high quality snowmelt-dominated watershed. The headwaters contain diverse, abundant native species and natural communities; extensive, intact, and interconnected habitats; high water quality; and natural unconfined channel morphology. The headwaters contain numerous USGS stream gauges that provide flow data for monitoring the river's free-flowing condition. Peak flows generally occur in late May and early June. Low flows generally begin in October below Jackson Lake and in September above the dam and on tributary streams.

The Snake River below Jackson Lake is influenced by Jackson Lake Dam, originally constructed in 1907 and raised in 1917. The dam is operated by the Bureau of Reclamation and provides water to Idaho to meet obligations of the Snake River Compact between Idaho and Wyoming. The Bureau of Reclamation cooperatively works with the National Park Service to provide spring-release flushing flows in May/June. Constant flows between 1,500 cfs to 2,100 cfs are released from July to September. Recent studies show that tributaries below the dam mitigate the dam's negative effects related to hydrology and geomorphology on the Snake River.

The Snake River and its tributaries contain a number of minor channel modifications (such as boat ramps, streambank stabilization, bridges, and culverts). These human-made features generally do not impede the free-flowing character of the river system. Any new modifications can only be approved if they would not adversely affect the river system's free-flowing condition, water quality, or outstandingly remarkable values.

ECOLOGICAL ORVS AND IN-STREAM FLOWS

Natural fluctuations of year-round flow are a primary contributor toward a properly functioning riparian ecosystem. These variable flow rates not only support in-stream aquatic species, but also the vegetation throughout the riparian corridor, providing indirect foraging material for many associated ungulate species. Rare, sensitive, and keystone plants that are water-dependent, such as cottonwoods and willows, depend on the natural flow regime for their health and propagation. Fauna such as moose, grizzly bears, amphibians, eagles, ospreys, elk, beavers, otters, and waterfowl depend on riparian vegetation for habitat and foraging, which is in turn reliant on the natural fluctuations of river flows. These facts are true for all segments of the river, whether designated as having an ORV present or not. In the Buffalo Fork and Gros Ventre segments of the headwaters, ungulate foraging relies heavily on the sedges that grow in the area, with moose and bison being especially noticeable grazers in the Buffalo Fork segment.

In the wild and scenic segment of the Snake River as well as the Gros Ventre segment, swans are reliant on water currents that keep sections of the river from freezing, providing open water habitat in the winter months. Similarly, beaver in the wild and scenic Snake River segments are dependent on a minimum winter flow in order to dam up or use deeper sections to cache food supplies. These sections also support various communities of thermal microbes within the riverbed that depend on certain in-stream flow rates. In

years of drought, the wild segment of the Snake River requires a high enough flow volume to support the myriad species that would migrate from other nearby low-flow tributaries.

RECREATIONAL ORVS AND IN-STREAM FLOWS

Recreational activities in the wild segment of the Snake River include boating (within the John D. Rockefeller, Jr. Memorial Parkway), hiking, camping, and backpacking—yet fishing remains the most popular use. Fishermen commonly catch cutthroat trout, but occasionally hook some brown trout as well. Fishing from the bank as well as from a boat is common along this segment, and commercially guided fishing takes place at Flagg Ranch. The season runs from April 1 until peak runoff for cutthroat trout, with the season recurring again from June to October, dependent on flow-rates. Recreational fishing is better during moderate flows (at or below 1,000 cfs) in this wild segment of the Snake River.

Floating in the wild reach of the Snake River begins at Flagg Canyon Launch and continues to Jackson Lake. Canoes, kayaks, and rafts all float this section, but their use is dependent on timing, duration, and intensity of flows, with a minimum of 200 cfs for access, and a peak flow for whitewater experiences at around 5,000 to 10,000 cfs. The section running through Flagg Canyon has natural whitewater features dependent on high flows over 1,500 cfs. Floating along this stretch is popular at all flows, from the minimum to the maximum; the season generally runs from June to September.

Natural flows contribute to aesthetic elements such as scenery and natural sounds. Seasonal waterfalls contribute to visitor experience in this segment and are dependent on natural flows. Hunting in John D. Rockefeller, Jr. Memorial Parkway includes ducks and geese, which need a minimum flow rate to sustain their habitat. Low water levels are maintained with side channel seeps and puddles. The season runs from September to January.

In the scenic segment of the Snake River, most fishing is conducted from boats. Cutthroat trout fishing depends on tapering, steady flow (2,000–3,500 cfs) for consistent conditions and a longer season in this segment, with a pre-runoff season occurring from April to May, and a later summer season running from July 1 to October 15.

Along the scenic segment of the Snake River, the experience is not considered to be whitewater, but is rather a focus on moderate, consistent flows that mimic the natural hydrograph. The timing of recreational use follows this peak run-off period. Vessels that utilize this reach include rafts, drift boats, canoes, kayaks, and paddle boards. Boat ramps become inaccessible in low-flow periods, and the commercial trips that run along this segment rely on continuous, moderate flow rates for economic viability (high flows become hazardous and low flows prevent safe navigation of the waters). The float season generally starts in April and runs to October, varying with the season. Peak use lies between June 15 and September 15.

Flows in the scenic segment of the Snake River contribute to aesthetic aspects such as scenery and the natural soundscape, which contribute to recreation experiences such as viewing scenery, photography, hiking, and picnicking, among others. This segment is largely dam controlled, and therefore, much of the hydrology is influenced by the reservoir. Temperatures in the river can rise to unnaturally high levels in the summer months due to low flows, yet high flows can be problematic as well, as they shorten the duration of float trips and negatively affect the fishing environment. Therefore, constant flows are most desirable in the summertime to accommodate boaters and fishermen alike during peak use of the season.

FISH ORVS AND IN-STREAM FLOWS

Many designated river segments of the Snake River Headwaters are dependent on natural in-stream flow rates to sustain the populations of Yellowstone and Snake River cutthroat trout, to retain the high degree of native species diversity, and to provide habitat for natural reproduction. Fish in these reaches rely on a range of flows to provide the necessary habitat conditions for all life stages, including spawning, rearing, feeding, resting, and overwintering. High spring flows of sufficient magnitude and duration, occurring at the proper time in the season, are needed to cue cutthroat spawning, to maintain channel dimensions, and to support the health and regeneration of riparian vegetation as a necessary component for habitat. Low flows in the summer provide secure rearing habitat, but the flows must not become so low as to dry out such habitat or result in lethally high water temperatures. In turn, winter flows must remain sufficient to provide ice-free habitat with enough dissolved oxygen to last until waters become entirely ice-free in the spring melt-off.

In the scenic segment of the Snake River, dam operations more directly affect the timing, duration, frequency, and magnitude of in-stream flows. Too rapid a rate of change can be disruptive for spawning and for young fish in particular. A study of a hydrograph of the Snake River scenic segment should mimic that of the Pacific Creek and Buffalo Fork for continuity of habitat conditions for migrating fish. The fall decrease of in-stream flows should also drop at a steady rate, preventing possible stranding of fish in pockets of relatively deeper channels and pools. The scenic segment of the Gros Ventre poses additional potential concerns as dewatering and possible septic contamination may be occurring due to subdivision growth.

GEOLOGIC ORVS AND IN-STREAM FLOWS

The wild section of the Lewis River is a unique, low-gradient reach. High spring flows are needed to maintain gravel transport and to recruit large woody debris for deep pool formation. In-stream flow rates in the wild portion of the Snake River are vital to maintain the diversity of channel types within and to transport fluvial sediments. High flows are annually required in the spring to flush sediment from gravels, deposit sediment on floodplains for riparian vegetation recruitment, and to maintain the processes of meander migration and channel evolution. Channel diversity is a function of a range of flows, which must be sufficiently large and frequent to mobilize and redistribute bed materials.

The scenic portion of the Snake River is a textbook example of a naturally braided, geomorphologically active river channel. Natural flows are needed here as in the wild segment, and for the same reasons. In addition, timing of flow releases from Jackson Lake dam should match that of the hydrograph of Pacific Creek and Buffalo Fork so as to not destabilize riverbanks near the confluences, and for continuity of sediment transport. Releases should also be adjusted to mitigate the accelerated erosion of steep downstream cutbanks such as those above Spread Creek.

SCENIC ORVS AND IN-STREAM FLOWS

The scenic segment of the Lewis River is composed of a deep canyon with cascading waters that contribute to the natural scenery and sounds of the river. The natural flow regime allows rushing waters to shape the scenic landscape. In the wild stretch of the Snake River, the deep canyon and cascading waters provide a dramatic backdrop of natural scenery. The natural flow regime provides the sights and sounds of the river that contribute to the scenic experience, and

the abundant wildlife which contributes to scenic values is dependent on such flows as well.

The scenic stretch of the Snake River is defined by the sights and sounds of the natural scenery, which includes the peaceful flat river sections, the wild and braided channels, and the wildlife habitat such as beaver ponds and water-dependent cottonwood trees. The range of flows across the seasons contributes to the variation in the scenic landscape. Similar to the Snake River reaches, the scenic reach of Pacific Creek provides framed views of the river where flat water, water dependent vegetation and wildlife, and seasonal variations contribute to the scenic value. The scenic reach of the Buffalo Fork is characterized by the effect of slow flow rates on the natural scenery. River-related waterfowl and other wildlife contribute to the natural character of the scenery, and seasonal variations in flows provide the necessary water to support the associated riparian vegetation patterns, which provide a backdrop to this scenic landscape.

WATER QUALITY AND IN-STREAM FLOWS

In all the designated river segments of the Snake River Headwaters, water quality remains dependent on summer flow rates to keep summer water temperatures below a critical threshold. Many aquatic species rely on sufficient summer flow rates for their health and even survival. In the scenic segment of the Snake River, entrained sediment from large releases may be a problem as such releases are conducted contrary to the natural hydrograph. Elevated flows may be used to dilute contaminants as they occur—additional inquiry should be conducted to identify possible contaminants that may be occurring.

APPENDIX C: CONSULTATION LETTERS

United States Department of the Interior
NATIONAL PARK SERVICE
GRAND TETON NATIONAL PARK
P.O. DRAWER 170
MOOSE, WYOMING 83012

IN REPLY REFER TO:

N14(GRTE)

AUG 25 2011

Wyoming Game & Fish
5400 Bishop Boulevard
Cheyenne, WY 82006

Special Status Species Coordinator,

The National Park Service is in the process of developing a Comprehensive River Management Plan for the Snake River Headwaters Wild and Scenic River in Grand Teton and Yellowstone National Parks.

This long-term, comprehensive plan will define overall management goals and objectives, identify resources that need protection and prescribe management actions for the Snake River Headwaters within Grand Teton and Yellowstone National Parks.

The planning team has been provided a species list by the U.S. Fish and Wildlife Service, which included the following threatened, endangered, or candidate species: Canada lynx, gray wolf, grizzly bear, wolverine, greater sage-grouse, yellow-billed cuckoo. Whitebark pine was recently added as a candidate species. The planning team has also acquired the state species lists from the Wyoming Game and Fish website, including the avian and mammalian species of concern, and the Atlas of Birds, Mammals, Amphibians, and Reptiles in the State of Wyoming.

This letter will serve as a record that the National Park Service is initiating consultation with your agency pursuant to the requirements of the Endangered Species Act and National Park Service management policies.

We appreciate your attention to this inquiry and look forward to working with your office throughout this planning effort.

Sincerely,

Mary Gibson Scott
Superintendent

cc: Chris Church, Project Manager, DSC
Christina Miller, Natural Resource Specialist, DSC

United States Department of the Interior
NATIONAL PARK SERVICE
GRAND TETON NATIONAL PARK
P.O. DRAWER 170
MOOSE, WYOMING 83012

IN REPLY REFER TO:

N14(GRTE)

AUG 25 2011

U.S. Fish and Wildlife Service
Ecological Services Wyoming Field Office
5353 Yellowstone Rd., Suite 308A
Cheyenne, WY 82009

RE: Consultation Initiation, Grand Teton National Park and Yellowstone National Park, Wyoming

Dear Project Manager:

The National Park Service is in the process of developing a Comprehensive River Management Plan for the Snake River Headwaters Wild and Scenic River in Grand Teton and Yellowstone National Parks.

This long-term, comprehensive plan will define overall management goals and objectives, identify resources that need protection and prescribe management actions for the Snake River Headwaters within Grand Teton and Yellowstone National Parks.

Based on the species list you sent us, the following threatened, endangered, or candidate species will be included for the Grand Teton National Park and John D. Rockefeller Memorial Parkway portion of the plan: Canada lynx, gray wolf, grizzly bear, wolverine, greater sage-grouse, yellow-billed cuckoo, and whitebark pine.

This letter will serve as a record that the National Park Service is initiating consultation with your agency pursuant to the requirements of the Endangered Species Act and National Park Service management policies.

We look forward to working with your office throughout this planning effort.

Sincerely,

Mary Gibson Scott
Superintendent

cc: Chris Church, Project Manager, DSC
Christina Miller, Natural Resource Specialist, DSC

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
5353 Yellowstone Road, Suite 308A
Cheyenne, Wyoming 82009

OCT 27 2011

In Reply Refer To:
ES-61411/WY11TA0381

RECEIVED
OCT 31 2011
GRTE
Superintendent's Office

Memorandum

To: Superintendent, National Park Service, Grand Teton National Park and John D. Rockefeller, Jr. Memorial Parkway, Wyoming

From: Field Supervisor, U.S. Fish and Wildlife Service, Wyoming Field Office, Cheyenne, Wyoming

Subject: Comprehensive River Management Plan for the Snake River Headwaters Wild and Scenic River in Grand Teton and Yellowstone National Parks

This correspondence acknowledges receipt of the Grand Teton National Park (Park) letter dated August 25, 2011, received in our office on August 29, requesting initiation of section 7 consultation under the Endangered Species Act of 1973, as amended (Act), 16 U.S.C. 1531 *et seq*. This consultation concerns the possible effects of activities associated with the Comprehensive River Management Plan for the Snake River Headwaters Wild and Scenic River in Grand Teton and Yellowstone National Parks.

The U.S. Fish and Wildlife Service values the continuing consultation with Park staff to ensure the implementation of conservation measures within operating plans that minimize or prevent impacts to threatened, endangered, and candidate species. The consultation will proceed upon receipt of the biological assessment and other relevant information for the above proposed action. In accordance with 50 CFR § 402.02, and to facilitate the timely completion of the consultation, we encourage the Park to provide the Service with a Biological Assessment that addresses the direct and indirect effects of the action, together with the effects of other activities that are interrelated or interdependent with the proposed action.

If you have any questions regarding this letter or your responsibilities under the Act, please contact Ann Belleman at (307) 578-5116 or our office at the letterhead address.

cc: GTNP, Senior Wildlife Biologist, Moose, WY (S. Cain)
WGFD, Non-game Coordinator, Lander, WY (B. Oakleaf)
WGFD, Statewide Habitat Protection Coordinator, Cheyenne, WY (M. Flanderka)

L30(GRTE)

FEB 17 2012

Mary Hopkins
State Historic Preservation Officer
Wyoming State Historic Preservation Office
2301 Central Avenue, 3rd Floor
Cheyenne, WY 82002

Reference: Snake River Headwaters Wild and Scenic River, Comprehensive River Management Plan and Environmental Assessment

Dear Ms. Hopkins:

In accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, and the Advisory Council on Historic Preservation regulations, 36 CFR Part 800, the National Park Service is initiating consultation for our Snake River Headwaters Wild and Scenic River, Comprehensive River Management Plan and Environmental Assessment.

The National Park Service (NPS) is working with the U.S. Fish and Wildlife Service (USFWS) to develop a comprehensive river management plan (CRMP) with an environmental assessment (EA) for the Snake River Headwaters Wild and Scenic River in Teton County, Wyoming. The wild and scenic river designation includes the Snake River headwaters and its tributaries within the boundaries of Grand Teton National Park, Yellowstone National Park, the John D. Rockefeller Memorial Parkway, the USFWS National Elk Refuge, and the Bridger-Teton National Forest. The NPS is coordinating with the U.S. Forest Service, which is concurrently preparing a separate plan for the wild and scenic river segments within the Bridger-Teton National Forest. The designated river segments include, from north to south, the Lewis River, Snake River, Pacific Creek, Buffalo Fork, and the Gros Ventre River. Please see the map included in the enclosed scoping newsletter illustrating the designated river segments involved in this plan.

The CRMP will be a long-range plan to guide the management of the designated wild and scenic river segments for the next 15-20 years. The plan is being developed concurrently with preparation of an environmental assessment (EA) in compliance with the National Environmental Policy Act. The CRMP/EA will identify significant management issues confronting the rivers, and present management alternatives for addressing these issues consistent with legal and policy mandates, including protecting and enhancing the rivers' outstandingly remarkable values, water quality, and free-flowing condition. The environmental

impacts associated with implementing each of the management alternatives will be fully analyzed.

Because the scope of the plan is long-range and will be implemented over the next 15-20 years, it will include a conceptual framework for Section 106 compliance for the life of the plan. This framework will outline any cultural resources-related impacts that could be caused by the actions analyzed in the plan. Please note that discrete, site-specific Section 106 assessments of effect will be submitted in the future when the undertakings are planned and greater detail and when the type and intensity of impacts to cultural resources become known. This approach will allow the Section 106 assessment of effects concerning the CRMP's future undertakings to be more timely and accurate. However, we will be submitting an overall assessment of effect for your review and concurrence once we have completed a final draft of the environmental assessment, likely mid-summer. If you have any questions or need additional information, please contact Katherine Longfield at 307-739-3671.

Sincerely,

Mary Gibson Scott
Superintendent

Enclosure: Scoping Newsletter

cc: Chris Church, Project Manager, NPS-Denver Service Center
Katry Harris, Advisory Council on Historic Preservation

bcc: Longfield, Consolo-Murphy

KLongfield:lf:2/14/2012

1. mary-mp 3. Kelly
2. Sue 4. Daniel
file

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
5353 Yellowstone Road, Suite 308A
Cheyenne, Wyoming 82009

OCT 27 2011

In Reply Refer To:
ES-61411/WY11TA0381

RECEIVED
OCT 31 2011
GRTE
Superintendent's Office

Memorandum

To: Superintendent, National Park Service, Grand Teton National Park and John D. Rockefeller, Jr. Memorial Parkway, Wyoming

From: Field Supervisor, U.S. Fish and Wildlife Service, Wyoming Field Office, Cheyenne, Wyoming

Subject: Comprehensive River Management Plan for the Snake River Headwaters Wild and Scenic River in Grand Teton and Yellowstone National Parks

This correspondence acknowledges receipt of the Grand Teton National Park (Park) letter dated August 25, 2011, received in our office on August 29, requesting initiation of section 7 consultation under the Endangered Species Act of 1973, as amended (Act), 16 U.S.C. 1531 *et seq*. This consultation concerns the possible effects of activities associated with the Comprehensive River Management Plan for the Snake River Headwaters Wild and Scenic River in Grand Teton and Yellowstone National Parks.

The U.S. Fish and Wildlife Service values the continuing consultation with Park staff to ensure the implementation of conservation measures within operating plans that minimize or prevent impacts to threatened, endangered, and candidate species. The consultation will proceed upon receipt of the biological assessment and other relevant information for the above proposed action. In accordance with 50 CFR § 402.02, and to facilitate the timely completion of the consultation, we encourage the Park to provide the Service with a Biological Assessment that addresses the direct and indirect effects of the action, together with the effects of other activities that are interrelated or interdependent with the proposed action.

If you have any questions regarding this letter or your responsibilities under the Act, please contact Ann Belleman at (307) 578-5116 or our office at the letterhead address.

cc: GTNP, Senior Wildlife Biologist, Moose, WY (S. Cain)
WGFD, Non-game Coordinator, Lander, WY (B. Oakleaf)
WGFD, Statewide Habitat Protection Coordinator, Cheyenne, WY (M. Flanderka)

Katherine Longfield/GRTE/NPS
03/08/2012 03:04 PM

To Richard Currit <richard.currit@wyo.gov>
cc
bcc
Subject Re: Snake River Headwaters Wild and Scenic River

Richard,

Thanks for your response. I am glad you wrote because I have an update since I sent the letter. We received direction from region to combine the Yellowstone and Grand Teton 106 consultation. So, even though we both sent you separate initiation letters, we will be collaborating to send you a combined 106 consultation letter. If you would like to discuss, I'd be happy to talk about it. Overall, I think it will actually make things easier for all involved.

Best,

Katherine

Katherine Longfield
Cultural Resources Specialist
Grand Teton National Park
Moose, WY
83012

307-739-3671

Richard Currit Hi Katherine, I was just looking at the document... 03/08/2012 02:06:38 PM

Richard Currit
<richard.currit@wyo.gov>
03/08/2012 02:03 PM

To Katherine_Longfield@nps.gov
cc
Subject Snake River Headwaters Wild and Scenic River

Hi Katherine,
I was just looking at the documentation concerning the Comprehensive River Management Plan and Environmental Assessment. While I don't have any comments at this time, I just wanted to say that I look forward to reviewing and working on this. And to let you know that if you have any questions, or issues, I can help with that I'm happy to help.

Richard L. Currit
Senior Archaeologist
Wyoming State Historic Preservation Office
2301 Central Ave., Barrett Bldg. 3rd Floor
Cheyenne, WY 82002
307-777-5497

E-Mail to and from me, in connection with the transaction of public business, is subject to the Wyoming Public Records Act and may be disclosed to third parties.

L30(GRTE)

FEB 17 2012

Mary Hopkins
State Historic Preservation Officer
Wyoming State Historic Preservation Office
2301 Central Avenue, 3rd Floor
Cheyenne, WY 82002

Reference: Snake River Headwaters Wild and Scenic River, Comprehensive River Management Plan and Environmental Assessment

Dear Ms. Hopkins:

In accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, and the Advisory Council on Historic Preservation regulations, 36 CFR Part 800, the National Park Service is initiating consultation for our Snake River Headwaters Wild and Scenic River, Comprehensive River Management Plan and Environmental Assessment.

The National Park Service (NPS) is working with the U.S. Fish and Wildlife Service (USFWS) to develop a comprehensive river management plan (CRMP) with an environmental assessment (EA) for the Snake River Headwaters Wild and Scenic River in Teton County, Wyoming. The wild and scenic river designation includes the Snake River headwaters and its tributaries within the boundaries of Grand Teton National Park, Yellowstone National Park, the John D. Rockefeller Memorial Parkway, the USFWS National Elk Refuge, and the Bridger-Teton National Forest. The NPS is coordinating with the U.S. Forest Service, which is concurrently preparing a separate plan for the wild and scenic river segments within the Bridger-Teton National Forest. The designated river segments include, from north to south, the Lewis River, Snake River, Pacific Creek, Buffalo Fork, and the Gros Ventre River. Please see the map included in the enclosed scoping newsletter illustrating the designated river segments involved in this plan.

The CRMP will be a long-range plan to guide the management of the designated wild and scenic river segments for the next 15-20 years. The plan is being developed concurrently with preparation of an environmental assessment (EA) in compliance with the National Environmental Policy Act. The CRMP/EA will identify significant management issues confronting the rivers, and present management alternatives for addressing these issues consistent with legal and policy mandates, including protecting and enhancing the rivers' outstandingly remarkable values, water quality, and free-flowing condition. The environmental

impacts associated with implementing each of the management alternatives will be fully analyzed.

Because the scope of the plan is long-range and will be implemented over the next 15-20 years, it will include a conceptual framework for Section 106 compliance for the life of the plan. This framework will outline any cultural resources-related impacts that could be caused by the actions analyzed in the plan. Please note that discrete, site-specific Section 106 assessments of effect will be submitted in the future when the undertakings are planned and greater detail and when the type and intensity of impacts to cultural resources become known. This approach will allow the Section 106 assessment of effects concerning the CRMP's future undertakings to be more timely and accurate. However, we will be submitting an overall assessment of effect for your review and concurrence once we have completed a final draft of the environmental assessment, likely mid-summer. If you have any questions or need additional information, please contact Katherine Longfield at 307-739-3671.

Sincerely,

Mary Gibson Scott
Superintendent

Enclosure: Scoping Newsletter

cc: Chris Church, Project Manager, NPS-Denver Service Center
Katry Harris, Advisory Council on Historic Preservation

bcc: Longfield, Consolo-Murphy

KLongfield:lf:2/14/2012

K. Longfield

D18(YELL)
xL76

JUN 07 2012

«Title» «First_Name» «Last_Name»
«PositionDepartment»
«TribeInstitution»
«AddressLine»
«City», «State_Name» «ZipCode»

RE: Snake River Headwaters Wild and Scenic River, Comprehensive River Management Plan and Environmental Assessment

Dear «Title» «Last_Name»:

The National Park Service (NPS) is developing a comprehensive river management plan (CRMP) with an environmental assessment (EA) for the Snake River Headwaters Wild and Scenic River in Teton County and Park County, Wyoming. The wild and scenic river designation includes seven segments of the Snake River headwaters and its tributaries within the boundaries of Yellowstone National Park, Grand Teton National Park, the John D. Rockefeller Memorial Parkway, the U.S. Fish and Wildlife Service National Elk Refuge, and the Bridger-Teton National Forest of the U.S. Forest Service. The NPS is coordinating with the U.S. Forest Service, which is concurrently preparing a separate plan for the wild and scenic river segments within the Bridger-Teton National Forest. The designated river segments include, from north to south, the Lewis River, Snake River, Pacific Creek, Buffalo Fork, and the Gros Ventre River. A copy of the scoping letter can be found at:
http://parkplanning.nps.gov/projectHome.cfm?projectID=31397

Yellowstone, Grand Teton, John D. Rockefeller park units and the National Elk Refuge will be working to develop the plan and will coordinate consultation for the project. The CRMP will be a long-range plan to guide the management of the designated wild and scenic river segments for the next fifteen to twenty years. The plan is being developed concurrently with preparation of an EA in compliance with the National Environmental Policy Act. The NPS intends to release the CRMP/EA sometime this fall. The CRMP/EA will identify significant management issues confronting the rivers, and present management alternatives for addressing these issues consistent with legal and policy mandates, including protecting and enhancing the rivers' outstandingly remarkable values, water quality, and free-flowing condition.

We acknowledge the relationship of Native American tribes with the greater Yellowstone ecosystem and seek your input on the project. Through many years of working with tribes, we

have information regarding ethnographic resources and significant places within the greater Yellowstone ecosystem. However, we would welcome any further information you might wish to share to assist with development of the plan. We look forward to working with you and your staff as we develop this plan. If you have any questions or need additional information, please contact Tobin Roop (Yellowstone) at (307) 344-2224 or Katherine Longfield (Grand Teton) at (307) 739-3671.

Sincerely,

/s/ Dan Wenk

Daniel N. Wenk
Superintendent, Yellowstone National Park

Mary Gibson Scott

Mary Gibson Scott
Superintendent, Grand Teton National Park, John D. Rockefeller Memorial Parkway

cc:
«CCNames1»«CCNames2»«CCNames3»
Chris Church, Project Manager, NPS-Denver Service Center

bcc:
Central Files
Supt's Files YELL
David Hallac YELL
Cultural Resources Files YELL
Doug Madsen YELL
Sue Mills YELL
Supt's Files GRTE
Sue Consolo-Murphy GRTE
Katherine Longfield GRTE
YCR Files
No Reading Files

FNP:Troop:bec:5/25/12:2203

Title	First Name	Last Name	Position/Department	Tribe/Institution	MailingAddress	City	State	Zip Code
Mr.	Henry	Kostzuta	Chairman	Apache Tribe of Oklahoma	PO Box 1220	Anadarko	OK	73005
Mr.	Robbie	Magnan	Director, Fish & Game Dept	Assiniboine & Sioux Tribes, Fort Peck	PO Box 1027	Poplar	MT	59255
Ms.	Jeanne	Spaur	Project Coordinator / Biologi	Assiniboine & Sioux Tribes, Fort Peck	PO Box 1027	Poplar	MT	59255
Mr.	A.T. Rusty	Stafne	Chairperson	Assiniboine & Sioux Tribes, Fort Peck	PO Box 1027	Poplar	MT	59255
Ms.	Merna	Walking Eagle	Director, Natural Resources	Assiniboine & Sioux Tribes, Fort Peck	PO Box 1027	Poplar	MT	59225
Mr.	Curley	Youpee	Director, Cultural Resources	Assiniboine & Sioux Tribes, Fort Peck	PO Box 1027	Poplar	MT	59255
Mr.	Ervin	Carlson	ITBC President	Blackfeet Tribe	PO Box 850	Browning	MT	59417
Mr.	John	Murray	Tribal Historic Preservation (	Blackfeet Tribe	PO Box 850	Browning	MT	59417
Mr.	Willie	Sharp	Chairperson	Blackfeet Tribe	PO Box 850	Browning	MT	59417
Mr.	Gayle	Skunkcap Jr.	Director, Fish & Wildlife	Blackfeet Tribe	PO Box 850	Browning	MT	59417
Ms.	Charisse	Souccie	Chairperson	Burns Paiute Tribe	100 Pasigo Stree	Burns	OR	97720
Mr.	Kevin	Keckler	Chairperson	Cheyenne River Sioux Tribe	PO Box 590	Eagle Butt	SD	57625
Mr.	Ted	Knife Jr.	Vice-Chairman of Wolakota	Cheyenne River Sioux Tribe	PO Box 546	Dupree	SD	57623
Mr.	Narcisse [	Rousseau	Director, Game, Fish and Pa	Cheyenne River Sioux Tribe	PO Box 590	Eagle Butt	SD	57625
Mr.	Steve	Vance	Tribal Historic Preservation (	Cheyenne River Sioux Tribe	PO Box 590	Eagle Butt	SD	57625
Mr.	Raymond	Parker, Jr.	Chairman	Chippewa Cree Tribe	6020 Haystack Rd	Box Elder	MT	59521
Mr.	Alvin	Windy Boy	Tribal Historic Preservation (	Chippewa Cree Tribe	RR1 Box 800	Box Elder	MT	59521
Mr.	Chief	Allan	Chairperson	Coeur d'Alene Tribe	PO Box 408	Plummer	ID	83851
Mr.	Cameron	Huesser	Wildlife Department	Coeur d'Alene Tribe	PO Box 408	Plummer	ID	83851
Mr.	Jeffrey	Jordan	Fisheries Biologist	Coeur d'Alene Tribe	PO Box 408	Plummer	ID	83851
Mr.	Quanah	Matheson	Director, Culture Program	Coeur d'Alene Tribe	PO Box 408	Plummer	ID	83851
Mr.	Robert	Matt	Administrative Director	Coeur d'Alene Tribe	PO Box 408	Plummer	ID	83851
Dr.	Jill	Wagner Ph.D.	Tribal Historic Preservation (	Coeur d'Alene Tribe	PO box 408	Plummer	ID	83851
Mr.	Jimmy	Arterberry	Tribal Historic Preservation (	Comanche Tribe of Oklahoma	PO Box 908	Lawton	OK	73502
Mr.	Michael	Burgess	Chairman	Comanche Tribe of Oklahoma	PO Box 908	Lawton	OK	73502
Mr.	Francis	Auld	Kootenai Culture Committee	Confederated Salish and Kootenai Tribes	PO Box 278	Pablo	MT	59915
Ms.	Patricia	Hewankorn	Director, Kootenai Culture C	Confederated Salish and Kootenai Tribes	PO Box 155	Elmo	MT	59915
Mr.	Tony	Incashola	Director, Salish Culture Com	Confederated Salish and Kootenai Tribes	PO Box 550	St Ignatius	MT	59865
Mr.	Rich	Janneson Jr.	Natural Resources Departm	Confederated Salish and Kootenai Tribes	301 Main Street	Polsner	MT	59860
Mr.	E.T. Bud	Moran	Chairperson	Confederated Salish and Kootenai Tribes	PO Box 155	Elmo	MT	59915
Ms.	Marcia	Pablo	Tribal Historic Preservation (	Confederated Salish and Kootenai Tribes	PO Box 155	Elmo	MT	59915
Ms.	Germaine	White	Information and Education S	Confederated Salish and Kootenai Tribes	406 6th Ave E.	Polsen	MT	59860
Mr.	Harry	Smiskin	Chairman	Confederated Tribes and Bands of the Yaka	PO Box 151	Toppenish	WA	98948
Mr.	Albert	Andrews Redstar	Language Program Director	Confederated Tribes of the Colville Indian R	705 Cedar St	Coulee Da	WA	99116
Mr.	Michael	Finley	Chairperson, Colville Busine	Confederated Tribes of the Colville Indian R	PO Box 150	Nespelem	WA	99155
Ms.	Camille	Pleasants	Tribal Historic Preservation (	Confederated Tribes of the Colville Indian R	PO Box 150	Nespelem	WA	99155
Ms.	Bobbie	Conner	Director, Tamastslikt Institut	Confederated Tribes of the Umatilla Indian F	46411 Timine Way	Pendleton	OR	97801
Ms	Teara	Farrow	Manager, Cultural Resource	Confederated Tribes of the Umatilla Indian F	46411 Timine Way	Pendleton	OR	97801
Mr.	Elwood	Patawa	Chairperson	Confederated Tribes of the Umatilla Indian F	46411 Timine Way	Pendleton	OR	97801
Mr.	Eric	Quaempts	Department of Natural Reso	Confederated Tribes of the Umatilla Indian F	46411 Timine Way	Pendleton	OR	97801
Mr.	Duane	Big Eagle	Chairperson	Crow Creek Sioux Tribe	PO Box 50	Fort Thom	SD	57339
Mr.	Cedric	Black Eagle	Chairperson	Crow Tribe	PO Box 159	Crow Ager	MT	59022
Mr.	Darrin	Old Coyote	Vice Secretary	Crow Tribe	PO Box 159	Crow Ager	MT	59022
Mr.	Dale	Old Horn	THPO	Crow Tribe	PO Box 676	Crow Ager	MT	59022
Mr.	Lanny	Real Bird	Little Big Horn College	Crow Tribe	PO Box 364	Crow Ager	MT	59022
Mr.	Lawrence	Tobacco	Director of Natural Resource	Crow Tribe	PO Box 159	Crow Ager	MT	59022
Mr.	Delphine	Clair	Elder - Cultural Committee	Eastern Shoshone Tribe	PO Box 171	Fort Wash	WY	82514
Mr.	Wilfred	Ferris	Tribal Historic Preservation (	Eastern Shoshone Tribe	P.O. Box 538	Fort Wash	WY	82514
Mr.	Michael	Lajeunesse	Chariman	Eastern Shoshone Tribe	P.O. Box 538	Fort Wash	WY	82514
Ms.	Glenda	Trosper	Director Cultural Preservatio	Eastern Shoshone Tribe	PO Box 1008	Fort Wash	WY	82514
Mr.	Derrick	Bose	Buffalo Herd Manager, Dept	Flandreau Santee Sioux Tribe	603 W Broad Ave	Flandreau	SD	57028
Mr.	Tony	Reider	Chairperson	Flandreau Santee Sioux Tribe	PO Box 283	Flandreau	SD	57028
Mr.	John	Allen	Buffalo Chaser's Society	Gros Ventre and Assiniboine Tribes	656 Agency Main St	Harlem	MT	59526
Mr.	Mike	Azure	Director of Fish and Wildlife	Gros Ventre and Assiniboine Tribes	656 Agency Main St	Harlem	MT	59526
Ms.	Mel L.	Doney	Vice President	Gros Ventre and Assiniboine Tribes	656 Agency Main Street	Harlem	MT	59526
Mr.	Tracy	King	Chairperson	Gros Ventre and Assiniboine Tribes	656 Agency Main Street	Harlem	MT	59526
Ms.	Ina L.	Nez Perce	White Clay Society	Gros Ventre and Assiniboine Tribes	656 Agency Main St	Harlem	MT	59526
Mr.	Ronald D.	Twohatchet	Chairperson	Kiowa Tribe of Oklahoma	Rt. #3, Box 369	Carnegie	OK	73015
Ms.	Claire	Green	Cultural Resources Director	Lower Brule Sioux Tribe	187 Oyate Circle	Lower Bru	SD	57548
Mr.	Michael	Jandreau	Chairperson	Lower Brule Sioux Tribe	187 Oyate Circle	Lower Bru	SD	57548
Mr.	Ben	Janis	Director Department Wildlife	Lower Brule Sioux Tribe	PO Box 246	Lower Bru	SD	57548
Dr.	Brian	Molyneaux	Cultural Resources Represe	Lower Brule Sioux Tribe	187 Oyate Circle	Lower Bru	SD	57548
Mr.	Brooklyn [	Baptiste	Chairman	Nez Perce Tribe	PO Box 305	Lapwai	ID	83540
Ms.	Roberta	Bisbee	Assistant Secretary/Treasur	Nez Perce Tribe	PO Box 305	Lapwai	ID	83540
Mr.	Keith	Lawrence	Director, Wildlife Mgmt	Nez Perce Tribe	PO Box 365	Lapwai	ID	83540
Mr.	Aaron	Miles	Natural Resource Manager/I	Nez Perce Tribe	PO Box 365	Lapwai	ID	83540
Ms.	Rebecca A	Miles	Nez Perce Tribe Executive C	Nez Perce Tribe	PO Box 305	Lapwai	ID	83540
Mr.	Joel T.	Moffett	Treasurer	Nez Perce Tribe	PO Box 305	Lapwai	ID	83540
Mr.	McCoy	Oatman	Business Council	Nez Perce Tribe	PO Box 305	Lapwai	ID	83540
Ms.	Vera	Sonneck	Director, Cultural Resource I	Nez Perce Tribe	PO Box 365	Lapwai	ID	83540
Ms.	Darlene	Conrad	Tribal Historic Preservation (	Northern Arapaho Tribe	PO Box 396	Fort Wash	WY	82514
Ms.	Kimberly	Harjo	Chairperson	Northern Arapaho Tribe	PO Box 396	Fort Wash	WY	82514
Mr.	Ken	Trosper	Bison Manager	Northern Arapaho Tribe	PO Box 369	Fort Wash	WY	82514
Mr.	Conrad	Fisher	Tribal Historic Preservation (	Northern Cheyenne Tribe	PO Box 1199	Lame Dee	MT	59043
Mr.	Leroy	Spang	President	Northern Cheyenne Tribe	PO Box 1199	Lame Dee	MT	59043
Mr.	Wilmer	Mesteth	Culture Resources Represer	Oglala Sioux Tribe	PO Box 2070	Pine Ridge	SD	57770
Mr.	John	Yellowbird Steele	President	Oglala Sioux Tribe	PO Box 2070	Pine Ridge	SD	57770
Mr.	Rodney	Bordeaux	President/ITBC Board Memt	Rosebud Sioux Tribe	PO Box 430	Rosebud	SD	57570
Mr.	Terry	Gray	NAGPRA Representative/Si	Rosebud Sioux Tribe	PO Box 5	Parmelee	SD	57566

Mr.	Claudeo M	Broncho	Fish and Wildlife Policy Rep	Shoshone-Bannock Tribes	PO Box 306	Fort Hall	ID	83203
The	Fort Hall	Business Council	Fort Hall	Shoshone-Bannock Tribes	PO Box 36	Fort Hall	ID	83203
Mr.	Chad	Colter	Director Fish & Wildlife Dept	Shoshone-Bannock Tribes	PO Box 306	Fort Hall	ID	83203
Ms.	Lori	Edmo Suppah, Ec	Sho-Ban News	Shoshone-Bannock Tribes	PO Box 900	Fort Hall	ID	83203
Ms.	Ardythe	Peyope	Librarian	Shoshone-Bannock Tribes	PO Box 306	Ft. Hall	ID	83203
Mr.	Nathan	Small	Chairman, Fort Hall Busines	Shoshone-Bannock Tribes	PO Box 306	Fort Hall	ID	83203
Ms.	Carolyn B.	Smith	Cultural Resources Coordina	Shoshone-Bannock Tribes	PO Box 306	Fort Hall	ID	83203
Ms.	Yvette	Tuell	Environmental Program Mar	Shoshone-Bannock Tribes	PO Box 306	Fort Hall	ID	83203
Ms.	Brandelle	Whitworth	Attorney	Shoshone-Bannock Tribes	PO Box 306	Fort Hall	ID	83203
Ms.	Dianne	Desrosiers	Tribal Historic Preservation (	Sisseton-Wahpeton Sioux Tribe	PO Box 907	Sisseton	SD	57262
Mr.	Alvah	Quinn	Director, Game, Fish, Parks	Sisseton-Wahpeton Sioux Tribe	PO Box 509	Agency Vil	SD	57262
Mr.	Robert	Shepherd	Chairperson	Sisseton-Wahpeton Sioux Tribe	PO Box 509	Agency Vil	SD	57262
Mr.	Jim	Whitted	Consultant Coordinator	Sisseton-Wahpeton Sioux Tribe	PO Box 907	Sisseton	SD	57262
Ms.	Imogene	Belgarde	Director of Senior Services	Spirit Lake Sioux Tribe	PO Box 359	Fort Totter	ND	58335
Mr.	Raymond	Jetty Jr.	ITBC Board of Directors/Her	Spirit Lake Sioux Tribe	PO Box 359	Fort Totter	ND	58335
Mr.	Andrew	Morin	Director Game and Fish Dep	Spirit Lake Sioux Tribe	PO Box 359	Fort Totter	ND	58335
Ms.	Myra	Pearson	Chairperson	Spirit Lake Sioux Tribe	PO Box 359	Fort Totter	ND	58335
Mr.	Michael	Faith	ITBC Board of Directors, Vic	Standing Rock Sioux Tribe	PO Box D	Fort Yates	ND	58538
Mr.	Jeff	Kelly	Director Game and Fish Dep	Standing Rock Sioux Tribe	PO Box D	Fort Yates	ND	58538
Mr.	Charles W	Murphy	Chairperson	Standing Rock Sioux Tribe	PO Box D	Fort Yates	ND	58528
Mr.	Kade	Ferris	THPO/Natural Resources Di	Turtle Mountain Band of Chippewa Indians	PO Box 900	Belcourt	ND	58316
Mr.	Merle	St. Claire	Chairperson	Turtle Mountain Band of Chippewa Indians	PO Box 900	Belcourt	ND	58316
Mr.	Robert	Cournoyer	Chairman	Yankton Sioux Tribe	PO Box 248	Marty	SD	57361
Ms.	Mabel Jud	Honomichl	Cultural Committee	Yankton Sioux Tribe	PO Box 825	Wagner	SD	57380
Ms.	Faith	Spotted Eagle	Chair of Cultural Committee/	Yankton Sioux Tribe	PO Box 667	Lake Ande	SD	57356

WYOMING GAME AND FISH DEPARTMENT

5400 Bishop Blvd. Cheyenne, WY 82006

Phone: (307) 777-4600 Fax: (307) 777-4699

Web site: http://wgfd.wyo.gov

GOVERNOR
MATTHEW H. MEAD

DIRECTOR
SCOTT TALBOTT

COMMISSIONERS
AARON CLARK – President
MIKE HEALY – Vice President
RICHARD KLOUDA
FRED LINDZEY
T. CARRIE LITTLE
ED MIGNERY
CHARLES PRICE

September 27, 2012

WER 12140.01
U.S. Department of the Interior
National Park Service
Grand Teton National Park
Special Status Species Information for the
Development of a Comprehensive River Management Plan
for the Snake River Headwaters Wild and Scenic River in
Grand Teton and Yellowstone National Parks

National Park Service
Denver Service Center-Chris Church, DSC-P
12798 West Alameda Parkway
PO Box 25287
Denver, CO 80225-9901

Dear Mr. Church:

The staff of the Wyoming Game and Fish Department (WGFD) has reviewed the Special Status Species Information for the Development of a Comprehensive River Management Plan for the Snake River Headwaters Wild and Scenic River in Grand Teton and Yellowstone National Parks. We offer the following comments for your consideration.

Please see attached table (Table 1) describing the requested information on state species of concern.

Thank you for the opportunity to provide this information during the CRMP drafting phase. If you have any questions or concerns, please contact Amanda Losch, Staff Biologist, at (307) 473-3436.

Sincerely,

John Emmerich
Deputy Director

JE/mf/gb

"Conserving Wildlife - Serving People"

Mr. Chris Church
September 27, 2012
Page 2 – WER 12140.01

cc: USFWS
Tim Fuchs – WGFD, Jackson Region
Tracy Stephens – WGFD, Jackson Region
Susan Patla – WGFD, Jackson Region
Daniel Noon – NPS, Grand Teton National Park

Mr. Chris Church
September 27, 2012
Page 3 – WER 12140.01

Category	Species	Wyoming State Wildlife Action Plan (2010) Native Species Status (NSS)
Fish	Bluehead sucker	NSS1
	Mountain whitefish	NSS4
	Snake River cutthroat trout	NSS4
	Northern leatherside chub	NSSU
	Yellowstone cutthroat trout	NSS4
Amphibians	Boreal toad	NSS1
	Columbia spotted frog	NSS3
	Northern leopard frog	NSSU
Reptiles	Valley gartersnake	NSSU
	Northern rubber boa	NSS3
Invertebrates	Western pearlshell	NSSU
Birds	American bittern	NSS3
	American three-toed woodpecker	NSSU
	Bald eagle	NSS2
	Barrow's goldeneye	NSS3
	Black-backed woodpecker	NSSU
	Black rosy finch	NSSU
	Black tern	NSS3
	Bobolink	NSS4
	Boreal owl	NSS3
	Brewer's sparrow	NSS4
	Canvasback	NSS3
	Caspian tern	NSS3
	Clark's grebe	NSSU
	Common loon	NSS1
	Ferruginous hawk	NSSU
	Forster's tern	NSS3
	Franklin's gull	NSS3
	Greater sage-grouse	NSS2
	Great gray owl	NSSU
	Harlequin duck	NSS3
	Lesser scaup	NSS3
	Lewis' woodpecker	NSSU
	Long-billed curlew	NSS3
	Merlin	NSSU
	Northern goshawk	NSSU
	Northern pintail	NSS3
	Northern pigmy owl	NSSU

Mr. Chris Church
September 27, 2012
Page 4 – WER 12140.01

	Peregrine falcon	NSS3
	Redhead	NSS3
	Greater sandhill crane	NSS4
	Sage thrasher	NSS4
	Short-eared owl	NSS4
	Swainson's hawk	NSSU
	Trumpeter swan	NSS2
	Virginia rail	NSS3
	White-faced ibis	NSS3
	Willow flycatcher	NSS4
	Yellow-billed cuckoo	NSSU*
Mammals	American pika	NSSU
	Big brown bat	NSS4
	Bighorn sheep	NSS4
	Canada lynx	NSS1*
	Dwarf shrew	NSS3
	Fisher	NSSU
	Fringed myotis	NSS3
	Little brown myotis	NSS4
	Long-eared myotis	NSS3
	Long-legged myotis	NSS3
	Marten	NSS4
	Moose	NSS4
	Northern flying squirrel	NSS4
	Preble's Shrew	NSS3
	River otter	NSSU
	Townsend's big-eared bat	NSS2
	Uinta chipmunk	NSS4
	Vagrant shrew	NSS4
	Water vole	NSS3
	Wolverine	NSS3
	Yellow-pine chipmunk	NSS4

Table 1 – Wyoming Species of Greatest Conservation Need (SGCN) from the 2010 State Wildlife Action Plan (SWAP) with modeled ranges, distribution, or observation data within the NPS (including the National Elk Refuge) wild and scenic river corridors on the Buffalo Fork, Gros Ventre, Lewis River, Pacific Creek, and Snake River segments.

*Indicates a federally listed species

REFERENCES

Author Unknown
2004 "Recommended Stabilization Treatments and Specifications for Six Selected Buildings at Bar BC Ranch with Archeological Support Study."

Baron, Jill S. et al.
2008 "Some Guidelines for Helping Natural Resources Adapt to Climate Change." *IHDP Update Magazine*, Issue 2, 46–52.

Braak, A., S. J. Hollenhorst, N.C. Holmes, E. Papadogiannaki, and G. Vander Stoep
2010 "Grand Teton National Park Visitor Study—Summer 2008." Report 206, prepared by the Park Studies Unit, Visitor Services Project for the National Park Service, accessed April 2012, http://www.psu.uidaho.edu/files/vsp/reports/206_GRTE_rept.pdf.

Cole, D.
1990 *Ecological Impacts of Wilderness Recreation and Their Management.* Wilderness Management, 2nd Ed., International Wilderness Leadership Foundation.

Cole, D. and G. Stankey
1997 "Historical Development of Limits of Acceptable Change: Conceptual Clarifications and Possible Extensions." In: Proc. Limits of Acceptable Change and Related Planning Processes: Progress and Future Directions, Gen. Tech. Rep. INT-GTR-371. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station; 5.

Cole, D.; R. Manning and D. Lime
2005 "Addressing Visitor Capacity of Parks and Rivers." *Parks and Recreation* 40(3): 8–10.

Connor, Melissa
1985 Archeological Inventory for Package 328. Prepared for the National Park Service, Grand Teton National Park.

Daugherty, John, with Stephanie Crockett, William H. Goetzmann, and Reynold G. Jackson
1999 "A Place Called Jackson Hole: A Historic Resource Study of Grand Teton National Park." Prepared for Grand Teton National Park, Intermountain Region, National Park Service. Grand Teton Natural Historic Association: Moose, Wyoming. Also available at http://www.cr.nps.gov/history/online_books/grte2/hrs.htm.

Department of Administration and Information, State of Wyoming (A&I)
2011 "Wyoming Sales, Use, and lodging Tax Revenue Report." Economic Analysis Division, accessed July 2012, http://eadiv.state.wy.us/s&utax/Report_FY11.pdf.

Driver, B. L., and J. R. Bassett
1991 "The Paragraphs about Leisure and Recreation Experience Preference Scales: Results from Two Inventories Designed to Assess the Breadth of the Perceived Psychological Benefits of Leisure." In *Benefits of Leisure*, edited by B. L. Driver, P. J. Brown, and G. L. Peterson. State College, PA: Venture Publishing.

1975 "Defining conflicts among river users: A case study of Michigan's Au Sable River." *Naturalist* 26(11), 19–23.

Erwin, S., J. Schmidt, and N. Nelson
2011 "Downstream Effects of Impounding a Natural Lake: The Snake River Downstream from Jackson Lake Dam, Wyoming, USA." Earth Surface Processes and Landforms, 36(11), 1421–1434.

Federal Register (FR)
2010 "Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to List the North American Wolverine as Endangered or Threatened; Proposed Rule." Washington D.C.: Department of the Interior, U.S. Fish and Wildlife Service. Vol. 75, No. 239, Pgs. 78030-78061. http://www.gpo.gov/fdsys/pkg/FR-2010-12-14/pdf/2010-30573.pdf.

2006 "Endangered and Threatened Wildlife and Plants; 12-Month Finding for a Petition to List the Yellowstone Cutthroat Trout as Threatened", Washington D.C.: Department of the Interior, U.S. Fish and Wildlife Service., 50 CFR Part 17. Vol. 71, No. 34, Tuesday, February 21, 2006. Pp. 8818-8831. http://www.fws.gov/policy/library/2006/06-1539.pdf

2000 "Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Contiguous U.S. Distinct Population Segment of the Canada Lynx and Related Rule." Washington D.C.: Department of the Interior, U.S. Fish and Wildlife Service. Vol. 65, No. 58, pgs. 16052–16086. http://www.gpo.gov/fdsys/pkg/FR-2000-03-24/pdf/00-7145.pdf.

Francis, M.
2006 "Urban Parks as Community Places". In G5 International Urban Design Symposium, J. Jin (Ed.), 87–96. Chuncheon, South Korea.

Gonzalez, P.
2012 "Climate Change and Ecological Impacts at Yellowstone National Park, USA," Climate Change Response Program, Natural Resource Stewardship and Science, National Park Service. Washington, D.C.

Gramman, J. H.
1999 "The Effect of Mechanical Noise and Natural Sound on Visitor Experiences in Units of the National Park Service." *Social Science Research Review*, 1(1), 1–16.

Greater Yellowstone Coordinating Committee (GYCC)
2006 "Outdoor Recreation in the Greater Yellowstone Area: An Interagency Report." Prepared for the U.S. Forest Service, National Park Service, and U.S. Fish and Wildlife Service. http://fedgycc.org/RecreationintheGreaterYellowstoneArea.pdf.pdf.

Greater Yellowstone Science and Learning Center (GYSLC)
2008 "Snake River Finespotted Cutthroat Trout," accessed July 2012, last updated 1/4/2008, http://www.greateryellowstonescience.org/topics/biological/fish/fct.

Gresswell, R. E.
2011 "Biology, Status, and Management of the Yellowstone Cutthroat Trout," *North American Journal of Fisheries Management.* 31:5, pp. 782–812.

Haas, G. E., and T. J. Wakefield
1998 "National Parks and the American Public: A National Public Opinion Survey on the National Park System." Washington, D.C., and Fort Collins, CO: National Parks and Conservation Association and Colorado State University.

Halfpenny, J., S. J. Bissell, and D. Nead
1982 "Southern Limits of Lynx Distribution with Special Reference to Colorado." Unpublished report. Colorado Division of Wildlife. Denver, CO.

Hammitt, W. E. and D. N. Cole
1998 *Wildland Recreation: Ecology and Management.* 2nd Ed. Wiley: New York.

Holmes, M. and N. Berg
2009 "Greater Yellowstone Ecosystem Lynx Study: 2008/2009 Annual Report." Endeavor Wildlife Research Foundation. Jackson, WY. http://greateryellowstonescience.org/node/3221.

Interagency Wild and Scenic Rivers Coordinating Council (IWSRCC)
2002 "Wild and Scenic River Management Responsibilities. Technical Report." Prepared by the U.S. Forest Service, Portland, OR.

Interagency Wild and Scenic Rivers Council (IWSRC)
2012 "Newly Designated Wild and Scenic River: Interim Management and Steps to Develop a Comprehensive River Management Plan," accessed July 2012, http://www.rivers.gov/rivers/publications.php

2004 "Wild and Scenic Rivers Act: Section 7," accessed July 2012, http://www.rivers.gov/rivers/publications.php

Johnson, Ann M.
1999 Archeological Inventory for the Proposed Southwest Entrance Station, Grand Teton National Park, Wyoming. Prepared for the National Park Service.

Landrum, Christine M. J.
2005 Scope of Collection Statement: Grand Teton National Park and John D. Rockefeller, Jr. Memorial Parkway. January.

Leung, Y. F. and J. L. Marion
2000 "Recreation Impacts and Management in Wilderness: A State-of-knowledge Review." In: *Wilderness Science in a Time of Change Conference - Volume 5: Wilderness Ecosystems, Threats, and Management*; Cole, D. N., S. F. McCool, W. T. Borrie, J. O'Loughlin (comps.), Proc. RMRS-P-15-VOL-5. Ogden, UT: USDA, U.S. Forest Service, Rocky Mountain Research Station, 23–48.

Loomis, J., and L. Caughlan
2004 "Economic Analysis of Alternative Bison and Elk Management Practices on the National Elk Refuge and Grand Teton National Park: A comparison of Visitor and Household Responses." U.S. Geological Survey Open-File Report 2004-1305.

Loomis, J., and L. Koontz
2005 "Economic Importance of Elk Hunting in Jackson Hole, Wyoming." U.S. Geological Survey Open-File Report 2005-1183.

Mace, B. L., P. A. Bell, and R. J. Loomis
2004 "Visibility and Natural Quiet in National Parks and Wilderness Areas: Psychological Considerations." Environment and Behavior, 36(1), 5–31.

2003 "Source Attribution of Helicopter Noise in Pristine National Park Landscapes." *Journal of Park and Recreation Administration*, 21(3), 97–119.

Malm, W. C.
1999 "Introduction to Visibility." Air Resources Division of the National Park Service, Cooperative Agreement CA2350-97-001: T097-04, T098-06.

Manning, R. E.
2010 Studies in Outdoor Recreation: Search and Research for Satisfaction, 3rd Ed. Corvallis, OR: Oregon State University Press.

1999 "Chapter 5. Crowding in Outdoor Recreation: Use Levels, Perceived Crowding, and Satisfaction". In Studies in Outdoor Recreation: Search and Research for Satisfaction, Corvallis, OR: Oregon State University Press. 94.

Manning, R., W. Valliere, C. Van Riper, and L. Anderson
2007 "Research to Support Visitor Management at Alcatraz Island—A Replication and Extension, Study Completion Report." Prepared by the University of Vermont, Parks Studies Lab for the National Park Service, Golden Gate National Recreation Area.

Marion, J. L., Y. F. Leung
2001 "Trail Resource Impacts and an Examination of Alternative Assessment Techniques." *Journal of Park and Recreation Administration*, 19(3), 17–37.

McDonald, C. D., R. M.Baumgartner and R. Lachan
1995 "National Park Service Aircraft Management Studies." U.S. Department of the Interior, Report No. 94–2, Denver.

McKelvey, K. S., K. B. Aubry, and Y. K. Ortega
2000 "History and Distribution of Lynx in the Contiguous United States." In: Ruggiero, L. F. et al. eds. *The Ecology and Conservation of Lynx in the United States*. University Press of Colorado, Boulder.

Murphy, K. M., T. M. Potter, J.C. Halfpenny, K. A. Gunther, M. T. Jones, P. A. Lundberg, and N.D. Berg

2006 "Distribution of Canada Lynx in Yellowstone National Park." *Northwest Science 80*: 199–206.

National Elk Refuge, U.S. Forest Service (USFS)

2012 National Elk Refuge website: http://www.fws.gov/nationalelkrefuge/

National Park Service (NPS)

2012 "Yellowstone Employment Opportunities." Also available at http://www.nps.gov/yell/parkmgmt/jobs.htm.

2011a "Night Skies Monitoring Report, Visitor Enjoyment." Also available at http://www.nature.nps.gov/air/lightscapes/visitor.cfm.

2011b "Concessioner Statistics." Data provided to National Park Service from concessioners.

2011c Data for 2010 Fish and Float Visitors by River Segment provided by Dave Rhinehart, Business Resource Analyst, given to Ericka Pilcher, Visitor Use Specialist, for User Capacity workshop held April 12-13, 2011 at Grand Teton National Park.

2006 "Transportation Plan Final Environmental Impact Statement, Grand Teton National Park. Moose, WY." Available on the Internet at http://www.nps.gov/grte/parkmgmt/upload/Entire%20FEIS-comp.pdf>.

2004 "Night Skies Monitoring Report. Yellowstone National Park: Frog Rock." Also available at http://www.nature.nps.gov/air/lightscapes/monitorData/yell/fR20040912.cfm.

2002 "NPS-28: Cultural Resource Management Guideline." Also available at http://www.cr.nps.gov/history/online_books/nps28/28contents.htm.

2000 "Creation of Grand Teton National Park (A Thumbnail History)," accessed January 9, 2012, http://www.nps.gov/grte/planyourvisit/upload/creation.pdf.

1998 "Grand Teton National Park, Wyoming, Water Resources Scoping Report." Prepared by David N. Mott. Technical Report NPS/NRWSR/NRTR-98/154.

1997 "Snake River Management Plan Grand Teton National Park." Also available at http://www.nps.gov/grte/parkmgmt/upload/snakeriverplan.pdf.

n.d. "Archeology of Grand Teton National Park." Prepared by Midwest Archeological Center, accessed January 3, 2012, http://www.nps.gov/grte/planyourvisit/upload/Archeology.pdf.

1995 The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings. Also available at http://www.nps.gov/history/hps/tps/standguide/.

1991 Development Concept Plan for the Teton Corridor Moose to North Jenny Lake. Grand Teton National Park. Also available at http://www.nps.gov/grte/parkmgmt/upload/1991_tetoncorridor_dcp.pdf.

Osman, Zehra, and Joe Regula
2004 "Cultural Landscape Inventory Level I: South Entrance Developed Area Cultural Landscape, Yellowstone National Park." Prepared for the National Park Service.

Park, L.
2012 "Visitor Capacity and Use Monitoring Research at Snake River Headwaters in Grand Teton National Park and John D. Rockefeller, Jr. Memorial Parkway—Final Report." Southern Illinois University Carbondale, Department of Forestry.

Park, L., and E. Tucker
2012 "Interim Data Summary for the River Use Study and Monitoring at Snake River Headwaters in Grand Teton National Park." Interim document submitted by L. Park, October 31, 2011.

Pilcher, E., P. Newman and D. Stack
2006 Grand Teton National Park Soundscape Report.

Reeve, A., F. Lindzey, and S. Buskirk
1986 "Historic and Recent Distribution of the Lynx in Wyoming." Unpublished report. Wyoming Cooperative Fishery and Wildlife Research Unit, Laramie, WY.

Ruediger, B., J. Claar, S. Gniadek, B. Holt, L. Lewis, S. Mighton, B. Naney, G. Patton, T. Rinaldi, J. Trick, A. Vandehey, F. Wahl, N. Warren, D. Wenger, and A. Williamson
2000 "Canada Lynx Conservation Assessment and Strategy." USDA Forest Service, USDI USFWS, USDI BLM, and USDI NPS. Forest Service Publ. #R1-00-53. Missoula, Montana. http://www.fs.fed.us/r1/clearwater/terra_org/wildlife_07/t_e/canada_lynx/conservation_assessment_strategy%20.pdf

RRC Associates
2005 "Jackson Hole Airport Surveys, 2004/2005 Winter and Summer Surveys." Boulder, CO: Prepared for Jackson Hole AIR, Jackson Hole Airport Board, and Jackson Hole Chamber of Commerce.

Sanders, Paul H., Dale L. Wedel, and Pam Holtman
2003 "Bar BC Dude Ranch Mechanical Fuels Treatment Project." Prepared for National Park Service, Grand Teton National Park.

Sherer, P. M., FASLA
2006 "The Benefits of Parks: Why America Needs More Parks and Open Space". The Trust for Public Land.

Smaldone, Dave
2001 "A Study of Grand Teton National Park Visitors Summer & Fall 2000: Characteristics, Critical Issues, and Special Places. Final report submitted to the National Park Service and Grand Teton National Park." Contribution Number 946 of the Idaho Forest, Wildlife and Range Experiment Station, College of Natural Resources, University of Idaho, Moscow, ID.

Squires, J. R. and T. Laurion
2000 "Lynx Home Range and Movements in Montana and Wyoming: Preliminary Results." In: Ruggiero, L. F. et al. eds. *The Ecology and Conservation of Lynx in the United States*. University Press of Colorado, Boulder.

Squires, J. R. and R. Oakleaf
2005 "Movements of a Male Canada Lynx Crossing the Greater Yellowstone Area, Including Highways." *Northwest Science* 79:196-201.

Town of Jackson Planning and Building Department / Teton County Planning and Development Department (Jackson/Teton County)
2012 "Comprehensive Plan: Ecosystem Stewardship/Growth Management/Quality of Life." http://www.jacksontetonplan.com/plan/approved-plan/.

Tuler, S., and D. Golding
2002 "A Comprehensive Study of Visitor Safety in the National Park System: Final Report." Prepared by The George Perkins March Institute for the National Park Service. Also available at http://www.nature.nps.gov/socialscience/docs/Safety_Report.pdf.

U.S. Census Bureau
2011 Unites States Census Bureau website, http://www.census.gov.

2010 State & County QuickFacts: Jackson(town), WY. http://quickfacts.census.gov/qfd/states/56/5640120.html

U.S. Department of the Interior (USDI)
2007 "Adaptive Management: the U.S. Department of the Interior Technical Guide." USDI Adaptive Management Working Group, Washington, D.C. Available online at http://www.doi.gov/initiatives/AdaptiveManagement/TechGuide.pdf.

1982 "Interagency Guidelines on Wild and Scenic Rivers." Washington, D.C.

U.S. Fish and Wildlife Service (USFWS)
2012 "Species Reports." Environmental Conservation Online System, accessed October 18, 2011, http://ecos.fws.gov/tess_public/pub/stateListingAndOccurrenceIndividual.jsp?state=WY&s8fid=112761032792&s8fid=112762573902.

University of Idaho
2008 "Grand Teton National Park Visitor Study." Park Studies Unit, Visitor Services Project. Report 206.

Vaske, J. J., and M. P. Donnelly
2002 "Generalizing the Encounter—Norm—Crowding Relationship." *Leisure Sciences*, 24(3–4), 255–269.

Watson, A. E., M.J. Niccolucci and D. R. Williams
1994 "The Nature of Conflict between Hikers and Recreational Stock Users in the John Muir Wilderness." Journal of Leisure Research, 26(4), 372–385.

Whittaker, D., B. Shelby, B. Manning, D. Cole, and G. Haas
2011 "Capacity Reconsidered: Finding Consensus and Clarifying Differences." *Journal of Park and Recreation Administration*, 29(1), 1–20.

Wyoming Community Development Authority
2012 "Teton County: 2010 Census Data," http://www.wyomingcda.com/files/TetonDec11.pdf.

Wyoming Department of Environmental Quality (WYDEQ)
2012 "Wyoming Surface Water Quality Standards: Implementation Policies for Antidegradation, Mixing Zones, Turbidity, and Use Attainability Analysis," accessed March 9, 2012, http://deq.state.wy.us/wqd/watershed/surfacestandards/index.asp.

Wyoming Game and Fish Department (WGFD)
2012 "Sage-Grouse Core Management Areas Version 3", accessed August 21, 2012, http://wgfd.wyo.gov/web2011/Departments/Wildlife/pdfs/SG_COREAREASV3_CONNECTIVITY0000657.pdf

2005 "A Comprehensive Wildlife Conservation Strategy for Wyoming." Cheyenne, WY.

PREPARERS

PLANNING TEAM MEMBERS

Grand Teton National Park

Jennifer Carpenter, former Park Planner

Sue Consolo-Murphy, Chief of Science and Resource Management

Carol Cunningham, Technical Writer/Editor

Sarah Dewey, Wildlife Biologist

Chris Finlay, Facility Manager

Rick Guerrieri, Buffalo Fork Subdistrict Supervisory Park Ranger

Patrick Hattaway, North District Ranger

Andrew Langford, Assistant South District Naturalist

Katherine Longfield, Cultural Resource Specialist

Case Martin, Park Ranger

Kelly McCloskey, Ecologist

Kathy Mellander, GIS Specialist

Daniel Noon, Lead Planner

Sue O'Ney, former Resource Biologist/Hydrologist

Gary Pollock, Management Assistant

Dave Rhinehart, Business Resources Analyst

Mary Gibson Scott, Park Superintendent

Giovanni Tabacchi, Buffalo Fork District River Ranger

Margaret Wilson, Park Planner

Yellowstone National Park

Dan Mahony, Hydrologist/Fisheries Biologist

Linda Mazzu, Environmental Specialist

Sue Mills, Environmental Protection Specialist

Dan Reinhart, Resource Management Operations Manager

Matt Vandzura, Subdistrict Ranger

U.S. Fish and Wildlife Service, National Elk Refuge

Marty Meyer, Refuge Officer

Wyoming Game and Fish Department

Rob Gipson, Regional Fisheries Supervisor

Tracy Stephens, Fisheries Biologist

Intermountain Region

Michelle D'Arcy, Landscape Architect/Planner

Gary Weiner, Intermountain Region Wild and Scenic River Coordinator, RTCA

U.S. Forest Service, Bridger-Teton National Forest

Nancy Arkin, Recreation Program Manager

Pam Bode, Resources Staff Officer

David Cernicek, River Manager (Jackson and Buffalo Ranger Districts)

Dale Deiter, District Ranger (Jackson Ranger District)

Brian Goldberg, Geographic Information Specialist

Kerry Murphy, Wildlife Biologist (Jackson and Buffalo Ranger Districts)

Michael Schrotz, Planning Staff Officer

Ronna Simon, Forest Hydrologist

Sid Smith, Recreation Staff (Greys River Ranger District)

Jan Spencer, Wild and Scenic River Specialist (TEAMS)

Cindy Stein, Acting Recreation Staff Officer, CRMP Interim Team Leader

Sidney Woods, Natural Resource Planner

Denver Service Center

Tracy Atkins, Community Planner

Jim Bacon, Park Planner

Nell Blodgett, Geographic Information Specialist Program Lead

Chris Church, Project Manager

Carrie Miller, Cultural Resource Specialist

Christina Miller, Natural Resource Specialist/Planner

Ericka Pilcher, Visitor Use Planner

Kate Randall, Landscape Architect/Planner

B. Derrick Taff, Outdoor Recreation Planner STEP

Don Wojcik, Natural Resource Specialist

PREPARERS

Tracy Atkins, Community Planner, NPS Denver Service Center, M.S. Community and Regional Planning, M.S. Construction Engineering, B.S. Architectural Engineering, 24 years of experience, 4 years with the National Park Service.

Jim Bacon, Planner, Yosemite National Park and NPS Denver Service Center, M.S. Natural Resource Planning, 13 years of experience, 7 years with the National Park Service.

Chris Church, Project Manager, NPS Denver Service Center, B.S. Wildlife and Fisheries Science, 16 years of experience, 5 years with the National Park Service.

Nell Conti, GIS Program Lead, NPS Denver Service Center, B.A. Geography-Anthropology, M.S. GIS Science, 10 years of experience, 8 years with the National Park Service.

Carrie Miller, Cultural Resource Specialist, NPS Denver Service Center; M.Arh., Architectural History, B.S. Human Ecology, 10 years of experience, 2 years with the National Park Service.

Christina Miller, Natural Resource Specialist/Planner, NPS Denver Service Center, M.A.S. Environmental Policy and Management for Natural Resource Management, B.S. Biology, B.A. Geography, 5 years of experience, 9 years with the National Park Service.

Ericka Pilcher, Visitor Use Planner, NPS Denver Service Center, M.S. Parks and Protected Areas Management, B.S. Conservation Biology, 7 years of experience, 7 years with the National Park Service.

Kate Randall, Landscape Architect/Planner, NPS Denver Service Center, M.L.A. Landscape Architecture, B.A. Environmental Studies and International Studies, 12 years of experience, 5 years with the National Park Service.

B. Derrick Taff, Outdoor Recreation Planner STEP, NPS Denver Service Center, Ph.D. Human Dimensions of Natural Resources, 11 years of experience, 4 years with the National Park Service.

Don Wojcik, Natural Resource Specialist, NPS Denver Service Center, M.S. Environmental Policy & Natural Resource Management, B.S. Civil & Environmental Engineering, 17 years of experience, 3 years with the National Park Service.

CONSULTANTS

Kerri Cahill, Community Planner, NPS Denver Service Center

Bill Hansen, Hydrologist, Wild and Scenic River Program Co-Lead, NPS Water Resources Division

Joan Harn, River/Hydro Lead, WSR Co-Lead, NPS Washington Office

Cassie Thomas, Program Analyst, NPS Park Planning & Special Studies Division

Dave Vana-Miller, Water Resource Planning Program Lead, NPS Water Resources Division

CONTRIBUTORS

Benjamin Brehmer, Landscape Architect/Planner SCEP, NPS Denver Service Center

Sarah Conlin, Natural Resource Specialist SCEP, NPS Denver Service Center

Nancy Doucette, Visitor Use Management Specialist SCEP, NPS Denver Service Center

PUBLICATIONS SERVICES

Jim Corbett, Publications Supervisor, NPS Denver Service Center, 27 years of experience, 7 years with the National Park Service.

Ángel López, Visual Information Specialist, NPS Denver Service Center, 6 years of experience, 1 year with the National Park Service.

Wanda Gray Lafferty, Editor, NPS Denver Service Center, 35 years of experience, 12 years editing NPS documents, 2 years with the National Park Service.

Melissa Vagi, Editor, NPS Denver Service Center, 5 years of experience, 9 months with the National Park Service.

As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural and cultural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to assure that their development is in the best interests of all. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under United States (U.S.) administration.

NPS 127/109955 May 2013

Snake River Headwaters

National Park Service | U.S. Fish & Wildlife Service
U.S. Department of the Interior