

**A Biological Assessment of Impacts to
Terrestrial and Non-Anadromous Aquatic
Threatened, Endangered and Candidate Species from
the Trail and Backcountry Management Plan
in Redwood National and State Parks (RNSP)**

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I. INTRODUCTION

The purpose of this biological assessment (BA) is to determine whether the Redwood National and State Parks (RNSP) Trail and Backcountry Management Plan proposed actions may affect terrestrial or non-anadromous aquatic threatened, endangered or candidate species and/or their critical habitats. This biological assessment is prepared in accordance with legal requirements set forth under section 7 of the Endangered Species Act (19 U.S.C. 1536 (c), 50 CFR 402), and meets the criteria for formal consultation with the United States Fish and Wildlife Service (USFWS). The term of this assessment is for ten years or through 2016.

II. CONSULTATION TO DATE

Redwood National and State Parks receive lists from the Arcata Fish and Wildlife Service Office identifying the endangered, threatened, and candidate species that may be present or may be affected by park activities. The most recent list is dated 14 August 2006, (Ref. Doc. No. 979335052-85120). This list includes 24 species currently listed as threatened or endangered and four species listed as candidates in Humboldt and Del Norte Counties:

Endangered

Western Lily (*Lilium occidentale*)
Beach Layia (*Layia carnosa*)
Tidewater Goby (*Eucyclobius newberryi*)
Leatherback Turtle (*Dermochelys coriacea*)
California Brown Pelican (*Pelecanus occidentalis californicus*)
Short-tailed Albatross (*Phoebastria albatrus*)
Sperm Whale (*Physeter macrocephalus*)
Blue Whale (*Balaenoptera musculus*)
Humpback Whale (*Megaptera novaengliae*)
Fin Whale (*Balaenoptera physalius*)
Sei Whale (*Balaenoptera borealis*)

Threatened

Oregon Silverspot Butterfly (*Speyeria zerene hippolyta*)
California Coastal Chinook Salmon (*Oncorhynchus tshawytscha*)
Northern California Steelhead (*Oncorhynchus mykiss*)
Southern Oregon/ Northern California Coasts Coho Salmon (*Oncorhynchus kisutch*)
Green Turtle (*Chelonia mydas*)
Olive Ridley Sea Turtle (*Lepidochelys olivacea*)
Loggerhead Turtle (*Caretta caretta*)
Northern Spotted Owl (*Strix occidentalis caurina*)
Bald Eagle (*Haliaeetus leucocephalus*)
Marbled Murrelet (*Brachyramphus marmoratus*)
Western Snowy Plover (*Charadrius alexandrinus nivosus*)
Steller Sea Lion (*Eumetopias jubatus*)

Candidate

Pacific Fisher (*Martes pennanti pacifica*)

Mardon Skipper (*Polites mardon*)

Western Yellow-Billed Cuckoo (*Coccyzus americanus*)

Xantus Murrelet (*Synthliboramphus hypleucus*)

Critical habitat has been designated for eight species on the list. Critical habitat for coho salmon and marbled murrelet occurs within RNSP. Marbled murrelet critical habitat occurs in two units; unit CA-02-a includes Jedediah Smith Redwoods and Del Norte Coast Redwoods State Parks and unit CA-02-b includes Prairie Creek Redwoods State Park. Critical habitat for the marbled murrelet does not occur on federal parklands. Critical habitats for the tidewater goby, leatherback turtle, northern spotted owl, western snowy plover, and Steller sea lion have not been designated within RNSP.

Anadromous Fish Species

Effects from proposed projects to California coastal chinook salmon, southern Oregon/northern California coho salmon and their critical habitat, and northern California steelhead trout have been assessed through a separate consultation with NOAA Fisheries and will not be mentioned further in this document.

Previous Pertinent Consultations

Consultation on the maintenance of existing trails, campgrounds and associated facilities has been completed with the US Fish and Wildlife Service (USFWS). A Letter of Concurrence and a Biological Opinion were issued on 24 June 1998 (USFWS reference number 1-14-98-24). The regulatory coverage resulting from the annual maintenance consultation will terminate in 2007. A full description of the types of maintenance occurring at trails, campgrounds and associated facilities in RNSP and the effects on federally listed threatened and endangered terrestrial and non-anadromous aquatic species are described in those documents. Descriptions and discussions of the maintenance of proposed trails, campgrounds and associated facilities to be developed under this plan and the description of potential effects to listed species in this assessment will tier in part to this previous consultation. A new maintenance consultation will be completed before the expiration date in 2007 to extend the regulatory coverage beyond the consultation coverage of the Trail and Backcountry Management Plan.

Consultation regarding the development of trails in RNSP was described in a Biological Assessment for the construction of the Skunk Cabbage Memorial Groves Trail. A Biological Opinion was issued on 27 August 1998 (USFWS reference number 1-14-98-145) and regulatory coverage will terminate in August 2008. Either a new consultation will be completed before the expiration date in order to extend the regulatory coverage beyond the consultation coverage of the Trail and Backcountry Management Plan or an addendum to this consultation will be sought.

The Freshwater Spit Development Concept Plan was recently addressed in another Biological Assessment. A Letter of Concurrence was issued on 14 January 2003 (USFWS reference number 1-14-2003-1442). Trail "O", mentioned in the Trail and Backcountry Management Plan, was assessed under this previous consultation as well as visitor use of the Freshwater Spit in order to better consider the effects of all actions associated with the Freshwater Spit Development Concept Plan.

An upper portion of the Little Bald Hills Trail will be rerouted as part of the Port Orford Cedar Management Plan and was described in the 30 June 2004 biological assessment. A Letter of Concurrence was received on 20 July 2004 (USFWS reference number 1-14-04-2134) and regulatory coverage will expire in December 2009. All applicable conservation measures and recommendations have been incorporated into this assessment.

Vehicle access of RNSP beaches was described in a Biological Assessment in 2002. A Letter of Concurrence was issued on 21 May 2002 (USFWS reference number 1-14-01-953). This consultation covered the use of commercial fishermen vehicle permits and parks law enforcement and RNSP administrative vehicles on RNSP beaches. The consultation is currently being reinitiated due to the discovery of nesting western snowy plovers on RNSP beaches in 2004 and 2005. All effects from the use of vehicles, including law enforcement patrols and administrative vehicle use, will be assessed under the reinitiated consultation. The effects of vehicles will not be assessed but the effects of persons (visitors and staff) using the beaches on foot or horseback will be under the Trail and Backcountry Management Plan consultation.

Current Consultation

On 19 September 2002, a preliminary draft of the Trail and Backcountry Management Plan proposed action was sent to the USFWS Arcata office. A meeting at the USFWS office in Arcata was held on 24 September 2002 and was attended by Robin Hamlin and Lynn Roberts of the USFWS and Howard Sakai, Keith Bensen, Kristin Schmidt and Greg Holm of RNSP. Potential impacts were discussed with most discussion revolving around impacts to marbled murrelets from increases in predation from corvids due to increased human presence in suitable habitat. All agreed to an additional need for more background information regarding corvid ecology in the presence of human developments. A second meeting was held at the USFWS office in Arcata on 28 October 2002. Meeting attendees included Robin Hamlin and Lynn Roberts for USFWS and Howard Sakai, Keith Bensen and Kristin Schmidt of RNSP and on a telephone conference call, Dr. John Marzluff of the University of Washington. Discussions primarily concentrated on corvid ecology and the potential distances that corvid predation rates could be expected to increase in suitable marbled murrelet nesting habitat from visitor use of developments such as trails and campgrounds.

In March of 2003 a draft version of the Trail and Backcountry Management Plan Environmental Assessment was sent to the USFWS. On 8 April 2003 Keith Bensen and Howard Sakai met with Robin Hamlin and David Solis of the USFWS at the Arcata USFWS office. Discussions during this meeting were primarily about the draft environmental assessment and information needs necessary for consultation. On 30 May 2003 a memorandum was received from the USFWS (file number 1-14-2003-1517) with written comments on the March 2003 version of the Draft Environmental Assessment on the Trail and Backcountry Management Plan. During this time, however, a significantly different proposed action alternative had been developed by RNSP and so only some of the comments contained within the memorandum were still germane. On 3 June 2003 Robin Hamlin met with Keith Bensen at the South Operations Center at RNSP to discuss the new proposed action and assessment of impacts. Both agreed that the new alternative significantly reduced impacts to marbled murrelets, however, negative impacts were still expected to occur. Robin and Keith also went out to the proposed West Ridge Road watershed restoration/road to trail conversion project area to look at the removal of suitable spotted owl habitat. Robin outlined the information needs necessary for consultation on this portion of the proposed action. Detailed notes for all these meetings are filed with the Fish and Wildlife Branch, South Operation Center - RNSP, Orick, California. Comments were received from the

USFWS on an initial draft Trail and Backcountry Management Biological Assessment on 2 October 2003.

Telephone discussions took place between Lynn Roberts and David Solis (USFWS) and Kristin Schmidt (RNSP) between 13 – 15 January 2004 concerning the influence of barred owls (*Strix varia*) on spotted owls. In addition, western snowy plovers successfully bred on a RNSP beach for the first time during the summer of 2004 and mardon skippers were found within the boundaries of RNSP. Also, the Pacific fisher, which is widely distributed throughout RNSP, was made a candidate for Federal listing on 8 April 2004. These changes have been incorporated into both the Status and Distribution section of this assessment as well as all of the impacts analyses. Please see the 2004 addendum to the Status and Distribution section of Sakai (2003) for updated accounts on these three new listed species.

A review by the USFWS of a draft version of this Biological Assessment was received on 2 February 2005. A telephone discussion took place on 4 April 2005 between Keith Bensen, Robin Hamlin, Kristin Schmidt and Greg Holm (RNSP) concerning additional information needs in order to properly assess potential impacts to western snowy plovers. A final version of the Biological Assessment was sent to USFWS on 21 April 2005. Subsequently, additional information was presented to RNSP by the USFWS concerning the conservation status of the marbled murrelet in meetings and telephone conversations over the next few months. In mid October, 2005, RNSP requested the USFWS to delay the consultation while changes to the proposed action were considered that would further decrease negative impacts to marbled murrelets. Ideas for management changes were created and subsequent meetings were held from February to May 2006 with subject experts from the California Department of Fish and Game, the USFWS and Humboldt State University, as well as others from throughout the region, in order to properly design a science based adaptive management approach to further decrease impacts to murrelets. A draft version of the changed proposed action incorporating the adaptive management practices was sent to the USFWS for review on 2 May 2006. Comments on those changes were received by RNSP on 11 August 2006 and were subsequently incorporated into the revised final version of this Biological Assessment.

III. CURRENT MANAGEMENT DIRECTION

RNSP are located in Humboldt and Del Norte Counties in northwestern California and encompass 105,516 acres of land. Numerous federal and state laws, regulations, and policies guide management.

The National Park Service (NPS) Organic Act of 1916 states that national parks will be managed “to conserve the scenery and the natural and historic objects, and the wildlife therein, and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations.”

Management of Redwood National Park is guided by the 1968 enabling legislation (PL 90-545) in which Congress established the Park to preserve significant examples of primeval coast redwood forest, and the streams and seashores with which they are associated, for purposes of public inspiration, enjoyment, and scientific study. The 1978 park expansion legislation (PL 95-250) added lands to create a more meaningful park for the use and enjoyment of the visitors, and directed the NPS to implement a watershed rehabilitation program to reduce erosion caused

primarily by roads built in association with timber harvest. Title 36, *Code of Federal Regulations*, Parts 1 through 7 gives the park Superintendent discretionary authority regarding designations, closures, permits, and miscellaneous restrictions. These items are described in a compendium that provides direction for a wide variety of public activities that may occur within the national park.

The *California Public Resources Code* (sec. 5019.53 et seq.) prescribes general management policies for the state parks that include preservation of “outstanding natural, scenic, and cultural values, indigenous aquatic and terrestrial fauna and flora, and the most significant example of such ecological regions of California as the...coastal strip...redwoods...foothills and low coastal mountains...”. Additionally, the California Park and Recreation Commission established declarations of purpose for each of the three state parks (Jedediah Smith Redwoods, Del Norte Coast Redwoods, and Prairie Creek Redwoods State Parks) that direct that scenic, historic, and scientific values within the parks are to be preserved.

The *General Management Plan/General Plan and Environmental Impact Statement/Report for Redwood National and State Parks* (USDI and CDPR 2000) provides comprehensive guidance for managing the national and state parks as one complex with similar resources. The General Management Plan/ General Plan (GMP) provides overall vision and direction for the parks and identifies future planning needs. Under the GMP, the agencies will emphasize the protection of resources and will also provide a variety of opportunities for visitors to enjoy the parks. New visitor services and facilities will be provided to enhance the visitor experience if these services and facilities do not impact sensitive resources. The park agencies will cooperate with adjacent communities and landowners, local American Indian tribes, and other government agencies to accomplish long-range resource management planning to reduce threats to park resources. Hiking, mountain biking, and camping are currently important components of the activities available to people that visit RNSP. No areas within RNSP are closed to visitor use but many areas are managed to exclude public use of motor vehicles and bicycles.

The GMP identifies individual action plans needed to address specific park actions such as estuary, second growth, trail, fire and fuels, vegetation, back-country visitor use, and transportation management. Relative to management of listed threatened and endangered species the GMP directs park staff to “...avoid, minimize, rectify, reduce, compensate, or otherwise mitigate any potential adverse impacts on state or federally listed or proposed or candidate threatened or endangered species...” in association with construction, visitor use, or restoration activities (GMP p. 37). These actions will be achieved primarily by restricting work temporally and spatially so as not to disturb T&E species and by designating almost one-third of the parks as “primitive” zones where disturbance to all species from human activities would be limited to those “...necessary to restore and maintain ecosystem function” (GMP p. 38).

The National Park Service signed the Interagency Memorandum of Understanding implementing the *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* (USDA and USDI 1994; Northwest Forest Plan ROD). National Park lands within the range of the northern spotted owl are designated as congressionally reserved. Redwood National and State Parks are managed using an ecosystem management strategy, similar to the strategy presented in the Northwest Forest Plan ROD. Implementation of RNSP operations consistent with federal and state enabling legislation (i.e., to preserve, and restore where needed, the old-growth forest ecosystem) will augment the lands designated as Riparian and Late Successional Reserves on other nearby federal lands. Redwood National and State Parks policies and guidelines relative to watershed

restoration are similar to those outlined by the Aquatic Conservation Strategy in the Northwest Forest Plan ROD.

Section 7(a)1 of the Endangered Species Act (ESA) of 1973, as amended, requires that federal agencies utilize their authorities in furtherance of the purposes of the ESA by carrying out programs for the conservation of endangered and threatened species. Section 7(a)2 of the ESA requires that a federal agency, in consultation with and with the assistance of the Secretary of the Interior, ensures that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any listed species or results in the destruction or adverse modification of critical habitat. Specific management direction for each of the listed threatened, endangered, or proposed species considered in this document is reviewed in Section V, “Status and Distribution of Listed Species”.

Specific Legislation and Previous Plans for Trails and Associated Developments

The 1978 federal park expansion legislation (PL 95-250) also called for the development of foot trail access to the Tall Trees Grove on the east side of Redwood Creek. The legislation specified that “one route shall, unless shown by the Secretary [of the Interior] to be inadvisable, principally traverse the east side of Redwood Creek through the essentially virgin forest, connecting with the roadhead on the west side of the park east of Orick.”

Past planning documents have addressed trail development within RNSP; some actions having been taken and some not. The GMP (2000) specifically states that a new trail plan be developed but did not specify where developments should be placed (p. 57). Some of the trails, campgrounds and related developments described in this document have been discussed previously in one, some, or all of the following plans: General Management Plan for Redwood National Park (1980), Backcountry Trail Plan for Redwood and Skunk Cabbage Creeks (1984), General Plan for the Redwood State Parks (1985) and the Davison Ranch Development Concept Plan (1996).

IV. DESCRIPTION OF THE PROPOSED ACTION

A. Existing Conditions

1. Existing Developments –

a. Existing Trails and Trailheads –

The current RNSP trail system includes about 135 miles of hiking trails, 47 miles of equestrian trails, and more than 31 miles of bicycle trails (Table 1) (Appendix 1 – Map 1). Some of the trail miles are counted more than once because equestrian and bike trails are also open to hiking, and the Little Bald Hills trail is open to both horses and bikes. The Orick and Mill Creek horse trails are counted only under equestrian trails, and the Lost Man Creek bike trail is counted only under bike trails. Hiking only trails consist of a three foot wide foot tread, up to eight foot wide area cleared of understory vegetation, footbridges, puncheons (short, un-hand railed boardwalks), and raised “causeways.” Bicycle trails are placed on old abandoned roadbeds with bridges and culverts. Horse trails can either be on abandoned roadbeds or be similar to hiking trails except

with a four foot wide tread.

Trails have developed trail heads (Appendix 1 – Maps 4-8) (Appendix 2) unless they are connecting one trail to another. The size of trailheads varies from hard surfaced parking lots with multiple slots, toilets, interpretive signs, picnic facilities and trash cans to only simple gravel surfaced pullouts.

Table 1. Miles of trails and number of backcountry camps in RNSP.

Park Unit	Trail Type (in miles)			Backcountry Camps (# of campsites)
	Hiking Trails	Equestrian Trails	Bicycle Trails	
Jed Smith Redwoods State Park	18.5 ¹	2.0 ¹	1.5 ¹	0
Del Norte Coast Redwoods State Park	17.5	2.3	4	0
Prairie Creek Redwoods State Park	55.4	0	4.5 ²	3 (10)
Redwood National Park	43.8 ¹	42.8 ¹	21.5 ¹	6 (36) ³
Total	135.2	47.1	31.5	9 (45)

¹ Includes Little Bald Hills multi-use trail.

² Excludes Gold Bluffs Beach and Davison Roads.

³ Excludes dispersed camping along Redwood Creek gravel bars.

Approximately 68 designated trails or trail networks of various lengths currently exist within RNSP. Some trails or portions of trails are in or within a quarter mile of suitable marbled murrelet, bald eagle, spotted owl, Pacific fisher and/or mardon skipper habitat (Appendix 1, Maps 2-3 and Table 1 within Appendix 2). Approximately 18 associated developed trailheads are also scattered throughout RNSP, some of which are in or within a quarter mile of suitable marbled murrelet, bald eagle, spotted owl, Pacific fisher and/or mardon skipper habitat (Appendix 1, Maps 2-3 and Table 2 within Appendix 2). For more detailed habitat proximity analyses see Wallen and Childers (1997).

b. Existing Backcountry Camps and Dispersed Camping –

Nine backcountry camps exist within RNSP (Table 1) (Appendix 1, Maps 2-3). Camps are located along the Coastal Trail at Nickel Creek (five sites), DeMartin Prairie (ten sites), Flint Ridge (nine sites), Miner's Ridge (three sites), Ossagon (three sites), Gold Bluffs Beach environmental camp (four sites), Little Bald Hills (four sites), Elam Creek (three sites) and Forty-four Creek (four sites). No more than two tents are allowed per site. Some backcountry camps are within a quarter mile of suitable marbled murrelet, bald eagle, spotted owl, Pacific fisher and/or mardon skipper habitat (Appendix 1, Maps 2-3 and Table 3 within Appendix 2). For more detailed habitat proximity analyses see Wallen and Childers (1997).

Dispersed camping is currently allowed all along the Redwood Creek gravel bars upstream of McArthur Creek except within a quarter mile of the Tall Trees Grove. Camper use along Redwood Creek extends from the mouth of McArthur Creek upstream to approximately one mile upstream of the mouth of Bridge Creek; upstream of this area the creek channel becomes a steep, rocky gorge with little to no flat area suitable for camping. The gravel bars, and thus areas where dispersed camping is possible, end at a location on Redwood Creek called “Rocky Gap.” The stream distance from McArthur Creek to “Rocky Gap” is approximately 9.25 miles. No camping is allowed within 50 feet of a water source or on a trail, trailhead, or road nor is camping allowed within one quarter mile of the Tall Trees Grove. Some areas of “concentrated” dispersed camping exist in select areas along Redwood Creek where visitors regularly camp due to extensive sandy areas (Appendix 1, Maps 2-3).

Park regulations require all campers to store food and other scented materials in bear proof containers or by hanging food away from campsites, to maintain a clean camp to avoid attracting bears and other wildlife, and to pack out all trash. Campfires are permitted in designated backcountry camps only in park provided grills and fire rings. No ground fires are allowed outside of park provided grills or fire rings except by permit on the Redwood Creek gravel bars.

c. Existing Front Country Campgrounds and Associated Facilities -

Four large front country “drive-in” campgrounds exist within RNSP, most of which have associated facilities located within their boundaries (Appendix 1, Maps 2-3). Some large campgrounds are located near some listed species’ suitable habitat and some are not (Table 4 within Appendix 2). These developments receive some of the highest continual concentrated visitor and staff use compared to all other areas within the parks. Jed Smith Campground contains 106 campsites, a day use picnic area, a “campfire” education amphitheater, visitor center and maintenance yard. Mill Creek Campground contains 145 campsites, a “campfire” education amphitheater, and a picnic area. Mill Creek Campground is seasonally closed to the public between October and May. Elk Prairie Campground contains 75 sites while Gold Bluffs Beach Campground contains 26 campsites. Both of these campgrounds also contain a “campfire” education amphitheater. All four campgrounds are fully equipped with bear proof (and thus corvid proof) trashcans and food lockers except for Mill Creek Campground which does not have a complete compliment of bear proof food lockers and trashcans. Extensive signage and interpretive programs within each facility warn visitors to manage food and trash properly and not to feed wildlife as part of the RNSP bear management program.

d. Existing Picnic and Day Use Areas Not Associated With Front Country Campgrounds-

Six designated picnic and day use areas are found within RNSP (Appendix 1, Maps 4-8) of which some are located near suitable listed species habitat (Table 5 within Appendix 2). All of these areas contain parking lots, picnic tables, fire pits, toilets, and bear proof (and thus corvid proof) trashcans.

e. Existing Visitor and Outdoor Education Centers Not Associated With Front Country Campgrounds -

Two outdoor education centers, Howland Hill and Wolf Creek, are located within RNSP (Appendix 1, Maps 4 and 6) and are near some listed species’ suitable habitat (Table 6 within Appendix 2). These residential education centers provide environmental education sessions *in*

situ to regional school age children as well as general meeting facilities. Both centers have small cabins, toilets, meeting/mess halls, picnic tables, “campfire” education amphitheaters, parking lots and bear proof (and thus corvid proof) trashcans. Use is variable throughout the year depending on demand. The Hiouchi, Prairie Creek and Kuchel visitor centers are located outside of front country campgrounds. Each visitor center provides orientation materials to parks visitors inside central buildings (Appendix 1, Map). Each visitor center has a parking lot, outside bear proof trashcans and a limited number of picnic tables. The Hiouchi and Prairie Creek visitor centers are near spotted owl, marbled murrelet and Pacific fisher habitat (Table 6 within Appendix 2) while the Kuchel visitor center is located immediately adjacent to suitable snowy plover and California brown pelican habitat.

f. Existing Dispersed Use Along the Smith River –

The Smith River attracts a large number of bank side and drift boat fishermen due to its large runs of chinook salmon and steelhead trout as well as non motorized recreational boaters. Use of the river runs the length of its passage through RNSP throughout most of the year with greater numbers of visitors in the summer months and recreational fishermen in the fall and winter coinciding with salmon runs. There are also three areas which receive concentrated use where drift boaters pull out their boats and swimmers and picnicking visitors use swimming holes and sandy river bars (Appendix 1, Maps 9-13), some of which are near suitable listed and candidate species habitat (Table 7 within Appendix 2).

g. Existing Visitor Accessible RNSP Roads –

RNSP contains 12 roads (non county, state or federal highway roads and highways) which the parks maintain and provide as access for visitors (Appendix 1, Maps 2-3), some of which are within/near some listed species’ suitable habitat (Table 8 within Appendix 2). All of these roads are considered “high use” which has been previously defined as more than five vehicles per day (Wallen and Childers 1997). Lengths vary from approximately 10 miles long to less than a mile long. Some roads are paved and some are not but all are accessible to all passenger vehicles except for the Tall Trees Access, Howland Hill, Davison, Cal Barrel Roads and Coastal Drive which have large recreational vehicle size restrictions. Visitor use consists only of visitors driving to various attractions at posted speeds in street legal vehicles. Off road vehicles are prohibited on all RNSP roads.

h. Existing Miscellaneous Facilities Not Associated With Front Country Campgrounds –

There are 19 miscellaneous facilities located throughout RNSP which provide a wide variety of functions including staff offices, maintenance yards, historic barns, employee housing, fire stations, overlooks, and a youth hostel (Appendix 1, Maps 9-13). Some of these facilities are within/near various listed species suitable habitat (Table 9 within Appendix 2). All of these facilities contain bear proof (and thus corvid proof) trashcans. Most of these facilities’ impacts, if any, are primarily due to maintenance and are described in Wallen and Childers (1997).

i. Existing Allowable and Typical Visitor Use Activities on RNSP Ocean Beaches Requiring No Special Permit –

Visitors to RNSP ocean beaches typically use the beaches for hiking, wildlife watching, photography, kite flying, picnicking, and general outdoor exercise including but not limited to disc throwing, ball catch, kite flying, bicycle riding, sand castle building and sun bathing (on the

rare days that the sun is present). No wildlife or plants can be harmed or collected. Dogs are allowed on RNSP beaches if on a leash. Allowable consumptive activities include drift wood collection and beach rock collection up to what one person can carry in their arms but not in a container. Recreational beach fishing is allowed as long as the visitor has a current valid state fishing license. Horse back riding is allowed on all National Park beaches but is not allowed on State Park beaches. Fireworks are not allowed on RNSP beaches except on Freshwater Spit on 4 July. Bonfires are not allowed on RNSP beaches. No motorized vehicles are allowed on any beaches except by permit. Motorized vehicle use is being assessed under a separate consultation.

2. Current Visitor Use –

Combined national and state park visitation in RNSP in 2002 was approximately 850,000, divided roughly equally between the NPS and CDPR units (RNSP 2003). The NPS maintains visitor use statistics on backcountry camping and some trails and trailheads within the national park – the state parks maintain overall visitor use numbers based on a sampling regime and thus use of individual visitor facilities cannot be isolated. Tables 2 and 3 show numbers of visitors, vehicles or overnight stays recorded between 1998 and 2005 at selected NPS trailheads, four backcountry camps and dispersed camps on the Redwood Creek gravel bars.

Table 2. Visitor use by individual visitors at selected trails within Redwood National Park.

Year	Tall Trees Trailhead	Lady Bird Johnson Trailhead	Redwood Creek Trailhead	Skunk Cabbage Trailhead	Orick Rodeo Ground Horse Trailhead
1998	12,094	80,454	16,975	1,454	285
1999	11,160	53,649	15,779	10,284	217
2000	9,250	71,142	10,480	7,961	401
2001	No data	106,137	13,167	35,487	389
2002	No data	97,036	13,032	4,962	899
2003	No data	70,655	11,903	6,197	653
2004	7,252	65,869	19,183	11,152	3,317
2005	6,393	66,672	21,558	10,888	893

Table 3. Visitor use by individual overnight stays at selected backcountry and dispersed camps within Redwood National Park.

Year	Nickel Creek	Flint Ridge	DeMartin Prairie	Little Bald Hills	Elam and 44 Creeks Horse Camps	Redwood Creek Gravel Bars
1998	981	873	122	76	69	1,919
1999	1,209	1,120	113	142	46	1,548
2000	1,033	1,028	129	103	256	1,148
2001	776	821	66	68	49	1,488
2002	800	812	71	76	63	1,653
2003	818	1,487	75	25	115	980
2004	953	643	86	44	421	971
2005	734	530	275	10	339	692

Dispersed visitor use is not monitored along the Smith River. No estimate can be made for visitor use numbers along the Smith River except to state that use is highly concentrated near the Jedidiah Smith Redwood State Park campground (recreational swimmers and picnickers) and around drift boat take out points where recreational fishermen load their boats onto trailers, as indicated by the pink shaded areas on Map 9 in Appendix 1. Visitor use near the Jedidiah Smith campground is concentrated in the summer months of May through September while drift boat fishing mainly coincides with the fall and winter runs of chinook salmon and steelhead trout, respectively.

RNSP visitor beach use is not systematically monitored in the same manner as campground and trail use. Instead, visitors are counted during monthly or bimonthly western snowy plover/brown pelican surveys and provide an index of visitor use patterns on RNSP beaches (Holm et al. 2004). Visitor use is concentrated near specific access points on Gold Bluffs Beach and along the section of Freshwater Spit adjacent to US Highway 101 and along all of Crescent Beach (Appendix 4). Undoubtedly, visitor use is closely correlated with ease of access or proximity to towns. Beach areas away from these high use areas receive very little visitor use with all observed visitors in concentrations of less than five, and usually only recorded once or twice per survey year (unpub. data). Numbers of visitors at the high use visitor beach areas varies by location and season. Visitation is highest during summer months and lowest during the rainy season (winter and spring). Most visitor use in high use beach areas is in the multiple tens of persons during summer days and only single or no persons at high use beach areas during the rainy season (unpub. data). Dogs are scarce relative to high use beaches in Humboldt county (i.e. Clam Beach county park and Little River State Park) (pers. obs.) but are recorded occasionally during surveys in single occurrences every few surveys (Holm et al. 2004). These data will continue to be collected over the life span of this consultation.

3. *Current Staff Use –*

Staff use, as referred to and analyzed in this assessment, is RNSP staff walking or riding

horseback on designated existing trails, campgrounds, trailheads, designated dispersed camping areas (i.e. Redwood Creek gravel bars) and beaches while proceeding to a work area, leading visitors on an interpretive walk, conducting inventory and monitoring surveys or while on patrol. Staff use also refers to driving government vehicles on public accessible roads (i.e. non administrative only use roads) within RNSP while proceeding to a work area, leading visitors on an interpretive field trip or while on patrol. Staff use does *not* refer to administrative or emergency use of vehicles on RNSP beaches. Effects of that action are being analyzed in a separate consultation.

4. Current Maintenance –

Existing maintenance activities within RNSP were fully described and analyzed in a previous biological assessment (Wallen and Childers 1997). A Letter of Concurrence and a Biological Opinion were issued on 24 June 1998 (USFWS reference number 1-14-98-24). Please refer to these documents for an explanation of all current and ongoing maintenance activities. Threatened and endangered species effects analyses and determinations from the completed consultation have been fully incorporated into the Impacts to Threatened and Endangered Species section of this assessment. The annual maintenance consultation will be reinitiated before its regulatory coverage terminates in 2007 and will cover any maintenance for the life of this (the Trail and Backcountry Management Plan) consultation period.

B. Proposed Action

Summary -

The new trails, new facilities, rules changes, alterations to existing picnic areas, alterations to dispersed camping areas and visitor management changes proposed under this plan include:

1. Approximately 35.3 miles of new hiking trails, 2 miles of rerouted hiking trail, 12.5 miles of new equestrian trails (some of these miles are also open for hiking and also include some sections not entirely within RNSP) and approximately 10 miles of new bike trails.
2. Four new trailheads and the redesign of two existing trailheads.
3. Two new backcountry camps, the retrofit of two existing backcountry camps for increased accessibility and the retrofit and relocation of one backcountry horse camp for increased accessibility.
4. The opening of approximately 6.5 miles of the existing West Side Access (WSA) Road to the public.
5. The cessation of fees charged to visitors using backcountry camps.
6. Continued but modified issuing of backcountry permits to all visitors staying overnight in the backcountry.
7. The seasonal closure of two trail fords across Mill Creek.
8. New beach use rules and seasonal beach closures to minimize impacts to western snowy plovers/law enforcement patrol regularity.
9. New annual maintenance activities as facilities are completed.
10. The abandonment of approximately 3.5 miles of existing trail.
11. The complete removal of approximately five miles of existing trail/road.

12. Design and implementation of a Corvid Management Strategy based on an adaptive management decision system aimed at decreasing corvid predation of marbled murrelets linked to supplemental human food. The strategy will include the following actions:
 - Creation of a RNSP Corvid Management Strategy document.
 - Baseline corvid density and human food availability monitoring for three years at select existing visitor facilities.
 - After three years (end of 2008 or 2009) of baseline corvid monitoring, an intensive corvid management program will begin including removing picnic tables from five existing visitor facilities, disallowing dispersed camping along approximately four linear miles of lower Redwood Creek gravel bars and greatly increasing visitor education programs about the negative impacts of intentional and unintentional feeding of wildlife on marbled murrelets (and western snowy plovers and other birds) while continuing to monitor corvid densities and human food availability.
 - The aim of the corvid management program will be to decrease corvid densities and human food availability at sample monitoring sites by 50% by the end of 2011 or 2012. If the target is met, corvid management will continue as described. If the target is not met, additional corvid management techniques will be implemented in consultation with the USFWS during the following years and monitoring will continue.

Some of the trails will be constructed while some, primarily bike trails and some horse trails, will involve the conversion of an existing road to a designated trail. Thus, not all the trail miles described above will require the construction of new trail treads. Construction of all proposed trails, rerouted trails, trailheads and backcountry camps as well as the rehabilitation of existing trails is expected to be completed within 10 years. Construction will occur as funding becomes available. Maintenance will be initiated once each respective development is constructed or converted and will continue in perpetuity. Detailed descriptions of each development, construction technique, maintenance type and schedule, rules change and the corvid management are described below.

1. New Trails –

Locations for each new trail (Table 4) are shown in Appendix 1, Map 1. Letter designators for each proposed trail used in the Trail Plan are used here, throughout this document, and on maps for consistency.

Table 4. Proposed Trail Names, approximate lengths, type, whether a new construction or road conversion and proximity to threatened, endangered or candidate species habitat.

Trail Letter Designator and Trail Name	Miles	Trail Type	Construction or Road Conversion	Proximity to Listed Species Habitat
A. Hiouchi Flat Trail	1.1	hiking	construction	0.25 mile of marbled murrelet, spotted owl and fisher

B. Aubell-Boy Scout Tree Trail- Hatton Trail Connector ¹	8.0	hiking	construction	Within marbled murrelet, spotted owl and fisher
C. Camp Lincoln-Walker Hole Connector ¹	1.8	hiking	construction	Within marbled murrelet, spotted owl and fisher
D. Loeffler-Ellsworth-Peterson Trail Connector	0.3	hiking	construction	Within marbled murrelet, spotted owl and fisher
E. Mill Creek Horse Trail-Little Bald Hills Trail Connector ²	10.8	hiking/ equestrian	9.5 mile conversion/ 1.25 mile construction (almost entirely on adjoining non RNSP CDPR lands and USFS lands)	0.25 mile of marbled murrelet, spotted owl, fisher and mardon skipper
G. Rellim Ridge-Coastal Trail Connector	1.7	hiking	construction	0.25 mile of spotted owl and fisher
H. Crescent Beach Loop	0.7	hiking	construction	Within Oregon silverspot
L. B-Line Bike Trail	4.5	bicycle	conversion	0.25 mile of spotted owl and fisher
M. Q. East Side Trail (two segments) ¹	7.1	hiking	construction	Within marbled murrelet, spotted owl and fisher
N. Stone Lagoon Horse Trail ²	3.0	equestrian	construction (primarily on adjoining private lands)	None
R. Gyon Bluff segment of California Coastal Trail	0.5	hiking	construction	None
U. Coyote Creek Bike Loop	5.8	bicycle	conversion	0.25 mile of spotted owl and fisher
W. Elk Meadow-Lady Bird Johnson Trail Connector ¹	2.1	hiking	construction	Within marbled murrelet, spotted owl and fisher

X. Skunk Cabbage North Trail ¹	1.2	hiking	construction	Within marbled murrelet, spotted owl and fisher
Total	48.6			

¹Trail route will require spotted owl surveys to ensure that route does not pass by an occupied nest tree or grove.

²Trail E and N will be “tracked” separately throughout this document because they are connected actions within the federal “nexus” but will be taking place almost entirely outside of RNSP’s boundaries. Any section of this assessment which mentions trails E or N will be designated by the following lead sentence, “PLEASE NOTE – ACTIONS PARTIALLY OR WHOLLY OCCURRING OUTSIDE OF RNSP.” The assessment of impacts caused by these two trails involves lands outside of RNSP but have been included in the assessment because they are connected actions.

Lengths of trail segments, acres of potential impact and number of stream crossings were estimated using GIS analyses via planning corridors. All final trail alignments will be designed for site specific conditions when the trails are laid out. The final alignment will be determined in the field to account for steepness and grade, drainage patterns, soil type, ground stability, avoidance of sensitive resources, and the presence of obstacles or interesting features such as cliffs, large trees, large rocks and views. Final route adjustments will not be significant (i.e. routes will not deviate more than a few hundred feet), and will not affect the analyses described in this document.

Trails will be constructed to state or national park standards depending on the location of the trail or to specific standards required under a specific funding source. State park trail standards are described in the *California State Parks Trails Handbook* (1996) while national park trail standards are described in the *NPS Trails Management Handbook* (1983). In general, all newly constructed hiking trails will be built with a three foot wide tread necessitating up to a four foot wide soil disturbance, depending on the steepness of the slope. Newly constructed equestrian trails will require a four foot wide and “rocked” tread.

Trails located within a quarter mile of suitable bald eagle, spotted owl, marbled murrelet or Pacific fisher habitat (Appendix 1, Maps 4-13) that will be constructed during seasonal noise restriction periods (1 January through 31 August, 1 February through 9 July, 24 March through 15 September, 24 March through 15 June, respectively) will be constructed using hand tools only. Power tool use during seasonal noise restriction periods will be excluded from areas within a quarter mile of suitable habitat for these four species unless protocol surveys have cleared the area of any listed or candidate species presence. Any construction activity that requires pounding (i.e. hammering) will be done outside of the seasonal noise restriction period, if generated sounds are determined to be above ambient levels. Any proposed trail routes that pass through known spotted owl nest groves (an area of approximately a ¼ mile around known nest sites) discovered during protocol surveys (see paragraph below) and that require tree cutting will be done outside of the extended spotted owl limited operating period (February 1 through September 15) in order to avoid injuring, harming or disturbing recently fledged owlets.

New or rerouted trail routes will not be placed within the visual disturbance range (i.e. at least > 150 feet) of any known historic or active spotted owl activity centers. Areas without up to date (i.e. within two years) spotted owl surveys will be surveyed to protocol to determine spotted owl presence/absence. Any historic spotted owl activity center which is occupied by barred owls will be considered to be a vacant spotted owl activity center and not avoided. In the event a new nest is discovered, the exact visual range will be determined by a park biologist depending on the nest's location and intervening natural visual screens (e.g. dense vegetation, branches).

One proposed trail, Trail M, currently has a section of the route already constructed but not open to the public. The previously constructed section of Trail M passes within a quarter mile of a known spotted owl pair with a perpetually unconfirmed reproductive status (Appendix 1, Map 8). If a pair of spotted owls places a nest within the visual range of this trail section as determined above, then the trail will be closed from February 1 through July 9 and/or moved. Annual monitoring of this activity center using protocol surveys will continue until the activity center becomes inactive.

Sensitive and listed plant surveys will be conducted along the route of every trail passing through suitable habitat. If sensitive or listed plants are discovered along the trail route then the trail route will be altered to avoid the plants. No large trees of any species will be removed during trail construction. Most vegetation removed for trail construction will be shrubs and saplings. On foot trails a vegetation clearance zone of 6 feet wide by 8 feet high will be cleared while on horse trails a clearance zone of 8 feet wide by 10 feet high will be utilized. The maximum size of trees to be removed for trail construction will be 18 inches diameter at breast height (dbh) in dense second growth areas where no alternative route exists. The vast majority of trees removed are expected to be less than 12 inches dbh. More small trees (< 12 inches DBH) will be removed to construct trails in second growth coniferous and alder forests because these forests have much denser stands of smaller trees that cannot be avoided as compared to old growth coniferous forests. Topsoil and duff that is scraped off and placed on the side of a trail under construction contains a native seedbank that allows for rapid, natural revegetation. Some vegetation removed from a trail corridor, such as sword fern, will be stockpiled along the edge of the trail and replanted to improve aesthetic qualities.

There will be no major changes in natural topography due to trail construction; the majority of trails will be laid out along a contour or routed to avoid extremely steep slopes to achieve a reasonable grade and to avoid slope failure. Switchbacks or climbing turns will be used to make changes in trail elevation through areas confined by steep drainages, unstable soils, dense second growth forest, or other features like large logs and rocks that must be avoided. Retaining walls or other soil retaining structures will be built where a trail must traverse steep side slopes, where parent soils are unstable, where trail structures require footings and abutments or where the trail passes under trees and the trail tread is built up to protect roots and maintain grade. Newly disturbed soils will be compacted along the trail tread while other disturbed soil areas will be covered with local duff or small pieces of vegetation removed during construction to reduce erosion. Trails will not be constructed when soils are saturated. If it is not possible to construct a trail or install a trail bridge with sufficient time for natural revegetation to occur before the onset of the rainy season, standard erosion control methods will be used such as scattering certified weed free straw, duff, and tree branches, installing silt fences and replanting. Trail bridges will be constructed across small perennial streams where the stream banks are too steep or the stream is too wide for safe access or crossing. Trail bridges will be constructed to span the entire active stream channel at most flows with the deck above the high water line. No abutments will be placed within any active stream channels. Bridges or boardwalks

("puncheons") will also be built across any perennially wet areas that cannot be avoided by the trail route. All of the perennial streams to be crossed by bridges are smaller order streams usually located in steep channels. Abutments for most RNSP trail bridges are ten to twelve feet wide.

The entire Crescent Beach Loop trail (H) will be a wheelchair accessible boardwalk and hard surfaced trail approximately 5 feet wide. Small portions (approximately 1,000 feet) of this trail route pass through low quality, unoccupied suitable Oregon silverspot habitat. Surveys for this species have been conducted in the area in 2004 and none were found (S. Mattoon pers. comm.).

Almost the entire length of the Mill Creek Horse Trail-Little Bald Hills Trail Connector (E) will be routed along existing roads and across existing bridges and culverts. No construction will be necessary along those portions of the trail which are on existing roads. Only a portion (approximately 1.25 miles) which will connect the existing Little Bald Hills trail to an existing road near the top of a ridge will require new construction (Appendix 1, Map 4). Small portions of this trail route pass through suitable mardon skipper habitat. Surveys for this species will be conducted along the entire route prior to construction. If skippers are found then the trail will be routed to minimize disturbance to suitable habitat, to the extent allowable by the terrain. In addition, construction would only occur when skippers are least active and less prone to disturbance (i.e. outside of 1 May to 31 August) (S. Mattoon pers. comm.).

Visual surveys for both species of butterfly will be conducted using techniques similar to surveys conducted in other occupied habitat areas in Del Norte county. Food source plants in the project area are identified and mapped and then visual surveys of "flights" of adult butterflies are made during appropriate periods of the year – for Oregon silverspots in Del Norte county flights are observed during late July while mardon skipper flights occur during late May to early July. Presence anywhere in the immediate vicinity would indicate species presence (K. Hansen pers. comm., S. Mattoon pers. comm.).

2. Rerouted Trail

Approximately two miles of the existing James Irvine hiking trail in Prairie Creek Redwoods State Park (Appendix 1, Maps 1, 3, 6 and 11) will be abandoned (see section 10 of the Proposed Action below for details) and approximately two miles of a new route will be constructed using all the methods for new trail construction described above in section 1 of the Proposed Action. The entire rerouted trail will be within suitable spotted owl, marbled murrelet and Pacific fisher habitat.

3. New and Redesigned Trailheads –

Four new trailheads will be constructed and two existing trailheads will be redesigned (Table 5). All trailheads will be located in areas that are already partially developed or have been previously disturbed/developed during past logging operations or road building projects. All trailheads will have vault toilets, bear-proof trash containers and information kiosks installed. All trailheads located on CDPR parks lands will have picnic tables while all trailheads located on NPS lands will not. A rough estimate of the area covered by each trailhead is based on the number and type of parking spaces. Passenger vehicle spaces are estimated to cover 200 square feet per vehicle while recreational vehicle spaces are estimated to cover 400 square feet. The

total area is then doubled to account for turnarounds and trailhead amenities.

All new trailheads will have interpretive signs which will describe the potential negative impacts to nesting marbled murrelets and other birds from the intentional and unintentional feeding of corvids (jays, crows and ravens) as well as penalties for feeding wildlife.

Table 5. Estimated vehicle capacity, estimated area, and trails served by each of the new and redesigned trailheads (see Appendix 1, Maps 4-8 for locations).

Trailhead Name	Trail(s) Served by Trailhead	Estimated Parking Spaces (# RV or passenger vehicle)	New or Redesigned Trailhead	Estimated Acres of Each Trailhead
Highway 199/Elk Valley Road Junction ¹	Aubell-Boy Scout Tree Trail-Hatton Trail Connector (B)	40 (20 RV, 20 passenger vehicle)	New	1.0
Camp Lincoln ¹	Aubell-Boy Scout Tree-Hatton Trail Connector (B)	5 (passenger vehicle)	New	0.2
Aubell Ranch ¹	Aubell-Boy Scout Tree Trail-Hatton Trail Connector (B)	30 (15 RV, 15 passenger vehicle)	New	0.8
East Side of 101 North of Wilson Creek ²	Coastal Trail (existing trail)	10 (3 RV, 7 passenger vehicle)	New	0.2
West Side Access Road: A-9 Deck ³	Redwood Creek Horse Trails (existing trails)	30 (15 RV, 15 passenger vehicle)	New	0.8
Mill Creek Horse Trailhead off Bertsch Avenue ³	Mill Creek Horse Trails (existing trails)	30 (15 RV, 15 passenger vehicle)	Redesign	0.8
Lyons Ranch Trailhead ²	Lyons Ranch Trail (existing trail), Coyote Creek Bike Trail (U) and East Side Trail (M, Q)	10 (passenger vehicle)	Redesign	0.2

¹ Located within ¼ mile of suitable marbled murrelet, spotted owl and Pacific fisher habitat.

² Not located within ¼ mile of suitable marbled murrelet, spotted owl or Pacific fisher habitat.

³ Located within ¼ mile of suitable spotted owl and Pacific fisher habitat.

Trailheads located within a quarter mile of suitable bald eagle, spotted owl, marbled murrelet or Pacific fisher habitat (Appendix 1, Maps 4-13) will be constructed outside the seasonal noise restriction period (1 January through 31 August, 1 February through 9 July, 24 March through 15 September, 24 March through 15 June, respectively) unless protocol surveys indicate that

listed species are not present. Newly disturbed soils will be compacted within the parking areas while other disturbed soil areas will be covered with local duff or small pieces of vegetation removed during construction to reduce erosion. Trailheads will not be constructed when soils are saturated. If it is not possible to construct a trailhead with sufficient time for natural revegetation to occur before the onset of the rainy season, standard erosion control methods would be used such as scattering certified weed free straw, installing silt fences and replanting. The West Side Access/A9 Deck trailhead will be placed on a pre-existing log deck and thus will require no new soil disturbance during construction except during the digging of the new toilet vaults.

4. *New, Relocated and Retrofitted Backcountry Camps –*

Two new backcountry camps will be constructed, one existing backcountry horse camp will be relocated, and one existing backcountry camp will be retrofitted to improve accessibility (Table 6).

Table 6. Number of campsites and names of each new, relocated or retrofitted backcountry campgrounds (see Appendix 1, Map 1 for locations).

Backcountry Campground	Number of campsites	New, Relocated or Retrofitted
Skunk Cabbage Creek ¹	4	New
Copper Creek ²	5	New
Forty-four Horse Camp ²	5	Relocated
Gold Bluffs Beach Environmental Camp ⁴	3	Retrofit

¹ Not located within ¼ mile of suitable marbled murrelet, spotted owl or Pacific fisher habitat.

² Located within ¼ mile of suitable spotted owl and Pacific fisher habitat.

³ Located within ¼ mile of suitable marbled murrelet, spotted owl and Pacific fisher habitat.

⁴ Located within suitable spotted owl and Pacific fisher habitat.

Each of the two new backcountry camps will have vault toilets, bear proof food lockers, fire rings and picnic tables installed at each campsite. Site selection for each of the new backcountry camps was partially based on sufficient flat ground upon which to place campsites. Minimal amounts of ground will be disturbed during toilet and campsite construction. The total amount of ground disturbed by construction for the two new backcountry camps is estimated to be less than an eighth of an acre. The Forty-four Horse Camp will be relocated onto an existing roadbed (which will no longer be utilized as a road) so there will be no new ground disturbance from its construction except for the digging of a new toilet vault. The two backcountry camps to be retrofitted will have new universally accessible vault toilets installed as well as universally accessible picnic tables. The only ground disturbance will result from digging new toilet vaults.

All new backcountry camps will have interpretive signs which will describe the potential negative impacts to nesting marbled murrelets and other birds from the intentional and unintentional feeding of corvids as well as penalties for feeding wildlife.

Backcountry camps located within a quarter mile of suitable bald eagle, spotted owl, marbled murrelet or Pacific fisher habitat (Appendix 1, Maps 4-13) will primarily be constructed, relocated, or retrofitted outside of the seasonal noise restriction period (1 January through 31 August, 1 February through 9 July, 24 March through 15 September, 24 March through 15 June, respectively) unless protocol surveys determine that no listed species are present. Any construction that takes place during seasonal noise restriction periods will only involve hand tools and no pounding (i.e. hammering) will occur unless ambient noise levels are above those made while pounding. Newly disturbed soils will be compacted and revegetated within the campsites while other disturbed soil areas (such as around toilets) will be covered with local duff or small pieces of vegetation removed during construction to reduce potential erosion. Campgrounds will not be constructed when soils are saturated. If it is not possible to construct or retrofit campgrounds with sufficient time for natural revegetation to occur before the onset of the rainy season, standard erosion control methods would be used such as scattering certified weed free straw, duff, and tree branches, installing silt fences and replanting.

5. Increased Public Access –

The West Side Access (WSA) Road will be opened to controlled public use. Public vehicles will only be allowed up to the proposed A-9 Deck Trailhead (Appendix 1, Map 3). Approximately 6.5 miles of existing road will be opened to public vehicles. Short sections (totaling approximately 0.75 miles) of the WSA Road are within 0.25 miles of suitable spotted owl habitat.

6. New Backcountry Permits –

Fees for backcountry permits will be discontinued, but all backcountry visitors will still be required to obtain a backcountry permit. Along with the backcountry permit each backcountry visitor will receive an interpretive message which describes the potential negative impacts to marbled murrelets, western snowy plovers and other nesting birds from the intentional and unintentional feeding of corvids and other wildlife. The message will be printed and attached to the permit (example Appendix 3) as well as given either through personal contact with an issuing interpretive or law enforcement ranger or through some other media such as a video or interpretive display. See Interpretive Programs section below for more details.

7. Seasonal Closure of Existing Mill Creek Horse Trail Fords -

The existing Mill Creek Horse Trail has two fords which cross Mill Creek (Appendix 1, Map 4). The fords are currently open all year to visitors and staff to use to cross the creek. Both fords are spawning areas used by anadromous salmonids. A seasonal closure will be placed on the southern ford from 15 October to 31 May and from 15 October until 31 March on the northern ford. The seasonal closures are meant to protect spawning SONCC coho and other anadromous salmonids and their redds from disturbance and trampling caused by hikers and horses crossing the fords. No RNSP staff or visitors will be allowed to cross the fords during the seasonal

closure period. The seasonal closures will be incorporated into the Superintendent's compendium and will become an enforceable parks rule subject to penalty for violation. Signs indicating the seasonal closure will be placed at the Mill Creek Horse Trail trailheads and at the turn offs to the fords themselves. A visitor education program (described in the "New Interpretive Programs" section below) will be initiated to inform the public of the seasonal closure and the reasons the closure is necessary. Both of these fords are within suitable spotted owl, marbled murrelet, bald eagle and Pacific fisher habitat.

8. *Western Snowy Plover Impact Minimization Measures -*

Western snowy plover impact minimization measures will vary depending on the time of year plovers are present within RNSP and the proximity of the plovers to high visitor use and low visitor use areas (see Appendix 4 for maps showing locations of high and low use areas within suitable snowy plover habitat).

- Over Wintering Western Snowy Plovers Present (1 October to 28 February)

When snowy plovers are detected during the winter period (1 Oct. 1 – 28 Feb.) on RNSP beaches, the following impact minimization measures will be implemented, depending on the date, location and number of plovers. Table 7 summarizes the minimization measures for wintering snowy plovers. Details are described in the following paragraphs.

Table 7. Summary of impact minimization measures for wintering snowy plovers at RNSP.

WINTER	1October – 31 January	1-28 February
2 or more plovers in low use area	- Increase monitoring, 2 surveys/month	- Increase monitoring to weekly - Post educational signs at access points
2 or more plovers in high use area	- Increase monitoring to weekly - Post educational signs at access points	- Monitor more than once weekly - Post regulatory signs at access points - Restrict some visitor and staff activities

Currently during the winter season no plover surveys occur in October, November, or February, and surveys are done once per month in December and January. Monitoring will be increased from current levels up to more than once per week, depending on the number of plovers, their location, and the date of observations (Table 7).

Educational materials about wintering snowy plovers (e.g. rack cards, brochures, signs, programs, and visitor guides) that are consistent with current range wide snowy plover recovery efforts will be made available at all visitor centers and kiosks, and will include information specific to RNSP if necessary. Educational and regulatory signs will also be consistent with current range wide snowy plover recovery efforts and be posted at beach access points and existing park bulletin boards along park beaches. Park employees, contractors, and volunteers that work on beaches, will also receive training from RNSP biologists to help them identify wintering snowy plovers and protect snowy plovers and their habitat.

If two or more plovers are detected within 0.25 miles of a high visitor use area during three

surveys in February, then managers will have the option of designating a temporary winter protection area (WPA), depending on the total number of birds present and both their proximity to and the potential for human disturbance. Regulatory signs and symbolic fencing will be used to designate the WPA, which could extend up to 0.25 miles north and south of the plovers, excluding the waveslope (defined as the area that was wetted by the wave action of the previous high tide and does not include the upper beach berm or any vegetated area), and include the sandy beach up to 1000 feet inland from the waveslope. No human access would be allowed within the WPA, but the waveslope adjacent to the winter protection area would still be accessible to pedestrians and equestrians. Pedestrian travel above the waveslope within the WPA would be allowed along marked corridors if the winter protection area significantly overlaps a high use visitor area (Appendix 4). Erecting signs and symbolic fencing and any subsequent potential impact assessment will be covered under a Section 10 (ESA) permit and consultation with the USFWS.

- Nesting Western Snowy Plovers Present (1 March – 30 September)

When snowy plovers are detected during the nesting season (March 1 – Sept. 30) on RNSP beaches, the following impact minimization measures will be implemented depending on the location and number of plovers, the time period they are present, and primarily by whether they are attempting to nest or have nested, and by the presence of broods. Table 8 summarizes the management actions for nesting season snowy plovers. Details are described in the following paragraphs.

Table 8. Summary of protective measures for snowy plovers during nesting season within RNSP.

NESTING	Plovers Present (March 1-Sept.30; any number)	Nesting confirmed	Broods Present
Monitoring	- Increase monitoring to weekly (to track breeding plovers and find scrapes/nests)	- Increase monitoring to > once per week if necessary (to monitor nest fate)	- Increase monitoring to > once per week if necessary (to monitor brood movements)
Education	- Post education and regulation signs at access points	- Post education and regulation signs at access points - Snowy Plover volunteer “corps” for education	- Post education and regulation signs at access points - Snowy Plover volunteer “corps” for education
Zones and Restrictions	- Restrict activities - Post regulatory signs at protection zone	- Restrict activities - Post regulatory signs at protection zone - Symbolic fencing - Predator exclosures/control	- Restrict activities - Post regulatory signs at protection zone - Symbolic fencing

Monitoring will be increased from current levels (one to two surveys per month from March through September) up to more than once per week if necessary and depending on staff availability. The primary goal of increased monitoring during the breeding season will be to look for breeding plovers, scrapes, nests, eggs, and broods in a timely manner so that plover, nest and brood protection measures can be most effective.

In addition to the education programs mentioned in the above section on wintering plover impact minimization measures, a volunteer “snowy plover corps” of trained docents will be utilized to educate visitors and other beach users about snowy plover presence, identification, biology, and any temporary restrictions due to the presence of snowy plovers. Also, “campfire talks” given at RNSP campgrounds will specifically address snowy plover ecology, management issues, and temporary restrictions.

If two or more plovers are detected within 0.25 miles of a high use area but have not nested, then managers will have the option of designating a temporary plover protection area (PPA), depending on the total number of birds present and both their proximity to and the potential for human disturbance. Regulatory signs and symbolic fencing will be used to designate the PPA, which could extend up to 0.25 miles north and south of the plovers, excluding the waveslope, and include the sandy beach area up to 1,000 feet inland from the waveslope. No human access would be allowed within the PPA, but the waveslope adjacent to the PPA would still be accessible to pedestrians and equestrians. Pedestrian travel above the waveslope within the PPA would be allowed along marked corridors if the PPA significantly overlaps a high use visitor area (Appendix 4).

If a nest is found, then regulatory signs and symbolic fencing will be used to designate a temporary nest protection area (NPA) that could extend up to 0.25 miles north and 0.25 miles south of the nest, based on the nest’s proximity to and the potential for human disturbance. The NPA excludes the waveslope and includes the sandy beach area up to 1,000 feet inland from the waveslope. No human access, dogs, horses or kite flying would be allowed within the NPA, but the waveslope adjacent to the NPA would still be accessible to pedestrians and equestrians. Pedestrian travel above the waveslope within the NPA would be allowed along marked corridors if the NPA significantly overlaps a high use visitor area (Appendix 4). Authorized personnel with Level 3 western snowy plover survey training (see Appendix 5) will erect predator exclosures around snowy plover nests, if necessary. Erecting exclosures and any subsequent potential impact assessment will be covered under a Section 10 (ESA) permit and consultation with the USFWS.

Temporary brood protection zones (BPZ) will be designated when a brood(s) is present, which is typically a 31-day period after hatching. The BPZ will extend for up to four miles north and four miles south of the nest site (USFWS 2001), unless monitoring indicates that a larger or possibly smaller area is adequate for protection based on a brood’s proximity to and the potential for human disturbance. The BPZ includes the waveslope and the sandy beach area up to 1,000 feet inland from the waveslope. Regulatory signs and symbolic fencing will be used if necessary and feasible to designate the north and south boundaries of the BPZ. Within the entire BPZ the beach, including the waveslope, will be closed to dogs, horses and kite flying, but the waveslope adjacent to the BPZ will still be accessible and open to pedestrian travel. If broods are detected within 0.25 miles of a visitor use area, then managers will have the option of designating a temporary brood protection area (BPA), depending on the brood’s proximity to and the potential for human disturbance. Regulatory signs and symbolic fencing will be used to designate the BPA, which could extend up to 0.25 miles north and south of the brood, excluding the waveslope, and include the sandy beach area up to 1,000 feet inland from the waveslope. No human access would be allowed within the BPA, but the waveslope adjacent to the BPA would still be accessible to pedestrians. Pedestrian travel above the waveslope within the BPA would be allowed along marked corridors if the BPA significantly overlaps with a high use visitor area.

RNSP law enforcement rangers will continue to patrol RNSP beaches at least once a week on a random basis in order to enforce the new regulations and restrictions. Patrols may increase during periods of active snowy plover nesting and brood rearing as staffing and other law enforcement priorities allow. A patrol log will be kept which will record when and where beach patrols were made and whether any plover related citations or warnings were issued.

9. New Annual Maintenance –

As each new trail, trailhead and backcountry campground is completed an annual maintenance program will commence and continue in perpetuity. Annual maintenance could occur every day, once per week, once per month, a few times per year, once per year or only every few years depending on the trail or facility's condition and the type of maintenance necessary.

Annual trail maintenance will involve clearing vegetation which has overgrown or fallen on the trail route or drainage structures. Vegetation clearance zones will be the same as for trail construction. Overgrown or fallen vegetation will be cleared to 6 feet wide by 8 feet tall on foot trails and 8 feet by 10 feet on horse trails. Trail treads will require cyclic reshaping (once every five years to remove sluff and berm material and regain an out sloped surface). Bridges along foot and horse trails could occasionally require minor repairs including replacing broken handrails and deck boards. Most trails will receive maintenance only once or twice per year.

New bicycle trails that will be established and opened to the public on currently existing and maintained non-public RNSP roads will be maintained to road standards so that park personnel can utilize the trails/roads for management purposes. This includes brushing the sides of roads, clearing inboard ditches and culverts of fallen vegetation and grading road surfaces with graders. These activities were described in detail and analyzed in a previous consultation to determine impacts to threatened and endangered terrestrial species from annual maintenance (facilities, roads, and trails) in RNSP (Wallen and Childers 1997). A Letter of Concurrence and a Biological Opinion were issued on 24 June 1998 (USFWS reference number 1-14-98-24).

Annual trailhead maintenance will include daily or weekly toilet and picnic facility cleaning as well as emptying trash cans. Trailhead boundaries may also be cleared of overgrown vegetation, and any existing structures (e.g. toilet buildings, picnic tables, signs, bulletin boards) may be repaired as the need arises.

Annual campground maintenance will include daily, weekly, or monthly cleaning of toilets. Vegetation will be cleared around campsites, usually on an annual or biannual schedule. Occasional repairs to foodlockers, fire rings, hitching posts, signs and picnic tables will occur on an as needed basis.

Maintenance activities with power tools that produce noise above ambient levels at trails, trailheads or backcountry campgrounds in or within a quarter mile of marbled murrelet, spotted owl, bald eagle and/or Pacific fisher habitat will occur outside of each species' respective seasonal noise restriction period (bald eagle – 1 January through 31 August, northern spotted owl – 1 February through 9 July, marbled murrelet – 24 March through 15 September, Pacific fisher – 24 March through 15 June) unless the area has been shown to be unoccupied through protocol surveys. Only hand tools will be used to maintain developments in or within a quarter mile of suitable habitat during the seasonal noise restriction period of any of these three species if not otherwise cleared by surveys.

The only exception to the above maintenance schedule will be the clearance of large trees which have fallen on the East Side Trail (M,Q,) (Appendix 1, Map 8 or 13). Up to two large trees on this trail may be cleared per year with chainsaws during the respective seasonal noise restriction period. Any more trees which fall on this trail would be cleared using only hand tools or after the seasonal noise restriction period. Past experience has shown that this type of maintenance does not occur every year.

10. Trail Closure and Restoration–

Two existing trails and one segment of an existing trail that are better served by other existing trails or that pose potential resource risks will be closed and restored (Table 9)(Appendix 1, Maps 2 and 3). Trail closure and restoration is accomplished by de-compacting the trail tread to loosen soils, pulling up the fill material to obtain full recontouring of the hill slope, planting native understory vegetation (from within the same watershed) to obliterate the trail, scattering branches and duff over the rehabilitated trail and placing large debris at junctions or trailheads. Work will be done using only non-motorized hand tools. No vegetation is removed during restoration work.

Table 9. Proposed trails or trail segments to be closed and restored, their lengths, and proximity to threatened, endangered, and candidate species habitat.

Trail Name	Length Of Trail In Miles	Proximity to listed species habitat
R1. Mill Creek Campground Trail	0.4	Within spotted owl and fisher
R2. Boat Creek Trail	1.0	Within spotted owl, marbled murrelet and fisher
James Irvine Trail segment	2.0	Within spotted owl, marbled murrelet and fisher

11. Road to Trail Conversion and Watershed Restoration -

The West Ridge Road/Butler Creek Trail (R3) and Ossagon Road are a five mile and 0.2 mile long old logging roads built before acquisition of the area by the California Department of Parks and Recreation. A one mile portion of the West Ridge Road road bed is currently utilized as part of the West Ridge Trail. The Ossagon Road is redundant because of the nearby Ossagon Trail. Sections of the roads are currently beginning to fail and have the potential to cause increased sedimentation into streams if left to further deteriorate. The West Ridge and Ossagon Roads are also some of the few physical remnants of historic logging roads remaining within Prairie Creek Redwoods State Park. Thus an additional reason for removal of the roads is to enhance aesthetic qualities and restore the “naturalness” of the surrounding unroaded old growth forest areas. Four of the five miles of West Ridge Road will be completely removed while one mile of road will be partially removed and converted to a foot trail. All of the 0.2 mile long Ossagon Road will be

removed (Appendix 1, Map 6 or 11). Approximately 23 acres of ground will be disturbed and devegetated along the West Ridge Road/Butler Creek Trail (R3) while approximately one acre of ground will be disturbed and devegetated along the Ossagon Road. Almost all of the 23 acres along the West Ridge/Butler Creek Trail are within an approximately sixty year old regenerated redwood/Douglas fir forest, however, the trees growing within the road fill to be restored are of a generally smaller stature than the surrounding stands (pers. obs.). The one acre along the Ossagon Road is within old growth redwood forest, however, the trees growing within the road fill to be restored are of a much smaller stature than the surrounding stand with no tree within the fill greater than 12 inches DBH (pers. obs.).

Approximately 0.6 miles of West Ridge Road lies within anadromous habitat (Prairie Creek watershed) (Appendix 1, Map 6 or 11). These sections contain only one stream crossing (across Prairie Creek) with the rest of the road section consisting of typical cut and fill or ridge top graded construction which will require rehabilitation. The other approximately 4.5 miles of road and crossings to be removed lie within small non-anadromous watersheds that drain directly west to Gold Bluffs Beach. All of the 0.2 mile long Ossagon Road lies within the Prairie Creek watershed (Appendix 1, Map 6 or 11).

Road removal work and road to trail conversion work involves completely excavating stream crossings, restoring natural contours and landforms along road corridors by retrieving sidecast fill, uncovering buried topsoil, spreading woody debris on finished surfaces and replanting with native species (if needed). The natural contours of the streambed and forest floor developed and existed in balance with the pre-disturbance natural hydrologic conditions, and represent the most stable configuration for the landscape. The re-exposed topsoil provides a nutrient-rich base for re-establishment of native species. The woody debris scattered adjacent to the finished stream channels provides immediate surface erosion control, habitat for small terrestrial species, and, as it decays, adds additional organic matter to the soil.

Road to trail conversion involves all of the above steps except that a small portion of the road prism (approximately 5 feet wide) is left upon which a trail tread is placed. The trail tread is located on the cutbench of the former road in order to create a stable tread. In addition, armored stream crossing or small foot bridges are installed across streams at the uphill, upstream portion of the former road stream crossing.

Restoration will focus primarily on removing fill from stream channels and headwater swales, stabilizing sidecast fill material, and restoring natural hillslope topography and drainage patterns. Removal of roads will include retrieving material sidecast during road construction, excavating stream crossing fill material, placing the excavated material in stable locations and shaping it to blend with the surrounding topography. In areas needing treatment, the goal is to re-create landforms that existed prior to road construction as much as is reasonably feasible. Stream crossings will be excavated to near original width, depth and slope to expose natural channel armor. Side slopes will generally match original contours above and below the road. Material excavated from the channels will be placed in stable locations away from streams. Road reaches will be recontoured, with excavated material placed against the cutbank locally (outsloping) or, where slopes are potentially unstable, moved to stable locations (exported outsloping). All excavated material is shaped to mimic and blend with the surrounding topography, recreating natural landforms and drainage patterns. Trees growing on fill are felled and used as mulch on restored areas to provide surface erosion control and speed natural revegetation.

Watershed restoration work requires use of heavy equipment (various combinations of

bulldozers, excavators, loaders, dump trucks and scrapers) in order to be effective. Restoration work will be scheduled for the month of 16 September to 15 October due to disturbance concerns for terrestrial threatened and endangered species and to avoid the rainy season. If the watershed restoration geologist determines that windows of dry weather are predicted beyond 16 October and there are small additional work items that can be completed within the predicted window, then NOAA Fisheries will be consulted. If an agreement is reached work may continue.

Experienced heavy equipment contractors will be employed through an established contracting framework. A watershed restoration geologist will be present on-site during excavation work to make adjustments to excavation design and to ensure resource protection and quality control.

a. Detailed Description of Stream Crossing Removal Techniques - A bulldozer begins a stream crossing excavation by dishing down the road fill, scooping out as much fill as possible, and pushing it along the road to a stable storage location. The excavation work does not disturb the bottom of the stream channel nor is it near flowing water during this time. Once the bulldozer has removed as much fill as possible, an excavator is moved onto the downstream portion of the remaining fill. The excavator begins excavating the remaining fill from the channel, beginning at the downstream extent of the fill and moving in the upstream direction. The goal of the stream channel excavation is to uncover, yet not disturb, the buried natural channel armor, usually a combination of rock and woody debris. The large woody debris, encountered during the excavation, is placed in the channel to augment the natural channel armor.

Streams with significant surface flow, capable of sediment transport off-site, are diverted around excavation areas. Streams with only subsurface seepage through the buried streambed gravels are not diverted because the flow is not disturbed during excavation. When a culvert is present, generally, water is kept flowing through the culvert as long as possible. When a culvert is near the center of the crossing, it is removed section by section, as the excavator works its way up the channel; thus water is only allowed to flow on the finished stream channel excavation, and not on partially excavated areas. If there is no culvert, the water is generally flowing along the old channel bottom gravels, buried at the base of the fill. The crossing is still excavated from the downstream end up so that water that emerges from the base of the fill is released into the finished channel. When an excavation nears its upstream end, water must flow across a partially excavated area for a brief period while the excavation of the top of the crossing is completed.

Stream channel excavations may experience minor adjustments, mostly during the first winter following excavation. The remaining road fill, wedged in the interstices of the original stream bed may be mobilized; small portions of channel sidebanks may settle or slide; the original channel bed armor may adjust in response to the logging slash up and downstream of the excavation site; decaying logging slash or natural organic debris may collapse, causing a small chain reaction up and downstream; etc. Much of the material mobilized during these adjustments is trapped by the large woody debris that is encountered during the excavation and placed back into the channel, augmenting the natural channel armor. Woody debris placed on areas adjacent to streams reduces surface erosion and provides habitat for seedlings, fungi, microorganisms, insects, birds, newts, salamanders and small mammals. This habitat enhances the recovery of the forest ecosystem across the former road corridor.

In road to trail conversion all the above steps remain the same except that armored stream crossings or small foot bridges are installed across streams at the uphill, upstream portion of the former road stream crossing after the original stream crossing has been removed.

b. Detailed Description of Road Removal Techniques - Excavation of sidecast fill reduces the amount of road fill that may fail as a mass movement, restores surface runoff patterns, and often uncovers buried topsoil. Many sections of road in RNSP are built on a layer of pioneer road logging debris and forest understory vegetation. This layer of organic material continues to decay and contributes to slope failures. The configuration of the road (insloped, outsloped, ditched, rutted, etc.) controls local hillslope runoff patterns.

A bulldozer removes vegetation from the inboard ditch then de-compacts the inboard ditch with its rippers or blade. It then de-compacts the roadbed with its rippers and then dishes down the outside edge of the road, and pushes the fill toward the cutbank. Depending on how steep the slopes are, the bulldozer may be able to complete the excavation and shape the fill to conform with local pre-disturbance landforms, or, on steeper ground an excavator assists, lifting more fill up toward the cutbank. On the steepest slopes, all of the work may be done with the excavator.

The original buried topsoil is often encountered as the sidecast excavation nears completion. Uncovering this layer of organic and nutrient rich material is one of the goals of sidecast fill excavations. It is a marker horizon that indicates original ground configuration, and thus the most stable configuration for road removal work.

Undergrowth vegetation and trees that are growing in the road prism and fill are removed and stockpiled for surface erosion control in areas adjacent to streams. The average width of fill with trees growing in it is estimated to be 36 feet wide or 4.6 acres per mile of road. This helps to reduce potential surface erosion, and also provides immediate cover for small mammals. As the debris decays, it adds organic matter to the soil, and encourages fungi, speeding recovery of native forest vegetation as well as reducing the establishment of exotic plants.

Road to trail conversion includes all of the actions described above except that a small portion of the road prism (approximately 5 feet wide) is left upon which a trail tread is placed. The trail tread is located on the cutbench of the former road, not on old fill, in order to create a stable tread. Excavated fill is placed on the cut above the new trail tread recontouring the terrain to mimic the original shape of the slope. The tread is outsloped where necessary and no inboard ditches are created in order to provide for proper drainage. The trail tread may be constructed with gentle meanders to soften the appearance of straight road sections. Final trail tread shaping may be done by heavy machinery or by handcrews. Final mulch placement along exposed slopes beside the trail tread is also completed by handcrews because excavator placement has proven to be inefficient for this task in road to trail conversion projects. Handcrews cut and place vegetation left by the excavator along the trail tread and also may replant stockpiled vegetation with viable root balls to further speed revegetation and soften the restored area's appearance.

c. Post Restoration Monitoring and Adjustments – All completed projects are visited several times during the first winter, and photo-points established prior to excavation are re-photographed. The distribution of woody debris and rock in the excavated channel may be rearranged using hand tools, to minimize post-excavation erosion.

12. Design and Implementation of Corvid Management Strategy, Corvid Monitoring and Adaptive Management System –

A RNSP corvid management strategy and monitoring system is being designed with the

assistance of subject matter experts and subsequently implemented by park personnel. The aim of the strategy is to decrease corvid predation of marbled murrelets near existing park visitor facilities. The main objective will be to reduce corvid densities by reducing or eliminating potential anthropogenic food sources currently supplementing corvid populations. The corvid management strategy and monitoring system is summarized in Table 10.

Table 10. Corvid Management Strategy and Monitoring Summary.

Year	Existing Visitor Use Area Targeted For Specific Corvid Management		
	Prairie Creek and Jed Smith Campgrounds	Lower Redwood Creek Dispersed Camping Area (downstream of Bond Creek)	-LBJ Trailhead -Tall Trees Trailhead -Mill Creek Loop Trail -Three Hour Loop Trail -Redwood Creek Overlook
Proposed Corvid Management and Monitoring Actions			
2006-7	-corvid density and human food availability monitor	-corvid density monitor	-corvid density monitor
2007-8	-corvid density and human food availability monitor	-corvid density monitor	-corvid density monitor
2008-9	-corvid density and human food availability monitor	-corvid density monitor	-corvid density monitor
2009-10	-corvid density and human food availability monitor -intensive education	-corvid density monitor -disallow camping -intensive education	-corvid density monitor -remove picnic tables -intensive education
2010-11	-corvid density and human food availability monitor -intensive education	-corvid density monitor -disallow camping -intensive education	-corvid density monitor -remove picnic tables -intensive education
2011-12	-corvid density and human food availability monitor -intensive education	-corvid density monitor -disallow camping -intensive education	-corvid density monitor -remove picnic tables -intensive education
	assess whether corvid density reduction target of 50% met		

A corvid management strategy document will be produced by May 2007 which will detail the corvid management goals, techniques and monitoring system that will be implemented as generally described in this proposed action (see below) as well as additional techniques and methods which *may be* utilized as supplemental funding allows but that are not part of this proposed action (see below). The strategy will contain specific tasks, identify responsible RNSP work groups and establish a timeline for implementation of the various corvid management

actions. It will also contain a detailed description of the corvid monitoring system including survey station location and layout rationale, survey methods, survey timing, data management and data analysis methods. Finally, a prioritized set of additional management, monitoring and research recommendations will be included that will guide efforts should additional funding become available. Included in these additional management recommendations will be outreach programs to surrounding landowners and land management agencies which may be influencing the corvid population within RNSP.

The first component of the strategy will be to conduct three years (2006 through 2008 or 2009) of corvid density and human food availability monitoring. The three years of corvid monitoring is meant to establish a baseline corvid density index upon which to compare future densities post implementation of the intensive corvid management program described below. The monitoring system design is being fully vetted by biostatisticians familiar with bird density monitoring sampling design (J. Baldwin, Z. Peery pers. comm.). Variable distance corvid point count stations are being established in and around visitor facilities and at “control” areas away from visitor facilities. The facilities and the number of monitoring survey stations include: Jedediah Smith (3 stations) and Prairie Creek (2 stations) campgrounds, Lady Bird Johnson Trail and Tall Trees Trail trailheads, the Mill Creek Loop and Three Hour Loop Horse Trails, the Redwood Creek Overlook (1 station each) and along Redwood Creek downstream of the Bond Creek junction (7 stations) (Appendix 1, Maps 9, 11 and 12). Ten “control” corvid monitoring stations are being randomly scattered throughout suitable marbled murrelet habitat at least a quarter mile from any habitat edge or visitor facility. Each station will be monitored twice monthly from May through September coinciding with the Steller’s jay and common raven breeding season, the marbled murrelet breeding season and RNSP’s high visitor use season. Human food availability surveys will be conducted twice monthly from May to September at Prairie Creek and Jedediah Smith campgrounds.

A separate corvid survey effort, unrelated to the adaptive management decision process or corvid monitoring program, will be made at Lady Bird Johnson Trail and Tall Trees Trail trailheads, the Mill Creek Loop and Three Hour Loop Horse Trails and the Redwood Creek Overlook. The purpose will be to determine the “increased corvid density distance effect” potentially occurring at these smaller, less visited visitor facilities. The study design is unknown at this time. The study design will be developed in conjunction with subject matter experts and will be implemented either with RNSP staff (if no external funds are available) or through external researchers (if external funds become available).

Corvid management actions will commence during the first three “baseline” years (2006 through 2008 or 2009) of the corvid management program. Potential major anthropogenic corvid food sources will be identified for possible (pending additional funding) future cleanup or education outreach efforts inside RNSP and within one mile outside of the parks’ boundary (e.g. illegal dumps, landfills, solid waste transfer stations, livestock feedlots). An existing visitor education program aimed at raising awareness about the connection between feeding corvids and predation of marbled murrelets will continue to be implemented and enhanced. Educational signs and posters have been installed at trailheads, campgrounds and visitor centers. Feature articles are included in every park orientation brochure. Pamphlets are being handed out at all entrance kiosks (see Appendix 3 for examples). Currently a “don’t feed corvids/murrelet conservation” message is being incorporated in most campfire and ranger led naturalist programs from June through mid September (approximately 50 programs per week). Starting next year, a corvid/murrelet message will be incorporated into all ranger presentations. In the near future (i.e. within the next year) a visitor center video produced by Santa Cruz county state parks that

introduces the human food/corvid/murrelet issue will be shown at RNSP visitor centers. In addition, the rest of Mill Creek campground will have all bear proof storage lockers installed using oil spill settlement money (see below) in the next year or two.

In 2009 or 2010, picnic tables at five existing developed areas in or immediately adjacent to marbled murrelet habitat will be removed in order to discourage visitors from lingering and eating in the area. The five areas include the Lady Bird Johnson Trail and Tall Trees Trail trailheads, the Mill Creek Loop and Three Hour Loop Horse Trails, and the Redwood Creek Overlook (Appendix 1, Maps 9 and 12). In addition, existing dispersed camping will be disallowed along approximately four miles of Redwood Creek gravel bars from Bond Creek downstream to an area approximately 0.25 miles downstream of McArthur Creek (effectively eliminating all dispersed camping downstream of Bond Creek to the park boundary because no dispersed camping is currently allowed 0.25 miles downstream of McArthur Creek) (Appendix 1, Map 12). Dispersed camping will still be allowed upstream of Bond Creek, except for the half mile area near the Tall Trees Grove (existing restriction) – thus, roughly five miles of streamside areas suitable for dispersed camping will still be available to the public (Appendix 1, Map 12).

Also in 2009 or 2010 and continuing through 2011 or 2012, RNSP will expand the corvid/murrelet education program. Interpretive and other park staff will continue make the issue a central interpretive theme for the park, but more personnel, programs and media will be devoted to getting the message to visitors, particularly at Jedidiah Smith, Prairie Creek and Mill Creek campgrounds as well as visitor centers, major trailheads and picnic areas. Increased interpretive staff levels will also allow greater “roaming” through campgrounds, picnic areas and major trailheads. Other media (e.g. signs, videos and permanent displays) (example of trailhead kiosk sign – Appendix 3) will be manufactured and installed. The additional staff and media should result in significantly greater numbers of park visitors being contacted and informed. The additional staffing and media production will be funded for the next 15 years by oil spill settlement money earmarked for marbled murrelet conservation in RNSP. All increased educational efforts will be funded through this source. At this time, the funds are planned to support five seasonal corvid/murrelet education staff, one part time corvid/murrelet education staff leader and additional educational media (e.g. signs, pamphlets, video). These figures may change after implementation planning and funding amounts are finalized.

The aim of the corvid management program is reduce corvid density at least 50% below the three year average baseline determined during the first three years of the corvid management program at each visitor use area. At the end of 2011 or 2012, RNSP will examine whether the corvid density target level has been met. If the target density level has been met, then RNSP will continue with the same types and intensities of corvid management described in this proposed action. If the target density has not been met, then RNSP will *consider* one or more of the following more intensive corvid management techniques in conjunction with advice from subject matter experts and the USFWS:

- Greater visitor education emphasis or change in visitor education programs.
- More enforcement of wildlife feeding prohibition rules.
- Capture and harassment of corvids.
- Corvid removal (either lethal or translocation).*
- Moving, closing or implementing seasonal closures of facilities.*

* Would require reinitiating consultation with the USFWS as well as additional environmental

and park planning efforts.

Corvid monitoring would continue throughout the more intensive management period for three to four more years (2011 or 2012 to 2016 or 2017) and another reassessment of corvid density reduction would be made. This consultation would be at its termination point, thus the second reassessment would be made under a reinitiated consultation or request to extend the lifespan of this consultation.

Summary of Conservation Measures in the Proposed Action

Trail/Road Abandonment and Restoration

The abandonment of 3.5 miles of existing trails or segments of trail (Mill Creek Campground Trail, James Irvine Trail, Boat Creek Trail) (section 10 in the Proposed Action) and total restoration of 5.0 miles of existing road/trail (West Ridge/Butler Creek Trail) (section 11 in the Proposed Action) is intended to greatly reduce or even remove the potential for any future visitor or staff caused disturbance to spotted owls, marbled murrelets or Pacific fishers or increased predation risk to marbled murrelets caused by the presence of humans along those miles of trail and potentially increase the amount of available suitable habitat.

Intensive Visitor Education, Picnic Table Removal and Partial Dispersed Camping Area Closure Using Adaptive Management System

An intensive visitor education program in two of RNSP's frontcountry campgrounds, the removal of picnic tables in five developed areas and the closure of four miles of dispersed camping in or adjacent to suitable marbled murrelet habitat under an adaptive management system (Section 12 in the Proposed Action) is intended to decrease the density of corvids in these areas below current levels and thus decrease the predation risk to murrelets by decreasing the amount of human food attractants.

V. STATUS AND DISTRIBUTION OF LISTED SPECIES

Only terrestrial habitats within the Parks are/would be impacted by existing visitor use/the proposed action, therefore, no threatened, endangered, or candidate species which occur only in marine or estuarine habitats will be included in this assessment. No further mention will be made of the following species: tidewater goby, short-tailed albatross, sperm whale, blue whale, humpback whale, fin whale, sei whale, and Steller's sea lion.

Please refer to Sakai (2003) and the 2004 addendum for RNSP specific general species accounts and park wide habitat status descriptions for the following listed and candidate species found within RNSP that may be affected by existing visitor use/the proposed action: western lily, beach layia, leatherback turtle, California brown pelican, Oregon silverspot butterfly, green turtle, olive Ridley sea turtle, loggerhead turtle, northern spotted owl, bald eagle, marbled murrelet, western snowy plover, Pacific fisher and mardon skipper.

Effects to yellow-billed cuckoo and Xantus's murrelet will not be assessed in this document.

Neither candidate species occurs in or near RNSP and thus they cannot be affected by ongoing or proposed actions. RNSP believes these candidate species were erroneously placed on the list of potential listed and candidate species that could occur within the parks. Please refer to the RNSP memo to the USFWS Arcata office dated 28 February 2005 for a full discussion explaining this issue.

Description of Action Area –

The Action Area (Appendix 1, Maps 2 and 3) for this analysis is the maximum effect area of all species potentially impacted by existing developments and dispersed use areas as well as additional areas potentially impacted by the proposed action. The Action Area is approximately 35,860 acres, or roughly one third of RNSP.

The status and distribution of listed and candidate species within the Action Area are described below.

a. Western Lily

RNSP staff believe that the current habitat in RNSP's coastal scrub and grasslands are not suitable to sustain populations of western lily, due primarily to meadow encroachment by spruce and shrubs (L. Arguello pers. comm.). Although a systematic survey of RNSP's coastal scrub and grasslands has not been conducted for the lily, a substantial amount of potential habitat, especially in the northern half of RNSP, has been surveyed in association with projects. Currently, this species has not been documented in RNSP and is unlikely to exist within the Action Area or within RNSP (L. Arguello pers. comm.).

b. Beach Layia

Technically most sandy RNSP beaches could be used by parks visitors and could potentially contain suitable beach layia habitat, thus all beaches fall within the Action Area. The foredunes of all major beaches within RNSP except Freshwater Spit (which was restored by the parks through intensive exotic species control) are almost completely occupied by exotic European beach grass (*Ammophila arenaria*) which may be precluding colonization by beach layia (Leonel Arguello pers. comm.). A population of beach layia exists on Freshwater Spit. Refer to Sakai (2003) for a complete discussion of this population as well as all other RNSP beaches and habitat suitability.

c. California Brown Pelican

Most RNSP beaches could be potentially used by parks visitors and all the parks' beaches contain suitable California brown pelican resting habitat. No pelicans breed within RNSP and thus do not breed within the Action Area. Pelicans have been seen loafing within the Action Area as noted in 2002 during beach surveys conducted by RNSP staff. Sixty-five were seen near Fern Canyon (mouth of Home Creek), 100 plus near Ossagon and 3 near Carruther's Cove (RNSP unpub. data). As many as 200+ pelicans were seen loafing near the mouth of Redwood Creek in 2004 (pers. obs.) (Appendix 1, Maps 6-8). As stated in Sakai (2003), RNSP beaches are

suspected to only be used as daytime loafing sites.

d. Oregon Silverspot Butterfly

The only existing or proposed action areas that could potentially affect Oregon silverspot butterflies are the construction and maintenance of proposed trail H (Appendix 1, Map 2). It is expected that the total amount of suitable habitat affected by the proposed trail H construction totals less than half an acre which equates to the Action Area. The Action Area equates the total amount of vegetation that could potentially be removed or altered as a result of Trail H construction.

No silverspots were detected in this area during repeated surveys for the species in the early to mid 1990's and in 2004 nor have silverspots been reported anywhere within RNSP. It is suspected that the microclimate of this area may be too cool for silverspots (S. Mattoon pers. comm.).

e. Leatherback Turtle, Green Turtle, Olive Ridley Sea Turtle, and Loggerhead Turtle

The Action Area takes in all sandy beaches which could potentially be used by RNSP visitors. RNSP beaches are unlikely to be used by sea turtles because only a single record of any sea turtle has been noted within RNSP - one olive Ridley sea turtle on Freshwater Spit. This stranding was considered a fluke event caused by severe current changes during El Nino Southern Oscillation event (see discussion in Sakai 2003).

f. Northern Spotted Owl

The total amount of suitable spotted owl habitat within the Action Area is 34,859 acres. Suitable habitat is shown on Maps 4-8 in Appendix 1. Various portions of the Action Area have been surveyed to protocol within the last two years but portions remain unsurveyed, particularly within Prairie Creek and Jed Smith Redwoods State Parks. Six activity centers, Cedar Creek, Damnation Creek, Richardson Creek, Hatchery Hill, Lost Man Creek, Emerald Creek and East Side Trail have been discovered within the Action Area.

Cedar Creek has been vacant since 1995 with a reproductive barred owl (*Strix varia*) pair present within the activity center since 2001 and is no longer considered to exist. Damnation Creek has been vacant since 1995 with barred owls currently present within the activity center and is no longer considered to exist. Richardson Creek has been vacant since 1996 and has barred owls currently present within the activity center and is no longer considered to exist. All three of these former activity centers were systematically inventoried to determine their "non-existent" status (Schmidt 2004).

Hatchery Hill has been vacant since 1994 with barred owls currently present within the activity center. This activity center has never been reproductive nor has a nest ever been discovered. Extensive surveys have yet to be conducted around this activity center and so it is considered vacant but still in existence. Lost Man Creek was first discovered in 1993. Only one nesting attempt has been recorded, in 2001. The nest failed. Barred owls have been discovered within

the activity center. Emerald Creek was first discovered in 1993 and fledged one owlet in 1993 and two owlets in 1999. It has been vacant since 2000 and has been occupied by a reproductive barred owl pair since that year. "Floater" spotted owls have been found within a mile of the activity center and so it is considered vacant but still in existence. East Side Trail was first discovered in 1993. It is occupied by spotted owls but no nest has been discovered and barred owls are present within the activity center.

Other areas within the Action Area have regularly occurring barred owl pairs which form the center of 0.5 mile radius "barred owl exclusion zones" (Appendix 1, Maps 4-8). RNSP considers these areas to be unavailable to spotted owls as long as they are occupied by barred owls (see the 2004 addendum to Sakai 2003).

g. Bald Eagle

Six thousand seven hundred and four acres of suitable bald eagle habitat exist within the Action Area. No bald eagle nests have been discovered within the Action Area. RNSP's only confirmed eagle nest, however, is located within a quarter mile of the existing McArthur Creek Horse Loop trail (Appendix 1, Map 7). It is not considered to be within the Action Area because an intervening ridge completely blocks the trail from the viewshed of the nest thereby negating potential for disturbance or effect.

The nest was discovered in 1997. It produced two young in 1999, one in 2000, 2001 and 2004 respectively, and two in 2002 and 2003 respectively. A suspected bald eagle territory near the Mill Creek Horse Loop Trail (Appendix 1, Map 4) was found in 2003. No nest has been found yet, and therefore it is uncertain whether the territory is or is not within the Action Area (Bensen 2004).

h. Marbled Murrelet

Fourteen thousand six hundred and ninety nine acres of suitable marbled murrelet habitat exists within the Action Area. Suitable habitat is shown on Maps 9-13 in Appendix 1. All suitable habitat within RNSP is assumed to be occupied but the total number of murrelets, their distribution and their reproduction within the Action Area are currently impossible to estimate. Please see Sakai (2003) for a discussion on the species status within RNSP as a whole.

i. Western Snowy Plover

The Action Area takes in all sandy beaches which could potentially be used by RNSP visitors. The fore and back dunes of Gold Bluffs and Crescent Beaches are almost completely occupied by exotic European beach grass which greatly reduces the potential suitability of the habitat for plovers. The total beach habitat within RNSP and thus the Action Area is 1,022 acres. No snowy plovers had been recorded within the Action Area since 1985 (Page et al. 1986) despite intensive ongoing surveys (Holm 2003). However, a pair of snowy plovers was discovered on Gold Bluffs Beach just north of Fern Canyon/Home Creek in January of 2004. An adult was later found in the same area with two chicks on 24 May 2004. One chick fledged on 23 June. The fate of the other chick was unknown. Please see the 2004 addendum to Sakai (2003) for a discussion on the species status within RNSP as a whole.

j. Mardon Skipper

The only suitable habitat within RNSP occurs in the Little Bald Hills area. Only trail E will pass through a 1.5 mile portion of the Little Bald Hills area and only 0.25 miles will be within suitable habitat (Appendix 1, Map 4). Less than half an acre of suitable habitat will be disturbed. No other listed species exist in the area therefore only that small disturbed area is part of the Action Area. Skippers were found in several areas of the Little Bald Hills in 2004 and are believed to be present potentially throughout most of the fescue grasslands, including possibly within the Action Area (S. Mattoon pers. comm.). The size of the population, extent and reproduction are currently unknown. No surveys have been conducted within the Action Area.

k. Pacific Fisher

Thirty four thousand eight hundred fifty-nine acres of suitable fisher habitat exists within the Action Area. Suitable fisher habitat and suitable spotted owl habitat have been identified as the same in RNSP and so suitable fisher habitat is shown on Maps 4-8 in Appendix 1 and suitable owl habitat. All suitable habitat within RNSP is assumed to be occupied but the total number of fishers, their distribution and their reproduction within the Action Area are currently unknown. Please see the 2004 addendum to Sakai (2003) for a discussion on the specie's status within RNSP as a whole.

VI. IMPACTS TO THREATENED AND ENDANGERED SPECIES

A. Direct Effects

PLEASE NOTE – “existing developments” are any RNSP built structures such as buildings, campgrounds, picnic areas, trails and trailheads while “dispersed use areas” are natural areas which regularly receive human use such as coastal beaches, Redwood Creek gravel bars, the Smith River and undesignated drift boat haul out points and swimming holes along the Smith River (Appendix 1, Map 1).

1. Disturbance

a. California Brown Pelican

1) Visitor and Staff Use of Existing Developments and Dispersed Use Areas -

All beaches accessible to visitors and RNSP staff provide suitable California brown pelican resting habitat (Appendix 1, Maps 4-7). Pelicans do occasionally loaf along some of these stretches of beach, especially near creek mouths on Gold Bluffs Beach (in groups of less than 100) and near the Redwood Creek and Klamath River (in groups of less than 200) (RNSP unpub.

data) (pers. obs.). Visitors walking along these stretches of beach may impact pelicans by causing them to flush either into the ocean or to another section of beach. The temporary disturbance does not appear to cause observable harm, as evidenced by the return of the pelicans to the same loafing spot once visitors pass and by their persistence on these beach stretches year after year in relatively consistent numbers (RNSP unpub. data)(pers. obs.). In addition, the offshore rocks dispersed along RNSP's coastline provide nearby, abundant, isolated, undisturbed resting habitat and have been recorded as being consistently used by large numbers of pelicans as both loafing areas and night roosts for at least the past 25 years (Sowls et al. 1980, Carter et al. 1996, Capitolo et al. 2004, Bensen 2004). The apparent high use of the various offshore rocks and more isolated stretches of RNSP beaches as loafing and roosting areas indicates that sufficient resting areas for pelicans are available in RNSP outside of the high visitor use areas along Freshwater Spit, Crescent Beach and near Gold Bluffs Beach campground and picnic area on Gold Bluffs Beach. Visitor caused disturbance does not appear to be measurably impacting brown pelicans in RNSP.

2) Proposed Action –

Construction, visitor use and maintenance of trails H and R (Appendix 1, Map 1) are the only project activities that could potentially disturb brown pelicans. Park staff have never recorded brown pelicans during the last two years (RNSP unpub. data) utilizing Crescent Beach near trail H or the southern end of Freshwater Spit near the northern terminus of trail R. The closest known beach loafing site to Crescent Beach within RNSP is approximately twelve air miles south at the Klamath River mouth while the closest recorded loafing site to the northern terminus of trail R is approximately two miles north at the mouth of Redwood Creek (RNSP unpub. data). No loafing pelican surveys have been conducted on the north end of Stone Lagoon spit near the southern terminus of trail R. It is unlikely that pelicans are using this section of beach to loaf because of the regular visitor use from the nearby Humboldt Lagoons State Park access point and parking lot. Trail H will traverse the vegetated back dunes of Crescent Beach where loafing pelicans have never been recorded. Unless pelicans begin using this area in the future, the construction, use, and maintenance of trail H will not cause an impact. Trail R will traverse a coastal bluff and only the termini will be near beaches. Visitors using trail R should not increase foot traffic at the mouth of Redwood Creek because of the intervening two miles of beach which is not easily traversed due to steep wave slopes and deep sand. This fact coupled with the apparent lack of pelican use of these beaches makes the likelihood of disturbance from trail R construction, visitor use and maintenance low.

b. Oregon Silverspot Butterfly

1) Visitor and Staff Use of Existing Developments and Dispersed Use Areas -

Only the far northern portion of the Coastal Trail behind Crescent Beach traverses potential suitable Oregon silverspot butterfly habitat (Appendix 1, Map 4). No silverspots have been discovered in RNSP during repeated surveys in the early to mid 1990's or in 2004, including within the Action Area, and the area is currently not occupied by the species. There is, therefore, no possibility for current visitor use to cause disturbance unless the area becomes suddenly colonized. Specie experts believe this is highly unlikely because the microclimate is thought to be too cool for silverspots (Mattoon pers. comm.).

2) Proposed Action –

Project activities that could potentially disturb Oregon silverspot butterflies are the construction, visitor use and maintenance of trail H (Appendix 1, Map 4). Trail H will pass through sections of potential silverspot habitat located behind Crescent Beach. As stated above, no silverspots were detected in this area during surveys for the species. The future potential for individual butterflies to be disturbed, therefore, is extremely low. RNSP will, however, conduct surveys for the species along the trail route prior to construction using the techniques described previously in the Proposed Action section on page 14. If the species is located in the future, RNSP staff will take actions to protect individuals (i.e. cease construction) and enter into consultation with USFWS. As stated previously, specie experts believe that it is highly unlikely that the area will be colonized by silverspots due to poor habitat conditions (Matoon pers. comm.).

c. Leatherback Turtle, Green Turtle, Olive Ridley Sea Turtle, Loggerhead Turtle

1) Visitor and Staff Use of Existing Developments and Dispersed Use Areas -

Only the Coastal Trail section along the north and south ends of Gold Bluffs Beach traverses suitable sea turtle habitat (Appendix 1, Map 6). None of the four sea turtles have ever been recorded as breeding on beaches within RNSP. Only one species, the olive Ridley sea turtle, has ever been recorded on an RNSP beach. The turtle was recorded approximately 8 miles south of the Coastal Trail sections on Gold Bluffs Beach, and that detection is assumed to have been a fluke event caused by altered ocean currents. Sea turtles could potentially occur on RNSP beaches in the future and people using trails near beaches could disturb the rare individual turtle that washed up on a park beach. Currently, RNSP beaches do not appear to be vital to the continued existence of any these turtles. There will be no measurable disturbance effect from existing visitor use for any of the four listed turtle species.

2) Proposed Action –

Trails R and H (Appendix 1, Map 1) are within viewing distance of beaches. Neither of these proposed trails are expected to have an effect on any of the four sea turtle species for the same reasons just described for existing visitor use.

d. Northern Spotted Owl

1) Visitor and Staff Use of Existing Developments and Dispersed Use Areas -

A large portion of existing RNSP developments and dispersed use areas are within a quarter mile of suitable spotted owl habitat (Appendix 1, Maps 4-8 and Appendix 2). Auditory disturbance from visitor and staff use of existing developments and dispersed use areas are not expected to be a measurable source of disturbance for spotted owls except along park roads. The vast majority of visitors and parks staff using RNSP developments and dispersed use areas do not produce noise above ambient levels that would cause a spotted owl to flush from its perch, abandon its nest or avoid using suitable habitat. In addition, most RNSP visitors and staff use parks trails after the nest initiation period (i.e. after the end of May) (Childers 1999, RNSP 2003) when spotted owls are presumably least sensitive to auditory disturbance. This supposition is further supported by the existence of activity centers in RNSP near existing trails which may indicate

habituation to noise from park visitors. For example, the pairs at the Lost Man Creek and Emerald Creek activity centers have both placed nests within a few hundred yards of existing trails (Schmidt 2004).

Roads, however, do have the potential to cause noise disturbance because of visitor and staff use of vehicles. No studies have been conducted which conclusively connect regular vehicle use of roads and spotted owl nest failure. Aircraft noise effects studies on Mexican spotted owls (Johnson and Reynolds 2002) did not detect any measurable effects to owls at flight distances of 460m. There is also no information on the habituation of spotted owls to consistent above ambient noises such as those produced by vehicles on roads. There is some local evidence that some habituation might occur at some owl territories in RNSP as evidenced by the former activity centers at Cedar Creek, Richardson Creek and Hatchery Hill which were within a quarter mile of busy park roads (Howland Hill Road, Alder Camp Road and Lost Man Creek Access Road, respectively (Appendix 1, Maps 4-6)). It has been assumed that any above ambient noise could be disturbing to nesting spotted owls as identified in the draft Spotted Owl Recovery Plan (USDI 1992). No effective noise attenuation model has accurately accounted for noise blocking objects or terrain and thus a quarter mile effects distance is used in RNSP (and by other federal land management agencies in northern California) for any above ambient noise producing activities.

Disturbance caused by the presence of humans on foot at existing facilities and trails within suitable spotted owl habitat is not expected to cause owls to abandon or alter their use of the habitat. Recent research on Mexican spotted owls has demonstrated that they show no discernable behavioral response when humans closely approach cliff side nests on existing trails (Elliot et al. 2003, R. Hamlin pers. comm., K. Schmidt). Assumedly, northern spotted owls nesting in forest canopies, as opposed to the open canyon habitat of Mexican spotted owls, would be even less reactive due to the greater cover present in their forested habitat. Northern spotted owl nests in RNSP are usually located over 100 feet above the ground in large redwood trees in dense, multilayered forest canopies (Tanner 1999). Presumably, the extremely tall and dense structure of RNSP forests provides significant visual screening for arboreal nesting species. Again, the nests at Lost Man Creek and Emerald Creek activity centers near existing high use trails provide some evidence for this presumption. During a previous consultation on a previous trail construction project in RNSP in the Skunk Cabbage Memorial Groves (refer to Biological Opinion, USFWS number 1-14-98-145) the presence of pedestrian humans was determined to have a adverse effect on spotted owls. An average distance of 150 feet was used to approximate a visual disturbance distance based on the typical mix of RNSP spotted owl habitat structure (i.e. denser young forest and more open old growth forest) (Wallen and Mayle 1998). Based on the new research and further experience with spotted owls within RNSP, it has been determined that pedestrian human presence along trails is not actually a source of detrimental effects. Therefore, no effects area has been analyzed as part of this assessment.

Current spotted owl compliance monitoring efforts eliminate some areas that could be potentially occupied by spotted owls from impacts associated with existing roads (Schmidt 2004). These compliance monitoring efforts will continue for the life of this consultation but are part of a separate consultation (USFWS reference number 1-14-98-24) and will be reinitiated under that consultation when it terminates (see Previous Pertinent Consultations section for details). In addition, barred owls are most likely excluding spotted owls from a number of historic spotted owl activity centers as well as other areas of suitable spotted owl habitat. RNSP has determined that 0.5 mile "barred owl exclusion zones" exist wherever persistent vacancy by spotted owls and occupancy by barred owls has been established through extensive surveys (see 2004 addendum

to Sakai 2003; Kelly et al. 2003). The total amount of RNSP suitable spotted owl habitat covered by barred owl exclusion zones is 5,420 acres with 2,810 contained within the Action Area. Compliance survey areas and barred owl exclusion zones are indicated by transparent, blue line circles on Maps 4-8 in Appendix 1.

There are, however, a number of roads in suitable spotted owl habitat which are not near compliance survey areas or barred owl exclusion zones. These areas could potentially contain unknown spotted owl territories which are being negatively affected by the noise disturbance caused by visitor vehicles. Complicating analyses, however, are suitable habitat areas not near compliance surveys or barred owl zones that are already being affected by non visitor vehicular noise disturbance caused by RNSP maintenance activities. These areas have been previously analyzed and accounted for during a previous consultation (USFWS reference number 1-14-98-24). These suitable habitat areas are indicated by solid gray polygons on Maps 4-8 in Appendix 1.

Existing visitor vehicle noise disturbance effects which do not overlap with any of the above mentioned suitable habitat areas are indicated by solid pink polygons on Maps 4-8 in Appendix 1. As the maps indicate, the impact of this disturbance is evenly distributed across all of RNSP. The numerical results of the analysis are described below in Table 11. The complex overlapping nature of the analysis makes a tabular presentation of the effects of each existing road used by visitors impossible.

Table 11. Amount of suitable spotted owl habitat within RNSP impacted by noise disturbance from existing visitor vehicles that does *not* overlap with 1) previously authorized disturbance take areas (USFWS reference number 1-14-98-24), indicated by solid grey polygons on Maps 4-8 in Appendix 1 (3,072 acres within RNSP), 2) suitable habitat areas confirmed to be unoccupied by spotted owls through compliance surveys, indicated by transparent solid blue lined polygons on Maps 4-8 in Appendix 1 (9,403 acres within RNSP of which 7,442 are within the Action Area) or 3) suitable habitat unavailable for use by spotted owls within barred owl exclusion zones, indicated by transparent dotted blue line circles on Maps 4-8 in Appendix 1 (5,419 acres within RNSP of which 2,810 acres are within the Action Area).

Amount of suitable habitat within RNSP.	Amount of suitable habitat within Action Area.	Amount of suitable habitat potentially impacted by existing visitor vehicle noise disturbance (percentage of suitable habitat)
69,000 acres	34,859 acres	2,059 acres (3.0%)

2) Proposed Action –

Proposed trails and facilities in or within one quarter mile of suitable spotted owl habitat that could be a source of disturbance include trails A, B, C, D, G, L, M, W, X and the rerouted section of the James Irvine Trail; the Camp Lincoln and Highway 199/Elk Valley trailheads; the Skunk Cabbage backcountry camp; and the relocated Forty-four horse camp. The Skunk Cabbage backcountry camp and the two trailheads are not actually within suitable habitat but are within a quarter mile. Only one proposed trail or facility, Trail M, is within a quarter mile of a known active or inactive spotted owl activity center (Appendix 1, Maps 4-8).

Table 12. Proposed trails or facilities in or within one quarter mile of suitable spotted owl habitat and current survey/monitoring status. Other proposed trails, trailheads, backcountry campgrounds are more than a quarter mile from suitable spotted owl habitat.

Trail or Facility	Spotted Owl Surveys Completed?	
	Yes	No
A – Hiouchi Flat Trail	X	
B – Aubell-Boy Scout Tree Trail-Hatton Trail Connector		X
C – Camp Lincoln-Walker Hole Connector		X
D – Lieffer-Ellsworth-Peterson Trail Connector	X	
G – Rellim Ridge-Coastal Trail Connector	X	
X – Skunk Cabbage Trail North	X	
W – Elk Meadow-Lady Bird Johnson Trail Connector		X
M – East Side Trail Segment		X ¹
L – B-Line Bike Trail		X ^{1,2}
Highway 199/Elk Valley Road Junction Trailhead		X ³
Camp Lincoln Trailhead	X	
Skunk Cabbage Backcountry Camp	X	
Forty-Four Horse Camp Relocate	X	
Rerouted section of James Irvine Trail		X

¹Portions of trail route covered by current surveys/monitoring.

²Trail route on existing road, no construction required.

³Extremely high levels of existing ambient noise and visual disturbance from highway and/or adjacent private businesses and homes.

The spotted owl proposed action disturbance effects discussion has been broken up into the following subsections: construction, visitor use, maintenance and trail removal/watershed restoration.

1. Construction -

Noise disturbance may impact spotted owls due to trail or facility construction noise (i.e. use of mechanized tools) that will occur between 10 July and 31 August. The impacts are not expected

to be adverse because the noise disturbance will be occurring late in the breeding season.

Even though pedestrian human use of existing facilities and trails is not believed to be a source of disturbance for spotted owls, it is unknown how “naïve” spotted owls may react to a new trail or facility placed within the immediate “visual range” (i.e. 150 feet) of an active nest tree. Therefore, as described in the proposed action, RNSP will use protocol surveys to locate unknown active spotted owl activity center locations. Any activity center discovered will be avoided by moving the trail route outside of the visual range distance of the nest as determined by an RNSP biologist (i.e. at least 150 feet).

A number of the proposed trails and facilities located within one quarter mile of suitable habitat are currently covered by existing adjacent spotted owl compliance surveys as shown in Table 9. Except for the East Side Trail activity center along proposed Trail M mentioned above, none of the other proposed action sites currently covered by existing surveys have detected spotted owls within the last two years. These existing compliance surveys will continue. Trail L will not require surveys for construction activities because the route is along an existing road and thus construction will not be necessary. The Highway 199/Elk Valley Road junction trailhead will not require surveys because the existing high levels of noise and visual disturbance created by the adjacent highway, private businesses and homes located along the RNSP boundary renders any additional disturbance moot. Trails B, C, W, portions of trail M and the rerouted section of the James Irvine Trail will require new spotted owl surveys in order to determine whether spotted owl activity centers exist along the proposed trail route.

Only one known spotted owl activity center, East Side Trail along proposed trail M, is within 150 feet of a proposed trail route (Appendix 1, Map 8). The activity center is located along a section of the proposed trail that has already been constructed but that has never been opened to the public. Construction activities and thus the possibility for noise disturbance by construction workers, will not occur since this section of Trail M is already built and in good condition.

2. Visitor Use –

As noted above in the construction section, the East Side Trail activity center is located along the proposed Trail M route (Appendix 1, Map 8). A nest has never been found at this activity center since annual monitoring began in 1993, but the results in some years has been uncertain. The activity center is based on daytime owl pair locations. During some surveys the initial owl detection was within 150 feet of the trail route and in other surveys the initial detection was greater than 150 feet from the trail route. The activity center has also had barred owl detections in 1997 and 2000 (Schmidt 2003). It is unknown if the spotted owls at this activity center will eventually nest or where the potential future nest will be located or if the activity center will be taken over by barred owls. RNSP will continue to monitor this activity center and close the trail if spotted owl nesting is initiated within visual range of the trail as described in the proposed action.

Visual disturbance of newly discovered, “naïve” nesting spotted owls by visitor use of new trails will not occur because of the activity center avoidance measures described in the proposed action (i.e. protocol surveys will “clear” the proposed trail routes and reroutes). Besides the East Side Trail activity center described above, there are no known activity centers that are currently active or inactive that are within the visual disturbance range of proposed trail routes.

An additional 166 acres of suitable, unsurveyed spotted owl habitat will be disturbed by vehicle

noise when the 6.5 mile portion of the West Side Access Road is opened to the public (Appendix 1, Map 7).

3. *Maintenance -*

Some noise disturbance to spotted owls will occur from the maintenance of the proposed trails and facilities but this disturbance is not expected to have an adverse effect because all above ambient noise producing work (i.e. power tool use) will occur outside of the “regular” seasonal noise restriction period (i.e. work will occur after 9 July during the less sensitive late breeding season,). The only exception to this is the potential removal of two fallen old growth trees with chainsaws during the seasonal noise restriction period along proposed Trail M. Past experience has shown that this type of emergency maintenance only occurs every few years. It is estimated that a total of 250 acres of suitable habitat could potentially be disturbed each year by the removal of two fallen trees with chainsaws.

4. *Trail Removal/Watershed Restoration -*

No disturbance to spotted owls will occur from the proposed removal of trails and watershed restoration work because all work will occur outside of the breeding and post fledging limited operating period (February 1 through September 15).

Table 13. Persistent, Annual Disturbance Summary for Spotted Owls

Amount of suitable habitat within RNSP.	Amount of previously authorized persistent, annual disturbance from past consultations within RNSP ¹ (percentage of suitable habitat)	Additional amount of suitable habitat potentially impacted annually by existing visitor and staff use noise disturbance (percentage of suitable habitat)	Additional amount of suitable habitat potentially impacted annually by proposed action noise disturbance (percentage of suitable habitat)	Total (percentage of suitable habitat)
69,000 acres	3,072 acres (4.4%)	2,059 acres (3%)	416 acres (0.2%)	5,547 acres (8.0%)

¹ USFWS reference number 1-14-98-24.

e. Bald Eagle

1) Visitor and Staff Use of Existing Developments and Dispersed Use Areas -

The one known bald eagle nest in RNSP is on a ridge a mile to the south of Orick and is located within a quarter mile of the McArthur Creek Horse trail (Appendix 1, Map 7). The nest is not visible from the trail because of a ridge between the trail and the nest tree but eagles perched on nearby trees may be able to see visitors on the trail. The nest has maintained very high fledging success despite the presence of the trail. Presumably the ridge prevents disturbance from visitors using the trail. If any new nests or winter roosts are discovered within 0.5 miles of existing developments or dispersed use areas, RNSP staff will temporarily close the section of trail or associated facility and enter into consultation with the US Fish and Wildlife Service.

2) Proposed Action -

No existing known bald eagle nests or winter roosts occur within 0.5 miles of any proposed trails or facilities. RNSP staff opportunistically survey portions of suitable habitat throughout RNSP for new bald eagle nests and winter roosts each year and will continue to do so. If any new nests or winter roosts are discovered within 0.5 miles of proposed trails or facilities, RNSP staff will temporarily close the trail or facility and enter into consultation with the US Fish and Wildlife Service.

f. Marbled Murrelet

1) Visitor and Staff Use of Existing Developments and Dispersed Use Areas -

Much, but not all, of the discussion on the effects of noise and visual disturbance to spotted owls is also relevant to marbled murrelets as were previous RNSP analyses of visitor and staff use of existing developments and dispersed use areas. Noise disturbance from visitor and staff use should not have a detrimental effect on marbled murrelets for the same reasons discussed above for spotted owls except for those habitat areas along RNSP roads. Marbled murrelets may or may not be visually disturbed by human presence near their nests. Researchers have come to contrary conclusions on the effects of visual disturbance of human presence or above ambient noises near nests. Nelson and Hamer (1995) noted that there may be some effects due to human presence near nests (though these were discussed in relation to nest predation and not abandonment) as did the USFWS (1997). In contrast, Singer et al. (1992, 1995) recorded murrelet nesting in the presence of significant visitor use of campgrounds and heavily trafficked roads and trails. Hebert and Golightly's (2006) research of nesting marbled murrelets in RNSP also indicates that murrelets may habituate to human presence and will not abandon their nests when exposed to experimental loud mechanical noises. They conjecture that noise and visual disturbance may not have a direct deleterious effect on nesting murrelets. It must be noted that their experimental sample size was relatively small ($n = 18$).

Due to the uncertainty of murrelet behavioral response to human caused disturbance, it may be possible that visual disturbance caused by visitors using existing developments and dispersed use areas and noise caused by vehicles on RNSP roads may flush some marbled murrelets from nests or cause murrelets to avoid suitable habitat areas. The distance from visitors and staff using these developments and dispersed use areas at which a murrelet may flush from its nest most likely varies widely between locations because of the different spatial arrangement of intervening visual barriers (e.g. tree branches, tree trunks, topography) (Wallen and Mayle 1998, Sakai 2003). This is especially true for murrelets at RNSP where most nests are greater than 150 feet from the ground in tall old growth redwood trees (Hebert pers. comm.). During a previous consultation on a trail construction project in the Skunk Cabbage Memorial Groves (refer to Biological Opinion, USFWS number 1-14-98-145) an average distance of 150 feet was used to approximate a visual disturbance distance (Wallen and Mayle 1998) and a quarter mile was used to measure the effects of above ambient noise.

If suitable habitat in areas previously addressed in past consultations are eliminated, then 3,129 additional non-overlapping acres are potentially being negatively affected by noise and visual

disturbance caused by visitor use of existing developments and dispersed use areas. This equates to approximately 7.6 percent of the 41,000 acres of suitable habitat within RNSP. The visual disturbance acres have not been “tracked” in this assessment because the area of indirect effect caused by the potential increased predation risk discussed below in the Indirect Effects section is larger and affects the exact same areas as do areas of visual disturbance, thereby negating the visual disturbance calculations. Noise disturbance acreages, however, have been tracked in this assessment because they do not completely overlap with the indirect effects just mentioned.

2) Proposed Action –

Proposed trails and facilities in or within one quarter mile of suitable marbled murrelet habitat which could potentially be a source of disturbance include trails A, B, C, D, M, W, X, the rerouted section of the James Irvine Trail, and the Camp Lincoln and Highway 199/Elk Valley trailheads. The two trailheads are not located within suitable habitat but are within a quarter mile while only the northwestern half of trail M is located in or within a quarter mile of suitable habitat (Appendix 1, Maps 9-13).

Table 14. Proposed trails, trailheads and backcountry camps in or within one-quarter mile of suitable marbled murrelet habitat.

Trail or Facility
A – Hiouchi Flat Trail ¹
B – Aubell-Boy Scout Tree Trail-Hatton Trail Connector
C – Camp Lincoln-Walker Hole Connector
D – Lieffer-Ellsworth-Peterson Trail Connector
E – Mill Creek Horse Loop – Little Bald Hills Connector ²
X – Skunk Cabbage Trail North
W - Elk Meadow-Lady Bird Johnson Trail Connector
M – East Side Trail ³
Highway 199/Elk Valley Road Junction Trailhead ^{1, 2}
Camp Lincoln Trailhead ^{1, 2}
Aubell Trailhead ²
Rerouted section of James Irvine Trail

¹Extremely high levels of existing ambient noise and visual disturbance

due to presence of highway and/or adjacent private businesses and homes.

²Not located within suitable habitat but within one quarter mile.

³Northwestern half of trail located in or within quarter mile of suitable habitat.

The marbled murrelet proposed action disturbance effects discussion has been broken up into the following subsections: construction, visitor use, maintenance and trail removal/watershed restoration.

1. Construction -

No noise disturbance to marbled murrelets will occur from construction work because all above ambient noise producing work (i.e. mechanized tool use) will occur outside of the seasonal noise restriction period. Visual disturbance may occur for the reasons stated above in the Existing Trails, Trailheads, Backcountry Campgrounds and Dispersed Camping section above. Any areas of visual disturbance caused by construction workers have been considered in conjunction with future visitor use effects, discussed below, because the impacts were assumed to be the same (i.e. construction workers will be at the same locations as future visitors using the new developments – thus the effects completely overlap).

2. Visitor Use -

Noise disturbance from visitor use of proposed trails and facilities are not expected to be a direct source of measurable disturbance for marbled murrelets for the same reasons stated above for spotted owls. Using the same distance figures and analysis used above for visitor use of existing trails and associated facilities, an additional maximum 384 acres of suitable marbled murrelet habitat may be *visually* disturbed by visitor use within the next ten years depending on the construction schedule of the proposed trails and associated facilities. This equates to an additional 0.9 percent of the 41,000 acres of suitable murrelet habitat available in RNSP. Again, disturbance associated with these acres will not be tracked in this assessment or used as part of the final effects determination because of the completely overlapping indirect effect of increased predation threat occurring at exactly the same locations. Please note that the additional disturbance associated with the rerouted section of the James Irvine Trail equates the loss of the disturbance associated with the abandoned section of the same trail (described in section four below), resulting in no net change in the existing amount of disturbance.

3. Maintenance -

No noise disturbance to marbled murrelets will occur from the maintenance of the proposed trails and facilities because all above ambient noise producing work (i.e. power tool use) will occur outside of the seasonal noise restriction period. The only exception to this is the potential removal of two fallen old growth trees with chainsaws during the seasonal noise restriction period along trail “M” (Appendix 1, Map 13). Past experience has shown that this type of emergency maintenance only occurs every few years. It is estimated that 250 acres of suitable habitat could be disturbed annually by the removal of two fallen trees with chainsaws. Any areas of visual disturbance have been considered in conjunction with future visitor use, discussed immediately above.

4. Trail and Road Removal/Watershed Restoration -

No disturbance to marbled murrelets will occur from the proposed abandonment and/or removal of trails and watershed restoration work. All work will occur outside of the seasonal noise and visual restriction period.

Table 15. Persistent, Annual Disturbance Summary for Marbled Murrelets¹

Amount of suitable habitat within RNSP.	Amount of previously authorized persistent, annual disturbance from past consultations within RNSP ² (percentage of suitable habitat)	Additional amount of suitable habitat potentially impacted annually by existing visitor and staff use disturbance (percentage of suitable habitat)	Additional amount of suitable habitat potentially impacted annually by proposed action (percentage of suitable habitat)	Total (percentage of suitable habitat)
41,100 acres	3,584 acres (8.7%)	3,129 acres (7.6%)	384 acres (0.9%)	7,097 acres (17.2%)

¹It must be noted that almost all of the additional disturbance caused by existing visitor and staff use and the proposed action overlaps with areas that are affected by potential increased predator risk (discussed in the Indirect Effects section) and so the figures will not “add up” in the final determination. Final determination of effect area totals were calculated using GIS in order to eliminate assessing different effects to the same area twice.

² USFWS reference numbers 1-14-98-24 and 1-14-98-145.

g. Western Snowy Plover

1) Visitor and Staff Use of Existing Developments and Dispersed Use Areas -

Most sandy beaches accessible to visitors along the RNSP coastline could be suitable western snowy plover habitat for either over wintering or breeding birds. As evidenced by RNSP’s first recorded successful breeding season in 2004, it appears that Gold Bluffs Beach is the most suitable habitat available in the park. Visitor use along this beach is primarily concentrated in the middle section from Espa Lagoon to the vicinity of Fern Canyon (Appendix 4). Visitors (and staff) walking and recreating along this and other park beaches could potentially cause both adult and juvenile plovers to flush. Of particular concern would be kite flying (which plovers may perceive as potential predators), horses and dogs walking on the beach off leash. Adults flushed from nests could expose eggs and chicks to predators or extreme heating or cooling depending on weather conditions. Flushed adults and chicks could expend unnecessary energy which could decrease their survivorship (USFWS 2001). Constant disturbance could cause nest abandonment or suitable habitat avoidance (Page et al. 1977, Colwell et al. 2004).

The minimization measures described in detail in the Proposed Action should greatly lessen or eliminate these potential impacts. Provisions pertinent to managing visitor caused disturbance for wintering plovers include increasing monitoring efforts when more than two plovers are present and the posting of information signs at beach access points. If two or more wintering plovers are present within 0.25 miles of a high use visitor use area between 1 February and 28 February then visitor activity restrictions may be put in place which will deny public access to areas 1,000 feet above the waveslope. Varying provisions pertinent to managing visitor caused disturbance for nesting and brooding plovers include increasing monitoring, increasing visitor

education, restricting public access to areas within 0.25 miles to up to four miles of the plovers north and south along the beach and 1,000 feet above the waveslope and erecting predator exclosures, symbolic fencing and regulatory signs. Despite these conservation measures, however, there is the possibility that some adults, nests, or chicks could go undetected during surveys thus causing the conservation measures to not be put in place. There is, therefore, the possibility that some unquantifiable amount of disturbance may take place.

2) Proposed Action –

Trails R and H (Appendix 1, Maps 2 and 3) are located near suitable snowy plover habitat. Due to the immediate proximity of these trails to suitable snowy plover habitat, trail construction, visitor use and maintenance activities could potentially disturb plovers if they were present. It is not expected, however, that these new trails will increase visitor use above existing visitor use levels on the nearby beaches. Again, as for the existing visitor and staff use just discussed above, the minimization measures described in the Proposed Action should lessen, but not completely eliminate the possibility of disturbance.

h. Mardon Skipper

1) Visitor and Staff Use of Existing Developments and Dispersed Use Areas -

The only suitable habitat for mardon skippers within RNSP occurs in the Little Bald Hills area (Appendix 1, Map 2). Only the Little Bald Hills trail passes through the area. Occasional visitors walking or riding down the trail could cause minor flushing behavior of individual butterflies or caterpillars. This disturbance should be negligible to minimal.

2) Proposed Action -

PLEASE NOTE – ACTIONS PARTIALLY OR WHOLLY OCCURRING OUTSIDE OF RNSP.

The only suitable habitat for mardon skippers within RNSP occurs in the Little Bald Hills area (Appendix 1, Map 2). Only trail E will pass through a 1.5 mile portion of the Little Bald Hills area and only 0.25 miles will be within suitable habitat. Individuals could be disturbed during construction activities but this disturbance is expected to be minimal because only a very small area (less than a half acre of suitable habitat) will be disturbed. RNSP will conduct surveys prior to any construction within suitable habitat. If skippers are found, construction will be timed so as to not disturb the species most important life cycle periods (i.e. 1 May to 31 August) (S. Mattoon pers. comm.). Once the Little Bald Hills Trail – Mill Creek Horse Trail connector trail (trail E2) is completed, however, visitor use should increase in the habitat areas along the existing Little Bald Hills Trail. Occasional visitors walking or riding down the trail should only minimally disturb individual butterflies or caterpillars. The same is true of future maintenance workers on the trail.

j. Pacific Fisher

1) Visitor and Staff Use of Existing Developments and Dispersed Use Areas -

Research about the effects of human disturbance on fishers is scarce and primarily anecdotal.

Seglund (1995) found that no rest sites were located within 100m of homes, roads and campgrounds. Breyer and Golightly (1995) speculated that major roads may be a significant enough disturbance to cause fishers to avoid the area near them. Slauson (2003), however, found fishers near (<100m) minor (unpaved) park roads and trails within RNSP more than expected and >100m from minor park roads and trails significantly less than expected (chi squared = 4.61, df = 1, prob. of chi squared > 4.61 = $p < 0.04$). Fishers were also found along paved park roads (e.g. Newton B. Drury Parkway) but not near US Highway 101. Slauson (2003) surmised that RNSP roads and trails do not present a disturbance threat to fishers but that major, non-RNSP highways may (see Cumulative Effects section discussion below). It is believed that the presence of visitors on trails probably does not affect fishers but that major, frontcountry campgrounds within suitable habitat probably cause fishers to avoid these areas for resting and denning (Zielinski pers. comm.).

Most likely the Jedidiah Smith, Mill Creek and Prairie Creek campgrounds as well as major, high use trailheads and park roads (i.e. Lady Bird Johnson Grove, Big Tree, Simpson Reed Grove, Stout Grove trailheads; Newton B. Drury Parkway, Alder Camp Road, Redwood Creek Trailhead Access Road, Davison Road, Cal Barrel Road, Mill Creek Campground Access Road, Howland Hill Road, Walker Road and Coastal Drive) (Appendix 1, Maps 2 and 3) are potentially eliminating some suitable habitat areas from being utilized by fishers. Using Seglund's (1995) 100m area of effect, the total habitat potentially made less suitable by major park campgrounds, roads and trailheads is 2,169 acres or 3.1 % of the total suitable fisher habitat within RNSP.

The effects of small, backcountry camps and large trailheads on fishers are unknown. The amount of human use may be such that existing RNSP backcountry camps and trailheads in suitable habitat are a source of disturbance. Alternately, the lack of electrical power (and thus the use of radios and other noise making devices), lower overall human presence and general low impact nature of backcountry campers and trailhead users may not be a sufficient enough disturbance to cause fishers to abandon suitable habitat. It is unlikely that the dispersed camping along Redwood Creek gravel bars is causing a measurable disturbance. Visitor camps along the Redwood Creek gravel bars are located in the open in areas naturally avoided by fishers.

2) Proposed Action -

No new major campgrounds or roads are proposed. The additional new trails are not expected cause additional disturbance to fishers. The new proposed backcountry campgrounds are all located in low quality suitable habitat (i.e. < 40 year old second growth) which do not provide suitable denning or rest sites. The likelihood for disturbance, therefore, is low. The proposed new trailheads are all either in unsuitable habitat or located along the edge of RNSP near developed private land, with much greater sources of disturbance compared to the effects of a new trailhead (Appendix 1, Maps 2 and 3). Construction and maintenance of new trails, trailheads and backcountry camps as well as the proposed watershed restoration in Prairie Creek Redwoods State Park could partially disturb fishers nearby in maternal dens but seasonal noise restrictions will eliminate noise disturbance during the critical natal den period of use (24 March to 15 June).

2. Injury or Harm

No injury or harm is expected for California brown pelican, leatherback turtle, green turtle, olive

Ridley sea turtle, loggerhead turtle, northern spotted owl, marbled murrelet, or bald eagle from any visitor or staff use of existing developments, dispersed use areas or any proposed actions.

Specifically, spotted owls and marbled murrelets will not be harmed or injured by existing or future visitor or staff use of RNSP developments because there is no possibility that a visitor or staff member walking, riding or driving on the ground could injure arboreal species like owls and murrelets. No harm is expected to come to marbled murrelets due to activities described in the Proposed Action because no suitable nest trees will be removed or altered, thereby negating the possibility for injury to nestlings and adults. No harm is expected to come to spotted owls because all new development areas will be surveyed for spotted owl presence as described in the Proposed Action. Any areas containing occupied nest trees will be avoided or if an occupied nest stand is discovered then no activities will take place between 1 February and 15 September in order to avoid harming recently fledged owlets as described in the Proposed Action.

a. Western Lily

1) Visitor and Staff Use of Existing Developments and Dispersed Use Areas -

RNSP staff believe that the current habitat in RNSP's coastal scrub and grasslands is not suitable to sustain populations of western lily, due primarily to meadow encroachment by spruce and shrubs (L. Arguello pers. comm.). The only existing trails or facilities within suitable habitat are along the northern and middle sections of the Coastal Trail. Visitor use of the trail is restricted to the trail tread itself where no vegetation exists and thus the potential for injury or harm to any individual plant is not possible because no plants are on the trail tread. The exact amount of suitable habitat is unknown. Although a systematic survey of RNSP's coastal scrub and grasslands has not been conducted for the lily, a substantial amount of habitat, especially in the northern half of RNSP, has been surveyed in association with projects. Currently, this species has not been documented in RNSP and is believed to not exist within the parks (L. Arguello pers. comm.).

2) Proposed Action –

Listed plant surveys will be conducted for every project activity area/route before construction begins. If either species is located, RNSP staff will protect the plants by changing the location of the development and enter into consultation with USFWS. The possibility that any individual plant will be discovered, let alone injured or harmed, is low due to the lack of detections from past surveys within RNSP.

b. Beach Layia

1) Visitor and Staff Use of Existing Developments and Dispersed Use Areas -

The only existing known population of beach layia within the Action Area is the population on Freshwater Spit. The effects of visitor use to beach layia on Freshwater Spit was analyzed in the Freshwater Spit Development Concept Plan Biological Assessment. A Letter of Concurrence was issued on 14 January 2003 (USFWS reference number 1-14-2003-1442).

2) Proposed Action -

Trail R (Appendix 1, Map 3) is the only proposed new development that will occur near the only existing RNSP beach layia population. The trail route will not pass directly across suitable habitat but the north terminus will be near the beach which could increase foot traffic in the immediate area. The only known plants are located approximately 0.25 miles north of the trail's north terminus (A. Williams pers. comm.) and thus should not be affected by any increased foot traffic caused by the construction of Trail R.

c. Oregon Silverspot Butterfly

1) Visitor and Staff Use of Existing Developments and Dispersed Use Areas -

The only existing developments and dispersed use areas that could potentially affect Oregon silverspot butterflies is the Coastal Trail near Crescent Beach (Appendix 1, Map 4). No silverspots were detected in this area during repeated surveys for the species in the early to mid 1990's and 2004. It is suspected that the microclimate of this area may be too cool for silverspots (S. Mattoon pers. comm.). The likelihood that silverspots will use this area is thought to be very low (K. Hanson pers. comm.). Due to the lack of presence of silverspots and very low potential for their presence in the future, no harm or injury is expected from existing use of the Coastal Trail.

2) Proposed Action -

The construction and maintenance of trail H (Appendix 1, Map 4) could have the potential to cause individual caterpillars to be potentially harmed if they are present. As stated above, no silverspots have been found during past surveys and are highly unlikely to be found during future surveys (Mattoon pers. comm.). The trail route will be surveyed prior to construction. If silverspots are found in this area then RNSP will close the trail and reinitiate consultation with the USFWS.

d. Western Snowy Plover

1) Visitor and Staff Use of Existing Developments and Dispersed Use Areas -

Visitors (and staff) walking and recreating along park beaches could potentially trample unseen plover nests. The impact minimization measures described in the Proposed Action should greatly lessen, but not completely eliminate, this potential impact. Denying public access within a quarter mile (north and south) by 1,000 feet above the wave slope of snowy plover nests, providing visitor education programs, posting signs and erecting symbolic fencing should prevent most trampling incidents. Mobile adults and chicks should not be threatened by visitors walking or running on the beach (visitors are not allowed to use motorized vehicles on RNSP beaches without a permit – this activity will be covered by another consultation). Broods will be protected from being trampled by a horse by the impact minimization measures described in the Proposed Action.

There is always the possibility that an unknown plover pair could establish a nest without being detected early enough by RNSP surveyors and subsequently get trampled by visitors. The

probability that this may occur, however, is expected to be minimal because of the provision in the impact minimization measures to restrict public access during the month before the official breeding season (i.e. February) if two or more plovers are found in the same location on any RNSP beach during the regular survey schedule throughout the nesting season. Restricting public access before birds even attempt to nest should provide an extra measure of protection even if a pair of plovers begins to nest right at the beginning of the breeding season.

2) Proposed Action -

Trails R and H (Appendix 1, Maps 2-3) are located near, but not in, suitable snowy plover habitat. Trail construction, visitor use and maintenance activities of the trails themselves will not result in the trampling of an unseen plover nest. However, visitors leaving these new trails and accessing the adjacent beach could potentially trample an unseen plover nest. Again, as for the existing visitor and staff use just discussed above, the impact minimization measures should greatly lessen or eliminate this potential impact.

e. Mardon Skipper

1) Visitor and Staff Use of Existing Developments and Dispersed Use Areas -

The only existing developments and dispersed use areas that could potentially affect mardon skipper are short sections of the Little Bald Hills Trail (Appendix 1, Map 4) which traverse suitable habitat. Little harm is expected from visitor and staff use of the trail because few skippers would be expected to be on the trail for long periods because little to no vegetation grows on the trail tread.

2) Proposed Action -

The construction and maintenance of trail E (Appendix 1, Map 4), have the potential to cause individual caterpillars to be harmed if they are present. The trail route will be surveyed prior to construction. If skippers are found in this area then RNSP will reroute the trail through unsuitable habitat areas as much as the terrain allows to minimize the potential for future impacts.

f. Pacific Fisher

1) Visitor and Staff Use of Existing Developments and Dispersed Use Areas -

Injury or death caused by vehicle collisions has been cited as a potential threat to fisher (Zielinski 1995). Two fisher studies in the northeast of the United States have recorded radio collared study animals being struck by vehicles and fisher road kills have also been recorded in Yosemite National Park (citations in USFWS 2004, Paragi et al. 1994). Wide, paved roads which have higher speed limits have been identified as being a greater threat than unpaved or low speed limit roads because of the greater chance that a fisher would not be able to avoid being hit (USFWS 2004). No research, however, has directly addressed the question of under what vehicle speeds a road becomes a potential death or injury threat to fishers.

Visitors to RNSP utilize park roads to directly view the parks' attractions and to drive to

trailheads, campgrounds and picnic areas. Park staff also use the same roads to access various portions of RNSP. All or portions of RNSP's 12 visitor accessible roads are within suitable fisher habitat (Appendix 1, Maps 4-8). All twelve of RNSP's visitor accessible roads are either two or one lanes wide. Ten of the 12 visitor accessible RNSP roads have speed limits of either 25 or 15 miles per hour. The nine mile long Newton B. Drury Parkway and 2.5 mile long Alder Camp Road have 45 and 35 mile per hour speed limits, respectively. Both roads are paved, two lane and completely within suitable fisher habitat. These two roads, presumably, represent a greater threat to fisher than do the rest of RNSP's visitor accessible roads. No vehicle caused fisher mortalities have been recorded within RNSP but fisher have been seen running across park roads and have been detected within 100m of park roads (unpub. RNSP database, Slauson 2003). Slauson (2003) conjectured that the Newton B. Drury Parkway may be a source of fisher mortality or injury but that the threat was relatively minor due to the overall narrowness of the road. He did, however, identify U.S. Highway 101 as a much greater threat for vehicle caused fisher mortality (see Cumulative Effects section discussion below). It is difficult to accurately assess the overall impact of RNSP visitor accessible roads to fisher except to state that, relatively speaking, roads with higher speed limits have a great potential for negative impacts than do roads with lower speed limits. A quantification of that threat is currently impossible to determine given the paucity of research addressing the issue.

2) Proposed Action -

No additional roads are proposed, however, 6.5 miles of the West Side Access Road will be opened to the public. All portions of the road within RNSP pass through areas of either low fisher habitat suitability or unsuitability (i.e. the road is surrounded by stands < 40 years old with many areas dominated by red alder (*Salix rubrens*) with little to no downed woody component. The road will have a 15 mile per hour speed limit. Most of the road is very narrow, often only one lane wide. Visitor use of the road will increase the potential for collisions with fisher over current use levels (only RNSP staff currently use the road). The increased threat should be relatively low, however, due to the low vehicle speed limit posted for the West Side Access Road.

3. Loss and Modification of Suitable Habitat

All Species

1) Visitor and Staff Use of Existing Developments and Dispersed Use Areas -

The only potential for loss or modification of suitable habitat from existing developments and dispersed use areas is from maintenance of the developments; visitor and staff use of developments and dispersed use areas does not inherently damage any species habitat if developments are properly maintained. Maintenance activities were fully analyzed for effects to listed species in a Biological Assessment which examined RNSP's annual maintenance program (Letter of Concurrence and Biological Opinion - USFWS reference number 1-14-98-24). This coverage terminates in 2007. A new consultation will be completed which will cover all maintenance activities before the termination date.

a. Western Lily

Proposed Action –

RNSP staff believe that the current habitat in RNSP's coastal scrub and grasslands is not suitable to sustain populations of western lily, due primarily to meadow encroachment by spruce and shrubs (L. Arguello pers. comm.). Although a systematic survey of RNSP's coastal scrub and grasslands has not been conducted for the lily, a substantial amount of habitat, especially in the northern half of RNSP, has been surveyed in association with projects (L. Arguello pers. comm.). Currently, this species has not been documented in RNSP. Due to the lack of apparently suitable habitat, no suitable habitat is expected to be removed. All projects initiated in RNSP's coastal zone are reviewed for possible impacts to threatened and endangered plants, including a ground survey in the project area. In the highly unlikely case that the species is located in a project area, RNSP staff will protect the plants by changing the trail route and enter into consultation with USFWS.

b. Beach Layia

Proposed Action –

Trail H, an elevated boardwalk is near (within 50 yards), but not in, low quality suitable beach layia habitat (L. Arguello pers. comm.) (Appendix 1, Maps 2 and 3). The habitat near this trail is of low quality because during the winter months the open, sandy foredunes are often completely inundated by the sea while the vegetated back dunes contain no open sandy areas. In addition, beach layia has only been found at one location within RNSP, approximately 30 miles south of the H trail location. The trail will not traverse this habitat and thus there is no potential for removing unoccupied, but low quality suitable habitat.

The R trail will not traverse beach layia habitat but the termini are located near suitable beach layia habitat within a quarter mile of RNSP's only known population on Freshwater Spit. The trail route itself will not alter or remove suitable habitat and the termini will be off the beach.

All projects initiated in RNSP's coastal zone, including trail construction, are surveyed for threatened and endangered plants. If the species is located in a project area, RNSP staff will protect the plants by moving the trail to a less sensitive location and enter into consultation with USFWS.

c. California Brown Pelican

Proposed Action –

No suitable brown pelican habitat will be altered by project activities.

d. Oregon Silverspot Butterfly

Proposed Action –

The only project activities that could potentially alter Oregon silverspot butterfly habitat is the construction and maintenance of trail H (Appendix 1, Map 2). Trail H will pass through sections of low quality, potentially suitable silverspot habitat located behind Crescent Beach. It is unknown if larval or adult food source plants exist in the action area.

No silverspots were detected in this area during repeated surveys for the species in the early to mid 1990's and in 2004. It is suspected that the microclimate of this area may be too cool for silverspots (S. Mattoon pers. comm.). RNSP will conduct surveys for the species and host plants along the trail route prior to construction. If the species is located in the future, RNSP staff will change the trail route out of suitable habitat and enter into consultation with USFWS. If food source plants do exist in the action area, then there is the potential for approximately 0.1 acres of low quality, unoccupied suitable habitat to be removed.

e. Leatherback Turtle, Green Turtle, Olive Ridley Sea Turtle, Loggerhead Turtle

Proposed Action –

No trails, trailheads or campgrounds will be built directly on suitable sea turtle habitat so there will be no effect from any project activity.

f. Northern Spotted Owl

Proposed Action –

1. Trail, Rerouted Trail, Trailhead and Backcountry Campground Construction -

None of the proposed trailheads or backcountry camps are located in suitable spotted owl habitat and thus there is no possibility of habitat removal or degradation from the construction of these facilities. Trails A, B, C, D, G, X, M, L and the rerouted portion of the James Irvine Trail are partially or entirely located within suitable spotted owl habitat (Appendix 1, Maps 4-8). None of the proposed trails requiring construction are within known nest groves or a quarter mile of any known activity center (trail M is already constructed through the East Side Trail activity center). Construction of the proposed trails will not result in the removal of suitable spotted owl nesting or roosting trees because only trees less than 18 inches DBH will be cut with most less than 12 inches DBH. Trail construction may result in a temporary degradation of habitat from removal of some potential hunting perches and prey habitat. This degradation, however, will be minimal when compared to the significant amounts of remaining surrounding available habitat. No nest groves of unknown territories will be degraded because protocol surveys, described in the proposed action, should presumably find unknown nest sites. ***The total amount of spotted owl nesting, roosting and foraging habitat that will be degraded by trail construction is approximately 14.5 acres (0.02%) spread throughout RNSP's 69,000 + acres of suitable***

habitat. No individual spotted owl territory will have more than a negligible amount of habitat degraded due to the linearity of the proposed construction. Each foot trail will have a vegetation clearance zone of 6 feet wide by 8 feet tall while on horse trails a clearance zone of 8 feet by 10 feet will be utilized. This means that in old growth forest and suitable mature second growth forest areas (>40 years old) understory shrubs and tree limbs will be the primary vegetation cleared with few trees being removed. The few trees removed should not prevent spotted owls from utilizing the area because remaining trees will continue to provide sufficient foraging perches and prey habitat. No overstory canopy would be altered and thus canopy cover would not decrease post construction. In dense second growth areas, which provide marginal spotted owl foraging habitat (>30 years old), more trees will be removed but the remaining trees will continue to provide sufficient foraging perches and prey habitat. In no areas of trail construction through suitable habitat is the canopy expected to be more than marginally altered.

2. Maintenance -

None of the proposed maintenance activities will result in the removal or degradation of suitable spotted owl habitat components and thus there are no negative effects.

3. Trail Closure and Restoration -

Removal/abandonment of trails R1, R2 and the two mile portion of the James Irvine Trail will involve only hand tool work to reshape and recontour the existing foot trail bed back to the original slope and replace topsoil and understory vegetation. No spotted owl habitat components will be affected by these activities.

4. Watershed Restoration/Road-to-Trail Conversion -

1) West Ridge Road/Butler Creek Trail ("R4")

The 5 miles of watershed restoration/road-to-trail conversion work to occur along the West Ridge Road/Butler Creek Trail (Appendix 1, Map 6) in Prairie Creek Redwoods State Park will have the same effect on spotted owl habitat regardless of the treatment style (full restoration or road-to-trail). The area was last cut in 1958 and is now considered suitable spotted owl habitat. Portions of the watershed restoration/road-to-trail conversion project area have been surveyed for spotted owls (see discussion on barred owl presence below). No spotted owl activity centers have been found within the area during these partial surveys.

The proposed activities will include felling trees that are growing within the road fill that will be recontoured to the original hill slope. The species mix is typical of near-coastal naturally regenerating second growth forest in RNSP with a mixture of redwood, Sitka spruce, red alder and Douglas fir. Random measurements of 20 of the largest trees growing in the road fill dispersed throughout the restoration/conversion work area indicated a mean height of 124 feet (SD = 15.9, range 94 – 148 feet) and mean DBH of 21.2 inches (SD = 4.6). Most trees are smaller than these outliers. Ocular surveys of the entire road fill area to be felled did not reveal any suitable nesting or roosting structures (i.e. debris piles on basal branch sprays, large deformities or large cavities) on any of the trees. The trees growing within the fill do, however, provide many suitable foraging perches and prey habitat. The surrounding forest is suitable nesting, roosting and foraging habitat.

The average width of the area to be felled along the width of the road fill was estimated to be 36 feet based on previous RNSP watershed restoration work done in the same geomorphology type (Gold Bluffs Formation) in the Lost Man Creek watershed. The total area of suitable spotted owl habitat which will be removed is estimated to be 23 acres. Many fill areas are much narrower than those restored in Lost Man Creek, particularly on the southern half of the restoration/conversion area where the road bed was placed entirely on or near the ridge top where little cutting and filling was required. The total amount of acres of suitable habitat to be removed will therefore be less than the estimated amount.

Due to the linearity of the restoration/road-to-trail conversion project area, the area was divided in two for analysis. Thus, 11.5 acres (one half of 23 acres) of suitable habitat will be removed in each half. This represents a small percentage of the suitable habitat available in the area, as shown in Table 16 and Map 6, Appendix 1. The area will still provide ample suitable nesting, roosting and foraging habitat post conversion/restoration.

Table 16. Available suitable spotted owl habitat, in acres, surrounding the West Ridge Road watershed restoration/road-to-trail conversion project area. No old growth habitat will be removed or degraded. ***Approximately 23 acres, or approximately 11.5 acres of suitable habitat in >40 year old second growth will be removed in each half of the project area.*** Percentage of available habitat to be removed is in parentheses in the total row.

	0.7 Mile Radius			Overlapping 1.3 Mile Radius		
	Old Growth	Suitable Second Growth	Total (percent habitat to be removed)	Old Growth	Suitable Second Growth	Total (percent habitat to be removed)
North Half (11.5 acres suitable habitat to be removed)	660	249	909 (1.2%)	1,984	481	2,465 (0.4%)
South Half (11.5 acres suitable habitat to be removed)	737	248	985 (1.2%)	2,357	397	2,754 (0.4%)

Compliance surveys conducted along the Newton B. Drury Parkway (Appendix 1, Map 6) determined that a barred owl territory (multiple detections over the past two years) is present in the middle of the northern half of the watershed restoration/trail conversion project area (Schmidt 2004). It is likely that spotted owls are now excluded from a significant portion of the watershed restoration/trail conversion project area. Other areas of the project area have not been surveyed and thus it is unknown if those areas are also occupied by barred or spotted owls.

2) Ossagon Road ("R3")

The 0.2 miles of watershed restoration work to occur along the Ossagon Road) in Prairie Creek

State Park will occur along an abandoned jeep road (Appendix 1, Map 6). The area is entirely in old growth redwood and Sitka spruce and is all suitable spotted owl habitat. All of the project area has been surveyed for spotted owls during annual compliance surveys for maintenance work that occurs along the nearby Newton B. Drury Parkway. Annual surveys started in 1998. No spotted owl or barred owl detections have ever been recorded within one mile of the area during these surveys.

The proposed restoration activities will include the felling of trees growing within the road fill to be recontoured to the original hill slope. All trees growing within the fill slope that may be felled have been surveyed for potential nest platforms. None exist because all of the trees are less than 18 inches DBH. The old growth stand is open with few subcanopy trees and a full upper canopy. The forest floor and subcanopy is almost completely occupied by dense fern and shrub growth. The trees growing within the fill do, however, provide many suitable foraging perches and prey habitat. The surrounding forest is suitable nesting, roosting and foraging habitat.

The average width of the area to be felled along the width of the road fill is about 36 feet based on previous RNSP watershed restoration work done in the same geomorphology type (Gold Bluffs Formation) in the Lost Man Creek watershed. ***The total area of suitable habitat to be removed is estimated to be one acre.*** Much of the upper half of the road passes along the bottom of a swale where no fill exists, therefore, the total amount of acres of suitable habitat to be removed will be less than the estimated amount. This represents a small percentage of the suitable habitat available in the area. There is approximately 855 acres of suitable habitat within 0.7 miles and 2,236 acres within 1.3 miles of the project area. The area will still provide ample suitable nesting, roosting and foraging habitat to support a reproductive spotted owl pair.

i. Bald Eagle

Proposed Action –

No suitable bald eagle habitat will be removed or degraded during any of the proposed project activities.

j. Marbled Murrelet

Proposed Action –

No suitable marbled murrelet habitat or habitat components will be removed or degraded during any of the proposed project activities, including trees that provide cover to potential nest platforms. All trees proposed for removal (i.e. along new or rerouted trail routes or within watershed restoration work corridors) within suitable habitat areas are too short to provide cover for nest platforms (i.e. their canopies do not extend up to the level where nest platforms exist within large redwood trees – generally greater than 150 feet) (Herbert, pers. comm.). Therefore, there will be no effect to suitable marbled murrelet habitat.

Marbled Murrelet Critical Habitat

There are no trees meeting the criteria of critical habitat (including primary constituent elements

– i.e. one half site potential tree height within 0.5 miles of trees with suitable nesting platforms – roughly equating to trees over approximately 150+ feet tall within designated critical habitat areas within RNSP) that will be removed by any proposed actions; there will be no effect to designated critical murrelet habitat.

k. Western Snowy Plover

Proposed Action –

Trails H and R (Appendix 1, Maps 2 and 3) will pass near suitable snowy plover habitat but will not pass through it. Trail H goes through heavily vegetated back dunes which are unsuitable for plover use while trail R is on a coastal bluff which is unsuitable for plovers.

l. Mardon Skipper

Proposed Action –

PLEASE NOTE – ACTIONS PARTIALLY OR WHOLLY OCCURRING OUTSIDE OF RNSP

The only suitable habitat for mardon skippers within RNSP occurs in the Little Bald Hills area. Only trail E (Appendix 1, Map 2) passes through this area. Approximately 0.25 miles of the proposed 1.5 mile new trail route requiring construction passes through suitable fescue grassland/Jeffrey pine woodlands habitat. The remaining sections of newly constructed trail route will pass through unsuitable closed canopy mixed conifer forest and knobcone pine forest. Therefore, approximately 0.1 acres (0.02%) of suitable habitat will be lost out of the 346 suitable acres available on RNSP land. An unknown amount of suitable habitat is available on adjacent Six Rivers National Forest land. No campgrounds or trailheads are planned within this habitat type.

m. Pacific Fisher

Proposed Action –

1. *Construction*

None of the proposed trailheads or backcountry camps are located in suitable fisher habitat and thus there is no possibility of habitat removal or degradation from the construction of these facilities. Trails A, B, C, D, G, X, M, L and the rerouted portion of the James Irvine Trail are partially or entirely located within suitable fisher habitat (Appendix 1, Maps 4-8). Construction of the proposed trails will not result in the removal of suitable fisher denning or rest site trees because only trees less than 18 inches DBH will be cut with the majority of trees to be cut to be below 12 inches DBH. No trees of this size class should have cavities sufficiently large enough to provide a den or rest site. Canopy cover will not be lowered during trail construction in old growth and mature second growth forest areas because clearance zones for trails will only extend up to 10 feet by eight feet wide. Even in dense second growth forested areas where more trees will be removed per linear mile should have more than sufficient remaining over arching tree limbs to maintain suitable cover.

2. Maintenance -

None of the proposed maintenance activities will result in the removal or degradation of suitable fisher habitat components and thus there are no negative effects.

3. Trail Closure and Restoration -

The removal of trails R1 and R2 will only involve hand tool work to reshape and recontour the existing foot trail bed back to the original slope and replace topsoil and understory vegetation. No fisher habitat components will be affected by these activities.

4. Watershed Restoration/Road-to-Trail Conversion -

1) West Ridge Road/Butler Creek Trail ("R4")

The 5 miles of watershed restoration/road-to-trail conversion work to occur along the West Ridge Road/Butler Creek Trail (Appendix 1, Map 6) in Prairie Creek State Park will have the same effect on fisher habitat regardless of the treatment style (full restoration or road-to-trail). The area was last cut in 1958 and is considered suitable fisher habitat.

The proposed activities will include felling trees growing within the road fill to be recontoured to the original hill slope. The species mix is typical of near-coastal naturally regenerating second growth forest in RNSP with a mixture of redwood, Sitka spruce, red alder and Douglas fir. Ocular surveys of the entire road fill area to be felled did not reveal any potential suitable denning or rest site cavities in any of the trees, although some cavities could have been missed.

The average width of tree felling along the width of the road fill is about 36 feet based on previous RNSP watershed restoration work done in the same geomorphology type (Gold Bluffs Formation) in the Lost Man Creek watershed. The total area of suitable habitat to be removed is estimated to be 23 acres. Many fill areas are much narrower than those restored in Lost Man Creek, particularly on the southern half of the restoration/conversion area where the road bed was placed entirely on or near the ridge top where little cutting and filling was required. The total amount of actual acres of suitable habitat to be removed will therefore be less than the estimated amount. Even with the loss of this habitat, the area should still provide ample suitable foraging, resting and denning habitat for fisher. The destruction of the forest canopy will cause a short term discontinuity in the area's cover and reduce available prey habitat which will cause some temporary habitat degradation. The long, thin, linear nature of the canopy disturbance should not create an insurmountable break in cover for fisher but may create a short term and limited area of elevated predation risk. Understory vegetation should recover and provide sufficient cover within five to ten years (L. Arguello, pers. comm.).

2) Ossagon Road ("R3")

The 0.2 miles of watershed restoration work to occur along the Ossagon Road in Prairie Creek State Park will occur along an abandoned jeep road (Appendix 1, Map 6). The area is entirely in old growth redwood and Sitka spruce and is all suitable fisher habitat. The proposed activities will include the felling trees growing within the road fill to be recontoured to the original hill slope. None of the trees growing within the fill slope are large enough to have sufficiently sized cavities suitable for fisher (all the trees are < 18 inches DBH). The old growth stand is very open

with little subcanopy tree growth and a full upper canopy. The forest floor and subcanopy is almost completely occupied by dense fern and shrub growth. The trees growing within the fill do provide some fisher prey habitat.

The over arching old growth trees should still provide more than sufficient cover after the restoration work is completed. Potential fisher prey habitat may be altered. The average width of the area to be felled along the width of the road fill is about 36 feet based on previous RNSP watershed restoration work done in the same geomorphology type (Gold Bluffs Formation) in the Lost Man Creek watershed. The total area of suitable habitat which will be altered is estimated to be approximately one acre. Much of the upper half of the road passes along the bottom of a swale where no fill exists. The total amount of actual acres of suitable habitat to be altered will therefore be less than the estimated amount. Loss of one acre of suitable prey habitat should only minimally degrade the habitat suitability of the area.

B. Indirect Effects

No indirect effects to western lily, beach layia, California brown pelican, Oregon silverspot butterfly, leatherback turtle, green turtle, olive Ridley sea turtle, loggerhead turtle, northern spotted owl, bald eagle, mardon skipper and Pacific fisher are expected from any existing trails, trailheads, backcountry camps and dispersed camping or any proposed actions.

a. Marbled Murrelet

Visitor and Staff Use of Existing Developments and Dispersed Use Areas and Proposed Action -

A potential indirect effect from visitor and staff use of RNSP developments, dispersed use areas and the proposed action is the possibility of increasing corvid populations or altering corvid behavior such that corvid predation of marbled murrelet nests increases. Sakai (2003) pages 53-54, provides a detailed discussion of the rationale linking nest predation by corvids and murrelet population decline. More recently, Perry et al.'s (2004) ecological modeling study provides further evidence linking nest predation and marbled murrelet population decline in the Santa Cruz mountains of central California. Finally, Hebert and Golightly (2006) reported relatively high rates of marbled murrelet nest failure in RNSP with most causes of failure unknown. They did, however, document one case of nest predation by a Steller's jay and another case of nest predation by a common raven using remote video cameras.

Recent studies (e.g. Marzluff and Neatherlin under review, Marzluff et al. 2004, Marzluff et al. 2001, Marzluff et al. 2000, Marzluff et al. 1996) have documented a connection between the introduction of anthropogenic food sources within suitable marbled murrelet nesting habitat and an increased rate of nest predation by corvids. The food source may be a result of alteration of habitat near a human development so that there is an increase in corvid food plants such as berry producing shrubs or the food source may be the food waste created by humans themselves. Food rich sites have been known to increase the reproductive success of American crows and to a lesser extent common ravens. The evidence is mixed for Steller's jays. Some studies have shown marked increases in local Steller's jay population densities (Marzluff et al. 2004, Suddjian 2004) near anthropogenic food sources while analyses of larger, regional population trends have

shown no discernable jay population increase (Liebezeit and George 2003). Steller's jays have been shown to exploit human food sources if they are nesting within one kilometer of the food source (Marzluff pers. comm., Marzluff and Neatherlin, under review). In addition, areas of human development which are adjacent to distinct habitat edges have shown a strong correlation with greatly increased Steller's jay habitat use and may result in increased fledgling survivorship (Marzluff et al. 2004). At a minimum, human food sources may sufficiently alter jay foraging patterns such that nest predation would increase around the food source. The scale at which an anthropogenic food source must occur in order for crow, raven or jay populations to increase is unknown. Assumedly, the larger the food source, the greater the population gain by jays, crows and ravens as well as increased jay foraging and vice versa. There is evidence for this within suitable marbled murrelet habitat areas as reported in a recent corvid density survey around large drive-in campgrounds in the Santa Cruz Mountains. Researchers found Steller's jay densities to be upwards of 5 to 35 times higher near large campgrounds compared to areas away from large campgrounds (Suddjian 2004). The human developments sampled in that survey and in the Marzluff and Neatherlin (under review) and Marzluff et al. (2004) studies were large drive-in campgrounds; whether a small backcountry camp or trailhead would provide sufficient food for jay, crow and raven populations to increase or act as an attractant is unknown.

Beyond a potential increase in numbers of corvids and presumably a concomitant increase in nest predation, there is also the possibility that opportunistic visitor encounters with curious Steller's jays could unnaturally cause jays to linger within suitable murrelet habitat. Steller's jays lingering in suitable murrelet habitat may then disproportionately predate nests near the human encounter because of greater foraging time spent in the area. Experiments with gray jays have shown that even the mere presence of humans can attract gray jays and cause them to linger in an area (Gutzwiller et al. 2002). Whether this holds true for Steller's jays is unknown but Suddjian's (2004) study as well as anecdotal observations and small sample studies made in RNSP seem to indicate that Steller's jays may react in a similar manner (Wallen et al. 1999, Wallen et al. 1998).

Increased murrelet nest predation by corvids appears to decrease the farther from a habitat edge or human development that a murrelet (or other bird) nest is located (Brand and George 2001, Marzluff et al. 2000, Paton 1994). As stated above, developments which do not provide a ready source of anthropogenic food (e.g. trails) presumably have less of an effect than do developments that potentially do provide a supplemental food source (e.g. campgrounds, picnic grounds and trailheads) (Marzluff pers. comm.). The zone of "potential increased predation threat" has been determined to be 500 ft. on either side for trails and 0.25 miles radius for all other visitor facilities which might be a food source (i.e. front country campgrounds, trailheads, picnic grounds, backcountry campgrounds and dispersed camping areas along Redwood Creek gravel bars) (Sakai 2003). These distances are based on research conducted on proxy marbled murrelet nests set near campgrounds (Marzluff et al. 2000) and discussions with researchers (Marzluff pers. comm.) and the USFWS about the effects of visitor use developments within RNSP. Predation within this zone represents an area where there is an unquantifiable potential increase in the possibility of predation and is not assumed to be a complete elimination of all nesting murrelets within the area by corvids.

A GIS analysis was conducted using the preceding distances to determine the amount of available murrelet habitat within RNSP potentially being affected by visitor and staff use of existing and proposed trails and facilities. All RNSP trails, trailheads, backcountry camps and dispersed camping areas along Redwood Creek which could potentially provide human food sources were included in the analysis. In considering the overall potential effect of an increased

corvid predation threat to murrelets it was also necessary to evaluate the potential additive effects of existing noise disturbance generated by RNSP maintenance activities as well as the additive effects of noise disturbance caused by visitor use as described in the Disturbance section above. Existing maintenance activities were assessed and consulted upon previously (please refer to the Letter Of Concurrence and Biological Opinion issued on 24 June 1998 (USFWS reference number 1-14-98-24). Over the past three years approximately 1,623 to 4,400 acres of suitable marbled murrelet habitat or 4% to 9% of the total suitable habitat were disturbed by above ambient noise generated by RNSP management activities. Amounts vary from year to year depending on the amount of work completed in various locations. The total amount of noise disturbance “take” authorized during the same time period ranged from 5,356 to 5,756 acres. The highest authorized take acres were used to calculate the potential effects of noise disturbance in the GIS model. The additional non overlapping noise disturbance effects of RNSP visitor road use analyzed in this biological assessment were added to the total effects area. Many of the proposed actions are slated to occur near areas which already have some sort of management action occurring nearby, and thus much of the proposed action area overlaps current management action areas already affecting suitable habitat through noise disturbance. The mechanism to differentiate overlapping adversely affected areas occurring from separate management actions is to assess effect to an area only once. This assessment, therefore, lumps the existing noise disturbance effects from existing maintenance (analyzed previously) and existing visitor use (analyzed in this assessment) with the potential increased corvid predation threat effects described above. In analyzing the effects of the proposed action, the potential increased corvid predation threat effects were considered “primary” while the effects from noise disturbance were considered “secondary” and thus only those areas not overlapping the existing potential increased predation effect areas and noise disturbance effect areas were considered additive. This reasoning was used for both potential visual disturbance and road caused noise disturbance calculations. As stated before, all suitable habitat areas potentially visually disturbed are enveloped within the greater area of potential increased corvid predation and thus are entirely overlapped.

Combined impacts minus the overlapping previously analyzed maintenance disturbance effects are presented in tabular form in Table 17 and in graphic form in Appendix 1, Maps 9-13. Existing impacts are indicated by solid pink polygons while proposed action impacts are indicated by solid red polygons. Previously analyzed maintenance impacts are indicated by solid gray polygons on Maps 4-8 in Appendix 1.

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Table 17. Results for an effects model of increased predation threat to marbled murrelets from corvids due to existing and proposed visitor use developments in RNSP both with and without existing, overlapping noise disturbance effects. Amounts are shown as acres of suitable marbled murrelet potentially affected. The total amount of suitable marbled murrelet habitat within RNSP (contiguous and residual old growth) is approximately 41,787 acres.

Cause of Effect	Existing Developments Effects Area (percentage of total available marbled murrelet habitat)	Proposed Action Effects Area Not Overlapping Effects From Existing Developments (percentage of total available marbled murrelet habitat)
Increased Predation Threat	10,289 (25%)	1,250 (3%)
Visitor Use Noise Disturbance	3,129 (7%)	0 (0%)
Increased Predation Threat Plus Non-Overlapping Visitor Use Noise Disturbance Minus Existing Disturbance From RNSP Maintenance Activities	12,830 (31%)	1,188 (3%)

Results of the GIS analysis show that about one third of the total available suitable habitat within RNSP is potentially being affected by an increased corvid predation threat near park developments. If it is assumed that human food waste is the primary source of supplemental food for corvids originating from these developments and that the supplemental foods are increasing corvid populations or altering foraging behaviors, then decreasing the amount of human food waste should decrease corvid activity near developments. RNSP has recently replaced all trash containers at existing developments within suitable murrelet habitat with bear proof (and thus corvid proof) containers which should decrease supplemental corvid feeding. The only existing development in RNSP which has not had every food storage container converted to bear/corvid proof containers is Mill Creek campground (Appendix 1, Map 9). Half of the campground has had bear proof food storage containers installed. The other half will be completed once oil spill settlement money has been disbursed (expected within the next year). Approximately 10 acres of suitable murrelet habitat is within 0.25 miles of the campground. All of the Mill Creek campground's trash containers are bear proof. Existing and proposed regulations governing the disposal of food waste along the dispersed camping area of Redwood Creek requires campers to pack out all food waste and store food in bear proof (and thus corvid proof) containers/locations while camping. The new intensive education programs described within the proposed action should also help to decrease the amount of supplemental corvid feeding occurring within both the front and backcountry. Finally, the removal of picnic tables from five visitor use areas and the elimination of dispersed camping along four miles of

Redwood Creek gravel bars (all adjacent to or in suitable murrelet habitat) under an adaptive management system as described in the proposed action has the potential to further reduce the potential for an increased predation threat. Unfortunately, these mitigating actions are not easily measured with simple GIS models. The proposed corvid monitoring program should provide a quantifiable proxy with which to measure whether the proposed corvid management actions is reducing the severity and extent of the increased predation threat to murrelets from existing visitor use developments and areas. The proposed adaptive management system will ensure that more intensive corvid management actions will be considered if target corvid densities are not met.

The construction of new visitor use facilities adjacent to or in suitable murrelet habitat would cause some additional indirect negative effects on top of those created by existing visitor use developments (Table 17). Placement of the proposed developments and proposed mitigation actions (described in Proposed Action section 12), however, may decrease the severity of the additional negative effects. For example, none of the proposed backcountry camps, presumably the greatest potential new source of anthropogenic food, are located within a quarter mile of suitable murrelet habitat. Additionally, all of the new trailheads proposed for construction are either located well outside of suitable murrelet habitat (Aubell Ranch, East Side of 101 North of Wilson Creek, A9 Deck, Lyons Ranch) or are located in highly develop/suitable habitat “edges” on the boundaries of RNSP (Camp Lincoln, Highway 199/Elk Valley Road Junction) where outside agricultural and domestic land uses are presumably already causing increases in corvids, particularly crows and ravens. Any potential additional effect from the latter two trailheads would most likely be overwhelmed by the current adjacent effects of surrounding land uses. Finally, none of the proposed trails bisects a large block of undeveloped suitable habitat but instead are primarily located near habitat edges (Appendix 1, Maps 9-13). New trails located along habitat edges should have less of an indirect effect than new trails located in core habitat areas.

RNSP recognizes that the effects area shown in Table 17 is a large proportion of habitat to be potentially affected by RNSP visitor use. However, the current scientific understanding of corvid/marbled murrelet/human development interactions and the effects of mitigating actions are vague at best. In addition, the GIS effects model was developed primarily based on comments by Dr. John Marzluff and his research in Olympic National Park, which he cautioned may or may not be applicable to RNSP. As described above, murrelet reproductive success is not expected to be totally eliminated within these areas of RNSP, but are expected to experience some as yet un-measurable level of elevated predation threat. Any additional predation threat, however, is problematic in light of the unsustainable recruitment levels apparently being experienced by the region’s murrelet population (McShane et al. 2004).

b. Western Snowy Plover

1) Visitor and Staff Use of Existing Developments and Dispersed Use Areas

Predation has been identified as a major threat to successful snowy plover reproduction (USFWS 2001). Visitors currently have access to all suitable snowy plover beaches (Appendix 1, Maps 4-7). Like marbled murrelets, western snowy plovers could potentially be indirectly affected by visitor and staff use of suitable habitat areas through the unintended attraction of predators. People using RNSP beaches could inadvertently attract scavenging plover predators like common ravens, American crows, gulls, gray foxes and coyotes by leaving garbage out in the open and

feeding wildlife (USFWS 2001). Unfortunately, no available research has addressed under which visitor use conditions or levels that predators would be attracted to suitable snowy plover habitat areas.

Presumably, high visitor use areas with greater concentrations of visitors that consume food, and subsequently leave food scraps, would attract more potential predators than areas that aren't regularly used as "dispersed" picnic areas. High visitor use areas include all of Crescent Beach; South Klamath Spit; the areas near Fern Canyon, Gold Bluffs Beach Campground, Gold Bluffs Beach Picnic Area, Gold Bluffs Beach Vehicle Access Gate and Espa Lagoon; as well as all of Freshwater Spit south of Redwood Creek within RNSP (Appendix 4) (RNSP 2004). Regular trash pick up, bear proof (and thus scavenger proof) trashcans and ongoing and proposed visitor education programs which discourage wildlife feeding should have some unknown mitigating effect. All RNSP developments and proposed developments have/will have bear/corvid proof trash containers.

Corvid presence data have been collected for the past two years in RNSP (RNSP unpub. data). Unfortunately, the data is not geographically relational (it is collected via a systematic instantaneous sampling system) and so it is unknown if high use visitor areas really are scavenger "magnets." Personal observations and comments by G. Holm (pers. comm.) indicate that there is not a strong tendency for scavengers to congregate around high use areas except for Crescent Beach, Freshwater Spit and South Klamath Spit. All other high visitor use areas seem to have a generally even scavenger distribution that peaks when natural food sources become abundant (e.g. young colonial nesting seabird carcasses during the post fledging period, smelt runs, Dungeness and sand crab influxes, large kelp accumulations after severe storms) (Holm pers. comm.) (pers. obs.). At this point in time, it is impossible to quantify the potential indirect impact of attracting scavenging wildlife.

2) Proposed Action -

None of the components of the proposed action are expected to appreciably change visitor use patterns in any suitable habitat areas, therefore, there will be no additional indirect effects from the proposed action.

C. Cumulative Effects

Cumulative effects are actions which originate from those state, tribal and private actions that may occur in the future that have the potential to impact listed species within RNSP. Much private timber company land occurs immediately adjacent to park boundaries, none of which has any existing or planned public trails or campground areas but which is regularly harvested. No other public or private campgrounds or trailheads exist within a quarter mile of RNSP land. Adjacent non Federal public land only occurs on the north end of RNSP along the eastern edge of the Rellim Ridge area and eastern edge of the northern portion of Del Norte Coast Redwoods State Park (recently acquired California Department of Parks and Recreation lands around Mill Creek) (Appendix 1, Map 1).

The recently acquired California Department of Parks and Recreation (CDPR) lands around Mill Creek adjacent to RNSP is to be managed according to actions described in an Interim Management Plan (IMP) which was recently completed. The IMP is planned to have a ten-year

life span after which a formal general plan will be developed by the CDPR. The most recent draft versions of the IMP state that no public campgrounds, trailheads, or trails will be developed in the Mill Creek acquisition area beyond what is proposed in RNSP's Trail and Backcountry Management Plan. The only public access will be on two existing primary roads (Hamilton Road and Picnic Road) through areas which contain small strips (i.e. less than an eighth of a mile wide at their widest) of suitable spotted owl habitat within a quarter mile of the respective roadways. The impacts of these potential developments were not assessed in this document because no Federal nexus has been initiated, i.e. all actions to date have been wholly outside of the RNSP partnership and under jurisdiction of the North Coast District of the CDPR. No spotted owls had ever been detected by the Rellim/Stimson timber companies in these small strips of habitat (unpub. data). The last surveys appear to have been conducted in the late 1990's. No other suitable threatened or endangered species habitat is within a quarter mile of these two roads. It is unknown if/when these roads or the entire property will be opened to the public and thus it is impossible assess the potential future impact of visitor and staff use.

US highways 199 and 101 as well as the Bald Hills Road (a county road) bisect much of RNSP (Appendix 1, Map 1). The parks have little to no control over the use/management of these rights of way. The use of these highways, however, potentially have the same or even an increased impact on listed species as do RNSP owned roads. All visitors to RNSP have to use one or more of these non-parks roads to move around the parks. All three roads pass through suitable marbled murrelet, spotted owl and fisher habitat. The effects of the public using these roads is presumably the same as the effects of the public using RNSP owned roads, namely, noise disturbance during the breeding season. Non-overlapping quarter mile buffers along these roads results in an additional 417 acres of suitable spotted owl habitat and 991 acres of suitable marbled murrelet habitat being adversely affected. Non overlapping 100m buffers along these roads results in an additional 1,276 acres of suitable fisher habitat being adversely affected. If combined with the total acres potentially affected by RNSP actions described above, then the total acres affected by both RNSP and related non-RNSP actions for spotted owls is 5,197 acres (or 8% of the total suitable habitat within RNSP), 15,010 acres for marbled murrelets (or 36% of the total suitable habitat within RNSP) and 3,445 acres for fishers (or 5% of the total suitable habitat within RNSP).

US Highways 101 and 299 and the county managed Bald Hills Road have an additional, potentially severe, cumulative impact on fisher. Wide, paved roads which have higher speed limits have been identified as being a greater threat than unpaved or low speed limit roads because of the greater chance that a fisher would not be able to avoid being hit (USFWS 2004). The speed limit on US Highway 101 is 65 miles per hour on some stretches while all other stretches and all of US Highway 199 have a 55 miles per hour speed limit. The Bald Hills Road is 35 miles per hour, however, local traffic often travels at higher speeds. Slauson (2003) believed that US Highway 101 along the "park bypass" section around Prairie Creek State Park (Appendix 1, Map 1) was a potential "faunal barrier" and source for fisher mortality due to its width and high vehicle speeds. Other, two lane sections of US 101 and all of US 199 are probably a *comparatively* lesser mortality threat and the Bald Hills road is probably even less of a threat due to lower vehicle speeds. As stated before, no research has directly addressed the question of under what vehicle speeds a road becomes a potential death or injury threat to fisher. Also as before, it is difficult to accurately assess the overall impact of these non-RNSP roads to fisher except that roads with higher speed limits have a greater potential for negative impacts than do roads with lower speed limits. No road killed fisher originating from any of these roads has been recorded in any RNSP database.

VII. DETERMINATION

Based on the nature and timing of the proposed action, it is my determination that the Trail and Backcountry Management Plan in RNSP will have the following effects on the threatened, endangered and candidate species listed in this document:

Threatened and Endangered -

The Trail and Backcountry Management Plan will not affect beach layia, western lily, leatherback sea turtle, green sea turtle, olive Ridley sea turtle, or loggerhead sea turtle. Oregon silverspot butterflies may be affected but not adversely affected by the loss of a negligible amount of unoccupied suitable habitat. California brown pelicans may be affected but not adversely affected by short term, temporary, human-caused disturbance of birds in low quality loafing habitat. One known bald eagle territory may be affected but not adversely affected by negligible amounts of visual disturbance caused by visitors and staff using the existing McArthur Creek Horse Trail.

Western snowy plovers may be affected and are likely to be adversely affected from a low potential for injury or harm caused by visitors inadvertently trampling unknown nests or eggs while using suitable RNSP beaches. Western snowy plovers may also be indirectly adversely affected by an increased predation threat caused by visitors inadvertently leaving food scraps or feeding wildlife in or near suitable habitat areas and thereby attracting potential predators. Impact minimization measures described in the Proposed Action should result in some diminution of these adverse effects. Neither of these adverse effects to western snowy plovers is quantifiable.

Spotted owls are likely to be adversely affected through the potential disturbance of suitable nesting habitat by emergency trail maintenance occurring on proposed trail M (for the clearing of two large fallen old growth trees with chainsaws during the seasonal noise restriction period). Two hundred and fifty acres of incidental take are therefore requested for conducting emergency trail maintenance. It is not expected that these 250 acres will be disturbed every year based on past trail maintenance records. Spotted owls are also likely to be adversely affected by noise disturbance of suitable nesting habitat caused by visitor and staff vehicles on existing and proposed-to-be opened RNSP roads; an additional 2,225 acres of incidental take are therefore requested.

Marbled murrelets are likely to be indirectly adversely affected by an increased nest predation threat from visitor and staff use of some proposed trails and trailheads as well as visitor and staff use of existing RNSP developments and dispersed use areas caused by visitors inadvertently leaving food scraps or feeding wildlife in or near suitable habitat areas and thereby attracting potential predators. Marbled murrelets are also likely to be directly adversely affected by disturbance of suitable habitat caused by visitor and staff vehicles traveling on existing RNSP roads. Incidental take is therefore requested for increased predation threat and noise disturbance effects amounting to 12,830 acres caused by existing visitor and staff use of park developments and an additional 1,188 acres from the proposed action for a total of 14,018 acres. Marbled murrelets are also likely to be adversely affected through the potential disturbance of suitable nesting habitat by emergency trail maintenance occurring on proposed trail M (for the clearing of two large fallen trees with chainsaws during the seasonal noise restriction period). One hundred

and ninety acres of additional incidental take (not overlapping with potential increased predator threat incidental take acres requested above – approximately 60 acres overlap) are therefore also requested. It is not expected that these 190 acres will be disturbed every year based on past trail maintenance records.

Candidate -

The mardon skipper may be negatively affected, but the negative effects should not measurably impact the local population. The effects are due to a small amount of disturbance from visitor and staff use of existing and proposed trails as well as a low possibility of some individuals being trampled by visitor and staff use of existing trails.

The Pacific fisher may be negatively affected and the negative effects are/will be measurable within the local population. The effects include possible noise disturbance of 2,169 acres of suitable denning habitat due to visitor and staff use of vehicles on existing, major RNSP roads as well as visitor and staff use of existing, major RNSP campgrounds and trailheads. Additional negative effects include the removal of 23 acres of suitable foraging habitat due to proposed watershed restoration work along the West Ridge Road, one acre of habitat degradation due to proposed watershed restoration work along the Ossagon Road as well as an unquantifiable negative effect from potential mortalities caused by vehicle strikes along major RNSP roads.

VIII. MANAGEMENT RECOMMENDATIONS

Recent research has shown that one of the causes behind increases in corvid (potential marbled murrelet and western snowy plover nest predators) populations near suitable murrelet and plover nesting habitat is the availability of anthropogenic food. These same researchers also recommend that the most effective way to reduce or disperse these potential predators is to reduce or eliminate these anthropogenic food sources. Particularly important food sources include open dumps, unsecured livestock feed, unsecured garbage, and bird feeders (Marzluff pers. comm., Marzluff and Neatherlin under review). It is likely that the effects of domestic and agricultural land use on private land abutting large portions of RNSP's suitable marbled murrelet habitat is producing a negative effect on murrelet populations within RNSP. For example, murrelet habitat in Jedidiah Smith Redwoods State Park is surrounded on two sides (west and north) by small farms, homes and business while homes and farms abut large blocks of suitable murrelet habitat along lower Redwood and Prairie Creeks (Appendix 1, Maps 9-12). The same may be true for western snowy plovers. Regional state and federal fish and wildlife regulatory agencies, along with RNSP, should initiate outreach programs with municipal and county agencies as well as concerned citizen groups to educate landowners located along RNSP's boundaries about this issue.

VIX. CONTRIBUTORS

- Judy Wartella, RNSP Computer Specialist, GIS analysis and map production.
- Greg Holm, RNSP Wildlife Biologist, GIS analysis and western snowy plover impact minimization measures section.

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Appendix 1

Maps and GIS Spatial Analysis Graphics

Appendix 2

Tables of Existing RNSP Visitor Use Facilities and Their Proximity to Suitable Marbled Murrelet, Spotted Owl and Pacific Fisher Habitat

Table 1. Existing trails and their proximity to suitable marbled murrelet, spotted owl and Pacific fisher habitat (only portions of a trail may be in/near suitable habitat). For more detailed habitat proximity analyses see Wallen and Childers (1997).

Trail Name	Located entirely or partially within ¼ mile of suitable marbled murrelet habitat?	Located entirely or partially within ¼ mile of suitable spotted owl/Pacific fisher habitat?
Leiffer Loop	Y	Y
Ellsworth Loop	Y	Y
Simpson Reed Peterson	Y	Y
Hatton	Y	Y
Hiouchi	Y	Y
Jed Smith Campground Nature	Y	Y
Stout Grove Loop	Y	Y
Wellman	Y	Y
Little Bald Hills	Y	Y
Mill Creek	Y	Y
Boy Scout	Y	Y
Nickerson Ranch	Y	Y
Mill Creek Horse	Y	Y
Rellim Ridge	Y	Y
Crescent Beach	N	Y
Hobbs Wall	N	Y
Saddler Sky Line	N	Y
Trestle Loop	N	Y
Coastal Northern Section	Y	Y
Old Stage	Y	Y
Enderts Beach	N	Y
Skid Road	Y	Y

Mill Creek Campground	N	Y
Alder Basin	N	Y
Revelation	Y	Y
Boat Creek	Y	Y
Little Creek	Y	Y
Mill Creek Nature	N	Y
Coastal South	Y	Y
Environmental Camp	Y	Y
Circle	Y	Y
Butler Creek	Y	Y
Prairie Creek Nature	Y	Y
Jogging	Y	Y
Damnation	Y	Y
Yurok Loop	N	N
Hidden Beach	N	N
Hostel Beach	N	N
Coastal Middle Section	Y	Y
Flint Ridge	Y	Y
Carruther's Cove	Y	Y
Ossagon	Y	Y
Ah Pah Interpretive	Y	Y
Hope Creek	Y	Y
Ten Taypo	Y	Y
West Ridge	Y	Y
Friendship Ridge	Y	Y
Fern Canyon Loop	Y	Y
James Irvine	Y	Y
Zig Zag 2	Y	Y
Zig Zag 1	Y	Y
C.R.E.A.	Y	Y
Rhododendron	Y	Y
Prairie Creek	Y	Y
Clintonia	Y	Y
Brown Creek	Y	Y

South Fork	Y	Y
Miner's Ridge	Y	Y
Foothill	Y	Y
Elk Prairie	Y	Y
Cathedral Trees	Y	Y
Wolf Creek Outdoor School Interpretive	Y	Y
Davison Bike	N	N
Lost Man Creek	Y	Y
Trillium Falls	Y	Y
Skunk Cabbage	Y	Y
Redwood Creek	Y	Y
Lady Bird Johnson	Y	Y
Forty-four Horse Loop	Y	Y
Elam Creek Horse Loop	Y	Y
McArthur Creek Horse Loop	Y	Y
Tall Trees	Y	Y
Emerald Ridge	Y	Y
Dolason	Y	Y
Lyons Ranch	N	N

Table 2. Existing developed trailheads and their proximity to suitable marbled murrelet, spotted owl and Pacific fisher habitat.

Trailhead Name	Located within ¼ mile of suitable marbled murrelet habitat?	Located within ¼ mile of suitable spotted owl and Pacific fisher habitat?
Stout Grove	Y	Y
Simpson Reed	Y	Y
Mill Creek Horse (Bertsch Avenue)	N	Y
Little Bald Hills	Y	Y
Lagoon Creek and Picnic Area	N	N
Flint Ridge	N	N
Ten Taypo/Hope Creek	Y	Y
Moorman Pond	Y	Y
Fern Canyon	N	N
Zig Zag	Y	Y

Big Tree	Y	Y
Prairie Creek	Y	Y
Lost Man Creek and Picnic Area	Y	Y
Elk Meadow	Y	Y
Skunk Cabbage	Y	Y
Redwood Creek	Y	Y
Lady Bird Johnson	Y	Y
Orick Horse	N	N
Tall Trees and Picnic Area	Y	Y
Dolason	N	N
Lyons Ranch	N	N

Table 3. Existing backcountry campgrounds and their proximity to suitable marbled murrelet, spotted owl and Pacific fisher habitat.

Campground Name	Located within ¼ mile of suitable marbled murrelet habitat?	Located within ¼ mile of suitable spotted owl and Pacific fisher habitat?
Little Bald Hills Primitive	N	N
Nickel Creek	N	N
DeMartin Prairie	Y	Y
Flint Ridge	Y	Y
Butler Creek	Y	Y
Miner's Ridge Primitive	Y	Y
Elam Creek Horse	Y	Y
Forty Four Creek Horse	Y	Y

Table 4. Existing front country campgrounds and associated facilities and their proximity to suitable marbled murrelet, spotted owl and Pacific fisher habitat.

Campground Name	Located within ¼ mile of suitable marbled murrelet habitat?	Located within ¼ mile of suitable spotted owl and Pacific fisher habitat?
Jed Smith Campground/Picnic Area/Visitor Center/Maintenance Yard	Y	Y
Mill Creek Campground/Picnic Area	N	Y
Gold Bluffs Beach Campground	Y	Y
Elk Prairie Campground	Y	Y

Table 5. Existing picnic or day use areas not associated with front country campgrounds and their proximity to suitable marbled murrelet, spotted owl and Pacific fisher habitat.

Picnic Area or Day Use Area Name	Located within ¼ mile of suitable marbled murrelet habitat?	Located within ¼ mile of suitable spotted owl and Pacific fisher habitat?
Templeman Meadow	Y	Y
Crescent Beach	N	N
False Klamath Cove	N	N
Redwood Creek Overlook	Y	Y
Prairie Creek	Y	Y
Freshwater Spit and Oreq-u	N	N

Table 6. Existing outdoor schools and visitor centers not associated with front country campgrounds and their proximity to suitable marbled murrelet, spotted owl and Pacific fisher habitat.

Outdoor School or Visitor Center Name	Located within ¼ mile of suitable marbled murrelet habitat?	Located within ¼ mile of suitable spotted owl and Pacific fisher habitat?
Hiouchi Visitor Center	Y	Y
Howland Hill Outdoor School	N	Y
Prairie Creek Visitor Center	Y	Y
Wolf Creek Outdoor School	Y	Y
Kuchel Visitor Center (formerly Redwood Information Center)	N	N

Table 7. Existing high use/non designated recreational areas along the Smith River not associated with other RNSP developments (e.g. boat haul outs, swimming holes) and their proximity to suitable marbled murrelet, spotted owl and Pacific fisher habitat.

Area Proximity Name	Located within ¼ mile of suitable marbled murrelet habitat?	Located within ¼ mile of suitable spotted owl and Pacific fisher habitat?
Highway 199	Y	Y
Walker Road South East Spur	Y	Y
Walker Road North West Spur	Y	Y

Table 8. Existing public access RNSP roads and their proximity to suitable marbled murrelet, spotted owl and Pacific fisher habitat (only portions of a road may be in/near suitable habitat).

Road Name	Located within ¼ mile of suitable marbled murrelet habitat?	Located within ¼ mile of suitable spotted owl and Pacific fisher habitat?
Howland Hill Road	Y	Y

Crescent Beach Access	N	N
Mill Creek Campground Access	N	Y
Coastal Drive	Y	Y
Klamath River Road	Y	Y
Alder Camp Road	Y	Y
NBD Parkway	Y	Y
Cal Barrel Road	Y	Y
Davison Road	Y	Y
Lost Man Access	Y	Y
Redwood Creek Trail Access	Y	Y
Tall Trees Access	Y	Y

Table 9. Existing miscellaneous facilities not associated with front country campgrounds and their proximity to suitable marbled murrelet, spotted owl and Pacific fisher habitat.

Facility Name	Located within ¼ mile of suitable marbled murrelet habitat?	Located within ¼ mile of suitable spotted owl and Pacific fisher habitat?
Hiouchi Housing and Fire Station	Y	Y
Pocomo Road Park Housing	Y	Y
Aubell Maintenance Shop and Administrative Offices	N	Y
Gold Bluffs Beach Park Housing	N	Y

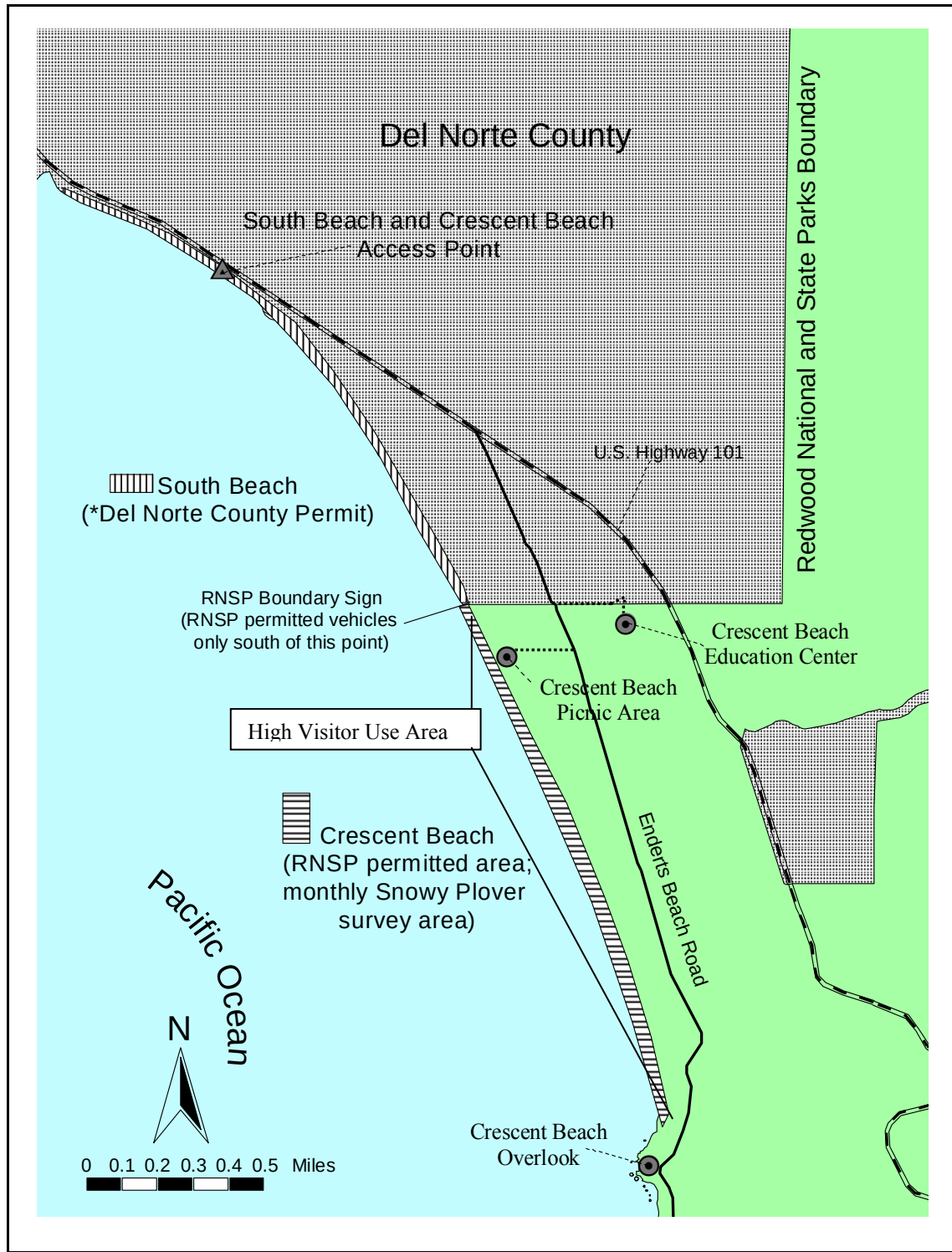
Prairie Creek Maintenance Yard/Park Housing	Y	Y
Wolf Creek Fire Cache and Park Housing	N	Y
Davison Ranch Horse Barn	N	Y
Crescent City Headquarters	N	N
Crescent Beach Overlook and Trailhead	N	N
Crescent City Overlook	N	N
False Klamath Cove Overlook	N	N
Redwood Youth Hostel	N	N
Klamath River Overlook	N	N
Requa Maintenance Yard/CCC Facility	N	N
High Bluff Overlook and Picnic Area	N	N
Old SOC Park Housing	N	N
Elk Camp Park Housing	N	N

Appendix 3

Examples of Interpretive Materials

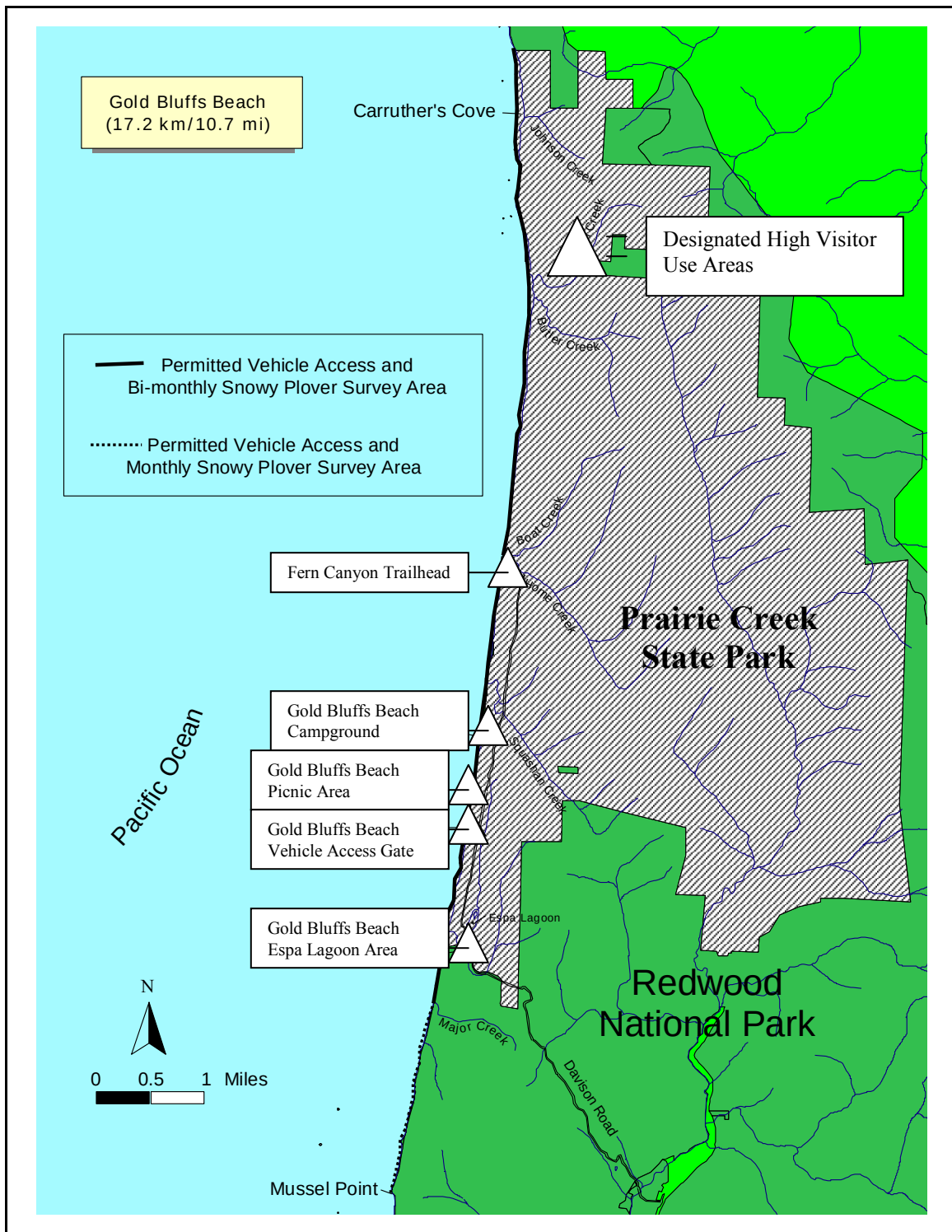
Appendix 4

Maps of High and Low Visitor Use Areas Within Suitable Western Snowy Plover Habitat Areas

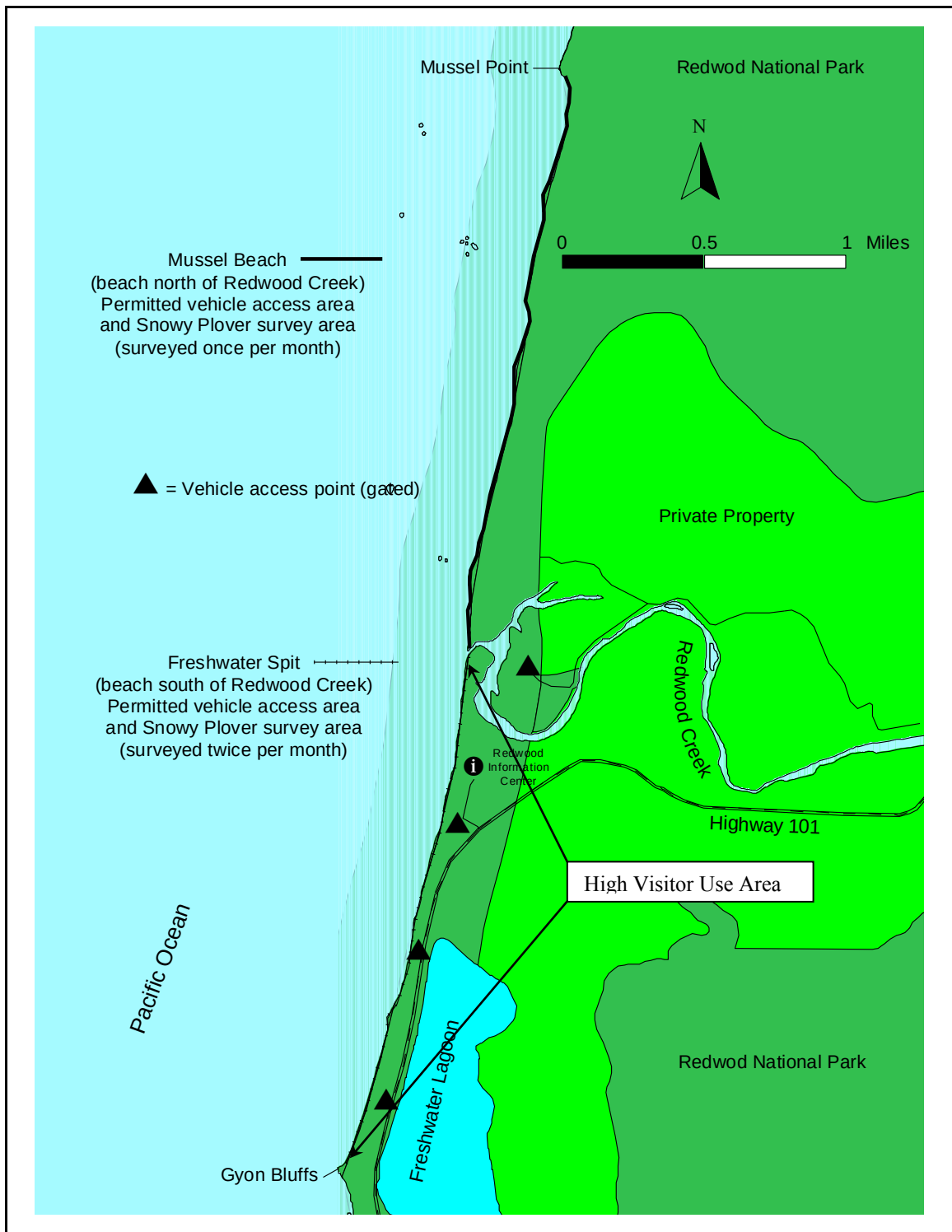


Map 1 - Crescent Beach, Redwood National Park.

Map 2 - Gold Bluffs Beach, Prairie Creek Redwoods State Park/Redwood National Park.



Map 3 - Freshwater Spit and Mussel Beach, Redwood National Park.



Appendix 5

Training requirements necessary for conducting Western Snowy Plover surveys and other activities (from Appendix J, pages J-2 – J-4, Western Snowy Plover Draft Recovery Plan, USFWS 2001)

Training and Qualifications

Prospective snowy plover surveyors should have good vision, the ability to spend several hours in the sun, and the ability to walk long distances in loose sand. In addition, the U.S. Fish and Wildlife Service has developed minimum training requirements for western snowy plover survey, management, and research activities. Five activity levels are recognized:

- Level 1 Winter surveys, or surveys outside known nesting areas.
- Level 2 Breeding season surveys and censuses.
- Level 3 Erecting exclosures around nests.
- Level 4 Breeding season studies or surveys that include handling eggs.
- Level 5 Banding and color marking adults or chicks.

While activity levels 1 through 5 are increasingly intrusive, they are not strictly sequential. For example, a field worker may receive training and be certified at level 3, but cannot participate in level 1 or 2 activities without training specific to those levels.

No certification is required for Level 1 activities, but training is encouraged. Level 2, 3, 4, and 5 activities require a Section 10(a) (1) (A) permit from the U.S. Fish and Wildlife Service. Field workers must be certified at the appropriate activity level to qualify for a permit, or to work independently under the holder of an existing permit. Classroom instruction will be made available for those involved with snowy plover surveys, management, and research (recovery task 1.1.5). At least 4 hours of instruction are required. Topics will include:

1. Biology, ecology, and behavior of snowy plovers;
2. Identification of adult plovers, their young, and their eggs;
3. Threats to plovers and their habitats;
4. Survey objectives, protocols, and techniques;
5. Regulations governing the salvage of carcasses or eggs;
6. Special conditions of the existing Recovery Permit;
7. Other activities (for example: banding, determining incubation stage, erecting exclosures).

Field instruction is required for activity levels 2, 3, 4, or 5. Instruction should take place under the direct supervision of a 10(a) (1) (A) permit holder. Activities for field training include:

1. Locating, identifying, and monitoring nests (levels 2, 4, and 5);
2. Handling eggs and capturing and handling adults or chicks (levels 4 and 5);
3. Erecting exclosures around nests (level 3).

4. Specifics on the target activity for which a permit has been issued;
5. Practical field exercises;
6. Field review of appropriate classroom topics.

Previous experience with snowy plovers, piping plovers, or other closely-related species will not substitute for the training described above. Further detail on obtaining permits, or becoming certified to work under an existing permit, is available through these offices:

CALIFORNIA

U.S. Fish and Wildlife Service
Sacramento Fish and
Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825
(916) 414-6600

U.S. Fish and Wildlife Service
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003
(805) 644-1766

U.S. Fish and Wildlife Service
Carlsbad Fish and Wildlife Office
2730 Loker Avenue West
Carlsbad, California 92008
(760) 431-9440

U.S. Fish and Wildlife Service
Coastal California Fish and Wildlife
Office
1125 16th Street, Room 209
Arcata, California 95521-5582
(707) 822-7201

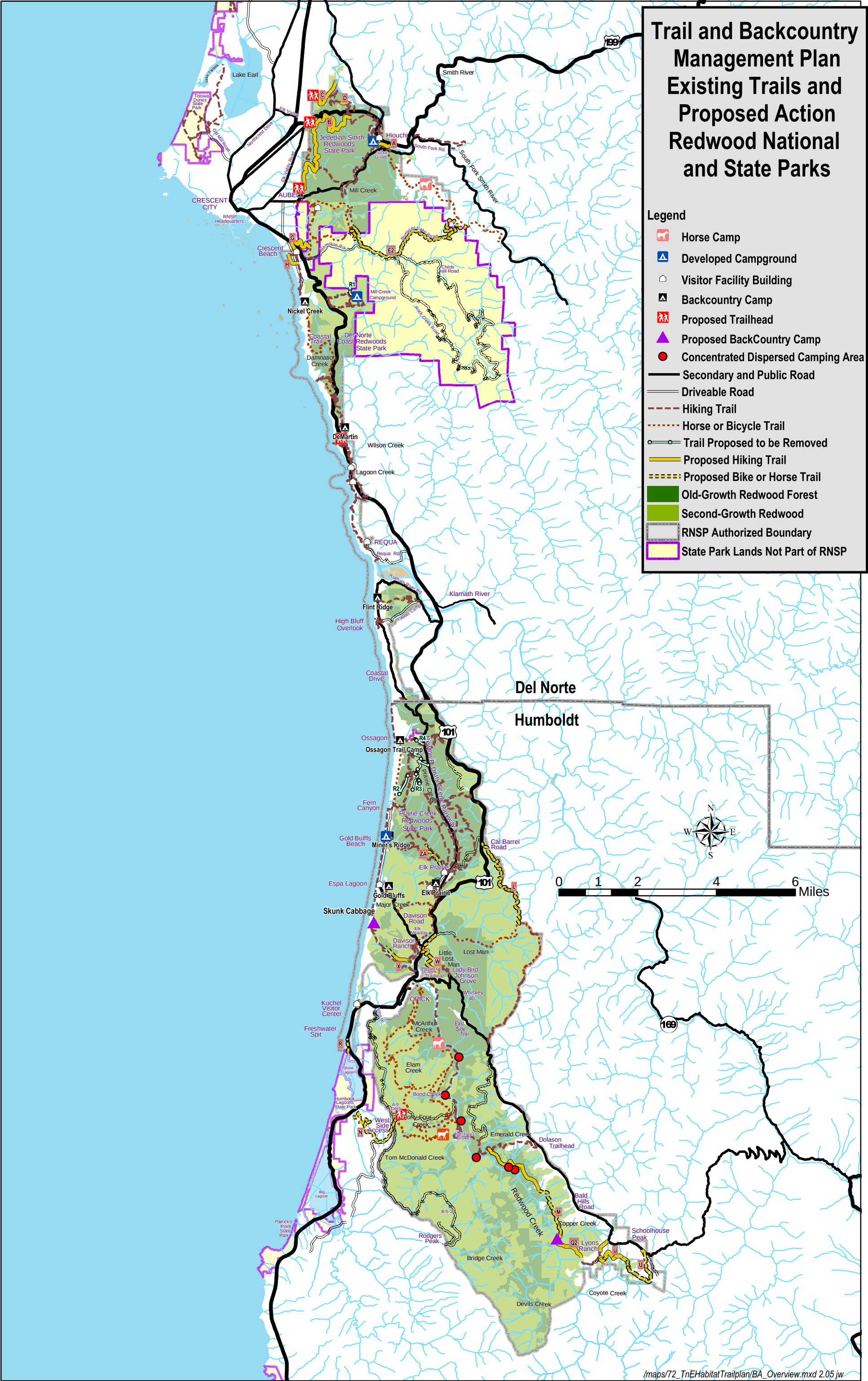
OREGON

U.S. Fish and Wildlife Service
Newport Fish and Wildlife Office
2127 S.E. OSU Drive
Newport, Oregon 97365-5258
(541) 867-4550

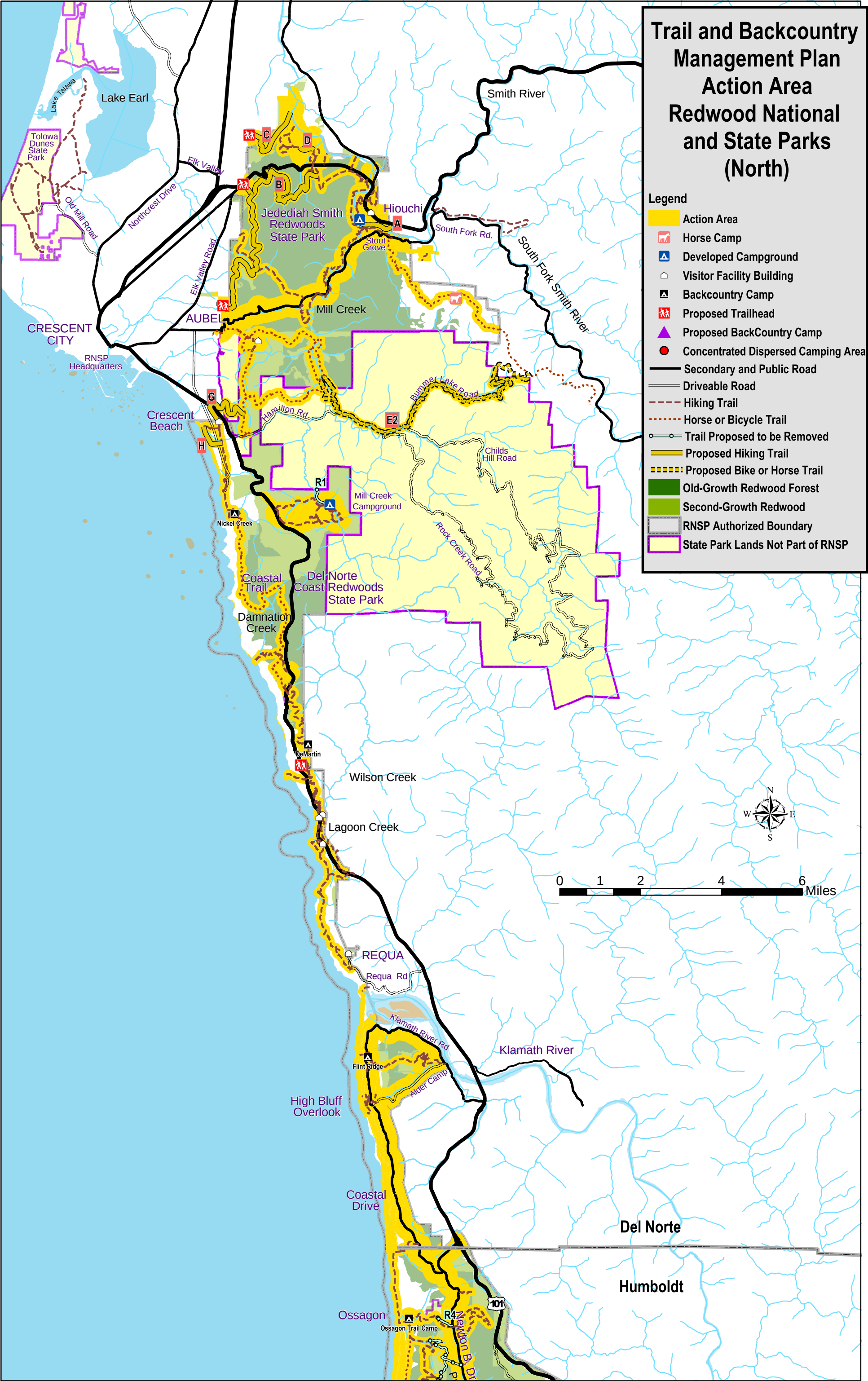
U.S. Fish and Wildlife Service
Oregon State Office
2600 SE 98th Avenue, Suite 100
Portland, Oregon 97266
(503) 231-6179
J-4

WASHINGTON

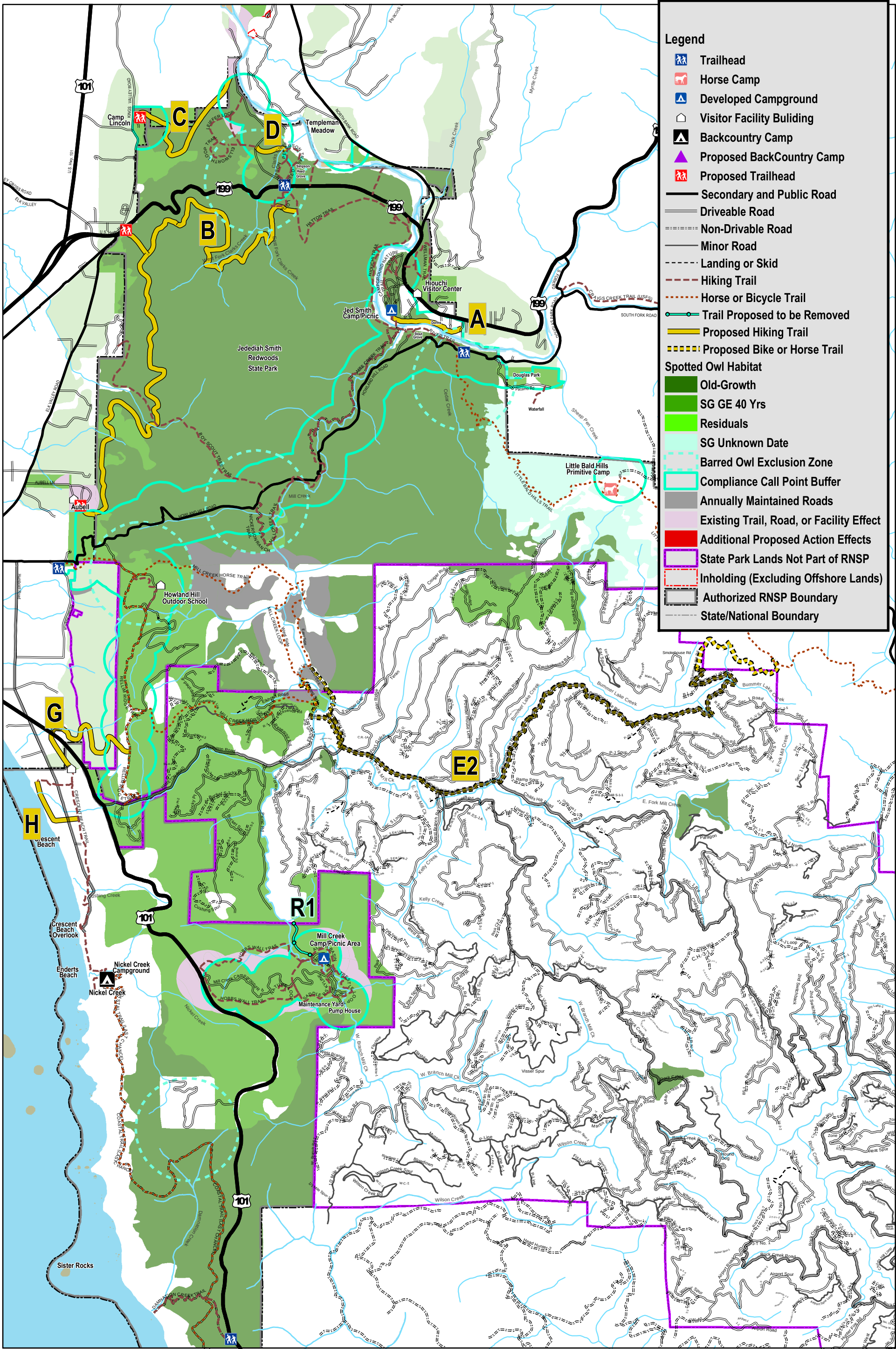
U.S. Fish and Wildlife Service
Western Washington Office
510 Desmond Dr SE, Suite 102
Lacey, Washington 98503
(360) 753-9440



Map 1

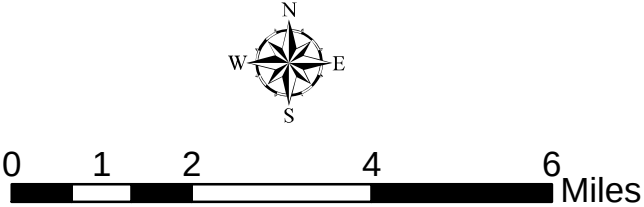


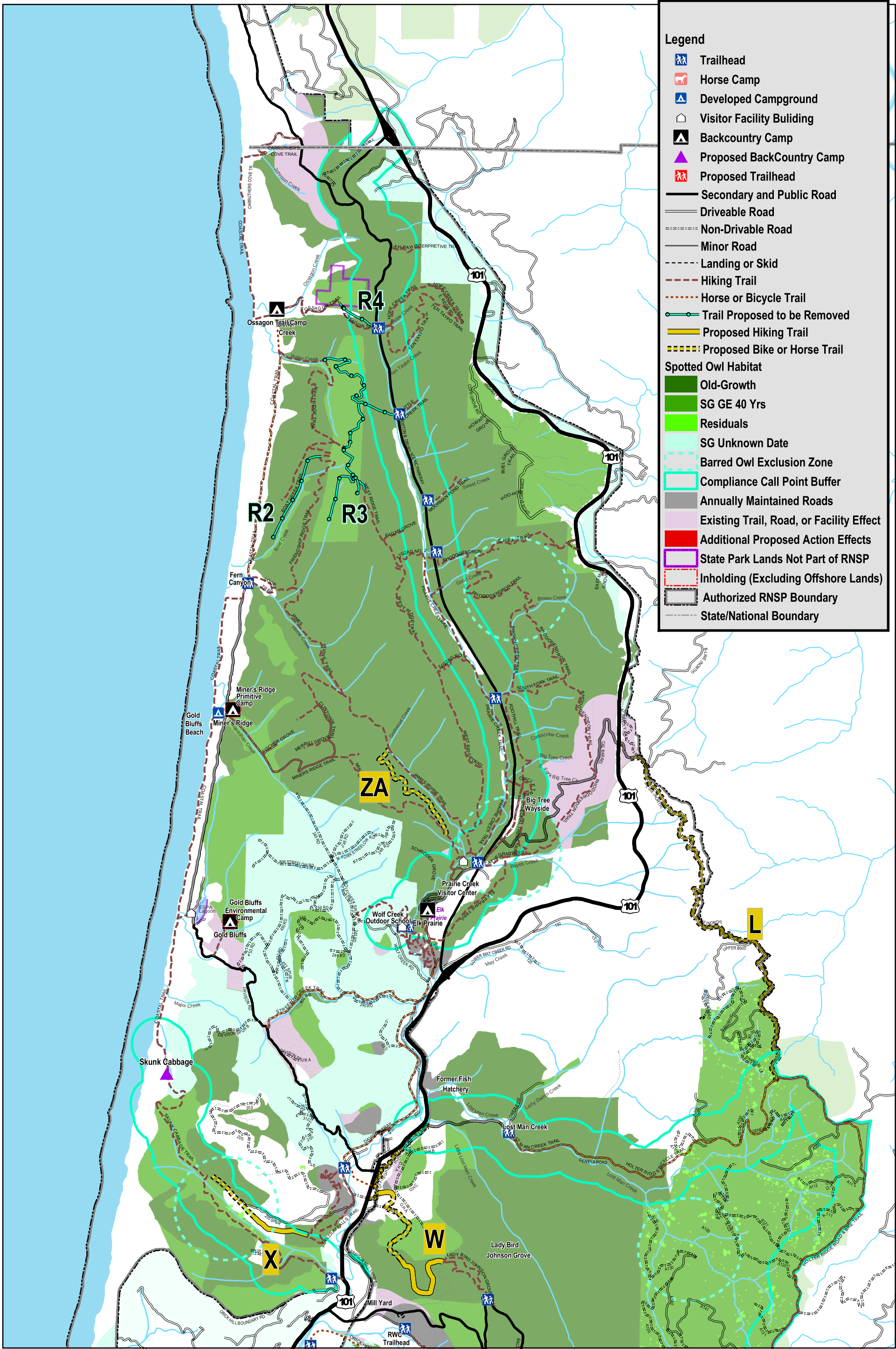
Map 2



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Map 4 Spotted Owl Effects
Trail and Backcountry Management Plan
Redwood National and State Parks



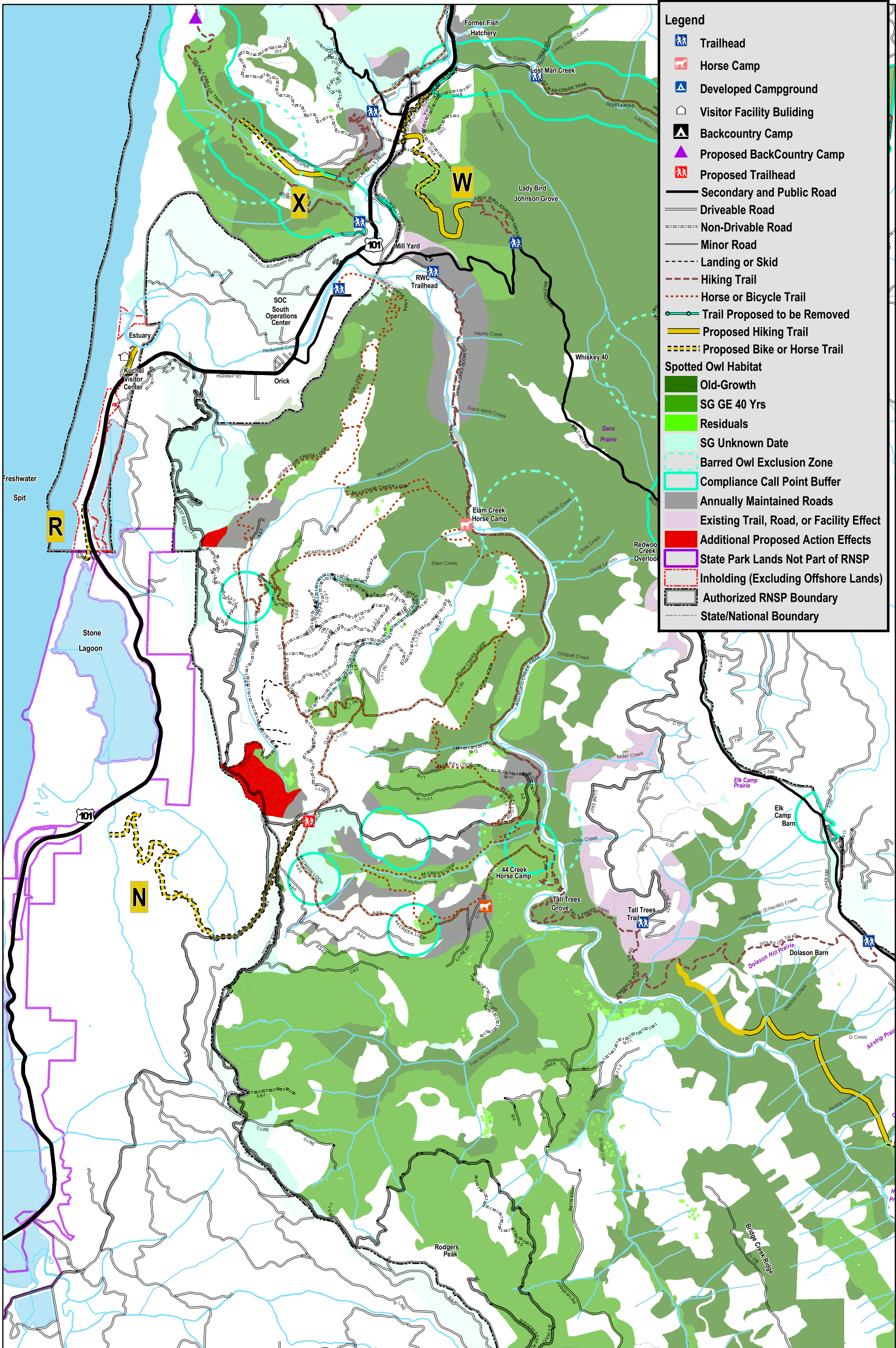


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Map 6 Spotted Owl Effects
Trail and Backcountry Management Plan
Redwood National and State Parks

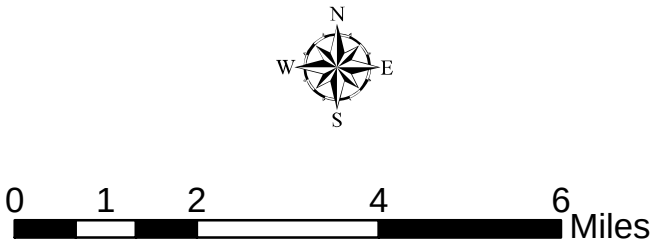


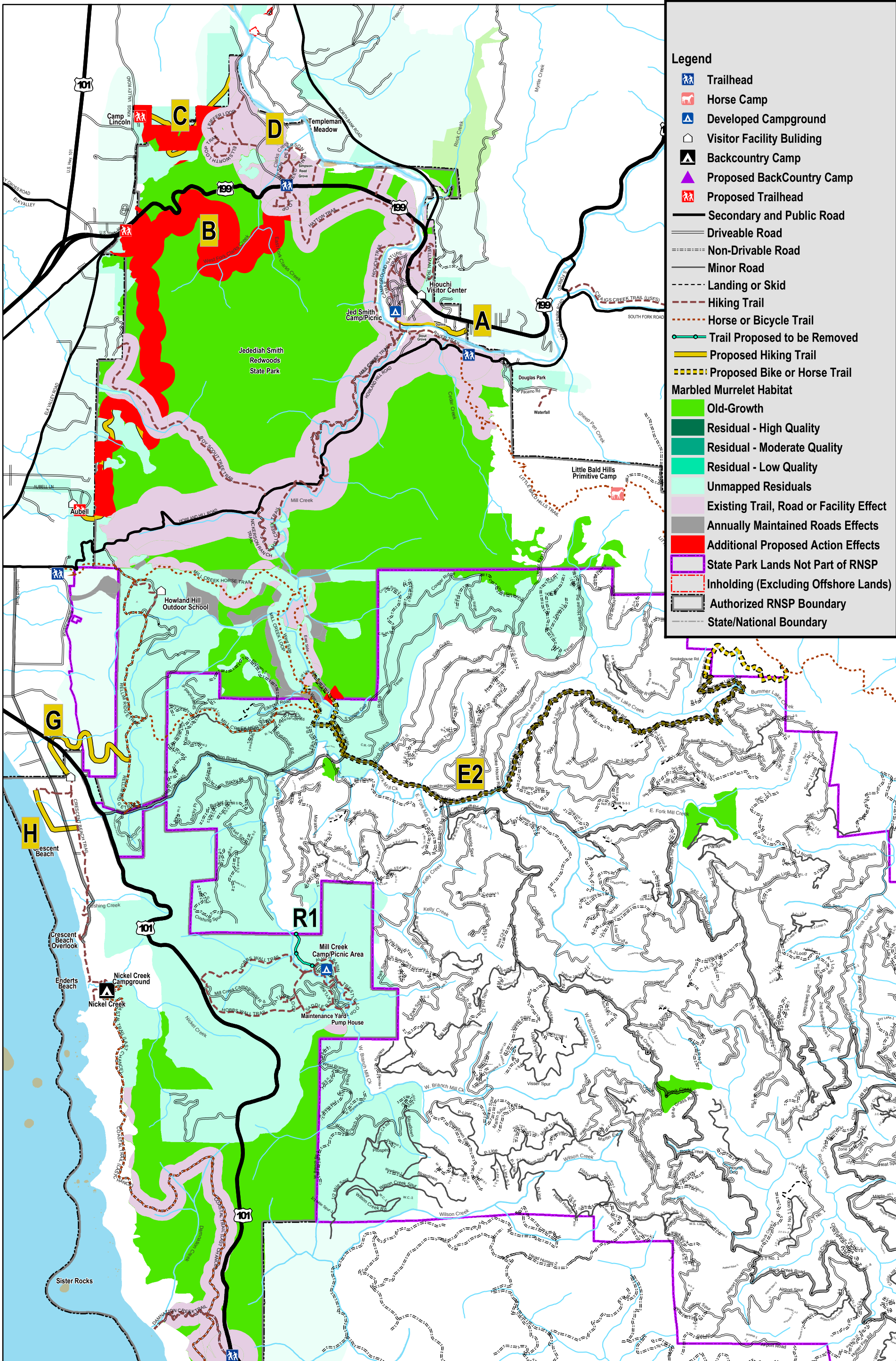
0 1 2 4 6 Miles



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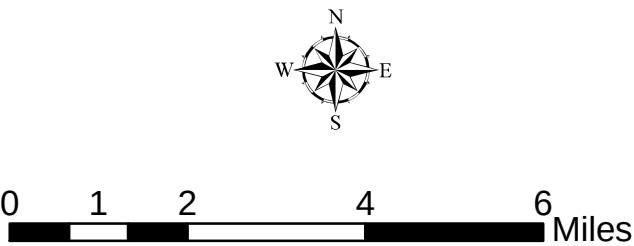
Map 7 Spotted Owl Effects
Trail and Backcountry Management Plan
Redwood National and State Parks

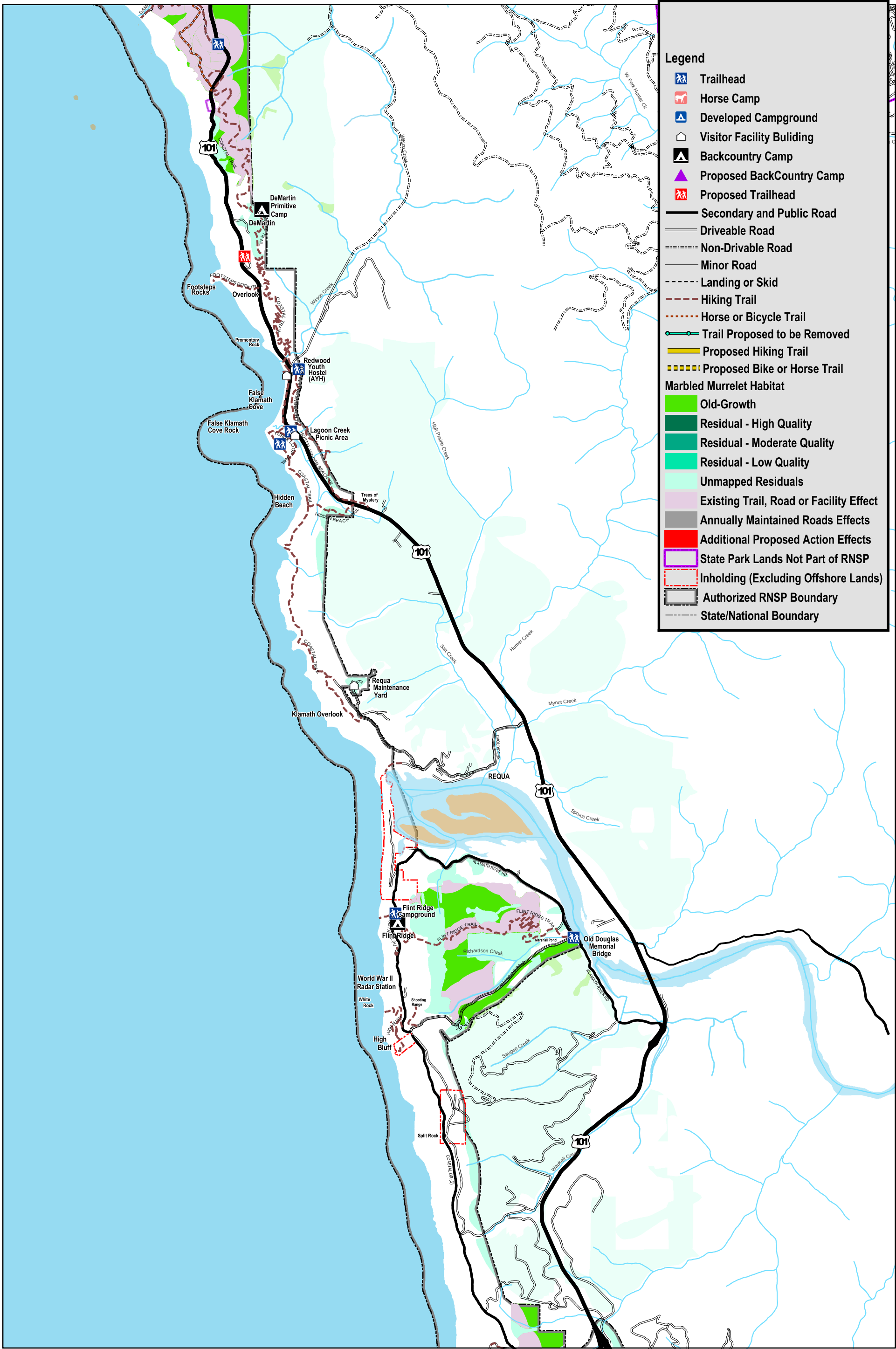




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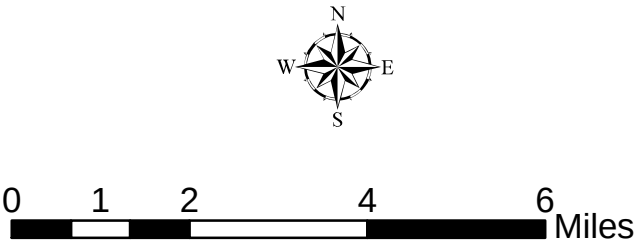
Map 9 Marbled Murrelet Effects
Trail and Backcountry Management Plan
Redwood National and State Parks

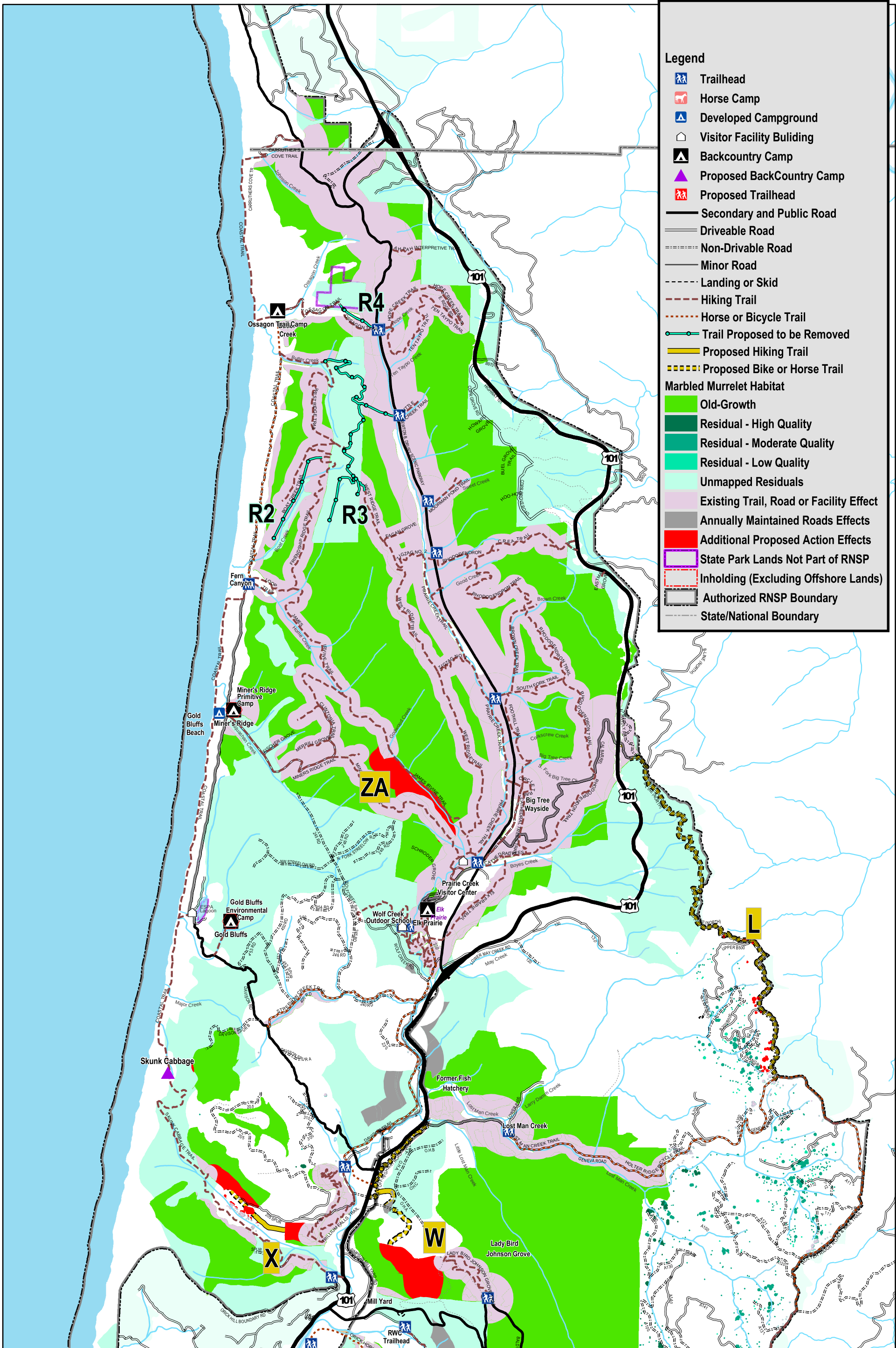




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Map 10 Marbled Murrelet Effects
Trail and Backcountry Management Plan
Redwood National and State Parks



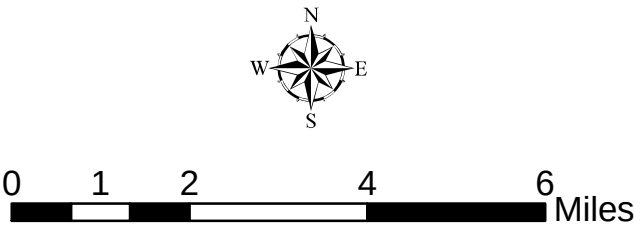


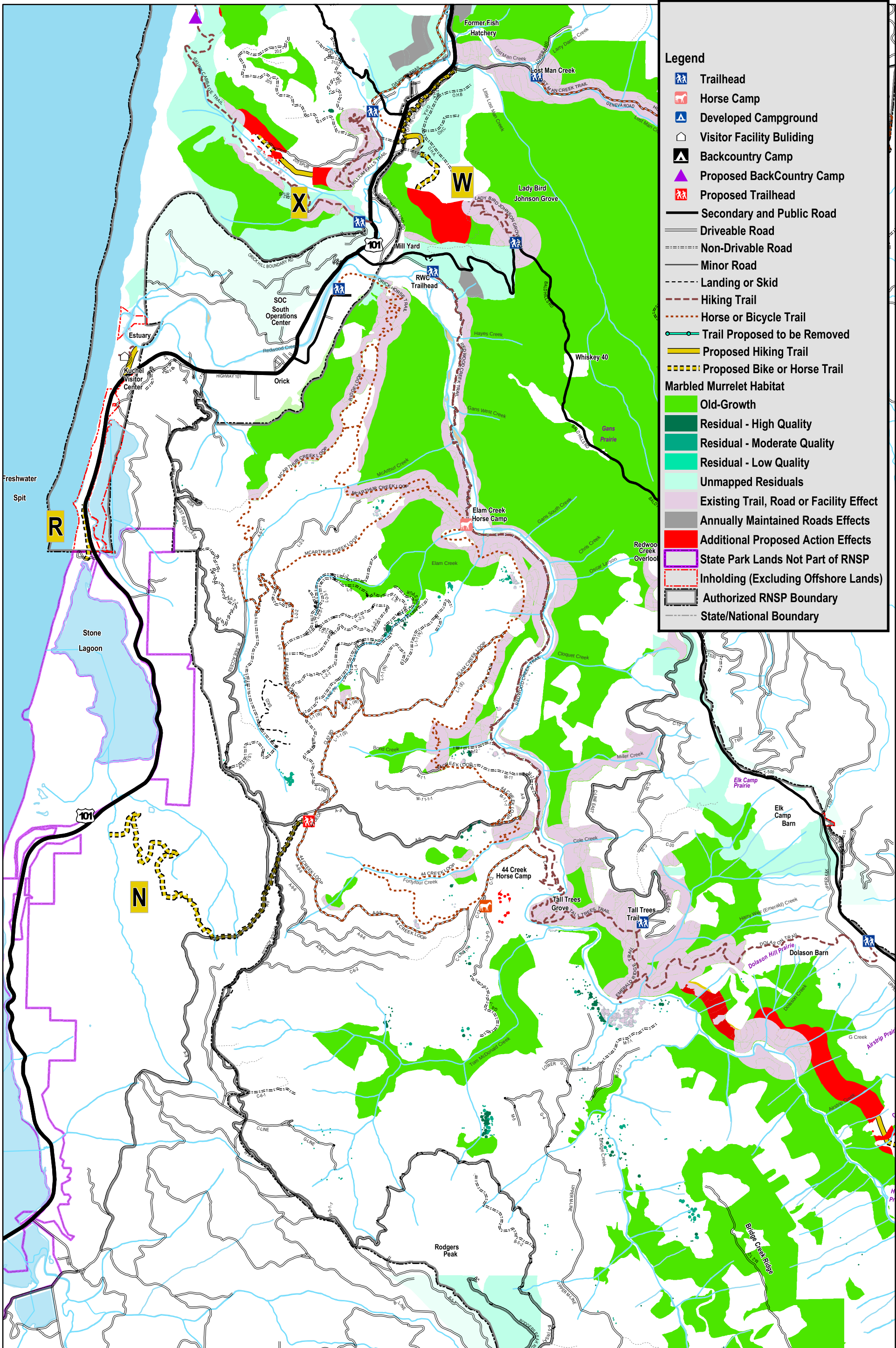
Legend

- Trailhead
- Horse Camp
- Developed Campground
- Visitor Facility Building
- Backcountry Camp
- Proposed BackCountry Camp
- Proposed Trailhead
- Secondary and Public Road
- Driveable Road
- Non-Driveable Road
- Minor Road
- Landing or Skid
- Hiking Trail
- Horse or Bicycle Trail
- Trail Proposed to be Removed
- Proposed Hiking Trail
- Proposed Bike or Horse Trail
- Marbled Murrelet Habitat**
- Old-Growth
- Residual - High Quality
- Residual - Moderate Quality
- Residual - Low Quality
- Unmapped Residuals
- Existing Trail, Road or Facility Effect
- Annually Maintained Roads Effects
- Additional Proposed Action Effects
- State Park Lands Not Part of RNSP
- Inholding (Excluding Offshore Lands)
- Authorized RNSP Boundary
- State/National Boundary

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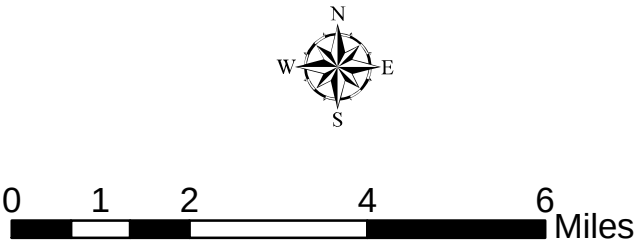
Map 11 Marbled Murrelet Effects
Trail and Backcountry Management Plan
Redwood National and State Parks

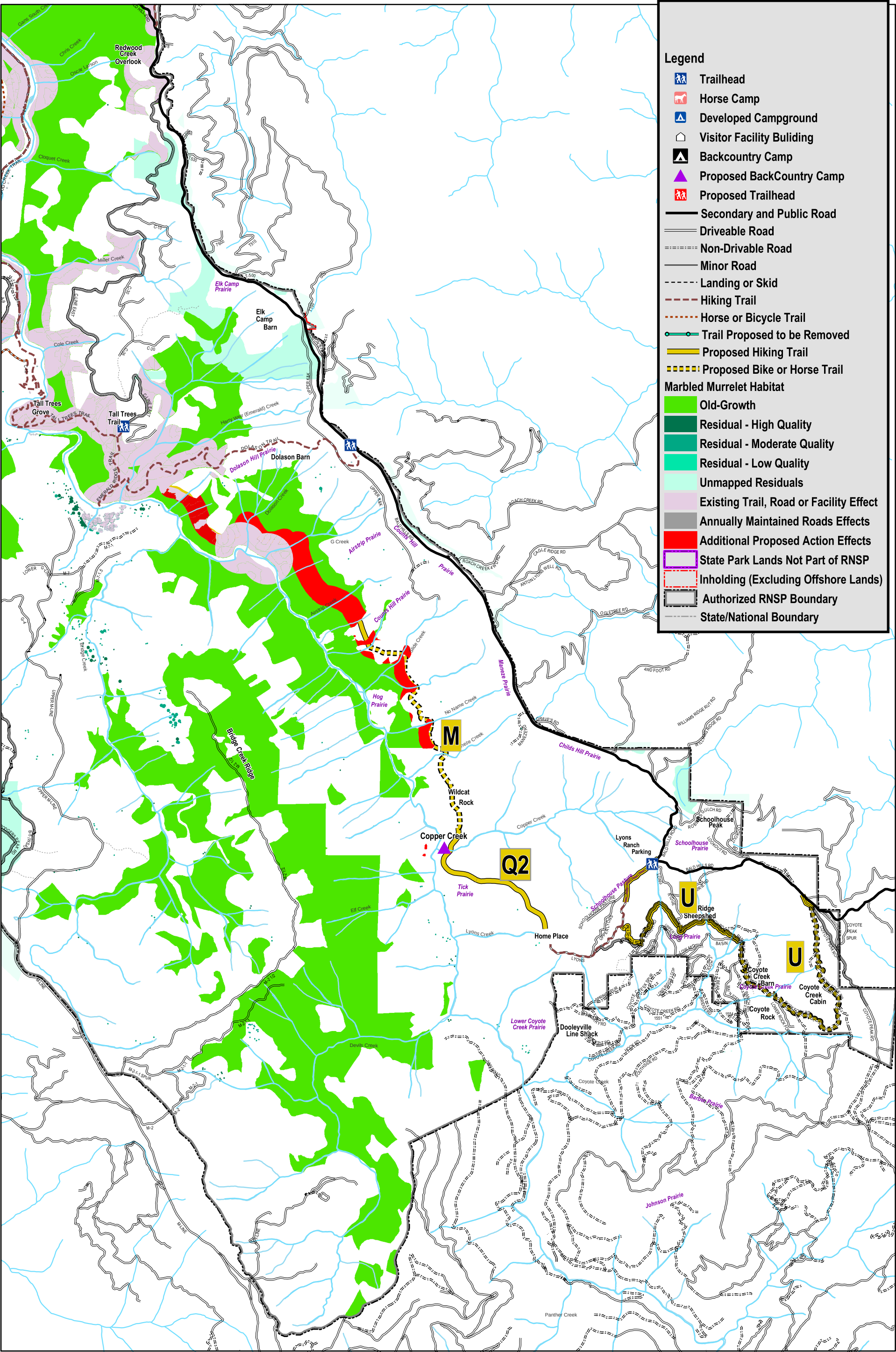




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Map 12 Marbled Murrelet Effects
Trail and Backcountry Management Plan
Redwood National and State Parks





/maps/72_TnEHabitatTrailplan/BA_Effects1.mxd 03.05 jw

Map 13 Marbled Murrelet Effects
Trail and Backcountry Management Plan
Redwood National and State Parks





United States Department of the Interior



FISH AND WILDLIFE SERVICE
Arcata Fish and Wildlife Office
1655 Heindon Road
Arcata, California, 95521
Phone: (707) 822-7201 FAX: (707) 822-8411

In Reply Refer To:
8-14-2003-1517

Memorandum

To: Park Superintendents, Redwood National and State Parks
Crescent City, California

From: Field Supervisor, Arcata Fish and Wildlife Office
Arcata, California

Subject: Formal Consultation on the Trail and Backcountry Management Plan,
Redwood National and State Parks, Humboldt and Del Norte Counties,
California

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the proposed Trail and Backcountry Management Plan for Redwood National and State Parks (Parks), Humboldt and Del Norte Counties, California, and the its effects on the Federally endangered California brown pelican (*Pelecanus occidentalis californicus*) and threatened bald eagle (*Haliaeetus leucocephalus*), marbled murrelet (*Brachyramphus marmoratus*), northern spotted owl ((*Strix occidentalis caurina*), western snowy plover (*Charadrius alexandrinus nivosus*), and Oregon silverspot butterfly (*Speyeria zerene hippolyta*). This document was prepared in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.). Your August 30, 2006, request for formal consultation was received on August 31, 2006.

You requested a conference opinion on this action. A conference is required only when a proposed action is likely to jeopardize the continued existence of a proposed species or destroy or adversely modify proposed critical habitat. No proposed species or proposed critical habitat occur within the Action Area. The following two candidate species do occur in the Action Area: Fisher (west coast DPS) (*Martes pennanti*) and mardon skipper (*Polites mardon*). Due to our current workload constraints, we will not be providing you with a conference opinion for these two candidate species. However, we encourage you

to design projects to fully protect the needs of these candidate species to help prevent the need for future listings.

This biological opinion is based on information provided in the August 22, 2006, biological assessment; other documents as referenced; telephone and e-mail correspondence; and site visits. A complete administrative record of this consultation is on file in this office.

Consultation History

For additional information on the consultation history refer to your August 30, 2006, letter requesting formal consultation and your biological assessment. A preliminary draft biological assessment was submitted to the Service on September 19, 2002. On September 24 and October 28, 2002 and April 8, 2003, meetings were held between Parks and Service staff to discuss the proposed project. A draft environmental assessment on the Trail and Backcountry Management Plan was received on March 24, 2003. On May 30, 2003, the Service provided comments on the draft environmental assessment. A draft biological assessment was submitted to the Service on August 26, 2003. On October 2, 2003, the Service provided comments on the draft. A second draft biological assessment was submitted to the Service on November 3, 2004. On February 2, 2005, the Service provided comments on the draft biological assessment. On April 21, 2005, the Parks requested formal consultation. On August 29, 2005, Service and Parks' staff met to discuss concerns about the status of marbled murrelets in the Parks. In mid-October, 2005, the Parks requested the Service delay completion of the consultation so that changes in the proposed action that would decrease impacts to the murrelet could be considered. From February to May 2006, meetings were held with biologists from the California Department of Fish and Game, Humboldt State University, the Service, and the Parks to discuss corvid management in the Parks. On May 2, 2006, new draft sections of the biological assessment were submitted to the Service for review. On August 10, 2006, the Service provided comments on the new draft sections. On August 30, 2006, the Parks submitted a request for formal consultation. The Service initiated consultation on August 31, 2006.

Other Services Conclusions

The Parks determined that the proposed project may affect, but is not likely to adversely affect the bald eagle, brown pelican, and Oregon silverspot butterfly. For a complete project description refer to the biological assessment and the description of the proposed action in the following biological opinion. The following discussions deal only with aspects of the proposed action that apply specifically to the bald eagle, brown pelican, and Oregon silverspot butterfly.

Bald Eagle

There are approximately 6,700 acres of suitable bald eagle habitat in the Action Area. In recent years, there have been two known bald eagle nests in the Parks. One of the nests was discovered in 1997 on a ridge just south of Orick. This nest produced young every

year between its discovery and 2005. The part of the tree which contained the nest was destroyed during the winter wind storms of 2005-06. This tree is not located in the Action Area. The other nest is located in the Action Area along the main branch of Mill Creek. The nest was discovered in 2005, produced one eaglet that year and in 2006. The nest is located approximately 100 yards from the existing Mill Creek Horse Loop Trail.

The Service concurs with your determination that the proposed project may affect but is not likely to adversely affect the bald eagle, based on the following factors:

Disturbance

1. Construction activities within 0.25 mile of suitable bald eagle nesting habitat from January 1 through August 31 will use hand tools only. Any activities requiring pounding (i.e., hammering) that produce sound greater than ambient levels will occur outside this period. Maintenance activities that use power tools will not occur within 0.25 mile of suitable nesting habitat unless surveys have determined that no nesting bald eagles are present or that young have fledged.
2. The only known bald eagle nest in the Action Area is located within 100 yards of the existing Mill Creek Horse Loop Trail. Visitors and park staff are not allowed along the section of the trail near the nest from October 15 through March 31 to protect spawning habitat for anadromous salmonids. The nest is located in the top of a 300 foot plus redwood tree. The nest is not visible from the trail because of intervening canopy layers. Since people on the existing trail from April 1 through August 31 may be visible to nesting eagles, we anticipate some change in behavior. However, the duration and intensity of the visual disturbance is expected to be insignificant.
3. If any new nests or winter roosts are discovered in the Parks within 0.5 mile of existing or proposed developments or dispersed areas, the Parks will temporarily close the section of trail or associated facility and enter into consultation with the Service.

Habitat Removal and Degradation

According to the biological assessment, no suitable bald eagle nesting habitat will be removed or degraded.

Direct Injury

Cutting trees will not occur in suitable bald eagle nesting habitat, avoiding direct injury or death of breeding bald eagles, eggs, or young.

Brown Pelican

All of the Parks' beaches contain suitable brown pelican resting habitat. Pelicans are known to loaf on the following Parks' areas with some regularity: berm and vicinity of the Redwood Creek estuary and certain sections of Gold Bluffs Beach, in particular the areas around Ossagon Creek, Squashan Creek, and Fern Canyon (Schmidt 2006a).

The Service concurs with your determination that the proposed project may affect but is not likely to adversely affect the brown pelican, based on the following factors:

Disturbance

Visitors use on the Parks' beaches may cause pelicans to be flushed from loafing locations. We anticipate that visitor use will disturb some pelicans; however, this disturbance is not expected to be significant because of the type of recreational use (pedestrian) and relatively low frequency and intensity of recreational activities.

Habitat Removal and Degradation

No suitable brown pelican habitat will be removed or degraded.

Direct Injury

Since pelicans are able to move away from people on the beaches, it is not anticipated that any pelicans will be harmed or injured.

Oregon Silverspot Butterfly

In the Parks, potentially suitable Oregon silverspot butterfly habitat occurs in the Crescent Beach/Endert's Beach area south of Crescent City. There are 240 acres of coastal prairie and wetland at this site (Sakai 2003). The Oregon silverspot butterfly's larval host plant, *Viola adunca*, and nectar sources are present at the site (Sakai 2003). According to the biological assessment, surveys in this area in the mid 1990's and 2004 did not detect any silverspot butterflies. The proposed 0.7 mile Crescent Beach Loop Trail goes through potential suitable habitat in this area.

The Service concurs with your determination that the proposed project may affect but is not likely to adversely affect the Oregon silverspot butterfly, based on the following factors:

Disturbance

To date, surveys conducted in this area have not detected any Oregon silverspot butterflies. Prior to construction of the proposed trail, additional flight season surveys will be conducted along the proposed trail route, if any Oregon silverspot butterflies are detected the Parks will close the trail and reinitiate consultation. No disturbance to Oregon silverspot butterflies is anticipated from the proposed trail construction, use, or maintenance, since no Oregon silverspot butterflies are believed to occur in the vicinity of the proposed trail route.

Habitat Removal and Degradation

The proposed trail will remove approximately 0.1 acre of unoccupied potentially suitable habitat. The loss of this small amount of suitable habitat is not expected to be significant because no Oregon silverspot butterflies are known to occur in the area.

Direct Injury

If Oregon silverspot butterflies are detected in the vicinity of the Crescent Beach Loop Trail in the future, the trail will be closed and consultation will be reinitiated.

The bald eagle, brown pelican, and Oregon silverspot butterfly will not be addressed further in this biological opinion, and, unless new information reveals effects of the proposed action that may affect these species in a manner or to an extent not considered, no further action pursuant to the Act is necessary relative to these species. The following biological opinion will deal only with impacts to the marbled murrelet, northern spotted owl, and western snowy plover.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Project Description

The Parks include Redwood National Park, Prairie Creek Redwoods State Park, Del Norte Coast Redwoods State Park, and Jedediah Smith Redwoods State park. Together these parks include approximately 105,500 acres in Del Norte and Humboldt Counties, California. The Parks' existing recreational developments include trails, trailheads, backcountry camps, dispersed camping areas, drive-in campgrounds, picnic areas, education centers, visitor centers, public roads, and miscellaneous facilities. The current trail system includes approximately 68 trails which consist of 135 miles of hiking trails, 47 miles of equestrian trails, and 32 miles of bicycle trails (some trails are multi-purpose so miles may be counted more than one time). There are 21 existing trailheads. The size of the trailheads varies from areas with hard surfaced parking lots, toilets, picnic facilities and trash cans to simple gravel pullouts. There are nine backcountry camps which vary in size from three to ten sites. Dispersed camping is currently allowed along approximately 9.25 miles of the Redwood Creek gravel bars upstream of McArthur Creek except within 0.25 mile of the Tall Trees Grove. The following four large front county campgrounds with associated facilities occur in the Parks: Jedediah Smith, Mill Creek, Elk Prairie, and Gold Bluffs Beach. Except for Mill Creek, the campgrounds contain corvid proof trashcans and food lockers. There are six picnic and day uses areas which contain picnic tables, fire pits, toilets, and corvid proof trashcans. There are two outdoor education centers, Howland Hill and Wolf Creek. These centers have cabins, halls, picnic tables, amphitheaters, and corvid proof trashcans. There are three visitor centers, Hiouchi, Prairie Creek, and Kuchel, with picnic tables and corvid proof trashcans. There are three high use recreational areas along the Smith River. There are 12 high-use visitor roads maintained by the Parks which vary in length from 10 to less than 1 mile long. There are 17 miscellaneous facilities which provide a variety of staff and visitor services. All of these facilities have corvid proof trashcans.

All of the beaches within the Parks are open to the public. The following activities are allowed on the Parks' beaches: leashed dogs; wood and rock collection – amount not to exceed what can be carried in a person's arms; recreational beach fishing; horseback riding (not on State beaches); fireworks on Freshwater Spit on July 4; and vehicles by permit.

Project Elements

The Parks are proposing to continue to allow use of existing facilities, construct new trails and facilities, alter some existing facilities, implement new rules and visitor management, and implement a corvid management and monitoring program.

Existing Developments

The Parks are proposing to continue use of all existing facilities except as discussed below.

Trail Closures Approximately 3.5 miles of existing trail (0.4 mile of Mill Creek Campground Trail; 1.0 mile of Boat Creek Trail, and 2.0 mile of James Irvine Trail segment) will be abandoned. Trail closure and restoration will consist of de-compacting the trail tread, pulling up the fill material, planting native vegetation, scattering duff, and placing large debris at junctions. Work will be done with hand tools and no vegetation will be removed. Approximately 2.0 miles of a new route for the James Irvine Trail will be constructed.

Road Removal Approximately 5 miles of West Ridge Road and 0.2 mile of Ossagon Road will be removed. These are remnants of historic logging roads in Prairie Creek Redwoods State Park. Four of the five miles of West Ridge Road will be removed and one mile will be converted to a foot trail. Road removal will remove approximately 23 acres of second-growth forest on the West Ridge Road and one acre on the Ossagon Road. The Ossagon Road section is located in an old-growth forest. The restoration work will use various types of heavy equipment.

Beach Use The Parks' plover management strategy was included as part of the proposed action in the April 12, 2006, vehicle beach access consultation (File number 8-14-2001-953). This strategy provides guidance on future plover surveys and minimization measures. The following are sections of the strategy that apply to visitor use on the Parks' beaches.

1. Park managers have the option of designating temporary winter protection areas (WPAs) or breeding season temporary plover protection areas (PPAs) which could extend up to 0.25 mile north and south of plovers. No human access would be allowed within the WPA or PPA, but the waveslope adjacent to the WPA and PPA would remain open to pedestrians and equestrians. Pedestrian travel above the waveslope in the WPA and PPA would be allowed along marked corridors if the WPA or PPA significantly overlaps a high use visitor area.

2. Park managers have the option of designating a temporary nest protection area (NPA) that could extend up to 0.25 mile north and south of a nest. No human access, dogs, horses, or kite flying would be allowed in the NPA, but the waveslope adjacent to the NPA would still be open to pedestrians and equestrians. Pedestrian travel above the waveslope within the NPA would be allowed along marked corridors if the NPA overlaps a high use visitor area.
3. Temporary brood protection zones (BPZ) may be designated when a brood is present. The BPZ will extend up to 4 miles north and south of the nest site, unless monitoring indicates that a larger or smaller area is adequate. The BPZ, including the waveslope, will be closed to dogs, horses, and kite flying, but the waveslope will still be open to pedestrians.
4. Park managers have the option of designating a temporary brood protection area (BPA) if broods are detected within 0.25 mile of a visitor use area. The BPA will include the area up to 0.25 mile north and south of the brood, but exclude the waveslope. No human access would be allowed within the BPA, but the waveslope would remain open to pedestrians. Pedestrian travel above the waveslope may be allowed on a marked corridor.
5. Education materials (e.g., rack cards, brochures, signs, programs, and visitor guides) will be made available at all visitor centers and kiosks. Park employees, contractors, and volunteers that work on beaches will receive training to help them identify snowy plovers and protect their habitat. A volunteer group of trained docents will be utilized to educate visitors and other beach users about plovers.

Proposed Developments

New Trails The proposal includes the construction of 14 new trails which consists of 35 miles of hiking trails, 2 miles of rerouted hiking trail, 12.5 miles of equestrian trails, and 10 miles of bike trails. In general, all new trails will be built with a 3-foot wide tread and equestrian trails will have a 4-foot wide rocked tread.

New Trailheads There will be five new trailheads and two existing trailheads will be redesigned. All trailheads will have vault toilets and corvid proof trashcans. Three of the new trailheads are located on state park land within 0.25 mile of marbled murrelet habitat. All three of these trailheads will have picnic tables. Two of the new trailheads are on national park lands farther than 0.25 mile of marbled murrelet habitat. These two trailheads will not have picnic tables

New Backcountry Campgrounds Two new backcountry campgrounds will be constructed, one existing backcountry campground will be relocated and one existing campground will be retrofitted for increased accessibility. The new backcountry campgrounds will have vault toilets, corvid-proof trashcans, bear proof food lockers, fire rings, and picnic tables. One campground will have 4 campsites and one 5 campsites.

Increased Public Access Approximately 6.5 miles of the existing West Side Access Road will be opened to the public. Approximately 0.75 mile of this road is within 0.25 mile of northern spotted owl nesting and roosting habitat.

Maintenance of New Facilities As each new trail and facility is completed an annual maintenance program will begin and continue into the future. Future maintenance activities in or within 0.25 mile of marbled murrelet or northern spotted owl nesting habitat that utilize equipment that produces noise above ambient levels will occur outside of the marbled murrelet breeding season, March 24 through September 15 and outside of the northern spotted owl early breeding season, February 1 through July 9. The only exception to these restrictions will be cutting up to two large trees per year from the East Side Trail (Trails M and Q) with chainsaws in suitable northern spotted owl and marbled murrelet habitat during the breeding season. Any additional trees that fall on this trail will be cleared using hand tools.

Corvid Management and Monitoring Program

Due to concerns regarding low marbled murrelet nesting success in the Parks and evidence that corvid predation of murrelet eggs and chicks may increase in proximity to recreational developments, the Parks have committed to undertake the following actions.

Corvid Management Strategy The Parks will develop a corvid management strategy by May 2007. The aim of the strategy is to decrease corvid predation of marbled murrelets near the Parks' visitor facilities. The main objective is to reduce corvid densities by reducing or eliminating anthropogenic food sources. The strategy document will detail corvid management goals, techniques, and monitoring that will be implemented. The document will contain specific tasks, identify responsible Parks' staff, and establish timelines for implementation. It will also identify additional tasks and research needs that may be implemented depending on funding availability.

Adaptive Management Approach The Parks will adopt an adaptive management approach for some existing recreational facilities in marbled murrelet nesting habitat. During the first three years (2007 through 2009), the Parks' will collect baseline data on corvid abundance and food availability in relation to some existing recreational facilities. From 2010 through 2012, the Parks will implement various management actions to lower corvid abundance and food availability. The goal is to reduce corvid densities by at least 50 percent below the baseline levels at each monitored visitor use area. In 2013, the Parks will determine if the desired reductions have been achieved. Depending on the results of the monitoring, additional management actions may be implemented from 2013 through 2015. The following describes specific actions that will occur during each period.

2007 through 2009

1. Corvid point count stations will be established in and around the following recreational facilities: Jedediah Smith Campground (3 stations); Prairie Creek Campground (2 stations); Lady Bird Johnson Trail trailhead, Tall Trees Trail trailhead, Mill Creek Loop Trail, Three Hour Loop Horse Trail, Redwood Creek

Overlook, and along Redwood Creek downstream of the Bond Creek junction (7 stations). Each station will be monitored twice monthly from May through September.

2. Ten control stations will be randomly scattered throughout suitable marbled murrelet nesting habitat at least 0.25 mile from any habitat edge or visitor facility. Each station will be monitored twice monthly from May through September.
3. Human food availability surveys will be conducted twice monthly from May to September at Prairie Creek and Jedediah Smith campgrounds.
4. Potential major anthropogenic food sources will be identified and mapped within 1 mile of the Parks' boundaries. Pending available funding, cleanup and education efforts will follow.
5. The existing visitor education program aimed at educating the public about the connection between feeding corvids and predation of murrelets will continue and expand. Existing efforts have included installing educational signs and posters at trailheads, campgrounds, and visitor centers; placing feature articles in every park orientation brochure; handing out pamphlets at all entrance kiosks; and discussing corvids at most campfire and ranger led programs. Starting in 2007, a corvid/murrelet message will become part of all ranger presentations. Within the next year, a visitor center video that discusses the food/corvid/murrelet issue will be shown at the visitor centers.
6. The remainder of the bear proof food storage lockers will be installed at Mill Creek Campground pending available funding.

2010 through 2012

1. Picnic tables will be removed from the following existing facilities: Lady Bird Johnson Trail trailhead, Tall Trees Trail trailhead, Mill Creek Loop Trail, Three Hour Loop Horse Trail, and Redwood Creek Overlook.
2. Dispersed camping will be disallowed along approximately 4 miles of the Redwood Creek gravel bars from Bond Creek downstream to an area approximately 0.25 mile downstream of McArthur Creek. Dispersed camping will still be allowed upstream of Bond Creek, except for the half mile area near the Tall Trees Grove (an existing restriction).
3. Pending available funding, the corvid/murrelet education program may be expanded by increasing personnel and programs particularly at the big campgrounds, visitor centers, major trailheads, and picnic areas. Funding may support five seasonal corvid/murrelet education staff, one part-time education staff leader, and development of additional interpretive material.

2013

1. At the end of the 6 year period, Parks' staff will determine whether or not the desired targets of reducing corvid density by at least 50 percent below the baseline levels at each visitor use area have been achieved.
2. If the targets have been met, then the Parks will continue the same types and intensities of corvid management.
3. If the targets have not been met, then Parks' staff will consider one or more of the following more intensive corvid management techniques in coordination with advice from subject matter experts and the Service: 1) increased visitor education and/or new visitor education material; 2) capture and harassment of corvids; 3) corvid removal (lethal or translocation); and 4) moving, closing, or implementing seasonal closures of visitor facilities.

Conservation Measures

When used in the context of the Act, "conservation measures" represent actions proposed by the Federal agency that are intended to further the recovery of and/or to minimize or compensate for project effects on the species under review. Because conservation measures are pledged in the project description by the action agency, their implementation is required under the terms of the consultation (USDI Fish and Wildlife Service and USDC National Marine Fisheries Service 1998).

Recovery Measures

The Parks are not proposing to include any recovery measures as part of the proposed action.

Avoidance and Minimization Measures

The Parks will implement the following avoidance and minimization measures:

1. Trails within 0.25 mile of suitable northern spotted owl or marbled murrelet habitat will be constructed with hand tools only during the early part of the owl breeding season (February 1 through July 9) and the murrelet breeding season (March 24 through September 15), unless protocol surveys indicate the species is not present.
2. Construction activities involving pounding (i.e., hammering) in areas where it is above ambient levels will not occur in unsurveyed or occupied owl nesting and roosting habitat from February 1 through July 9 or in unsurveyed or occupied murrelet nesting habitat from March 24 through September 15.
3. Trailheads within 0.25 mile of suitable nesting habitat will not be constructed during the early part of the northern spotted owl breeding season (February 1 through July 9) or during the marbled murrelet breeding season (March 24 through September 15), unless current protocol surveys indicate the species is not nesting.

4. Backcountry camp construction, relocation, and retrofitting that produce noise greater than ambient levels will not occur within 0.25 mile of suitable nesting habitat during the early part of the northern spotted owl breeding season (February 1 through July 9) or during the marbled murrelet breeding season (March 24 through September 15), unless current protocol surveys indicate the species is not nesting.
5. New or rerouted trail routes without current northern spotted owl surveys conducted to protocol will be surveyed prior to construction.
6. No trees will be removed within 0.25 mile of a known northern spotted owl nest site or in unsurveyed suitable nesting and roosting northern spotted owl habitat from February 1 through September 15.
7. New and rerouted trail routes will not be placed within the visual disturbance range (i.e., 150 feet) of any known historic northern spotted owl site that is unoccupied by barred owls or any active northern spotted owl activity centers.
8. If a northern spotted owl nest is discovered within the visual disturbance distance of the previously constructed section of the East Side Trail (Trail M), the trail will be closed from February 1 through July 9 or moved outside of the visual disturbance zone.
9. No trees greater than 18 inches diameter-at-breast-height (dbh) will be removed during trail construction.
10. Maintenance activities for new trails, trailheads, and backcountry campgrounds that use power tools will not occur within 0.25 mile of unsurveyed or occupied northern spotted owl habitat during the early breeding season (February 1 through July 9) or within 0.25 mile of unsurveyed or occupied murrelet nesting habitat during the murrelet breeding season (March 24 through September 15) except on the East Side Trail see measure number 11.
11. No more than 2 large trees per year will be cleared with chainsaws from the East Side Trail (Trail M and Q) during the northern spotted owl early breeding season (February 1 through July 9) or the marble murrelet breeding season (March 24 through September 15).
12. Trail closure and restoration work will be done with hand tools only.
13. Removal of four miles of the West Ridge Road and the 0.2 mile of the Ossagon Road will occur from September 16 to October 15.

Action Area

The Action Area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR §402.02). For purposes of this biological opinion, the Action Area includes the area defined by the Parks as including the maximum area directly or indirectly affected by existing developments, dispersed use areas, and proposed developments. The Action Area contains approximately 35,860 acres.

Time-frame of Biological Opinion

This biological opinion is valid from the date of issuance through December 31, 2017.

STATUS OF THE SPECIES

Marbled Murrelet

Legal Status

The marbled murrelet was Federally listed as a threatened species in Washington, Oregon and California on September 28, 1992 (USDI Fish and Wildlife Service 1992a). The final recovery plan was released in 1997 (USDI Fish and Wildlife Service 1997). The species is State-listed as endangered in California and as threatened in Oregon and Washington (USDI Fish and Wildlife Service 1997).

In 2004, the Service completed a 5-year status review of the marbled murrelet. As part of the status review process the Service contracted the task of compiling all new and relevant information available on the species. The contractor produced a report summarizing information relevant to the status of the species (McShane et al. 2004). Based on this report, the Service concluded that the California, Oregon and Washington distinct population segment of the marbled murrelet should remain listed as a threatened species. The Service also determined that the California, Oregon, and Washington distinct population segment of the marbled murrelet does not meet the criteria set forth in the Service's 1996 distinct population segment policy (61 FR 4722) (USDI Fish and Wildlife Service 2004a). Currently, the marbled murrelet remains listed and retains its' protected status as a threatened species under the Act until the original 1992 listing decision is revised through formal rule-making procedures.

Life History

Marbled murrelets are long-lived seabirds that spend most of their life in the marine environment, but use old-growth forests for nesting. Accounts of the taxonomy, ecology, and reproductive characteristics of the marbled murrelet are found in the following publications: Ecology and Conservation of the Marbled Murrelet (Ralph et al. 1995a), the Final Recovery Plan Marbled Murrelet (*Brachyramphus marmoratus*) Washington, Oregon, and California Populations (Recovery Plan) (USDI Fish and Wildlife Service 1997), the Final Supplemental Environmental Impact Statement on Management of Habitat for Late-successional and Old-growth Forest Related Species Within the Range

of the Northern Spotted Owl (USDA Forest Service and USDI Bureau of Land Management 1994a), the Status of the Marbled Murrelet in North America: with Special Emphasis on Populations in California, Oregon, and Washington (Marshall 1988), Marbled Murrelet (*Brachyramphus marmoratus*) (Nelson 1997), and in the Evaluation Report in the 5-Year Status Review (McShane et al. 2004). Information from these sources is incorporated by reference and summarized as follows.

Physical Description

The marbled murrelet is taxonomically classified in the family Alcidae, a family of Pacific seabirds possessing the ability to dive using wing-propulsion. The plumage of this relatively small seabird is identical between males and females, but adult plumage changes during the winter and breeding periods providing some distinction between adults and juveniles. Breeding adults have light, mottled brown under-parts below sooty-brown upperparts contrasted with dark bars. Adults in winter plumage have white under-parts extending to below the nape and white scapulars with brown and grey mixed upperparts. The plumage of fledged young is similar to the adult winter plumage (USDI Fish and Wildlife Service 1997).

Current and Historical Range

The breeding range of the marbled murrelet extends along the Pacific coast from Alaska to Monterey Bay in central California. Some wintering birds occur as far south as northern Baja California, Mexico. However, only the Washington, Oregon, and California population segment is Federally listed as threatened (USDI Fish and Wildlife Service 1992a). Limited information is available on their historic distribution and numbers; however, most summaries give indications that the distribution of marbled murrelet populations was significantly reduced as habitat was removed throughout its' range. Populations declined as a result. In some areas, only small numbers of marbled murrelets persist or have been locally extirpated, risking maintenance of the species' distribution. These areas are identified as "areas of concern" (USDI Fish and Wildlife Service 1997). They include distribution gaps in central California, northwestern Oregon, and southwestern Washington, where very little suitable habitat remains, and what habitat does remain occurs in small, fragmented patches.

Marine Environment

The breeding and winter range of the marbled murrelet in the listed range occur within the oceanographic system known as the California Current. The California Current is subject to high interannual frequency of anomalous conditions such as an El Niño which can affect prey availability (McShane et al. 2004).

Courtship, foraging, loafing, molting, and preening occur in near-shore marine waters. Beginning in early spring, courtship continues throughout summer with some observations even noted during the winter period (Speckman 1996, Nelson 1997). Observations of courtship occurring in the winter suggest that pair bonds are maintained throughout the year (Speckman 1996, Nelson 1997). Courtship involves bill posturing, swimming together, synchronous diving, vocalizations, and chasing in flights just above

the surface of the water. Copulation occurs both inland in the trees and at sea (Nelson 1997).

Marbled murrelets forage at all times of the day, but most actively in the morning and late afternoon (Strachan et al. 1995). They typically forage in pairs, but have been observed to forage alone or in groups of three or more (Carter and Sealy 1990, Strachan et al. 1995, Speckman et al. 2003). Strachan et al. (1995) believe pairing influences foraging success and cooperative foraging techniques may be employed. For example, pairs consistently dive together during foraging and often synchronize their dives by swimming towards each other before diving (Carter and Sealy 1990) and resurfacing together on most dives. Strachan et al. (1995) speculate pairs may keep in visual contact underwater. Paired foraging is common throughout the year, even during the incubation period, suggesting that breeding marbled murrelets may temporarily pair up with other foraging individuals or non-mates (Strachan et al. 1995, Speckman et al. 2003).

Marbled murrelets generally forage within nearshore marine waters at about 1.25 miles of shore (Strachan et al. 1995), but are also known to forage in freshwater lakes (Nelson 1997). Traditional feeding areas are used consistently on a daily and yearly basis (Carter and Sealy 1990). Activity patterns and foraging locations are influenced by biological and physical processes that concentrate prey, such as weather, climate, time of day, season, light intensity, up-wellings, tidal rips, narrow passages between islands, shallow banks, and kelp (*Nereocystis* spp.) beds (Ainley et al. 1995, Strong et al. 1995, Speckman 1996, Nelson 1997).

Marbled murrelets forage at depths generally less than 98 feet deep (Strachan et al. 1995, Burger 2002). The most common foraging depths are not known. However, marbled murrelets are known to feed on small schools of fish within the upper 16.4 feet of marine waters (Mahon et al. 1992). An alcid the size of a marbled murrelet is expected to have a maximum diving depth of about 154 feet (Mathews and Burger 1998), although the deepest record of a marbled murrelet was from one captured at 89 feet in a gill net off of California (Carter and Erickson 1992). Jodice and Collopy (1999) reported most diving in Oregon occurred in water less than 33 feet deep.

Juveniles are found closer to shore than adults; rarely greater than 0.625 mile offshore (Beissinger 1995). They forage without the assistance of adults (Strachan et al. 1995). Kuletz and Piatt (1999) found that in Alaska, juvenile marbled murrelets congregated in kelp beds. Kelp beds are often associated with productive waters and may provide protection from avian predators (Kuletz and Piatt 1999). McAllister (unpublished data—cited in Strachan et al. 1995) found that juveniles were more common within 328 feet of shorelines, particularly where bull kelp was present.

Throughout their range, marbled murrelets are opportunistic feeders and utilize prey of diverse sizes and species. They feed primarily on fish and invertebrates in near-shore marine waters although they have also been detected on rivers and inland lakes (Carter and Sealy 1986; USDI Fish and Wildlife Service 1992a). In general, small schooling fish and large pelagic crustaceans are the main prey items. Pacific sand lance (*Ammodytes*

hexapterus), northern anchovy (*Engraulis mordax*), immature Pacific herring (*Clupea harengus*), capelin (*Mallotus villosus*), and surf smelt (Osmeridae) are the most common fish species taken and are eaten year round. Squid (*Loligo* spp.), euphausiids, mysid shrimp, and large pelagic amphipods are the main invertebrate prey and are primarily eaten during the non-breeding season, thus are not a significant part of a nestling's diet.

Breeding marbled murrelets appear to be more selective in their choice of prey when feeding their chicks. They usually select a single, relatively large, energy-rich fish such as larger sand lance, immature herring, anchovy, smelt, and occasionally salmon smolt to carry and feed to their chicks (Burkett 1995; Nelson 1997). Freshwater prey appears to be important to some individuals during several weeks in summer and may facilitate more frequent chick feedings, especially for those that nest far inland (Hobson 1990). The distribution and abundance of prey suitable for feeding chicks may greatly influence the overall foraging behavior and location(s) during the nesting season. For example, the availability of abundant forage fish during the nestling period may significantly affect the energy demand on adults by influencing both foraging time and the number of trips inland required to feed nestlings (USDI Fish and Wildlife Service 1992a).

Marbled murrelets go through two molts each year. The timing of molts varies temporally throughout their range likely due to prey availability, stress, and reproductive success (Nelson 1997). Adult or after hatch-year marbled murrelets have two primary plumage types: alternate plumage during the breeding season and basic plumage during the winter. The pre-alternate molt occurs from late February to mid-May. This is an incomplete molt during which the birds lose their body feathers but retain their ability to fly (Carter and Stein 1995, Nelson 1997). A complete pre-basic molt occurs from mid-July through December (Carter and Stein 1995, Nelson 1997). During the pre-basic molt, marbled murrelets lose all flight feathers somewhat synchronously and are flightless for up to 2 months (Nelson 1997).

Little is known about marine-habitat preference outside of the breeding season, but use during the early spring and fall is thought to be similar to that preferred during the breeding season (Nelson 1997). Adults and subadults may move away from breeding areas prior to molting and must select areas with predictable prey resources during the flightless period (Carter and Stein 1995, Nelson 1997). During the non-breeding season, marbled murrelets disperse and can be found farther from shore (Strachan et al. 1995). During the winter there may be a general shift from exposed outer coasts into more protected waters (Nelson 1997). For example, many marbled murrelets breeding on the exposed outer coast of Vancouver Island appear to congregate in the more sheltered waters within the Puget Sound and the Strait of Georgia in fall and winter (Burger 1995). However, in many areas, marbled murrelets remain associated with their inland nesting habitat during the winter months (Carter and Erickson 1992). In central California, a radio telemetry study of marbled murrelet movement during the late summer and fall months revealed that most birds remained near their nesting areas immediately following molt, but then began to disperse distances greater than 100 miles to wintering areas (Peery et al. 2003a).

At sea predators include bald eagles, peregrine falcons (*Falco peregrinus*), western gulls (*Larus occidentalis*), and northern fur seals (*Callorhinus ursinus*) (McShane et al. 2004). California sea lions (*Zalophus californianus*), northern sea lions (*Eumetopias jubatus*), and large fish may also be occasional predators (Burger 2002).

Terrestrial Environment

Marbled murrelets generally nest in old-growth forests, characterized by large trees, multiple canopy layers, and moderate to high canopy closure. Marbled murrelet nests have been located at a variety of elevations from sea level to 5,020 feet (Burger 2002). However, most nests have been found below 3,500 feet. In California, nest stands are typically composed of low elevation conifers, which include coastal redwood and Douglas-fir. These forests are located close enough to the marine environment for the birds to fly to and from nest sites. The furthest known inland occupied site is in Washington, about 52 miles from the coast. However, marbled murrelets have been detected up to 70 miles from the coast in the southern Cascade Mountains (Evans Mack et al. 2003).

Radar and audio-visual studies have shown marbled murrelet habitat use is positively associated with the presence and abundance of mature and old-growth forests, large core areas of old-growth, low amounts of edge and fragmentation, proximity to the marine environment, total watershed area, and increasing forest age and height (McShane et al. 2004). In California and southern Oregon, areas with abundant numbers of marbled murrelets were farther from roads, occurred more often in parks protected from logging, and were less likely to occupy old-growth habitat if it was greater than 3 miles from other nesting marbled murrelets (Meyer et al. 2002). Meyer et al. (2002) also found at least a few years passed before birds abandoned fragmented forests.

Marbled murrelets do not form dense colonies, which is atypical for most seabirds. Limited evidence suggests they may form loose colonies or clusters of nests in some cases (Ralph et al. 1995b). The marbled murrelets reliance on cryptic coloration to avoid detection would suggest they utilize a wide spacing of nests in order to prevent predators from forming a search image (Ralph et al. 1995b). However, active nests have been seen within 98 feet in Oregon (Nelson and Wilson 2002). Estimates of marbled murrelet nest densities vary depending upon the method of data collection. For example, nest densities estimated using radar range from 0.003 to 0.042 mean nests per hectare, while nest densities estimated from tree climbing efforts range from 0.11 to 1.42 mean nests per hectare (Nelson 2005).

Of particular importance to recovery options is evidence that breeding marbled murrelets displaced by the loss of nesting habitat apparently do not pack in higher densities into remaining habitat (McShane et al. 2004). Thus currently unoccupied habitat with suitable nesting structure may be important to displaced marbled murrelets and first-time breeders.

There are little data available regarding marbled murrelet nest site fidelity because of the difficulty in locating nest sites and observing bands on birds attending nests. However,

marbled murrelets have been detected in the same nesting stands for many years suggesting marbled murrelets have a high fidelity to nesting areas (Nelson 1997). Use of the same nest platform in successive years and multiple nests in the same tree has been documented, although it is not clear whether the repeated use involved the same birds (Divoky and Horton 1995, Nelson and Peck 1995, Nelson 1997, Hebert et al. 2003a).

It is unknown whether juveniles disperse from natal breeding habitat or return to their natal breeding habitat after reaching breeding age. Divoky and Horton (1995) predicted that juvenile dispersal is likely to be high because marbled murrelets are non-colonial and nest in widely dispersed nest sites. Conversely, Swartzman et al. (1997 cited in McShane et al. 2004) suggested juvenile dispersal is likely to be low, as it is for other alcid species.

When tending active nests during the breeding season, breeding pairs forage within commuting distance of the nest site. Daily movements between nest sites and foraging areas for breeding marbled murrelets averaged 10 miles in Prince William Sound, Alaska (McShane et al. 2004), 24 miles in Desolation Sound, British Columbia, and 48 miles in southeast Alaska (Hull et al. 2001). In California, Hebert et al. (2003b) found the mean extent of north-south distance traveled by breeding adults to be about 46 miles.

Known predators of adult marbled murrelets in the forest environment include the peregrine falcon (*Falco peregrinus*), sharp-shinned hawk (*Accipiter striatus*), common raven (*Corvus corax*), northern goshawk (*Accipiter gentilis*), and bald eagle (*Haliaeetus leucocephalus*). Common ravens and Steller's jays (*Cyanocitta stelleri*) are known to take both eggs and chicks at the nest, while sharp-shinned hawks have been found to take chicks. Common ravens account for the majority of egg depredation, as they appear to be the only predator capable of flushing incubating or brooding adults from a nest (Nelson and Hamer 1995a). Suspected nest predators include great horned owls (*Bubo virginianus*), barred owls (*Strix varia*), Cooper's hawks (*Accipiter cooperi*), northwestern crows (*Corvus caurinus*), American crows (*Corvus brachyrhynchos*), and gray jays (*Perisoreus canadensis*) (Nelson and Hamer 1995a, Nelson 1997). Predation by squirrels and mice has been documented at artificial nests and cannot be discounted as potential predators on eggs and chicks (Luginbuhl et al. 2001, Raphael et al. 2002, Bradley and Marzluff 2003).

Reproductive Biology

Life history information is limited for the marbled murrelet (USDI Fish and Wildlife Service 1997). However, marbled murrelets probably do not reach sexual maturity until at least their second year, and most birds probably do not lay eggs until they are at least 3 years old (USDI Fish and Wildlife Service 1997). Marbled murrelets are estimated to live an average of 10 years (Beissinger 1995). Marbled murrelets produce one egg per nest and usually only nest once a year, however re-nesting is documented (Hebert et al. 2003a). Nests are not built, but rather the egg is placed in a small depression or cup made in moss or other debris on the limb (USDI Fish and Wildlife Service 1997). In California, egg-laying and incubation span a long period, beginning around March 24 and ending August 15, with the nestling period beginning April 23 and ending September 13 (Hamer et al. 2002).

Incubation lasts about 30 days, and chicks fledge after about 28 days after hatching. Both sexes incubate the egg in alternating 24-hour shifts. The chick is fed up to eight times daily, and is usually fed only one fish at a time. Adults fly from the ocean to inland nest sites at all times of the day, but most often at dusk and dawn (Nelson and Hamer 1995a). New information from a radio-telemetry study in northern California indicates that inland flights at dusk are exclusively made by breeding birds, whereas inland flights at dawn are made by both breeding and non-breeding birds (B. Accord pers. comm.). The young are semiprecocial, capable of walking but not leaving the nest. Fledglings apparently fly directly from the nest to the ocean, but are sometimes found on the ground, indicating that they were unable to sustain flight to reach the marine environment (USDI Fish and Wildlife Service 1997).

Threats

Marbled murrelets remain subject to a variety of threats both in the terrestrial and marine environment including the loss of nesting habitat, predation, noise and visual disturbance, gill-net fishing operations, oil spills and marine pollution, trends in prey availability from oceanographic conditions and overfishing, and disease (USDI Fish and Wildlife Service 1997, McShane et al. 2004).

Habitat loss

Marbled murrelets prefer late-successional and old-growth forests for nesting. Loss of this type of habitat due to timber harvest was the primary reason for listing the species (USDI Fish and Wildlife Service 1992a). Loss of nesting habitat exacerbated by poor reproductive success in remaining habitat are the primary factors responsible for a decline in the marbled murrelet population, compared to the historical population level in the early 1800's (USDI Fish and Wildlife Service 1997).

Predation

Predation of eggs and chicks is a major cause of nest failure (Nelson and Hamer 1995b). Even small increases in predation can have deleterious effects to population viability, due to the marbled murrelet's low reproductive rate (Nelson and Hamer 1995b). Poor reproductive success is likely caused by high predation rates. In particular, human activities which increase the number of predators or risk of predation near nesting areas should be discouraged (USDI Fish and Wildlife Service 1997).

Predation rates are influenced largely by habitat patch size, habitat quality, nest location relative to edge of nest stand, and proximity of nesting habitat to areas of human activity, where many of the corvid species are in high abundance. The quality of nesting habitat decreases as patch size decreases because the amount of forest edge increases in relation to the amount of interior forest habitat. As the amount of forest edge increases, the probability that nests would be located near an edge also increases. Nests placed near the edge of a stand are more likely subject to predation (Ralph et al. 1995b). Nelson and Hamer (1995b) found successful nests were farther from edges and were better concealed than unsuccessful nests. Furthermore, independent of patch size, the quality of nesting habitat decreases when in close proximity to human activity. Forest stands within 0.6

mile of human activity centers, such as campgrounds, can experience increased nest predation because human food sources attract corvids (Marzluff et al. 2000). The probability of predation on simulated marbled murrelet nests decreased from 95 percent to 50 percent when visitors and their food were not allowed into an area of the Olympic National Park (Marzluff and Neatherlin in review).

Disturbance

In coastal and offshore marine environments, vehicular disturbance (e.g., boats, airplanes, personal watercraft) is known to elicit behavioral responses in marbled murrelets of all age classes (Speckman 1996, Nelson 1997). Aircraft flying at low altitudes and boating activity, in particular motorized watercraft, are known to cause marbled murrelets to dive and are thought to especially affect adults holding fish (Nelson 1997). It is unclear to what extent this kind of disturbance affects the distribution and movements of marbled murrelets.

Marine projects that include seismic exploration, pile driving, detonation of explosives and other activities that generate percussive sounds can expose marbled murrelets to elevated underwater sound pressure levels. High underwater sound pressure levels can have adverse physiological and neurological effects on a wide variety of vertebrate species (Yelverton and Richmond 1981, Cudahy and Ellison 2002, Popper 2003). It is unknown to what extent this kind of disturbance may affect marbled murrelets. However, diving birds are able to detect and alter their behavior based on sound in the underwater environment (Ross et al. 2001) and elevated underwater sound pressure levels may cause marbled murrelets to alter normal behaviors, such as foraging. Disturbance related to elevated underwater sound pressure levels may reduce foraging efficiency resulting in increased energetic costs to all marbled murrelet age classes in the marine environment and may result in fewer deliveries or lower quality food being delivered to nestlings.

Marbled murrelets may be sensitive to human-caused disturbance in the terrestrial environment due to their secretive nature and their vulnerability to predation. There are little data concerning the marbled murrelet's vulnerability to disturbance effects, however research on a variety of other species, including other seabirds, indicate an animal's response to disturbance follows the same pattern as its response to encountering predators. Anti-predator behavior has a cost to other fitness enhancing activities, such as feeding and parental care (Frid and Dill 2002).

Anecdotal researcher observations indicate that marbled murrelets typically exhibit a limited, temporary behavioral response to noise disturbance at nest sites and are able to adapt to auditory stimuli (Singer et al. 1995 cited in McShane et al. 2004, Long and Ralph 1998). Responses by marbled murrelet adults and chicks to calls from corvids and other potential predators include no response, alert posturing, and aggressive attack. Adults may temporarily leave a nest (McShane et al. 2004). However, the most typical behavior of chicks and adults in response to the presence of a potential predator is to flatten against a tree branch and remain motionless (Nelson and Hamer 1995b, McShane et al. 2004). In addition, there may be physiological responses researchers cannot

account for with visual observations. Corticosterone studies have not been conducted on marbled murrelets, but studies on other avian species indicate chronic high levels of this stress hormone may have negative consequences on reproduction or physical condition (Wasser et al. 1997, McShane et al. 2004).

Though largely inconclusive, Hebert et al. (2003a) examined the effects of operating chainsaw noise during incubation and chick rearing periods on nesting adult marbled murrelets and chicks. Adult marbled murrelets and chicks both spent less time motionless and resting and more time exhibiting “raised head” and “bill up” behaviors during the disturbance trial than pre- and post-trial. The relevance of these behaviors is unknown; however, a species that relies on being cryptic and motionless to avoid predation at the nest may risk being detected by a predator if it moves more often.

Gill-net fishing

Marbled murrelets can become entangled in gill-nets and drown. Marbled murrelets can also be killed by hooking with fishing lures and entanglement with fishing lines (Carter et al. 1995). There is little information available on marbled murrelet mortality from net fishing prior to the 1990s, although it was known to occur (Carter et al. 1995). In the mid-1990s, a series of fisheries restrictions and changes were implemented to address mortality of all species of seabirds, resulting in a lower mortality rate of marbled murrelets (McShane et al. 2004). Fishing effort has also decreased since the 1980s because of lower catches, fewer fishing vessels, and greater restrictions (McShane et al. 2004); although a regrowth in gill net fishing is likely to occur if salmon stocks increase.

Oil spills and marine contaminants

Marbled murrelets are highly vulnerable to oiling. Oil spills which have occurred near murrelet concentrations have had catastrophic effects on marbled murrelet populations (USDI Fish and Wildlife Service 1996). Marbled murrelets exposed to oil floating on the water’s surface likely die within days of exposure. Though the number of oil spills has generally declined since passage of the U.S. Oil Pollution Act in 1990, marbled murrelet and seabird mortality remains a significant conservation issue (McShane et al. 2004).

The primary consequence from the exposure of marbled murrelets to contaminants is reproductive impairment. Reproduction can be impacted by food web bioaccumulation of organochlorine pollutants and heavy metals discharged into marine areas where marbled murrelets feed and prey species concentrate (Fry 1995). However, marbled murrelet exposure is likely a rare event because marbled murrelets have widely dispersed foraging areas and they feed extensively on transient juvenile and subadult midwater fish species that are expected to have low pollutant loads (McShane et al. 2004). The greatest exposure risk to marbled murrelets may occur at the regularly feeding areas near major pollutant sources, such as those found in Puget Sound (McShane et al. 2004).

Reduced prey availability

Many fish populations have been depleted due to overfishing, reduction in the amount or quality of spawning habitat, and pollution. Other than anchovies and herring, primary marbled murrelet prey species have little commercial fishery value and, in general, there

is little geographic overlap between marbled murrelet distribution and areas of commercial harvest (McShane et al. 2004).

Oceanographic variation can also influence prey availability. While the effects to marbled murrelets from events such as the warm phase of the Pacific Decadal Oscillation or El Niño have not been well documented, El Niño events are thought to reduce overall prey availability and several studies have found that El Niño events can influence the behavior of marbled murrelets (McShane et al. 2004). Even though changes in prey availability may be due to natural and cyclic oceanographic variation, these changes may exacerbate other threats to marbled murrelets in the marine environment.

Disease

The emergence of fungal, parasitic, bacterial, and viral diseases and biotoxins has affected populations of seabirds in recent years. West Nile virus disease has been reported in California which is known to be lethal to seabirds, but little is known about its potential impact on marbled murrelets (McShane et al. 2004). No diseases have been documented to have caused marbled murrelet mortality; however, four marbled murrelets may have died from domoic acid toxicosis in central California in 1999 (Burkett et al. 1999).

Genetics

Loss of genetic variation among populations was identified as a potential threat to the marbled murrelet (McShane et al. 2004). To date, analyses indicate that marbled murrelets from California, British Columbia/mainland Alaska, and the Aleutian Islands differ genetically (Friesen et al. in press). Evaluation of the genetic structure of Oregon and Washington populations is currently underway. Loss of any of the genetically distinct populations could reduce the species' genetic variability and its potential to adapt and evolve (McShane et al. 2004).

Conservation Needs

Recovery objectives for the marbled murrelet include the following (USDI Fish and Wildlife Service 1997): (1) stabilize and then increase population size, changing the current downward trend to an upward trend throughout the listed range; (2) provide conditions in the future that allow for a reasonable likelihood of continued existence of viable populations; and (3) gather the necessary information to develop specific delisting criteria. Stabilizing and increasing habitat quality and quantity on land and at sea are the primary means for stopping the current population decline and encouraging future population growth (USDI Fish and Wildlife Service 1997).

In order to achieve the recovery objectives, the following short-term conservation actions are needed (USDI Fish and Wildlife Service 1997): (1) maintain all occupied nesting habitat on Federal lands administered under the NWFP (USDA Forest Service and USDI Bureau of Land Management 1994b); (2) on non-Federal lands, maintain as much occupied habitat as possible and use the HCP process to avoid or reduce the loss of this habitat; (3) maintain potential and suitable habitat in large contiguous blocks; (4)

maintain and enhance buffer habitat surrounding occupied habitat; (5) decrease adult and juvenile mortality; and (6) minimize nest disturbances to increase reproductive success.

In order to achieve the recovery objectives, the following long-term conservation actions are needed (USDI Fish and Wildlife Service 1997): (1) increase the amount and quality of suitable nesting habitat; (2) decrease fragmentation by increasing the size of suitable stands; (3) protect “recruitment” nesting habitat to buffer and enlarge existing stands, reduce fragmentation, and provide replacement habitat for current suitable nesting habitat lost to disturbance events; (4) increase speed of development of new habitat; and (5) improve and develop north/south and east/west distribution of nesting habitat.

Six marbled murrelet conservation zones occur throughout the listed range. They are as follows: Puget Sound (Zone 1); Western Washington Coast Range (Zone 2); Oregon Coast Range (Zone 3); Siskiyou Coast Range (Zone 4); Mendocino (Zone 5); and Santa Cruz Mountains (Zone 6). Specific conservation management plans need to be developed for each zone (USDI Fish and Wildlife Service 1997). Zones 1 to 4 must be managed to produce and maintain well distributed, viable populations to address the long-term survival and recovery of the marbled murrelet.

Zone 4 extends from North Bend, Coos County, Oregon, south to the southern end of Humboldt County, California. It includes marbled murrelet populations in National and State Parks and land of the Pacific Lumber Company, as well as large blocks of suitable habitat critical to recovery of marbled murrelet populations in Washington, Oregon, and California over the next 100 years (USDI Fish and Wildlife Service 1997). The amount of suitable habitat protected in parks is probably not sufficient by itself to guarantee long-term survival in this Zone. Private land at the southern end of the Zone is important for maintaining the current distribution of the species (USDI Fish and Wildlife Service 1997). A gap of 300 miles exists in the distribution of suitable habitat between the southern portion of Zone 4 and the northern portion of Zone 6. Expansion of this gap should be avoided. Actions in Zone 4 should focus on preventing the loss of occupied nesting habitat, minimizing the loss of unoccupied but suitable habitat, and decreasing the time for development of new suitable habitat (USDI Fish and Wildlife Service 1997).

Maintaining marbled murrelet populations on private lands is critical for arresting the population decline in the next 50 to 100 years, especially where additional nesting habitat will not be available on nearby Federal lands. The demographic bottleneck that the murrelet population may experience during the next 50 to 100 years makes the maintenance of populations found on private lands an important component to improve viability and the likelihood for recovery. On private lands, the maintenance of all occupied sites should be the goal where possible.

Conservation Strategy

The conservation strategy is to conserve as much of the remaining suitable or occupied habitat on Federal land (i.e., the NWFP) and on key non-Federal lands. These habitats would provide a system of long-term habitat reserves which are needed to stabilize and eventually recover the declining population. This approach assumes that marbled

murrelet populations have not already declined below an extinction threshold from which recover is not possible (USDA Forest Service and USDI Bureau of Land Management 1994b). It also assumes that marbled murrelet populations will respond positively to a long-term reversal in the trend of habitat loss (Raphael et al. 2002). Our ability to predict extinction thresholds for the marbled murrelet is still quite crude (National Research Council 1995). In addition, our ability to estimate the size and trend in the marbled murrelet population is limited (Becker et al. 1997).

The NWFP is a conservative approach to managing marbled murrelet habitat, and it accommodates our inability to identify an extinction threshold. The biological opinion on the NWFP concluded that it "...should provide for the survival of a marbled murrelet population that is well distributed on Federal lands throughout the planning area" (USDI Fish and Wildlife Service 1994). The NWFP is designed to enable Federal lands to bear most of the burden for recovering and maintaining late-successional species such as the marbled murrelet. The NWFP protects approximately 90 percent of suitable marbled murrelet habitat on Federal lands (USDI Fish and Wildlife Service 1997); it prohibits removal of occupied marbled murrelet habitat on Federal lands, including the Matrix where intensive timber harvest is otherwise allowed.

Non-Federal land makes an important contribution to marbled murrelet recovery where gaps occur in the distribution of suitable habitat (USDA Forest Service and USDI Bureau of Land Management 1994b, USDI Fish and Wildlife Service 1997). Removal of some occupied marbled murrelet habitat on non-Federal land is likely and potentially permissible, assuming sufficient high quality habitat is protected throughout the listed range to maintain well distributed, viable subpopulations. On non-Federal lands in California, the California Forest Practice Rules and California Endangered Species Act protect occupied marbled murrelet habitat and a 300-foot buffer around the occupied habitat during the breeding season. Non-Federal landowners who propose to harvest occupied habitat may incidentally take the marbled murrelet in known or likely occupied habitat, in accordance with section 7 or section 10 of the Act. The Service applies recommendations of the Recovery Plan when authorizing incidental take of marbled murrelets. These recommendations include the following (USDI Fish and Wildlife Service 1997): minimize the loss of occupied marbled murrelet habitat by evaluating and ranking various types of occupied habitat, and balance short-term risks with long-term tradeoffs.

Section 7 consultation on several HCPs and on tribal lands has authorized incidental take of the marbled murrelet. Each of these approved actions retained the highest quality marbled murrelet habitat as part of a management strategy that was consistent with the Recovery Plan.

Current Condition

The current condition of the species incorporates the effects of all past human and natural activities or events that have led to the present-day status of the species (USDI Fish and Wildlife and USDC National Marine Fisheries Service 1998).

Marine environment

In the California Current, seabirds in general, have done poorly during the most recent El Niño. Response of the marbled murrelet to the El Niño is unknown, but it is likely that consistent with other seabird species, fewer marbled murrelets breed during an El Niño, and foraging effort is increased as birds have to disperse more widely in search of decreased prey (McShane et al. 2004). Threats from reduced prey availability due to over fishing are likely insignificant because marbled murrelets are opportunistic, feeding on a wide range of prey, and there is little geographic overlap between marbled murrelet distribution and areas of commercial harvest (McShane et al. 2004).

During the 1990s, oil tanker and shipping traffic into west coast ports grew, increasing the amount of oil that could be spilled. However, fewer spills have occurred since the U.S. Oil Pollution Act was instated in 1990, and a moratorium on oil development offshore of northern California, Oregon and Washington was enacted in 1992. Though marbled murrelets continue to be killed by oil spills, the overall threat has been reduced since the early 1990s (McShane et al. 2004).

In the mid 1990s, a series of fisheries restrictions and changes were implemented to address mortality of all species of seabirds, resulting in a lower mortality rate of marbled murrelets. Fishing effort has also decreased since the 1980s because of lower catches, fewer fishing vessels, and greater restrictions; although a regrowth in gill net fishing is likely to occur if salmon stocks increase. In most areas, the threat from gill net fishing has been reduced or eliminated since 1992. However, threats to adult and juvenile marbled murrelets are still present in Washington Zones 1 and 2 (McShane et al. 2004). In central California gill-net fishing is currently prohibited in waters less than 60 fathoms deep. This restriction protects the diving zone used by marbled murrelets, thus eliminating the threat of entanglement.

The Service considers disturbance in the marine environment to be a concern for marbled murrelets, particularly in areas of high human activity.

Terrestrial Environment

Habitat Amount The precise amount of suitable marbled murrelet habitat within the listed range is unknown at this time. However, based on recent agency estimates and the Service's internal files, the best estimate of potentially suitable habitat for the marbled murrelet within the listed range is approximately 2.2 million acres of which approximately 155,000 acres or 7 percent are classified as remnant habitat (USDI Fish and Wildlife Service 2003). Approximately 93 percent of the suitable habitat occurs on Federal land. Suitable habitat is distributed among the three States as follows: Washington, approximately 1 million acres; Oregon, approximately 800,000 acres; and California, approximately 400,000 acres (USDI Fish and Wildlife Service 2003). Though our ability to quantify suitable habitat has improved recently, the current estimates likely overestimate the amount in many areas because of the lack of detail on the presence of nesting structure. In fact, northern spotted owl habitat was used as a surrogate for marbled murrelet habitat in some areas. Marbled murrelet habitat quality depends on its proximity to marine waters, landscape context, and stand size. This

information is needed to refine estimates of total suitable habitat. Quality habitat must meet basic nesting requirements, provide refuge from predators, and be relatively stable against catastrophic disturbances. It is not possible at this time to estimate the amount of high quality habitat which contributes to long-term nesting success.

The NWFP protects marbled murrelet habitat on Federal land by prohibiting timber harvest of occupied murrelet habitat, regardless of the land allocation (USDA Forest Service and USDI Bureau of Land Management 1994a). In addition, the system of Federal reserves protects currently suitable marbled murrelet habitat and allows currently unsuitable habitat to develop into larger blocks of suitable habitat. Currently there are approximately 56,000 acres of old-growth redwood forest remaining in California, representing about 2.5 percent of the original old-growth redwood forest. More detailed descriptions of suitable marbled murrelet habitat throughout its listed range are given in Nelson (1997) and USDI Fish and Wildlife Service (1997) and are incorporated herein by reference.

Occupied habitat is defined as that portion of potentially suitable habitat which is occupied by nesting marbled murrelets (Evans Mack et al. 2003), or expected to be occupied, based on survey history in the area and the application of an occupancy index to unsurveyed areas. At least 483,919 acres of potentially occupied marbled murrelet habitat exist within the listed range of the species (Table 1); data are not available for Washington. Marbled murrelets may not occupy a large portion of potentially suitable habitat, due to the absence of nesting structure or its spatial configuration. As a result, the 2.2 million acres of suitable habitat likely overestimates the amount of actual occupied marbled murrelet habitat (USDI Fish and Wildlife Service 2003). For example, although about 100,000 acres of late-seral forests occur on the Siskiyou and Rogue River National Forests and the Medford District of the Bureau of Land Management. Survey results in the area closest to the coast suggest that marbled murrelets actually occupy approximately 26 percent of the suitable habitat, based on existing survey data and assumptions about areas not adequately surveyed. Where published data were lacking, the Service solicited professional judgments from agency biologists and considers these simple estimates as the best available information (USDI Fish and Wildlife Service 2003).

Approximately 68,000 acres of occupied marbled murrelet habitat occur in the California portion of Zone 4 (Table 1). The agencies were unable to separate habitat estimates for Zones 3 and 4 in Oregon. In general, much of the habitat varies in quality. In California, high quality habitat occurs primarily in unmanaged redwood forests which are found close to the coast. Lower quality habitat occurs inland in managed Douglas-fir forests. In California, the estimated 360,000 acres of potentially suitable habitat far exceeds the estimated 68,000 acres of occupied habitat (USDI Fish and Wildlife Service 2003). This discrepancy exists largely as a result of our incomplete understanding of the inland distribution of the marbled murrelet. For example, most habitats previously thought to be suitable on Forest Service lands in California are likely not occupied (Hunter et al. 1998). Comparisons or analyses using the larger amount of suitable habitat may underestimate

the potential impacts of a proposed action and, therefore, should not be used to analyze the impacts of a proposed action.

The Service estimates that marbled murrelets likely occupy approximately 430 acres of habitat in Zone 5 and 7,250 acres of habitat in Zone 6. Most suitable habitat in these Zones was historically harvested; suitable habitat which remains is of lower quality and found in scattered, small patches in State and County Parks and on private lands.

Habitat Trend Historically, the amount of suitable habitat has declined throughout the range of the marbled murrelet, due primarily to commercial timber harvest. Some habitat loss is attributed to natural disturbance, such as fire and windthrow. Timber harvest has eliminated most suitable habitat on private lands within Washington, Oregon, and California (USDI Fish and Wildlife Service 1997). In the early to mid-1800s, Western Washington and Oregon contained 14 to 20 million acres of old-growth forest, compared to about 3.4 million acres in 1991. This loss of habitat represents a reduction of 82 percent (USDI Fish and Wildlife Service 1997). About 1.3 million to 3.2 million acres of old-growth Douglas-fir/mixed conifer and 2.7 million acres of old-growth redwood forests occurred in northwestern California during the early to mid-1800s (USDI Fish and Wildlife Service and USDC National Marine Fisheries Service 1999).

Between 1992 and 2003, the loss of suitable marbled murrelet habitat totaled 22,398 acres over the 3-state area, of which 5,364 acres resulted from timber harvest and 17,034 acres resulted from natural events (McShane et al. 2004). Habitat loss and fragmentation is expected to continue in the near future, but at an uncertain rate (McShane et al. 2004). Gains in suitable nesting habitat are expected to occur on Federal lands over the next 40-50 years, but due to the extensive historic habitat loss and the slow replacement rate of marbled murrelets and their habitat, the species is potentially facing a severe reduction in numbers in the coming 20 to 100 years (Beissinger 2002).

Habitat Distribution Breeding populations of marbled murrelets are not currently distributed continuously throughout the forested portions of Washington, Oregon, and California. A gap of 100 miles in the north/south distribution of suitable habitat exists in southwestern Washington and northwestern Oregon, and a north/south gap of 300 miles exists in central California in the southernmost portion of the species' range. These gaps consist of areas of second-growth and remnant older forests where marbled murrelets occur in low numbers. The inland distribution is greatest in Washington at about 50 miles from the marine environment; it narrows down in Oregon; and it declines to as close as 10 to 15 miles from the coast in California.

Habitat Quality Overall, the quality of existing marbled murrelet habitat has diminished, compared to conditions which existed prior to logging (USDI Fish and Wildlife Service 1997). Total habitat area is greatly reduced, and remaining habitat is often fragmented and located further from the marine environment. In California, a large amount of remaining habitat occurs on National, State, and County Park lands which are

subject to a high degree of recreation and its associated effects on marbled murrelet populations.

Habitat quality varies on a range-wide basis. Some excellent old-growth habitat remains on Federal lands in each of the three states. However, habitat quality has declined throughout the marbled murrelet's range, compared to historic times. Habitat occurs in smaller patch sizes, consists of smaller trees, and contains more roads and clearcut openings. Predation has likely increased at the local level, due to increased numbers of predators which find food sources associated with human recreational activities. At a landscape level, the abundance of avian predators has probably increased. Ongoing research should shed more light on specific factors which affect marbled murrelet nest predation and stand size preferences. The best available information strongly suggests forest fragmentation may adversely affect the reproductive success of marbled murrelets (USDI Fish and Wildlife Service 1997).

Population Numbers, Trend, and Distribution

Population Numbers The size of the listed population of the marbled murrelet in Washington, Oregon and California was initially estimated at 18,550-32,000 birds (Ralph et al. 1995b). Two largely divergent population estimates in Oregon account for the wide range in the estimated population size.

Monitoring to determine a trend in marbled murrelet populations began in 2000 and has continued annually since, as part of effectiveness monitoring for the NWFP (Bentivoglio et al. 2002, Huff ed. in press) (Table 2). A separate population monitoring effort is conducted each year in Zone 6, which is not part of the NWFP area. The population point estimates from the effectiveness monitoring are as follows: 2000, 18,571 birds; 2001, 22,180 birds; 2002, 23,673 birds; 2003, 22,217 birds; 2004, 20,578 birds; and 2005, 20,223 birds (Table 2). It is premature to determine if biologically meaningful trends in population size exist, given that we only have 6 years of population monitoring data. Depending on the desired minimum power (80 or 95 percent) to detect annual decreases, at least 8 to 10 years of surveys are required for an overall population estimate (Huff ed. in press).

Four of the six Zones must be functional to effectively recover and maintain a well-distributed, viable marbled murrelet population, both in the short- and long-term (USDI Fish and Wildlife Service 1997). Based on the new estimates of population size it appears that Zones 1 through 4 contain relatively robust numbers of marbled murrelets (Table 2). However these robust populations continue to be affected. For example, both Zones 3 and 4 have experienced oil spills within the last 5 years, resulting in significant murrelet mortality. Recent radio telemetry work in Zone 4 indicates nest success is very low (Hebert et al. 2003a).

Population Trend Since 1995, four demographic modeling efforts provide the best available information on predicting population trends, and in one case, extinction probabilities of marbled murrelets into the future: Population Trends of the Marbled Murrelet Projected from Demographic Analyses (Beissinger 1995 in Ralph et al. 1995a);

Population Trends of the Marbled Murrelet Projected from Demographic Analyses (Beissinger and Nur 1997 in USDI Fish and Wildlife Service 1997); a subsequent analysis by Beissinger and Peery in 2003; and the Evaluation Report for the 5-Year Status Review of the Marbled Murrelet in Washington, Oregon, and California by McShane et al. 2004.

These efforts employed a Leslie Matrix modeling structure using estimates for demographic parameters such as survival and fecundity. Estimates of survival were derived from life history analyses of similar species. Estimates of fecundity (i.e., number of female young produced per adult female) were generated from estimates of nest success, either from radio-telemetry studies or from juvenile-to-adult ratios obtained in the marine environment. Table 3 lists the four latest murrelet Leslie Matrix models and the values for common demographic parameters used in each.

In 1995, juvenile-to-adult ratios for murrelets ranged between 0.01 and 0.14, while fecundity was estimated at less than 0.2, a value well below the level of productivity needed to sustain stable populations (Beissinger 1995). Fecundity would have to range from 0.2 to 0.46 to sustain stable populations. Marbled murrelet populations in California, Oregon, and Washington may be declining at a rate of 4 to 7 percent per year, and perhaps as much as 12 percent per year (Beissinger and Nur 1997 in USDI Fish and Wildlife Service 1997).

In 2003, juvenile-to-adult ratios were once again reviewed, based on 8 additional years of survey data collected at-sea (Beissinger and Peery 2003). Juvenile-to-adult ratios varied from 0.038 to 0.089, depending on Zone. Fecundity estimates were developed for 4 Zones, but unlike the analysis in 1995, fecundity estimates were compared to reproductive histories of individual birds, based on recent radio-telemetry studies. Using a stage-based Leslie matrix model with a range of values for adult survival, fecundity derived from juvenile-to-adult ratios was too low to maintain stable populations in most zones. Rates of population decline ranged from 2.0 to 15.8 percent per year, depending upon the recovery zone and the values used for survival. A downward trend of this magnitude means that the population could be less than one-half to one-twelfth its current size in 20 years. A comparison of fecundity values derived from juvenile-to-adult ratios, to fecundity values from individual reproductive histories resulted in good agreement between the estimates. Both techniques support the assertion that fecundity is too low to maintain viable populations of marbled murrelets in the listed range (Beissinger and Peery 2003).

In 2004, radio telemetry data were used to estimate nest success (McShane et al. 2004). Using a stochastic Leslie Matrix model for each Zone with estimates for immigration, a range of values for survival, and what was considered higher estimates of nest success from radio telemetry data rather than juvenile/adult ratio data, McShane et al. (2004) found all zone populations were declining at a mean annual rate of between 2.1 and 6.2 percent per decade (McShane et al. 2004). McShane et al. (2004) predict the highest rate of decline for Zone 6 and the lowest rate of decline for Zone 2.

In summary, all sources concluded that the listed population apparently exhibits a long-term downward trend.

Population Distribution The historic distribution of the marbled murrelet within its listed range was probably relatively continuous in near-shore waters and in coniferous forests near the coast from the Canadian border south to Monterey County, California (USDI Fish and Wildlife Service 1997). Current breeding populations are discontinuous and generally concentrated at-sea in areas adjacent to remaining late successional coniferous forests near the coast (Nelson 1997). At-sea observations of marbled murrelets are rare between the Olympic Peninsula in Washington and Tillamook County, Oregon, a gap of approximately 100 miles.

Off the California coast, marbled murrelets are concentrated in two areas at-sea that correspond to the three largest remaining blocks of older, coastal forest. These forest blocks are separated by areas of little or no habitat, which correspond to locations at-sea where few marbled murrelets occur. A 300-mile gap occurs in the southern portion of the marbled murrelet's breeding range, between populations in Humboldt and Del Norte counties in the north and populations in San Mateo and Santa Cruz counties to the south. Marbled murrelets likely occurred in this gap prior to extensive logging of redwood forests (USDI Fish and Wildlife Service 1997).

Threats in the terrestrial environment

Habitat Loss McShane et al. (2004) found that the annual rate of habitat loss has slowed since the marbled murrelet was Federally listed as threatened; however, habitat loss remains a threat to the species due to the continued permitted loss of habitat, and in particular occupied sites.

Predation Losses of eggs and chicks to avian predators have been determined to be the most important cause of nest failure Nelson and Hamer 1995a, McShane et al. 2004). Furthermore, McShane et al. (2004) conclude that since listing, threats from predation have actually increased. The abundance of several corvid species has increased dramatically in western North America as a result of forest fragmentation, increased agriculture, and urbanization (McShane et al. 2004). As predator abundance has increased, predation on murrelet chicks and eggs has also increased resulting in decreased reproductive success. This trend is likely to continue as forest fragmentation, agriculture, and urbanization continues to dominate the landscape.

Disturbance Although detecting effects of sub-lethal noise disturbance at the population level in marbled murrelets is difficult, the potential for effects of noise disturbance on marbled murrelet fitness and reproductive success remains a concern and should not be discounted (McShane et al. 2004). As such, the Service has concluded in recent biological opinions that the potential for injury associated with visual and auditory disturbance to marbled murrelets in the terrestrial environment includes flushing from the nest, aborted feeding, and postponed feedings. These responses by individual marbled murrelets to disturbance stimuli may reduce productivity of the nesting pair, as well as the entire population (USDI Fish and Wildlife Service 1997).

Disease Though little is known about the potential impact of diseases and biotoxins on marbled murrelets, there is a possibility that marbled murrelets will be negatively affected in the near future because of the cumulative effects of stressors such as oceanic temperature changes, overfishing, and habitat loss (McShane et al. 2004).

Current condition of each conservation zone

Zone 1 Based on 3 years of survey, Zone 1 apparently contains the largest, most robust population in the listed range. Most of the marbled murrelet population in Washington occurs in Zone 1 (Bentivoglio et al. 2002, Jodice et al. 2002, USDI Fish and Wildlife Service 1997).

Effects to marbled murrelet population in Zone 1 occur in both the marine and terrestrial environments. Mortality due to net fisheries is most prevalent in Zone 1, compared to other zones, and a high threat of oil spills and other marine pollution exists in this zone (USDI Fish and Wildlife Service 1997). Between 1984 and 1991 three moderate oil spills occurred in this Zone resulting in an estimated 30 to 60 marbled murrelet mortalities (McShane et al. 2004).

Most suitable marbled murrelet habitat in Zone 1 occurs in northwest Washington primarily on Forest Service and National Park Service lands, and to a lesser extent on State lands. The majority of historic habitat along the eastern and southern shores of Puget Sound has been replaced by urban development resulting in the remaining suitable habitat being farther inland from the marine environment than what occurred historically (USDI Fish and Wildlife Service 1997). Lands considered essential for the recovery of the marbled murrelet within Zone 1 include any suitable habitat in a LSR; all suitable habitat located in the Olympic Adaptive Management Area; suitable habitat on State lands within 40 miles of the coast; and habitat within occupied marbled murrelet sites on private lands (USDI Fish and Wildlife Service 1997).

Zone 2 Point estimates of population size in Zone 2 are difficult to interpret, due to the high degree of variation. However, Zone 2 contains the fourth largest marbled murrelet population in the listed range.

Effects to the marbled murrelet population in Zone 2 have occurred both in the terrestrial and marine environment. Two large oil spills occurred in 1988 and 1991 resulting in estimated marbled murrelets mortalities ranging from 205 to 630 birds (McShane et al. 2004).

Suitable marbled murrelet habitat north of Gray's Harbor in Zone 2 occurs largely on State, Forest Service, National Park Service, and Tribal lands, and to a lesser extent on private lands. Alternatively, the majority of habitat in the southern portion of Zone 2 occurs primarily on State lands, with a small amount on privately owned lands. These lands were extensively harvested in the last century (USDI Fish and Wildlife Service 1997). Some of the privately owned lands were purchased and put into the Federal refuge system. The absence of Federal lands in southwestern Washington dictates that

conservation of the marbled murrelet is largely dependent on contributions from non-Federal lands in that area. Lands considered essential for the recovery of the marbled murrelet within Zone 2 include any suitable habitat in a Late Successional Reserve, suitable habitat located in the Olympic Adaptive Management Area, suitable habitat on State lands within 40 miles of the coast, and habitat within occupied marbled murrelet sites on private lands (USDI Fish and Wildlife Service 1997).

Zone 3 Along with Zone 1, Zone 3 appears to contain a larger, more robust population than Zones 5, or 6. Strong (2004) continues to assert that marbled murrelet population numbers have declined since the early 1990's, but they appear to have stabilized at a lower level in recent years. The highest marbled murrelet density occurs off the central Oregon coast or the southern portion of Zone 3. Alternatively, the northern Oregon coast and northern portion of Zone 3 contains much lower densities of marbled murrelets.

Effects to the marbled murrelet population in Zone 3 occur both in the marine and terrestrial environment. In February and March of 1999, the M/V New Carissa oil spill occurred in Zone 3 near Coos Bay, Oregon; an estimated 262 marbled murrelets were killed, about 4 percent of the population in Zone 3 (Ford et al. 2001a). Prior to 1999, four additional oil spills resulted in marbled murrelet mortalities (McShane et al. 2004).

High quality suitable marbled murrelet habitat in Zone 3 occurs primarily in central Oregon on Forest Service and Bureau of Land Management lands. These lands are currently protected in LSRs. Alternatively, northwest Oregon contains less suitable habitat that is generally of lower quality and is found in small scattered patches. The remaining suitable habitat is largely found on State and private lands; it has a long history of timber harvest and wildfire.

Zone 4 Along with Zones 1, 2, and 3, Zone 4 appears to contain a larger, more robust population than Zones 5, or 6. However, new information from a radio-telemetry study in this Zone indicates nesting success is very low (Hebert et al. 2003a).

Effects to the marbled murrelet population in Zone 4 occur both in the marine and terrestrial environment. Two oil spills, M/V Kure and Stuyvesant, have resulted in the deaths of marbled murrelets within this zone. The M/V Kure oil spill occurred in Humboldt Bay in November 1997. Ten dead marbled murrelets were recovered during cleanup and recovery efforts. Marbled murrelet mortality attributable to the Kure spill was “probably fifteen times higher than the known mortality of ten murrelets” (Ford et al. 2001b).

The Stuyvesant oil spill occurred in September 1999 at the entrance to Humboldt Bay. A total of 24 marbled murrelets were recovered during the cleanup and recovery efforts. Modeling efforts estimate that mortality of murrelets was approximately 135 birds (A. Brickey pers. comm.). In total, the M/V Kure and the Stuyvesant oil spills are estimated to have killed 300 birds in Zone 4. These estimated effects are for direct mortality only;

oil can have a number of adverse effects on seabirds other than direct mortality (Burger and Fry 1993), but these effects have not been quantified for either oil spill.

Suitable marbled murrelet habitat in Zone 4 is fairly well distributed across the zone. Habitat in southwest Oregon is generally of high quality, occurring largely on Forest Service lands, and to a lesser extent on Bureau of Land Management lands. These lands are currently protected in LSRs. Northern California contains several large Parks and Reserves, and to a lesser extent some privately owned lands that are known to contain marbled murrelets. The Pacific Lumber Company HCP, located in northern California, permitted loss of nearly 5,000 acres of occupied marbled murrelet habitat. Though large amounts of habitat occur on Bureau of Land Management and Forest Service lands further inland, they contain few marbled murrelets.

Zone 5 The population in Zone 5 is extremely low. Recent surveys have confirmed the Recovery Plan's assumption that Zone 5 is not expected to substantially contribute to recovery (USDI Fish and Wildlife Service 1997).

Effects to the marbled murrelet population in Zone 5 have occurred largely in the terrestrial environment. A limited amount of suitable marbled murrelet habitat occurs in Zone 5. It is largely limited to State, County, and National Park lands. Most of the habitat that occurred historically in this Zone was harvested. The remaining habitat is of low quality and found in scattered small patches in Parks and on private lands.

Zone 6 Monitoring of the NWFP does not cover Zone 6, but independent research conducted in Zone 6 provides reliable population estimates. Like Zone 5, population size in Zone 6 is also quite low. New information from a radio-telemetry study in this Zone indicates the marbled murrelet population is highly endangered. A juvenile-to-adult ratio of 0.02 derived from surveys at sea is alarmingly low and further indicates a general failure in reproduction (Peery et al. 2002). Although Zone 6 is highly vulnerable, it was expected to contribute to recovery of the marbled murrelet in the short-term (i.e., 50-100 years) (USDI Fish and Wildlife Service 1997). Recent evidence in Peery et al. (2002) suggests this may not occur.

Effects to the marbled murrelet population in Zone 6 occur both in the marine and terrestrial environment. Since 1992, multiple oil spills have occurred in Zone 6 resulting in mortalities within the range of 1 to 5 percent of the zone population (McShane et al. 2004). Overall, oiling continues to have significant additive effects to the small population in Zone 6.

Suitable marbled murrelet habitat is restricted to small pockets of State and County Park lands and private lands in San Mateo and Santa Cruz Counties. Like Zone 5, most suitable habitat was harvested; remaining habitat is of lower quality, found in smaller patches, and highly affected by human recreational activity.

Northern Spotted Owl

Legal Status

The northern spotted owl was listed as threatened under the Act on June 26, 1990, due to widespread habitat loss and the inadequacy of existing regulatory mechanisms to provide for its conservation (USDI Fish and Wildlife Service 1990a).

Species Description and Range

The northern spotted owl is one of three spotted owl subspecies (American Ornithologists Union 1957). The distribution of this subspecies includes southwestern British Columbia, Washington and Oregon, and northwestern California south to Marin County (Gutiérrez et al. 1995).

Life History

Habitat Use

Northern spotted owls generally inhabit older forested habitats because they contain the structures and characteristics required for nesting, roosting, foraging, and dispersal (Forsman et al. 1984; Gutiérrez 1996; LaHaye and Gutiérrez 1999). Specifically, northern spotted owls require a multi-layered, multi-species canopy dominated by large overstory trees; moderate to high canopy closure; a high incidence of trees with large cavities or other types of deformities; numerous large snags; an abundance of large, dead wood on the ground; and open space within and below the upper canopy for northern spotted owls to fly within (Thomas et al. 1990). Forested stands with high canopy closure also provide thermal cover (Weathers et al. 2001), and protection from avian predators. Recent landscape-level analyses suggest that in parts of the subspecies' range a mosaic of late-successional habitat interspersed with other vegetation types may benefit northern spotted owls more than large, homogeneous expanses of older forests (Franklin et al. 2000; Zabel et al. 2003; Olson et al. 2004).

Prey

Northern spotted owls are mostly nocturnal (Forsman et al. 1984), but they may forage opportunistically during the day (Sovern et al. 1994). Composition of prey in northern spotted owl diet varies regionally, seasonally, annually, and locally, likely in response to prey availability (Carey 1993; Forsman et al. 2001). Northern flying squirrels (*Glaucomys sabrinus*) and woodrats (*Neotoma* spp.) are usually the predominant prey both in biomass and frequency (Forsman et al. 1984; Ward et al. 1998; Forsman et al. 2001, 2004) with a clear geographic pattern of diet paralleling differences in habitat (Thomas et al. 1990). Northern flying squirrels are generally the dominant prey item in the more mesic Douglas-fir (*Pseudotsuga menziesii*)/western hemlock (*Tsuga heterophylla*) forests characteristic of the northern portion of the range, whereas woodrats are generally the dominant prey item in the drier mixed conifer/mixed evergreen forests typically found in the southern portion of the range (Forsman et al. 1984; Thomas et al. 1990; Sztukowski and Courtney 2004). These two prey items were found to be co-dominant in the southwest interior of Oregon (Forsman et al. 2001, 2004). Other prey species (e.g., red tree vole [*Arborimus longicaudus*], red backed voles [*Clethrionomys*

gapperi], mice, rabbits and hares, birds, and insects) may be seasonally or locally important (Rosenberg et al. 2003; Forsman et al. 2004).

Home Range Size

Home range size varies geographically, increasing from south to north, which is likely in response to differences in habitat quality (USDI Fish and Wildlife Service 1990b). Home ranges are larger where northern flying squirrels are the predominant prey and are smaller where woodrats are the predominant prey (Zabel et al. 1995). When available prey density is low or there is an increased reliance on a single large prey species (e.g., northern flying squirrels), owls respond by increasing home range size (Carey et al. 1992; Zabel et al. 1995). Estimates of home range size vary from 1,166 acres in southern Oregon (Carey et al. 1992) to 9,066 acres in Washington (King et al. 1993). Home ranges are smaller during the breeding season and often increase dramatically in size during fall and winter (Forsman et al. 1984; Glenn et al. 2004).

Reproduction

In relative terms, the northern spotted owl is long-lived, has a long reproductive life-span, produces fewer and larger young, invests significantly in parental care, exhibits later or delayed maturity and has high adult survivorship (Gutiérrez et al. 1995). Reproduction can vary greatly among years, with most pairs breeding in good years, and few pairs breeding in poor years (Forsman et al. 1984; Franklin et al. 1999; Anthony et al. 2004). Delayed maturation, small clutch size, and temporal variability in nesting success all contribute to the relatively low fecundity (number of female offspring produced per territorial female) of this species (Gutiérrez 1996).

Northern spotted owls are highly territorial (Forsman et al. 1984; Gutiérrez et al. 1995; Franklin et al. 1996) and usually monogamous. Courtship begins in late February to early March and nesting occurs from March to June. Timing of nesting and fledging varies with latitude and elevation (Forsman et al. 1984). At about 35 days old, the young leave the nest but are incapable of flight (Forsman 1976). By September, parents feed their young irregularly and some juveniles begin to disperse (Gutiérrez et al. 1985; Forsman et al. 2002).

Dispersal

Most young disperse by early November (Gutiérrez et al. 1985; Forsman et al. 2002). Dispersal by juveniles (natal dispersal) occurs in stages, with juveniles settling in temporary home ranges between bouts of dispersal (Forsman et al. 2002). Median natal dispersal distances are approximately 10.5 miles for males and 14 miles for females (range = 0.4 to 69 miles) (Forsman et al. 2002). Miller (1989) reported relatively high first year mortality rates for juvenile NSOs (77 percent), an indication that juvenile owls are vulnerable during their first year. Leading causes of mortality are starvation, predation, and accidents (Miller 1989; USDI Fish and Wildlife Service 1990a; Forsman et al. 2002). Parasitic infection may contribute to these causes of mortality (Forsman et al. 2002). In addition to dispersing as juveniles, a small percentage of non-juvenile northern spotted owls (6 percent in Forsman et al. 2002) disperse in search of new mates and/or new territories (breeding dispersal).

Dispersing owls typically traversed a wide range of forest conditions and levels of habitat fragmentation (Forsman et al. 2002). Large non-forested valleys (e.g., the Willamette Valley) are apparent barriers to dispersing juvenile and adult northern spotted owls (Forsman et al. 2002). Analysis of genetic structure of northern spotted owl populations suggests that relatively high rates of gene flow occur between the Olympic Mountains and Washington Cascades (across the Puget Trough) and between the Olympic Mountains and the Coast Range of Oregon (across the Columbia River) (Haig et al. 2001), indicating that these areas may not be substantial barriers to movement.

Reasons For Listing

The northern spotted owl was listed as threatened throughout its range “due to loss and adverse modification of suitable habitat as a result of timber harvesting and exacerbated by catastrophic events such as fire, volcanic eruption, and wind storms” (USDI Fish and Wildlife Service 1990b). At the time of listing, significant threats to the northern spotted owl included low populations; declining populations; limited habitat; declining habitat; distribution of habitat or populations; isolation of provinces; predation and competition; lack of coordinated conservation measures; and vulnerability to natural disturbance (USDI Fish and Wildlife Service 1992b).

Threats

Habitat Trends

The amount of northern spotted owl habitat continues to decline on a range-wide basis across all ownerships, although at a rate that is less than in the years prior to the listing of the owl, particularly on Federal lands within the NWFP boundary (Bigley and Franklin 2004). Approximately 7.4 million acres of suitable habitat were estimated to exist on Federal lands in 1994 (Table 4). As of December 18, 2006, action agencies have consulted with the Service on the removal or downgrading of 206,368 acres (2.79 percent of total) of suitable habitat on Federal lands managed under the NWFP. (Acres of consulted-on effects reported above are from a December 18, 2006, query of the NWFP and section 7 Consultation Effects Tracker database [northern spotted owl database]). (Removal refers to habitat that no longer provides nesting, roosting, or foraging function after the effect, and downgrading refers to reduction in the function of the habitat [i.e., a change from nesting/roosting habitat to foraging habitat]). Because not all consulted-on effects have been realized, the northern spotted owl database is also updated to reflect action agency projects or portions of projects that were not implemented. Thus, acres displayed in the northern spotted owl database represent the best approximation of consulted-on effects that have and are expected to occur. As of December 18, 2006, range-wide consulted-on effects were consistent with NWFP timber harvest rate assumptions as expressed in the ROD (USDA Forest Service and USDI Bureau of Land Management 1994b).

Although most provinces have experienced some degree of habitat loss since 1994, total effects have been disproportionately distributed across the range of the northern spotted owl (Table 4). Most management-related, consulted-on habitat loss has been concentrated in Oregon. Reported habitat loss (i.e., expected and realized loss through

consulted-on Federal actions and reported loss through natural disturbance) in the Oregon Klamath Mountains Province and the two Oregon Cascades provinces make up approximately 85 percent of the reported habitat loss on Federal lands range-wide since 1994. Reasons for the comparatively greater rates of loss in these provinces include a higher percentage of acres outside of reserves than in other provinces, a shift to density-management harvest (which can impact up to three times as many acres as a regeneration harvest for an equal amount of timber volume removed) and habitat loss due to fires and subsequent salvage.

From 1994 through 2005, habitat removed or downgraded due to natural events is estimated to be approximately 224,000 acres range-wide (Table 4) (Acres of habitat removed or downgraded from natural events are from Courtney et al. 2004). A large portion of this loss can be attributed to the Biscuit Fire that burned over 500,000 acres in southwest Oregon and northern California in 2002. This fire resulted in the loss of approximately 66,000 acres of suitable northern spotted owl habitat, including habitat within five LSRs and five critical habitat units.

There is little information available regarding trends in northern spotted owl habitat on non-Federal lands. Federal and/or state databases that track changes to habitat on non-Federal lands are currently not in place. Internal Service consultations conducted since 1992 have authorized the removal or downgrading of 407,849 acres of habitat on non-Federal lands. Most of these losses have yet to be realized because they are part of large-scale, long-term Habitat Conservation Plans (HCPs). Since 1999, the Service has issued technical assistance for Timber Harvest Plans that have removed or downgraded an unknown but possibly substantial amount of northern spotted owl habitat.

Wildfire

At the time of listing there was recognition that catastrophic wildfire posed a threat to the northern spotted owl (USDI Fish and Wildlife Service 1990a). The amount of habitat lost to wildfire in the relatively dry East Cascades and Klamath Provinces suggests that fire may be more of a threat than was previously thought. However, the risk to northern spotted owls associated with large scale wildfire may be mitigated by the NWFP reserve design (Lint et al. 2005).

Barred Owls

Since 1990, the barred owl (*Strix varia*) has expanded its range south into Marin County, California and the central Sierra Nevada Mountains, such that it is now roughly coincident with the range of the northern spotted owl (Gutiérrez et al. 2004). Barred owl populations appear to be increasing throughout the Pacific Northwest, particularly in Washington and Oregon (Zabel et al. 1996; Dark et al. 1998; Wiedemeier and Horton 2000; Kelly et al. 2003; Pearson and Livezey 2003; Anthony et al. 2004). Based on current density estimates and apparent distribution, barred owl populations also appear to be self-sustaining (Gutiérrez et al. 2004).

New information suggests that competition with the barred owl is a greater threat to northern spotted owls than previously anticipated (Gutiérrez et al. 2004), whereas

hybridization is less of a threat (Kelly and Forsman 2004). Barred owls apparently compete with northern spotted owls through a variety of mechanisms: prey overlap (Hamer et al. 2001); habitat overlap (Hamer et al. 1989; Dunbar et al. 1991; Herter and Hicks 2000; Pearson and Livezey 2003); and agonistic encounters (Leskiw and Gutiérrez 1998; Pearson and Livezey 2003). The only study comparing food habits of northern spotted owls and barred owls in the Pacific Northwest indicated that barred owl diets overlapped strongly (>75 percent) with northern spotted owl diets (Hamer et al. 2001). However, barred owl diets were also more diverse than northern spotted owl diets, including species associated with riparian and other moist habitats, as well as more terrestrial and diurnal species. Recent studies indicate that barred owls are capable of utilizing a broader range of habitat types than northern spotted owls (Hamer 1988; Kelly et al. 2003). Anecdotal reports also indicate that barred owls react more aggressively towards northern spotted owls during encounters than the reverse (Gutiérrez et al. 2004).

Recent research and observations also indicate that barred owls may displace northern spotted owls. Kelly et al. (2003) reported northern spotted owl occupancy was significantly lower where barred owls were detected within 0.5 mile of the northern spotted owl territory center than in territories where no barred owls were detected. In Southern Oregon, 46 percent of northern spotted owls moved more than 0.4 mile, and 39 percent of northern spotted owls were not relocated again in at least 2 years after barred owls were detected within 0.5 mile of their territory centers (Kelly 2001). Using new methods to model the effect of barred owls on northern spotted owl site occupancy in Western Oregon, Olsen et al. (2005) found that barred owl presence led to increases in local extinction probabilities on 2 study areas and a decline in colonization probabilities on another. Similar findings regarding displacement of northern spotted owls by barred owls have been reported for the Olympic National Park (Gremel 2000) and the Gifford Pinchot National Forest (Pearson and Livezey 2003).

Anthony et al. (2004) reported that barred owls had a negative effect on northern spotted owl survival in three demographic study areas in Washington (Anthony et al. 2004). Olson et al. (2005) found a significant (but weak) negative effect of barred owl presence on northern spotted owl reproductive output but not on survival in Southern Oregon. At two study areas in Washington, investigators found relatively high numbers of territories previously occupied by northern spotted owls that are now apparently not occupied by either spotted or barred owls (e.g., 49 of 107 territories in the Cascades [Herter and Hicks 2000]; 23 of 33 territories in the Olympic Experimental State Forest [Wiedemeier and Horton 2000]). Given that habitat was still present in these vacant territories, some factor(s) may be reducing habitat suitability or local abundance of both species. This suggests that factors other than barred owls alone are contributing to declines in northern spotted owl abundance and territorial occupancy (Gutiérrez et al. 2004).

Despite these uncertainties, the preponderance of the evidence gathered thus far is consistent with the hypothesis that barred owls are playing some role in the decline of some northern spotted owl populations, particularly in Washington and portions of Oregon and the northern coast of California (Gutiérrez et al. 2004).

Although the barred owl currently constitutes a significantly greater threat to the northern spotted owl than originally thought at the time of listing, it is unclear whether forest management has an effect on the outcome of interactions between barred owls and northern spotted owl (Gutiérrez et al. 2004).

Potential Threats

West Nile Virus and Sudden Oak Death

Health officials expect that West Nile Virus (WNV) will eventually spread throughout the range of the northern spotted owl (Blakesley et al. 2004), but it is unknown how WNV will ultimately affect owl populations. Sudden Oak Death poses a threat of uncertain proportions because of its potential impact on forest dynamics and alteration of key habitat components (i.e., hardwoods); especially in the southern portion of the northern spotted owl's range. Because the magnitude of these threats is unknown at this time, they do not represent relevant information pertinent to analyses conducted for this biological opinion.

Inbreeding Depression, Genetic Isolation, and Reduced Genetic Diversity

Inbreeding and other genetic problems due to small population sizes were not considered an imminent threat to the northern spotted owl at the time of listing. Recent studies show no indication of reduced genetic variation in Washington, Oregon, or California (Barrowclough et al. 1999; Haig et al. 2004; Henke et al. unpublished).

Population Size and Trends

There are no estimates of the historical population size and distribution of the northern spotted owl. The species is believed to have inhabited most old growth forests throughout the Pacific Northwest prior to modern settlement (mid-1800s). According to the final rule listing the owl as threatened (USDI Fish and Wildlife Service 1990a), approximately 90 percent of the roughly 2,000 known northern spotted owl breeding pairs were located on Federally managed lands, 1.4 percent on State lands, and 6.2 percent on private lands; the percent of northern spotted owls on private lands in northern California was slightly higher.

Gutiérrez (1994), using data from 1986-1992, tallied 3,753 known pairs and 980 singles throughout the range of the northern spotted owl. At the time the NWFP was initiated (July 1, 1994), there were 5,431 known locations of northern spotted owl pairs or resident singles: 851 sites (16 percent) in Washington, 2,893 (53 percent) in Oregon, and 1,687 (31 percent) in California (USDI Fish and Wildlife Service 1995). The actual population of owls across the range was undoubtedly larger than either of these counts because some areas were not surveyed (USDI Fish and Wildlife Service 1992b; Thomas et al. 1993).

Because existing survey coverage and effort are insufficient to produce reliable population estimates, researchers use other indices, such as demographic data, to evaluate trends in NSO populations. Analysis of demographic data can provide an estimate of the rate and direction of population growth [i.e., lambda (λ)]. A λ of 1.0 indicates a stationary population (i.e., neither increasing nor decreasing), a λ less than 1.0 indicates a declining population, and a λ greater than 1.0 indicates a growing population.

At the January 2004 northern spotted owl demographic meta-analysis workshop, two meta-analyses were conducted to estimate the rate of owl population change. Data were analyzed separately for 13 individual study areas, and simultaneously across study areas (true meta-analysis). (See Figure 1 for locations of demographic study areas by state and physiographic province). Estimates of λ ranged from 0.896-1.005 for the 13 areas, and all but one of the estimates were <1.0 , suggesting population declines for most areas (Anthony et al. 2004). The weighted mean λ for all of the study areas was 0.963 (SE = 0.009, 95% CI = 0.945-0.981), suggesting that populations over all of the areas were declining by about 3.7 percent per year from 1985-2003. The mean λ for the eight monitoring areas on Federal lands was 0.976 (SE = 0.007, 95% CI = 0.962-0.990) and 0.942 (SE = 0.016, 95% CI = 0.910-0.974) for non-Federal lands, an average 2.4 versus 5.8 percent decline per year. This suggests that northern spotted owl populations on Federal lands had better demographic rates than elsewhere, but interspersed land ownership on the study areas confounds this analysis.

The number of populations that have declined and the rate at which they have declined are noteworthy, particularly the precipitous declines on the four Washington study areas and the Warm Springs Reservation in Oregon (Anthony et al. 2004). Declines in adult survival rates may be an important factor contributing to declining population trends. Survival rates declined over time on all four study areas in Washington. In Oregon, there were no time trends in apparent survival for four of six study areas, and remaining areas had weak non-linear trends. In California, two study areas showed no trend, one showed a slight decline, and one showed a significant linear decline (Anthony et al. 2004). Like the trends in annual rate of population change, trends in adult survival rate showed clear declines in some areas, but not in others.

Conservation Needs

Based on the above assessment of threats, the northern spotted owl has habitat-specific and habitat-independent conservation (i.e., survival and recovery) needs. Habitat-specific needs include: (1) large blocks of suitable habitat maintained to support clusters or local population centers of northern spotted owls (e.g., 15 to 20 breeding pairs) throughout the owl's range; (2) suitable habitat conditions and spacing maintained between local northern spotted owl populations throughout its range to facilitate survival and movement; (3) suitable habitat managed across a variety of ecological conditions within the northern spotted owl's range to reduce risk of local or widespread extirpation; (4) a coordinated, adaptive management effort to reduce the loss of habitat due to catastrophic wildfire throughout the northern spotted owl's range; (5) a research program to clarify whether these risk reduction methods are effective and how owls use habitat treated to reduce fuels; and, (6) in areas of significant population decline, owl habitat managed to sustain the full range of survival and recovery options for this species in light of significant uncertainty. Habitat-independent needs include: (1) a coordinated research and adaptive management effort to better understand and manage competitive interactions between spotted and barred owls; (2) research to better understand the risk that WNV poses to northern spotted owls and, if significant, additional research into methods that may reduce the likelihood or severity of outbreaks; and (3) research to

better understand the impacts that Sudden Oak Death impart on northern spotted owl habitat.

Ongoing Conservation Efforts

The NWFP is the current conservation strategy for the northern spotted owl on Federal lands. It includes a system of repetitive reserves, designed to protect large blocks of habitat for population clusters that provides the variety of ecological conditions that support owls. Reserves are distributed to maintain connectivity between these clusters and to reduce the likelihood of catastrophic events impacting connectivity and population dynamics within and between provinces. Several land-use allocations are intended to contribute primarily to supporting population clusters: LSRs, Managed Late Successional Areas (MLSAs), Congressionally Reserved Areas (CRAs), and Managed Pair and Reserve Pair Areas. The remaining land-use allocations—Matrix, Adaptive Management Areas (AMAs), RRs, Connectivity Blocks, and Administratively Withdrawn Areas (AWAs)—are designed to provide connectivity between habitat blocks intended for population clusters. Although the NWFP anticipated that northern spotted owl populations would decline in areas outside of reserves populations were expected to stabilize and eventually increase within reserves, as habitat conditions improved over the next 50 to 100 years (Thomas and Raphael 1993; USDA Forest Service and USDI Bureau of Land Management 1994a, 1994b). Recent reports have indicated that declines in northern spotted owl populations in portions of the species range may be greater than was expected (Anthony et al. 2004, Franklin and Courtney 2004). However, despite these declines Franklin and Courtney (2004) noted that there is little reason to doubt the effectiveness of the core of the NWFP conservation strategy. Additionally, Lint et al. (2005) felt that results from the first decade of NWFP monitoring failed to provide any reason to depart from the objective of habitat maintenance and restoration identified in that plan.

The FEMAT report noted that limited Federal ownership in some areas constrained the ability to form an extensive reserve network to meet conservation needs of the northern spotted owl. Thus, non-Federal lands were regarded as an important factor to the range-wide goal of achieving conservation and recovery of the NSO. The Service proposed a special rule under section 4(d) of the Act for non-Federal lands in 1995, but it was never finalized. Thus, take of northern spotted owls on non-Federal lands remains prohibited under section 9 of the Act unless authorized pursuant to a Federal Habitat Conservation Plan (HCP). The Service's primary expectation for private lands are for their contributions to demographic support (pair or cluster protection) to and/or connectivity with NWFP lands. Additionally, timber harvest within each state is governed by rules that provide protection of northern spotted owls and/or their habitat to varying degrees.

- *Washington:* In 1993, the State Forest Practices Board adopted rules (Washington Forest Practices Board 1996) that would “contribute to conserving the northern spotted owl and its habitat on non-Federal lands,” based on recommendations from a Science Advisory Group which identified important non-Federal lands and recommended roles for those lands in owl conservation (Hanson et al. 1993; Buchanan et al. 1994). Owl-related HCPs in Washington generally provide both

demographic and connectivity support as recommended in these reports and the Final Draft Recovery Plan for the northern spotted owl (USDI Fish and Wildlife Service 1992b). Thus, these areas support the NWFP.

- *Oregon:* The Oregon Forest Practices Act provides for protection of 70-acre core areas around known northern spotted owl nest sites, but it does not provide for protection of owl habitat beyond these areas (Oregon Department of Forestry 2000). In general, no large-scale northern spotted owl habitat protection strategy or mechanism currently exists for non-Federal lands in Oregon. The four owl-related HCPs currently in effect address relatively few acres of land; however, they will provide some nesting habitat and connectivity over the next few decades.
- *California:* In 1990, State Forest Practice Rules (FPRs) (California Department of Forestry and Fire Protection 2001), which govern timber harvest on private lands, were amended to require surveys for northern spotted owls in suitable habitat and to provide specific amounts of habitat around activity centers. Under the FPRs, no timber harvest plan (THP) can be approved if it is likely to result in the incidental take of Federally listed species, unless authorized pursuant to a Federal HCP. Although the Yreka Fish and Wildlife Office has observed an increase in requests for recognition of non-occupied status of northern spotted owl sites on industrial timberlands, neither the Service nor the California Department of Forestry and Fire Protection, who regulates non-Federal timber harvest, have conducted a comprehensive review of the effectiveness of the take avoidance process for private land timber harvest in California. Five large industrial landowners currently operate under Spotted Owl Management Plans that are approved by the Service. Four of these plans are located within portions of the range containing very low densities of northern spotted owls. These plans specify basic measures for owl protection. Three HCPs, authorizing take of northern spotted owls, have been approved. These HCPs are located in the California Coast Province and are expected to provide for owl demographic and connectivity support to NWFP lands.

Western Snowy Plover

Legal Status

The Pacific coast population of the western snowy plover was Federally listed as threatened on March 5, 1993 (USDI Fish and Wildlife Service 1993). In August 2002, we received a petition from the Surf Ocean Beach Commission of Lompoc to delist the Pacific Coast western snowy plover population. The City of Morro Bay submitted substantially the same petition dated May 30, 2003. On March 22, 2004, we published a notice that the petition presented substantial information to indicate that delisting may be warranted (USDI Fish and Wildlife Service 2004b). On April 21, 2006, we published a 12-month finding that (1) the Pacific Coast western snowy plover constitutes a valid distinct population segment, (2) delisting is not warranted due to continued existence of threats to the population and its habitat, and (3) the distinct population segment should

remain classified as threatened. In California, the western snowy plover has been classified by the California Department of Fish and Game as a “species of special concern” throughout all of California since 1978 (California Natural Diversity Database 2001).

Critical habitat was designated on December 7, 1999 (USDI Fish and Wildlife Service 1999). On June 19, 2003, the U.S. District Court for the District of Oregon found that our critical habitat designation was not consistent with the requirements of section 4(b)(2) of the Act, and remanded the designation to us; the Court partially vacated the 1999 critical habitat designation. On December 17, 2004, we published a proposed rule to re-designate critical habitat along the coasts of California, Oregon, and Washington (USDI Fish and Wildlife Service 2004c). On September 25, 2005, we published a final rule to re-designate critical habitat (USDI Fish and Wildlife Service 2005).

Taxonomy and Life History

Accounts of the taxonomy, ecology, and reproductive characteristics of the western snowy plover are found in the following recent publications: final rule listing the Pacific coast population of the western snowy plover as threatened (USDI Fish and Wildlife Service 1993); proposed rule designating critical habitat (USDI Fish and Wildlife Service 2004c); the draft recovery plan and appendices (U.S. Fish and Wildlife Service 2001); and *Snowy Plover* (Page et al. 1995).

Threats

Poor reproductive success, resulting from human disturbance, predation, and inclement weather, combined with permanent or long-term loss of nesting habitat to encroachment of introduced European beachgrass (*Ammophila arenaria*) and urban development has led to a decline in active nesting colonies, as well as an overall decline in the breeding and wintering population (USDI Fish and Wildlife Service 1993).

Conservation Needs/Strategy

The draft western snowy plover recovery plan provides a strategy for recovery of the listed population. Recovery objectives in the draft recovery plan (U.S. Fish and Wildlife Service 2001) include: (1) achieving well-distributed increases in numbers and productivity of breeding adult birds, and (2) providing for long-term protection of breeding and wintering plovers and their habitat.

The draft recovery plan states that delisting will be considered when the following criteria have been met: (1) maintain for 10 years an average of 3,000 breeding adults distributed among 6 recovery units as follows: Washington and Oregon, 250 breeding adults; Del Norte to Mendocino Counties, California, 150 breeding adults; San Francisco Bay, California, 500 breeding adults; Sonoma to Monterey Counties, 400 breeding adults; San Luis Obispo to Ventura Counties, California, 1,200 breeding adults; and Los Angeles to San Diego Counties, California, 500 breeding adults; (2) maintain a 5-year average productivity of at least 1.0 fledged chick per male in each recovery unit in the last 5 years prior to delisting; and (3) have in place participation plans among cooperating agencies, landowners, and conservation organizations to assure protection and management of

breeding, wintering, and migration areas listed in Appendix B of the draft plan to maintain the subpopulation sizes and average productivity specified in criteria 1 and 2 above.

Appendix B of the draft recovery plan identifies specific breeding and wintering locations important for recovery (U.S. Fish and Wildlife Service 2001). The draft plan identifies management goals for the number of adults at each of the breeding sites and recommends that managers consistently aim to achieve these goals annually. The management goal breeding numbers represent population targets that, in the view of the snowy plover recovery team's technical subteam, can be achieved under a very intensive management scheme. These numbers are about 15 percent higher than the recovery criteria subpopulation sizes, but lower than potential carrying capacity.

The Service considers the Pacific coast plover population to be a single management entity (U.S. Fish and Wildlife Service 2001). The recovery team recommended that no state, geographic region, or subpopulation be considered for delisting separately from the others. To consider delisting the population the recovery criteria will need to be achieved in each recovery unit.

A population viability analysis was conducted to aid the recovery team in developing recovery criteria for the draft recovery plan (Nur et al. 1999). The analysis makes the following conclusions. "Under status quo scenarios, even with intensive management in some areas, the population is almost certain to decline. Without question, ceasing current management efforts (area closures, predator exclosures, and predator control) would be disastrous for the Pacific coast population." "Recovery is plausible. It will require, however, short-term intensive management and long-term commitments to maintaining gains." These conclusions emphasize the immediate need for intensive management. The most direct means to increase population size is to enhance reproductive success throughout the listed range (Nur et al. 1999).

The population viability analysis suggests that reproductive success between 1.2 to 1.3 fledglings per male per year, with adult survival of 76 percent and juvenile survival of 50 percent, provides a 57 to 82 percent probability of reaching a population of 3,000 plovers within 25 years (Nur et al. 1999). Enhancing productivity is critical to population growth. Once the population size criterion is met, a lower rate of productivity can sustain the population (U.S. Fish and Wildlife Service 2001).

Current Conditions (Range-wide)

The current conditions incorporate the effects of all past human and natural activities or events that have led to the present-day status of the species (USDI Fish and Wildlife Service and USDC National Marine Fisheries Service 1998). The current Pacific coast western snowy plover population breeds from Damon Point, Washington, to Bahia Magdalena, Baja California, Mexico, and winters mainly in coastal areas from southern Washington to Central America (U.S. Fish and Wildlife Service 2001). The draft recovery plan identifies the following six recovery units for the Pacific Coast population: Unit 1 includes Washington and Oregon; Unit 2 includes Del Norte, Humboldt, and

Mendocino Counties, California; Unit 3 includes San Francisco Bay, California; Unit 4 includes Monterey Bay, California; Unit 5 includes San Luis Obispo, Santa Barbara, and Ventura Counties, California; and Unit 6 includes Los Angeles, Orange, and San Diego Counties, California (U.S. Fish and Wildlife Service 2001).

Habitat

Breeding Habitat The Pacific coast population is defined as those individuals nesting adjacent to tidal waters of the Pacific Ocean and includes all nesting birds on the mainland coast, peninsulas, offshore islands, adjacent bays, estuaries, and coastal rivers (USDI Fish and Wildlife Service 2004c). The Pacific coast population breeds primarily above the high tide line on coastal beaches, sand spits, dune-backed beaches, sparsely-vegetated dunes, beaches at creek and river mouths, and salt pans at lagoons and estuaries (U.S. Fish and Wildlife Service 2001). Less common nesting habitat includes bluff-backed beaches, dredged material disposal sites, salt pond levees, dry salt ponds, and river bars (U.S. Fish and Wildlife Service 2001). Suitable nesting habitat is distributed throughout the listed range.

The Service has identified 109 breeding locations that are important for recovery (U.S. Fish and Wildlife Service 2001). Acreage and miles of coastline by recovery unit are estimated as follows: Recovery Unit 1 (135 miles of coastline and 15,098 acres); Recovery Unit 2 (77 miles of coastline and 6,922 acres); Recovery Unit 3 (2 miles of coastline and 2,200 acres); Recovery Unit 4 (51 miles of coastline and 3,870 acres); Recovery Unit 5 (93 miles of coastline and 9,255 acres); and Recovery Unit 6 (30 miles of coastline and 7,112 acres) (U.S. Fish and Wildlife Service 2001).

The Pacific coast population has experienced widespread loss and degradation of nesting habitat at many nesting locations due to human disturbance, urban development, encroachment of introduced European beachgrass, and expanding predator populations. European beachgrass was introduced to the west coast around 1898 and now occurs from British Columbia to southern California (U.S. Fish and Wildlife Service 2001).

Wintering Habitat Wintering (winter is defined as November 1 through February) plovers are found on many beaches used for nesting and some beaches where nesting does not occur (U.S. Fish and Wildlife Service 2001). In California, the majority of wintering plovers utilize sand spits and dune-backed beaches (U.S. Fish and Wildlife Service 2001). Suitable wintering habitat is distributed throughout the listed range of the snowy plover.

The Service has identified 143 wintering locations that are important for recovery (U.S. Fish and Wildlife Service 2001). We also estimated the following acreage and miles of coast line for each of these locations: Recovery Unit 1 (91 miles of coastline and 10,446 acres); Recovery Unit 2 (80 miles of coastline and 8,336 acres); Recovery Unit 3 (2 miles of coastline and 2,200 acres); Recovery Unit 4 (64 miles of coastline and 4,654 acres); Recovery Unit 5 (107 miles of coastline and 9,785 acres); and Recovery Unit 6 (79 miles of coastline and 9,931 acres) (U.S. Fish and Wildlife Service 2001).

The Pacific coast plover population has experienced widespread loss and degradation of wintering habitat due to human disturbance, development, and encroachment of introduced European beachgrass. Small changes in the adult survival rate can have relatively large effects on population stability (Nur et al. 1999), so the maintenance of quality overwintering habitat is important to conservation (USDI Fish and Wildlife Service 2004c).

Population Numbers, Distribution, and Reproduction

Breeding Population Along the California coast the size of the Pacific coast population was first estimated at 1,566 adults, based on window surveys completed during the period 1977 to 1980 breeding seasons (Table 5). Window surveys are a one-time pass of a single surveyor or team of surveyors through potential snowy plover nesting habitat during May or June. The surveys suggested that plovers had disappeared from significant parts of its California breeding range (U.S. Fish and Wildlife Service 2001). Subsequent breeding season window surveys during 1989 and 1991 indicated a further decline in numbers (Point Reyes Bird Observatory unpublished data). Window surveys from 2001 through 2004 demonstrate an increase in observed breeders (Point Reyes Bird Observatory unpublished data), although there is still an overall decline when compared to historic breeding populations numbers. In 2005, 1,680 birds were counted along the California coast (Point Reyes Bird Observatory unpublished data) which is similar to the first estimate of 1,566 adults. Surveys show an increase in observed breeders from 2001 through 2005, although there is still an overall decline when compared to historic numbers (J. Baldwin *in litt.* 2004; K. Lafferty *in litt.* 2002 as cited in USDI Fish and Wildlife Service 2006).

The draft recovery plan provides an estimate of approximately 2,000 snowy plovers breeding along the U.S. Pacific coast (Table 6). This estimate is based on window surveys, breeding surveys, and data used in the population viability analysis. In 2005, the estimate of the U.S. population of the Pacific coast population was approximately 2,300 adults (L. Stenzel, *in litt.* 2004a; G. Page, *in litt.* 2005b; L. Kelly, *in litt.* 2006, M. Jensen *in litt.* 2006 as cited in USDI Fish and Wildlife Service 2006). The 2005 breeding season window survey in California counted 1,680 adult birds and the Oregon and Washington breeding season window survey counted 95 adult birds in 2004 (Table 7). About 55 percent of the birds were located within the area of San Luis Obispo and Ventura Counties, California. The draft recovery plan states that delisting will be considered when an average of 3,000 breeding adults distributed among the 6 recovery units has been maintained for 10 years. The goal is for approximately 40 percent of the breeding adults to be located from San Luis Obispo to Ventura Counties.

The current Pacific coast breeding population ranges from Damon Point, Washington, to Bahia Magdalena, Baja California, Mexico (U.S. Fish and Wildlife Service 2001). Historical records indicate that nesting plovers were once more widely distributed throughout the listed range. In Washington, plovers formerly nested at five locations; compared to only three current locations (U.S. Fish and Wildlife Service 2001). Occupancy at sites in Washington has declined for several reasons, including site degradation due to beach erosion (USDI Fish and Wildlife Service 2006). In Oregon,

plovers historically nested at 29 sites, compared to 10 current locations (USDI Fish and Wildlife Service 2006). In California, plovers were known to nest at 53 general nesting areas prior to 1970 (Page and Stenzel 1981); as of 1991, no evidence of breeding birds had been found at 33 of those 53 areas (Page, et al. 1991). An additional 11 locations have been lost to nesting plovers (Stenzel in litt. 2004b as cited in USDI Fish and Wildlife Service 2006). Plovers have disappeared from significant parts of the coastal California breeding range including locations in San Diego, Orange, Los Angeles, Ventura, Santa Barbara, Santa Cruz, San Mateo, Sonoma, Humboldt, and Del Norte counties (U.S. Fish and Wildlife Service 2001).

The U.S. Fish and Wildlife Service (2001) identifies the following gaps in the breeding distribution of the plover: Leadbetter Point/Gunpowder Sands, Washington south to Bayocean Spit, Oregon; Bayocean Spit south to Heceta Head, Oregon; Bandon State Park, Oregon south to Humboldt County, California; Humboldt County south to MacKerricher State Park, California; MacKerricher State Park south to Salmon Creek or Marin County, California; and Point Sur, California south to San Carpoforo Creek, California.

The fledging success of snowy plovers (percentage of hatched young that reach flying age) varies greatly by location and year (U.S. Fish and Wildlife Service 2001). The draft recovery plan uses the annual number of young fledged per adult male to assess reproductive success. Reproductive success for various sites was as follows: 1) Monterey Bay without predator control and exclosures, males averaged 0.85 fledglings annually (1984 to 1991); with predator control and exclosures, males averaged 1.11 fledglings (1992 to 1997); 2) San Diego County with some indirect management activities, males averaged 0.92 fledged young (1995 to 1997); and 3) Oregon with intensive management, males averaged 1.04 fledglings (1993 to 1997) (Nur et al. 1999). The draft recovery plan states that delisting will be considered when a 5-year average productivity of at least 1.0 fledged chick per male has been achieved in each recovery unit.

Wintering Population Fewer than 40 plovers winter on the Washington coast, fewer than 100 winter on the Oregon coast, and more than 2,500 winter along the California coast (U.S. Fish and Wildlife Service 2001). In 1986, the estimated winter population for the California and Oregon coast was 3,100 plovers (Page et al. 1986). The 2005 winter window survey numbers for California and Oregon are 3,426 and 97, respectively, totaling 3,523 individuals (Page, 2005. *in litt.*, Kelly, 2005. *in litt.*).

Plovers winter at two locations on the Washington coast, at nine locations on the Oregon coast, and at various locations along the California coast (U.S. Fish and Wildlife Service 2001). The majority of wintering birds in California are found from Sonoma County southward.

Current Conditions (Recovery Unit 2 - Del Norte, Humboldt, and Mendocino Counties) In California, pre-nesting bonds and courtship activities of western snowy plovers have been observed as early as mid-February (U.S. Fish and Wildlife Service 2001). The earliest nest initiation dates in Humboldt County have been as follows: 2001 (March 25),

2002 (March 19), 2003 March 18 (Colwell, et al. 2002), and 2004 (March 26) (Colwell, et al. 2004).

Habitat (Amount, Distribution, and Quality)

Breeding Habitat The draft recovery plan identifies 12 breeding locations in Recovery Unit 2 that are important for recovery (Table 8). Since 1999, nesting has only been documented at seven of these 12 locations: Big Lagoon (Colwell et al. 2005), Clam Beach/Little River; south spit of Humboldt Bay; Eel River Wildlife Area; Eel River gravel bars, Centerville Beach, and MacKerricher State Park (LeValley 1999; Mad River Biologists 2000; Colwell, et al. 2001). In recent years, nesting has also been documented at the following sites not included in the above list: Gold Bluffs Beach (Humboldt County) and Manchester State Park (Mendocino County).

Since 1977, plovers have nested at two locations in Del Norte County, 11 locations in Humboldt County, and two locations in Mendocino County (Page and Stenzel 1981; LeValley 1999; Mad River Biologists 2000; Colwell, et al. 2001; Colwell et al. 2004). Since 1999, no nesting has been documented at the following historic Del Norte County nesting areas: Lake Talawa and Smith River spit, and no nesting has been documented at the following historic Humboldt County nesting areas: Mad River Beach, Lanphere Dunes, Samoa Spit, and Elk River. In summary, since the late 1970's the number of nesting locations has declined 100 percent in Del Norte County, declined 36 percent in Humboldt County, and remained the same in Mendocino County (Table 9).

Since 1977, window surveys in Recovery Unit 2 have documented birds during the breeding season at the following 15 locations: Del Norte County – Lake Earl/Lake Talawa and Smith River spit; Humboldt County – Gold Bluffs Beach, Big Lagoon, Clam Beach/Little River, Mad River spit, Lanphere Dunes, north spit of Humboldt Bay, south spit of Humboldt Bay, Eel River gravel bars, Eel River Wildlife Area, and south spit of Eel River; Elk River spit, and Mendocino County - MacKerricher and Manchester State Parks. Clam Beach/Little River is the only site in Humboldt County where breeding birds were sighted during every survey year. Since at least 1991, breeding birds have not been present during the window survey period in the following four locations: Smith River spit, Lake Earl/Lake Talawa, Lanphere Dunes, and Elk River spit. Since 2000, breeding birds have consistently only occurred at three locations (Clam Beach/Little River; south spit of Humboldt Bay/Eel River Wildlife Area; and the Eel River gravel bars).

In Humboldt County, the majority of the breeding plovers occur in two locations, Clam Beach/Little River and the Eel River gravel bars. The quality of the available habitat in these areas is heavily impacted by human use. Vehicles are allowed in or adjacent to nesting habitat at both of these areas. The Clam Beach/Little River area is heavily used by recreationists. On Clam Beach/Little River, street-licensed 4-wheel drive vehicles are allowed to drive on the waveslope. The southern portion of this beach is closed to recreational vehicles during the nesting season; however, permitted commercial fishermen are allowed to drive vehicles during the day and night. Tire tracks above the waveslope showing evidence of vehicle play are frequently observed on this beach.

Vehicle tracks indicating regular driving in tight circular tracks have been noted in areas where adults tend broods (Colwell, et al. 2001). It is not unusual after a holiday weekend for the entire area on the northern portion of the beach from the waterline to the foredunes to be covered by vehicle tracks. Ruts created by vehicle tracks make it difficult for plover chicks to avoid oncoming vehicles, horses, unleashed dogs, predators, or other hazards.

No restrictions on recreational vehicle use exist for the Eel River gravel bar nesting areas. Depending on public access, significant disturbance of the nesting areas along the Eel River may occur due to four-wheel drive vehicles, motorcycles, wood collecting, target shooting, and homeless encampments (Mad River Biologists 2000). Plover researchers have documented vehicles destroying nests on the gravel bars in multiple years (Colwell, et al. 2004). Vehicle use related to gravel mining along the Eel River is governed by permits from the California Coastal Commission and the U.S. Army Corps of Engineers.

Since 2000, humans have contributed to low reproductive success in a variety of ways, including direct loss of eggs and chick mortality from pedestrians and vehicles, vandalism resulting in clutch loss, disturbance of adults tending eggs or chicks, and attracting corvids by leaving garbage (Colwell et al. 2006). In 2004, daily morning focal observations were made of incubating plovers throughout the nesting season at Clam Beach (Colwell et al. 2004). The frequency with which human activities occurred within 490 feet of 11 nests (6 nests on the north section of Clam Beach and 5 nests on the south section) was recorded (Colwell et al. 2004). Human activities averaged nearly seven times greater on the north end than south end of the beach, although there was considerable variation among nests (Colwell et al. 2004). Even though these observations are restricted to the vicinity of the nest sites, they are indicative of the relative levels of recreational activity on the north and south sections of Clam Beach. In 2003, 9 percent of the chicks on the north section fledged and 21 percent of the chicks on the south section fledged (Colwell et al. 2003). During the 2004 and 2005 breeding seasons, symbolic fencing was used on the northern section of Clam Beach to provide refuge to breeding plovers. In 2004, 40 percent of the chicks hatched on the north section fledged and 69 percent of the chicks hatched on the south section fledged (Colwell et al. 2004). In 2005, 37 percent of the chicks hatched on the north section fledged and 24 percent of the chicks hatched on the south section fledged (Colwell et al. 2005). In 2005, nests at Clam Beach hatched nearly twice the total number of chicks (48) than in any previous year (range: 17-28), only 31 percent of them survived (Colwell et al. 2005).

Wintering Habitat The draft recovery plan identifies 14 wintering locations in Recovery Unit 2 that are important for recovery (Table 10). Potential winter habitat is distributed in Recovery Unit 2 as follows: 12 miles of coastline (1,700 acres) in Del Norte County; 45 miles of coastline (5,450 acres) in Humboldt County; and 11 miles of coastline (1,170 acres) in Mendocino County (U.S. Fish and Wildlife Service 2001). Habitat quality at wintering locations has been lost or degraded due to human disturbance and European beachgrass.

Population (Numbers, Distribution, and Reproduction)

Breeding Population In California, pre-nesting bonds and courtship activities are observed as early as mid-February (U.S. Fish and Wildlife Service 2001). From 2001 through 2004, the earliest nest initiation dates in Humboldt County have been as follows: 2003 (March 18), 2002 (March 19), 2001 (March 25), and 2004 (March 26) (Colwell, et al. 2002; Colwell, et al. 2003; Colwell, et al. 2004). From 2001 through 2004, the latest nest initiation dates in Humboldt County have been as follows: 2002 (July 17), 2003 (July 15), 2004 (July 14), and 2001 (July 6) (Colwell, et al. 2002; Colwell, et al. 2003; Colwell, et al. 2004).

In 2006, the number of breeding plovers in Recovery Unit 2 (57; 28 females and 29 males) was tied for the lowest population size since monitoring started in 2001 (Colwell et al. 2006). Since 2001, the population size of breeding plovers has ranged from 57 to 74 adults (Colwell et al. 2006). In 2006, there were no breeding plovers in Del Norte County, 55 in Humboldt County, and 2 in Mendocino County (Colwell et al. 2006). The 2006 population represents 28.5 percent of the draft recovery plan management goal of 200 breeding adults in Recovery Unit 2. This breaks down to 0 percent of the draft management goal of 18 breeding adults in Del Norte County, 34 percent of the draft management goal of 162 breeding adults in Humboldt County, 10 percent of the draft management goal of 20 breeding adults in Mendocino County.

From 2000-2003, adult survival was estimated for color-banded plovers breeding in Humboldt County (Colwell et al. 2004). During this period, the number of marked adults ranged from 36 to 59. Annual adult survival ranged from 0.59 ± 0.06 to 0.81 ± 0.05 (Colwell et al. 2004). In 2006, adult survival was estimated at 0.63 ± 0.07 for males and 0.57 ± 0.07 for females and survival of juveniles from fledging to approximately one year was 0.31 ± 0.04 (Colwell et al. 2006). The population viability analysis for the listed subspecies assumed an adult survival rate of 76 percent and a juvenile survival rate of 50 percent for all subpopulations, but also modeled population trajectories with adult survival rates of 75 and 77 percent (Nur et al. 1999). The results of the analysis showed that even a one percent change in adult survival can have a substantial impact on population growth (Nur et al. 1999). Colwell et al. (2006) determined that the Humboldt County population was stable ($\lambda=0.99$) using Pradel models and that the population was declining ($\lambda=0.71$) using algebraic calculations. They concluded that the population is maintained by immigration from productive populations elsewhere along the Pacific coast (Colwell et al. 2006). From 2001-2006, approximately 29% of the annual breeding plovers were immigrants (32%, 29%, 43%, 12%, 17%, 42%) (Colwell et al. 2006).

Based on the 2006 surveys, breeding plovers were only sighted on 4 (33 percent) of the 12 breeding sites in Recovery Unit 2 identified as important for recovery in the draft recovery plan (Table 8). The four sites are Clam Beach/Little River; south spit of Humboldt Bay; Eel River gravel bars; and the Eel River South Spit and Beach. The 2006 number of breeding birds at only one of the 12 sites (Clam Beach/Little River) met or exceeded the draft recovery plan's management goal (Colwell, et al. 2005).

In 2006, plover productivity in Recovery Unit 2 was the lowest observed over the past 6 years (Colwell, et al. 2006). In 2006, 57 breeding plovers initiated 58 nests, which hatched 55 chicks and fledged 20 chicks (Colwell et al. 2006). All (100 percent) of the chicks fledged from Clam Beach and the Eel River gravel bars (Colwell et al. 2006). On Clam Beach, 26 percent of 38 chicks successfully fledged, whereas 71 percent of 14 chicks fledged on the gravel bars (Colwell et al. 2006). Once chicks hatch and leave the nest they become vulnerable to predators and humans (Colwell et al. 2006). Of the chicks that die, most (82 percent; n=33 chicks) succumb within 10 days of hatching (Colwell et al. 2004).

In 2006, males breeding in Recovery Unit 2 fledged 0.65 ± 0.91 chicks (Colwell et al. 2006). In one of the past 6 years, annual reproductive success for Recovery Unit 2 exceeded 1.3 fledged chicks per male (2001, 1.7 ± 1.4) (Colwell et al. 2004), which is the target for an increasing population assuming adult survival of at least 76 percent and juvenile survival of 50 percent (Nur et al. 1999). The 6-year (2001-2006) average productivity for Recovery Unit 2 has been 1.0 chick fledged per male. In 2006, beach-nesting males continued to exhibit low fledging success (0.45 ± 0.67 fledglings per male) compared to males nesting on the Eel River gravel bars (1.11 ± 1.27 fledglings per male) (Colwell et al. 2006). In 2006, the percentage of plovers breeding on the Eel River gravel bars was the lowest observed in six years (Colwell et al. 2006).

In 2006, the number of breeding males (29) in Recovery Unit 2 was well below the recovery target of 75 males (population target of 150 and assuming a 1:1 sex ratio). Therefore, in addition to producing few chicks per male, the recovery unit had a low number of males. Increasing the current population size will require relatively high productivity, juvenile survival, and adult survival. To achieve this objective, intensive management of nesting areas will be required.

Wintering Population Between 1979 and 1985, 89 wintering plovers were recorded in Recovery Unit 2, based on the median of the maximum number of plovers counted (Table 10) (Page, et al. 1986). Winter window surveys in Recovery Unit 2 recorded 155 adult plovers in 2001; 123 plovers in 2002; 168 in 2003; 147 in 2004; and 87 in 2005 (Table 10).

The draft recovery plan identifies 14 wintering locations in Recovery Unit 2 that are important for recovery. During the 2005 winter window surveys plovers occurred at 6 of these sites (43 percent) (Table 10). Since 2001, no plovers have been sighted at 6 of the sites (43 percent) during the winter window surveys.

Conservation Needs/Strategy Recovery Unit 2

The draft recovery plan identifies management goals for the number of breeding adults in Recovery Unit 2 (U.S. Fish and Wildlife Service 2001, Appendix B, Table B-1) (Table 8). Management goals are about 15 percent higher than the recovery criteria subpopulation sizes. The draft recovery plan also identifies the following delisting criteria for Recovery Unit 2; 1) maintain for 10 years an average of 150 breeding adults; maintain a 5-year average productivity of at least 1.0 fledged chick per male; and 3) have

in place participation plans among cooperating agencies, landowners, and conservation organizations to assure protection and management of the breeding listed in Table 8 and for the wintering areas listed in Table 10 to maintain the population size and average productivity specified in criteria 1 and 2.

ENVIRONMENTAL BASELINE (in the Action Area)

The environmental baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat, and ecosystem within the action area. The environmental baseline includes State, tribal, local, and private actions already affecting the species or that will occur contemporaneously with the consultation in progress. Unrelated Federal actions affecting the same species or critical habitat that have completed formal or informal consultation are also part of the environmental baseline, as are Federal and other actions within the action area that may benefit listed species or critical habitat. As stated earlier, the Action Area contains approximately 35,860 acres.

Marbled Murrelet

Conservation Needs

The primary conservation needs of the marbled murrelet in the Parks, as identified in the recovery plan, are to implement short-term actions to stabilize the population and longer-term actions to increase population growth and distribution (U.S. Fish and Wildlife Service 1997). Short-term actions applicable to the Parks include: (1) maintaining occupied habitat; (2) maintaining and enhancing buffer habitat; (3) decreasing risks of loss of nesting habitat due to fire and windthrow; (4) minimizing disturbance and reducing predation at nest sites; (5) increasing recruitment; and (6) initiating research to determine impacts of disturbance in terrestrial environments. Long-term actions include: (1) increasing the amount, quality, and distribution of nesting habitat; and (2) decreasing fragmentation. The recovery plan recommends considering the need to maintain high quality murrelet habitat when planning recreational projects in the Parks. Recreational facilities may present threats to murrelets through loss of habitat, nest disturbance, and increased predation from corvids (U.S. Fish and Wildlife Service 1997).

The goals of the Parks' conservation strategy is to minimize potential incidental take associated with noise disturbance, habitat loss and degradation, and corvid predation of nests; and to implement habitat improvement actions to provide for recovery of listed species (Sakai 2003).

Current Condition

Habitat Trends and Distribution

The Parks contain approximately 41,400 acres of suitable marbled murrelet nesting habitat. This includes 41,100 acres of old-growth forest and 300 acres of residual old-growth stands (isolated old-growth trees surrounded by mature tree buffers). The old-growth forests in the Parks are highly fragmented with only three stands containing more

than 5,000 acres. The majority (83 percent) of the old-growth stands are 100 acres or smaller in size with 31 percent of the stands less than 5 acres in size.

The Parks also contain approximately 50,000 acres of second-growth coniferous forest that are currently unsuitable nesting habitat. Approximately 90 percent of these stands were harvested since 1940; therefore, it is unlikely even under the most optimistic scenario that these stands will provide additional nesting habitat for more than a century.

There are approximately 14,700 acres of suitable marbled murrelet habitat within the Action Area.

Population Numbers, Distribution, and Reproduction

The Parks are located in marbled murrelet conservation Zone 4. The Parks assume that marbled murrelets occupy all old-growth forest and residual old-growth stands in the Parks. In 2001 and 2002, 25 marbled murrelet nests were located in the Parks (Hebert et al. 2003a). All of the known nests were located in contiguous stands of old-growth (Hebert et al. 2003a).

Since 2000, monitoring to determine marbled murrelet population trend has occurred annually in Zone 4 as part of the effectiveness monitoring for the NWFP (Huff et al. 2003). For sampling purposes, Zone 4 was divided into two strata. The northern strata includes the area from Coos Bay, Oregon to Big Lagoon, California and the southern strata the area from Big Lagoon south to Shelter Cove, California. The northern strata occurs offshore of National Forest lands in Oregon and the Parks in California. At-sea locations of radio-marked marbled murrelets captured offshore from the Parks ranged from Punta Gorda, Mendocino County north to Newport, Oregon; however, most of the detections occurred in the northern strata (Hebert et al. 2003b). In 2000, the murrelet population point estimate for the northern strata of Zone 4 was 4,400 birds with a 95 percent CI of 3,000-8,700 (Huff et al. 2003). In 2001, the point estimate was 3,400 with a 95 percent CI of 2,400-5,900 and in 2002, 3,800 birds with a CI of 2,600-5,000 (Huff et al. 2003). In 2003, the point estimate was 3,700 with a 95 percent CI of 2,600-5,700 (Huff unpublished). In 2004, the point estimate was 3,200 with a 95 percent CI of 2,000-7,800 (Huff unpublished). In 2005, the point estimate was 3,300 with a 95 percent CI of 2,200-5,400 (Huff unpublished). At this point these data are insufficient to estimate statistically valid population trends; however, they provide a useful baseline estimate of the marbled murrelet population (Huff et al. 2003).

In 2003, the rate of population change was estimated for Zone 4 with a stage-based Leslie matrix model (Beissinger and Peery 2003). The rate of population decline for this zone ranged from 2.5 to 13.2 percent per year depending on the values used for adult and juvenile survival. All combinations of adult and juvenile survival, even the most optimistic, produced a negative rate of population change indicative of a declining population (Beissinger and Peery 2003).

Murrelets in the Parks appear to have very low hatching success compared with murrelets in other parts of their range (Hebert and Golightly 2006). From 2001 through 2003, 16 of

37 known nesting attempts in the Parks successfully hatched (hatching success, 43.2 percent) (Hebert and Golightly 2006). If birds with brood-patches that were not observed nesting were included in the calculation, the estimate of hatching success was 22.2 percent (Hebert and Golightly 2006). Nelson (1997 as cited in Hebert and Golightly 2006) calculated an average hatching success of 67 percent from Alaska to central California. Bradley et al. (2004 as cited in Hebert and Golightly 2006) reported an average hatching success of 86 percent for murrelets in Desolation Sound, British Columbia.

From 2001 through 2003, estimated fledging success ranged from 56.2 percent (assuming all chicks with unknown outcomes were successful) to 31.2 percent (assuming all chicks with unknown outcomes were unsuccessful) (Hebert and Golightly 2006). This range of possible fledging success brackets the average (45 percent) reported by Nelson (1997 as cited in Hebert and Golightly 2006) and the maximum value was similar to the average (69 percent) reported by Bradley et al. (2004 as cited in Hebert and Golightly 2006).

From 2001 through 2003, reproductive success was estimated to be 6.9 to 12.5 percent, lower than most northern investigations (Hebert and Golightly 2006). This level of reproductive success is insufficient to maintain current population levels (Hebert and Golightly 2006). Predation and poor food availability have been identified as important factors limiting reproductive success (Nelson and Hamer 1995, Peery et al. 2004). During their park study, Hebert and Golightly (2006) observed predation by both jays and ravens. If non-nesting birds with brood patches that were not confirmed to be nesting, were actually breeders that lost their egg to predators, this would constitute a failure rate of 64 percent in 2001; 39 percent in 2002; and 50 percent in 2003 (Hebert and Golightly 2006).

Northern Spotted Owl

Conservation Needs

The Parks are in the California Coast province as delineated in the Draft Recovery Plan for the northern spotted owl (USDI Fish and Wildlife Service 1992b). The Parks are recognized as being important for providing demographic support of owl populations in the northern California Coast Range and also for providing connectivity with interior populations on national forest lands.

Current Conditions

Habitat Trends and Distribution

The Parks define suitable nesting and roosting habitat in their General Management Plan as old-growth forest with canopy closures of greater than or equal to 70 percent, with at least 40 percent of the canopy contributed by trees greater than or equal to 21 inches dbh. Second-growth stands greater than 40 years of age are considered suitable habitat, especially if large residual trees occur in the stand. Within the Parks there are approximately 41,000 acres of old-growth forests, all of which are considered to be suitable nesting and roosting habitat. As of 2005, there were approximately 23,230 acres

of second-growth forest at least 40 years of age that may be suitable nesting and roosting habitat (Schmidt 2006a). There are approximately 230 acres with residual old-growth trees that are assumed to be suitable habitat (Schmidt 2006a).

There are approximately 34,860 acres of suitable northern spotted owl habitat in the Action Area.

Population Numbers, Distribution, and Reproduction

The first park-wide inventory was conducted between 1993 and 1995 and identified 37 activity centers (Sakai 2003). The Parks have monitored 36 of these known activity centers. From 1995 through 2003, the number of activity centers occupied by one or more owls ranged from a high of 30 in 1995 to a low of 11 in 2000 and the number of territories that fledged young during the same time period ranged from one to seven (Sakai 2003). In 2006, there were only 16 active sites (territories with one or more spotted owls present in the previous three years) in the Parks (Schmidt 2006a). All but one of the territories was located in the Redwood Creek watershed (Schmidt 2006a). During the early 1990's spotted owls were detected in Prairie Creek Redwoods, Del Norte Coast Redwoods and Jedediah Smith Redwoods state parks (Schmidt 2006a).

In 2005, 16 activity centers were monitored in the Parks (not including the Mill Creek acquisition area) (Schmidt 2006b). Eight territories were occupied by at least one spotted owl; three were occupied by pairs (Schmidt 2006b). Nesting was confirmed at one site, Coyote Creek (Schmidt 2006b).

In 2005, barred owls were observed in 21 of the known spotted owl territories and at least 10 of these territories appear to no longer be occupied by spotted owls (Schmidt 2006a). In 2005, there were an estimated 42 independent barred owl sites in the Parks (Schmidt 2006a).

The following seven known activity centers occur in the Action Area: Cedar Creek, Damnation Creek, Richardson Creek, Hatchery Hill, Lost Man Creek, Emerald Creek, and East Side Trail. All of the activity centers except for the East Side trail site are currently occupied by barred owls. The East Side Trail site was identified in 1993. It is currently occupied by northern spotted owls, but barred owls are present in the vicinity. Portions of the Action Area are currently unsurveyed especially within Prairie Creek and Jedediah Smith Redwoods State Parks.

Western Snowy Plover

Breeding Season

In California, pre-nesting bonds and courtship activities of western snowy plovers have been observed as early as mid-February (U.S. Fish and Wildlife Service 2001). During the past 5 years, the earliest known nest initiation date in Humboldt County is March 18 and the latest is July 17 (Colwell et al. 2002).

Conservation Needs

The U.S. Fish and Wildlife Service (2001) describes the role of Federal agencies in achieving recovery of the plover in the draft recovery plan. Lands managed by Federal agencies are extremely important to the conservation of the snowy plover. Under section 7(a)(1) of the Act, Federal agencies are required to actively promote the conservation of listed species. The snowy plover cannot be recovered simply through general habitat protection or compliance with required section 7 consultations. The snowy plover must be actively monitored and managed or its population size will continue to decline.

Federal agencies alone cannot assure recovery of the snowy plover, but they need to significantly increase their current monitoring and management efforts to assure survival and recovery of this species. Federal agencies should take a lead role in conserving this species and serve as examples to non-Federal landowners.

Current Condition

Habitat

Breeding Habitat The Parks contain approximately 1,020 acres of beach habitat; however, much of it has been compromised due to the presence of European beachgrass and recreational activities. The northern half of Gold Bluffs Beach probably constitutes the best plover habitat in the Parks (Schmidt 2006a). Freshwater Spit and the adjacent beach to the north also provide good quality habitat (Schmidt 2006a). Known threats to plovers in the Parks include vehicles, unleashed dogs, visitor recreation activities, predators, and firewood cutting and gathering.

In 2004-2006, plovers have been sighted on Gold Bluffs Beach during the breeding season, the majority of the observations have been north of the beach that lies due west of the Fern Canyon parking area (Holm 2004; Holm 2005; Holm 2006). In 2004 and 2005, all but two of the plover locations were in the area between Squashan Creek and about 0.5 mile north of Fern Canyon; one of the other locations was south of Espa Creek (2004) and one was in front of the Gold Bluffs Beach Campground (2005) (Schmidt 2006a).

Wintering Habitat The Service has identified Gold Bluffs Beach as a wintering area that is important for recovery of the snowy plover (U.S. Fish and Wildlife Service 2001). During the Parks' 2004, 2005, and 2006 plover surveys, wintering plovers were detected on Gold Bluffs Beach near Fern Canyon (Holm 2004; Holm 2005; Holm 2006).

Population Numbers, Distribution, and Reproduction

Breeding Population Plover numbers are difficult to compare from year-to-year because of variations in survey efforts. Current breeding season surveys include monthly surveys at Crescent Beach, the southernmost section of Gold Bluffs Beach, and Mussel Beach; and twice per month surveys at the northern and middle sections of Gold Bluffs Beach and Freshwater Spit (Holm 2006).

There are very few historic observations of plovers and no historic records of nests on the Parks' beaches. During 2004 through 2006, surveyors documented the following number of individual plovers during breeding season surveys at Gold Bluffs Beach, 2004, 5; 2005, 9; and 2006, 8 (Holm 2004; Holm 2005; Holm 2006).

On May 24, 2004, an adult plover with two chicks was sighted on Gold Bluffs Beach. One of the chicks fledged on June 23. The fate of the other chick was unknown. In 2005, a pair of plovers nested in early May but the nest failed within a few days of the estimated hatch date. There was no documented nesting in 2006. Overall in 2004 and 2005, four breeding plovers initiated two nests, which produced two chicks and fledged one juvenile. Male fledgling success during this period was 0.5 fledgling per male which is well below the target of 1.2-1.3 fledglings per male necessary for an increasing population.

Wintering Population Yocum and Harris (1975) noted wintering plovers as occurring regularly on Gold Bluffs Beach. Between 1979 and 1985, winter surveys conducted along the California coast detected plovers on Gold Bluffs Beach during two out of three winters (Page et al. 1986). The yearly maximum number of plovers detected during this period was nine (Page et al. 1986).

Current winter season surveys include once per month surveys in December and January at Freshwater Spit, the northern and middle sections of Gold Bluffs Beach and once per month in January at Crescent Beach (Holm 2006). In January 2004, two wintering plovers were detected on Gold Bluffs Beach for the first time since the mid-1980s (Holm 2004). In January 2005, three plovers were observed near Fern Canyon on Gold Bluffs Beach (Holm 2005). During the 2005/2006 winter surveys, up to eight snowy plovers were detected near Fern Canyon (Holm 2006).

EFFECTS OF THE ACTION

This section presents an analysis of the direct and indirect effects of the proposed project, including interrelated and interdependent actions, on the species. These effects are then evaluated with respect to the conservation needs of the species within the Action Area and within the larger conservation strategy established in the recovery plan or other documents.

Marbled Murrelet

Direct Effects - Habitat Modification

No marbled murrelet nesting habitat will be removed or degraded by the proposed action. None of the trees to be removed are potential nest. All of the trees proposed to be removed in suitable murrelet habitat are less than one-half site potential tree height and their canopies do not extend high enough to provide cover for potential nesting platforms. Since all potential nest trees, potential nesting platforms, and trees providing protective cover around nesting platforms will be retained, impacts due to the proposed action do not reach the level of habitat degradation.

Direct Effects - Disturbance

Scientific Basis for Disturbance

Management activities that require use of heavy equipment, chainsaws, helicopters, and large vehicles introduce noise, visual, and air disturbances into the environment. The effects of auditory and visual disturbances on birds are extremely difficult to determine (Knight and Skagen 1988). Confounding factors include the tolerance level of individual birds, type and frequency of human activity, ambient sound levels, how sound reacts with topography and vegetation, and differences in how species perceive noise and human presence. Regardless of these difficulties, research conducted on a variety of bird species does suggest that the effects of human disturbance can have a negative impact on reproductive success (Carney and Sydeman 1999, Frid and Dill 2002, Marzluff and Neatherlin in review). Disturbance can affect productivity in a number of ways, including interference of courtship (Bednarz and Hayden 1988), nest abandonment (White and Thurow 1985), egg and hatchling mortality, due to exposure and predation (Drent 1972; Swensen 1979), and altered parental care (Fyfe and Olendorff 1976; Bortolotti et al. 1984).

Disturbance is defined as noise in excess of ambient levels in or within 0.25 mile of suitable nesting habitat or as the reaction of nesting birds to human presence or activity, resulting in disruption of essential breeding behaviors. Disturbance during the breeding season may potentially disrupt the species' essential breeding behaviors by: 1) causing abandonment of the breeding effort by failure to initiate nesting or to complete incubation; 2) disrupting nesting activity such as feeding young; and 3) causing premature dispersal of juveniles.

Data on timing of various aspects of the breeding season indicate that murrelets in California have the longest breeding period in North America. Incubation commences as early as March 24 and ends as late as August 13; the nestling period may begin April 24 and end September 9 (Hamer and Nelson 1995). In California, we have defined the murrelet breeding season as the period from March 24 through September 15. The Service considers the use of motorized equipment during the breeding season (March 24 through September 15) to have the potential to significantly disrupt essential murrelet behaviors.

Effects of the Proposed Action - Disturbance

A limited operating period from March 24 through September 15 will be imposed for most of the projects utilizing motorized equipment (such as new construction, watershed restoration projects, and maintenance of new trails) in or within 0.25 mile of nesting habitat. No disturbance to breeding marbled murrelets associated with the utilization of motorized equipment that implement this limited operating period is anticipated.

Some of the Parks' existing roads and facilities occur in suitable nesting habitat. Visitor use of these sites is highest from May to September which overlaps with the murrelet breeding season. Use of these roads and facilities may introduce a high level of disturbance which may affect marbled murrelets nesting within suitable habitat in the vicinity. This level of activity may disturb adult or juvenile murrelets and could cause

them to flush from their nest site, could cause a juvenile to prematurely fledge, or could interrupt feeding exchanges.

Approximately 3,129 acres of suitable nesting habitat occur within 0.25 mile of existing roads and concentrated human use areas, such as campgrounds and trailheads. An additional 384 acres of habitat occurs within 0.25 mile of proposed facilities. The Service anticipates that disturbance associated with the use of existing and proposed roads and facilities could result in annual harassment of an undetermined number of nesting murrelets associated with 3,513 acres of habitat (3,129 acres + 384 acres).

The Parks are proposing to use chainsaws during the breeding season to remove up to two fallen old growth trees per year from the new East Side Trail. This would be the only exception to the earlier discussed timing restriction on maintenance of new trails. The Service anticipates that the using chainsaws during the breeding season could result in harassment of an undetermined number of nesting murrelets associated with 250 acres of habitat per year along the East Side Trail.

The total amount of nesting habitat subject to annual disturbance due to the proposed action will be 3,763 acres (3,513 acres + 250 acres).

Direct Effects - Injury or Mortality

Scientific Basis for Injury or Mortality

Timber harvest activities such as tree felling, helicopter yarding, and prescribed burning of occupied or unsurveyed suitable habitat during the breeding season could directly injure or kill adults, eggs, or young. Murrelets may be struck and killed or injured by falling trees during harvest or stand improvement, although such risk is likely confined to the area relatively close to the nest tree. Adults can reasonably be expected to move from the area and avoid injury or death. However, eggs and flightless young are vulnerable to injury or death for approximately 60 days (Nelson and Hamer 1995b).

Effects of the Action – Injury or Mortality

Construction of new trails and facilities may require tree felling; however, the trees to be removed will not be potential nest trees or trees that provide cover to potential nesting platforms. Consequently, the likelihood that the proposed action will result in direct mortality of murrelets, particularly to young or the loss of eggs is discountable.

Indirect Effects - Increased Risk of Predation

Indirect effects are defined as those effects that are caused by or will result from the proposed action at a later time, but are still reasonably certain to occur (50 CFR 402.02).

Scientific Basis for Increased Risk of Predation

Corvids have been implicated as the main predator of murrelet nests (Nelson and Hamer 1995). Corvids are extremely intelligent and efficient predators that use a highly refined search image for locating prey (McShane et al. 2004). Common ravens and Steller's jays are known to take both murrelet eggs and chicks at the nest. Common ravens account for the majority of egg depredation, as they appear to be the only predator capable of

flushing incubating or brooding adults from a nest (Nelson and Hamer 1995b). Suspected nest predators include northwestern crows, American crows, and gray jays (Nelson and Hamer 1995b, Nelson 1997). Populations of several corvid species have increased dramatically in the west as a result of forest fragmentation, increased agriculture, and urbanization (McShane et al. 2004).

Predation has consistently been the most significant cause of recorded nest failure at murrelet nests (McShane et al. 2004). Recent studies have shown that most monitored nests have failed (43 to 85 percent) and most failures (78 percent) are due to predation (McShane et al. 2004). In general, studies of avian predation have found: 1) higher nest predation in areas with high predator densities; 2) increased abundance or diversity of predators with increased variety and complexity of habitats; 3) increased abundance of some corvid species along edges or in forest fragments near human activities; 4) high nest predation by corvids along edges near human activities or in areas of low forest cover; and 5) high predation by small mammals in a variety of habitat including interior forests and along non-natural edges (McShane et al. 2004).

In many studies, the highest risk of predation was documented in areas close to humans within 0.6 mile including along suburban edges and in campgrounds, dumps, and other areas of development, where human food sources attract predators (McShane et al. 2004). In the Santa Cruz Mountains, Steller's jays were 9 times more numerous and common ravens 7 times more common in State Park campgrounds than in control areas (Suddjian 2005). Furthermore, the probability of predation on simulated murrelet nests decreased from 95 percent to 50 percent when visitors and their food were not allowed into an area of the Olympic National Park (Marzluff and Neatherlin in review). Because human food is not consistently available along park trails, Steller's jay numbers are not expected to increase adjacent to trails. However, due to the presence of humans, jay activity could increase along trails relative to the surrounding areas which would increase the risk of predation for nests located along trails (J. Marzluff pers. comm.). The more time jays spend in an area, the more likely they are to encounter a nest.

It is reasonable to infer that as predator abundance has increased, predation on murrelet chicks and eggs has also increased, and murrelet reproductive success has decreased. The degree to which increased predation may occur and the extent of the area adjacent to recreational facilities into which nest predators may travel are difficult to quantify. Based on discussions between the Parks' biologists, Service biologists, and Dr. John Marzluff it was agreed to use 500 feet along trails and 0.25 mile around permanent recreation facilities, such as trailheads, backcountry camps, and campgrounds, to calculate the acreage of suitable habitat that would be exposed to increased corvid predation.

Effects of the Action – Increased Risk of Predation

The Service anticipates an increase in corvid predation on murrelet eggs and nestlings adjacent to trails and facilities due to increased human presence. The amount of anthropogenic food available to corvids is expected to increase commensurate with visitor use. We used 500 feet for the average distance from trails and 0.25 mile from permanent facilities to estimate the amount of nesting habitat that would be subject to

indirect effects from increased predation risk. By multiplying the 500 feet by miles of trail that lie adjacent to suitable habitat, the Service anticipates the proposed action would result in take due to harm in a total of 10,289 acres of occupied habitat adjacent to existing facilities and trails; and 1,250 acres of occupied habitat adjacent to proposed facilities and trails annually. While the proposed action would not result in a net reduction in the acres of occupied habitat, the indirect threat of increased corvid predation would result in a reduction (to an undeterminable extent) in habitat quality in approximately 78 percent of the suitable habitat in the Action Area (11,539 acres impacted out of 14,700 acres in the Action Area).

The majority (90 percent) of this impact is due to the continued operation of existing recreational facilities rather than opening of new facilities. Potential impacts of some of the new facilities will be lessened because they are located in areas that may already have a high predation risk due to adjacent agricultural and land uses such as highways. To further minimize the risk of increased predation at existing and new facilities, the Parks are developing a corvid management strategy.

Summary of Project Effects on the Marbled Murrelet Numbers, Distribution, and Reproduction

No suitable murrelet habitat will be removed or degraded. The proposed action may affect the number and productivity of marbled murrelets in the Parks by disturbing breeding murrelets and increase the risk of predation of murrelet eggs and nestlings.

The Service anticipates the proposed project will result in direct adverse effect to murrelets in the form of harassment of murrelets associated with 3,763 acres of occupied habitat (3,129 acres associated with existing facilities; 384 acres associated with new facilities; and 250 acres associated with new trail maintenance) annually and in the form of harm due to increased corvid predation in approximately 11,539 acres of occupied habitat (10,289 acres associated with existing facilities and 1,250 acres associated with new facilities) annually. This amount (11,539 acres) of suitable nesting habitat represents approximately 78 percent of the suitable nesting habitat (14,700 acres) in the Action Area; 28 percent of the suitable nesting habitat (41,400 acres) in the Parks; and 17 percent of the suitable nesting habitat (68,000 acres) in the California portion of Zone 4.

In the short-term, conservation needs of the marbled murrelet are the protection of occupied habitat, minimization of disturbance, and reduction of predation at nest sites. The proposed project will result in long-term disturbance and increased predation risk to nesting marbled murrelets. The Parks have minimized the number of acres subject to disturbance and predation risk by implementing limited operating periods and locating some of the proposed facilities in suitable nesting habitat that is already heavily influenced by existing human developments such as highways, agriculture, and development. The majority (90 percent) of the increased predation risk is associated with existing facilities and trails rather than new ones. The Parks' proposed visitor education program and corvid management strategy is intended to decrease corvid predation of marbled murrelets near existing park facilities. If the target reductions in corvid densities

are not achieved at the end of 2011 or 2012, then the Parks will consider adopting more intensive management techniques.

Over the long-term, the conservation needs of the marbled murrelet focus on increasing the amount, quality, and distribution of suitable nesting habitat to stop population decline and increase population growth. The proposed project does not impact the amount of nesting habitat; however, it would impact habitat quality to an undeterminable extent.

Northern Spotted Owl

Habitat Modification

Scientific Basis for Habitat Modification

Management practices have the potential to reduce the quantity and quality of northern spotted owl nest and roost sites. Spotted owls depend upon existing structures, such as cavities and broken treetops, for nest sites. Management activities which result in the removal of the oldest, most decadent trees or require removal of hazard trees and snags are likely to remove potential spotted owl nest sites (Blakesley et al. 1992). Further, activities designed to reduce ladder fuels or release the growth of co-dominant trees often simplify vertical structure in the understory, where spotted owls perch for hunting or roosting (Forsman et al. 1984).

Removing trees, snags, and downed wood can affect spotted owl prey composition and/or availability by altering characteristics of the habitat upon which prey species depend. Because the amount of snags and down material on the forest floor is positively correlated with densities of some prey species, a reduction in the abundance of these components may contribute to localized, short-term declines in prey (Williams et al. 1992). Reductions in populations of these prey species could lower spotted owl recruitment.

For the purposes of the following discussion, changes in habitat function are categorized as removal, downgrade, or degrade. *Removal* represents a complete loss of habitat function following an action. For example, an area functioned as nesting/roosting habitat; after habitat modification, the area does not provide any habitat function. *Downgrade* is a subset of the term *removal* and refers to a loss of habitat function and change from one habitat function to another. For example, an area functioned as nesting/roosting habitat; after habitat modification, the area is capable only of providing foraging habitat. This term could also be used to signify a change in function from foraging to dispersal as well. *Degrade*, to be distinguished from *downgrade*, indicates a reduction in habitat quality, but not habitat function. For example, an area that functioned as foraging habitat prior to an action still provides foraging habitat after the effect, but prey abundance may be reduced due to a reduction in some structural components or vegetation.

Removal or downgrading of habitat within home ranges, especially when located close to the nest site, can reasonably be expected to negatively affect northern spotted owls. A linear reduction in northern spotted owl productivity and survivorship occurs as the amount of suitable habitat within a spotted owl home range declines (Bart 1995). In

northwestern California, survivorship of adult owls was greater where greater amounts of older forest were present around the activity center, but reproductive success increased where the amount of edge between older and younger forest was relatively high (Franklin et al. 2000).

Research indicates that spotted owls in northern California focus their activities in heavily-used “core areas” that ranged in size from about 167 to 454 acres, with a mean of about 409 acres (Bingham and Noon 1997). These core areas, which included 60 to 70 percent of the owl telemetry locations during the breeding season, typically comprised only 20 percent of the home range area. Therefore, habitat removal within core areas could have disproportionate effects on owls. Spotted owl abundance and productivity significantly decrease when the proportion of suitable habitat within 0.7 mile of an activity center falls below 500 acres, which represents 50 percent of the total 1,000 acres within 0.7 mile (O’Halloran 1989; Simon-Jackson 1989; Thomas et al. 1990). For the purpose of consultation, the Service identifies the following guidelines for the amount of suitable habitat needed to maintain essential behaviors, such as breeding, within the home range area: 500 acres within 0.7 mile of the activity center and 1,336 acres within 1.3 mile of the activity center.

Effects of the Proposed Action – Habitat Modification

None of the proposed new trailheads or backcountry camps are located in suitable northern spotted owl habitat. All or portions of eight of the new trails and the new portion of the James Irvine Trail are located in suitable owl habitat. The proposed watershed restoration work along West Ridge and Ossagon roads is located in suitable owl habitat.

Habitat Removal Suitable northern spotted owl habitat will be removed as a result of the proposed watershed restoration work. All vegetation along the road fill will be removed. The average width of the area to be treated is approximately 36 feet. Restoration work along the West Ridge Road will remove approximately 23 acres of owl habitat and work along Ossagon Road will remove approximately one acre of owl habitat. The proposed project areas are not within the home range of any known northern spotted owl activity centers. The amount of suitable habitat within 0.7 mile of both project areas exceeds 500 acres and the amount within 1.3 miles of the project sites exceeds 1,336 acres. The impacts of this habitat removal is expected to be insignificant for the following reasons: 1) post-project amounts of suitable habitat within 0.7 and 1.3 miles of the project areas will exceed the Service’s guidelines for the amount of habitat within these distances of activity centers; 2) prey species are not expected to be significantly impacted because trees and woody debris removed during project work will be spread across the finished surface; and 3) residual old-growth trees will not be removed. The proposed project will result in short-term loss of 24 acres of habitat; however, it will also provide long-term benefits by allowing the re-growth of forest on restored roadbeds and reduce forest fragmentation.

Habitat Degradation Suitable northern spotted owl habitat will be degraded as a result of the proposed new trail construction. Shrubs, tree limbs, and trees less than 18

inches dbh may be removed during trail construction. No down logs will be removed. The small trees and shrubs provide potential habitat for owl prey species. Their removal may result in minor degradation of approximately 14.5 acres of suitable habitat as a result of trail construction. The impact of this degradation on northern spotted owls is expected to be insignificant for the following reasons: 1) no dominant or co-dominant trees or down logs will be removed; 2) habitat suitability and function will be maintained; 3) no conifers greater than 18 inches dbh will be removed; 4) overstory canopy will not be altered; 5) primarily minor stand components will be removed (e.g., small trees, shrubs, and limbs) and 6) vegetation removal will occur along a narrow linear trail corridor.

Disturbance

Scientific Basis for Disturbance

The effects of noise on birds are extremely difficult to determine (Knight and Skagen 1988). Confounding factors include the tolerance level of individual birds, type and frequency of human activity, ambient sound levels, how sound reacts with topography and vegetation, and differences in how species perceive noise. Regardless of these difficulties, research conducted on a variety of bird species does suggest that disturbance can have a negative impact on their reproductive success (Tremblay and Ellison 1979; Belanger and Bedard 1989; Piatt et al. 1990; Henson and Grant 1991). Disturbance can affect productivity in a number of ways, including interference of courtship (Bednarz and Hayden 1988), nest abandonment (White and Thurow 1985), egg and hatchling mortality, exposure and predation (Drent 1972; Swensen 1979), and altered parental care (Fyfe and Olendorff 1976; Bortolotti et al. 1984).

The few studies which examined responses of northern and Mexican spotted owls (*Strix occidentalis lucida*) to several disturbance sources, such as helicopters, small chainsaw, hikers, indicate that noise can disrupt owl behaviors, such as flushing from roosts and prey delivery rates (Delaney et al. 1999; Delaney and Grubb 2001; Swarthout and Steidl 2001). However, owl sensitivity varies with stimulus distance, location (i.e., aerial or ground), type, and timing, as well as individual tolerance (Delaney et al. 1999; Delaney and Grubb 2001; Swarthout and Steidl 2001).

Proposed management activities such as road removal, construction of new facilities, and trail maintenance may use motorized equipment, such as bulldozers or chainsaws, which introduce high levels of noise into the environment. The Service considers the use of motorized equipment during the period from February 1 through July 31 to have the potential to disrupt essential owl behaviors such as breeding, roosting, and foraging. For the purpose of consultation, the Service identifies a threshold of 0.25 mile as a minimum distance from suitable nesting and roosting habitat to avoid disturbance during the breeding season due to changes in these essential behaviors.

Effects of the Action – Disturbance

The proposed watershed restoration projects on the West Ridge and Ossagon roads will occur outside of the period from February 1 through September 15; therefore, no disturbance to breeding northern spotted owls is anticipated in association with the proposed restoration work.

A limited operating period from February 1 through July 9 will be imposed for most projects utilizing motorized equipment (such as new construction, maintenance of new trails) in or within 0.25 mile of unsurveyed or occupied nesting and roosting habitat. The period from July 10 through July 31 is after the period when the majority of young owls have fledged from the nest. As a result, we anticipate some change in the owl's behavior from the proposed management activities implementing this limited operating period but would not expect them to result in abandonment of the breeding effort, disruption of nesting activities, or premature dispersal of juveniles.

Some of the existing recreational trails occur in suitable northern spotted owl nesting and roosting habitat. Research on the response of breeding Mexican spotted owls, another subspecies of spotted owl, to hikers suggest that hikers are not likely to have strong effects on the survival or fitness of owls unless hiking intensity remains high for long periods (Swarthout and Steidl 2003). This study was conducted on existing trails in Canyonlands and Capitol Reef National Parks. In these study areas, nesting owls and hikers are concentrated in narrow, steep-walled canyons unlike the expansive forested habitat available in the Parks. It is unlikely that the presence of hikers on existing trails in the Parks will result in harassment of breeding northern spotted owls.

Prior to construction, new and rerouted trail routes will be surveyed for northern spotted owls. Routes will not be located within 150 feet of any known historic or active spotted owl activity centers to protect nests from disturbance. One of the proposed trails (East Side Trail) is located within 0.25 mile of a known owl activity center. The activity center is located along a section of the proposed Trail M route that has already been constructed but is not open to the public. The Parks will continue to monitor this owl site. If an owl nest is located within visual distance of the trail, then the trail will be closed from February 1 through July 9 or rerouted. Implementation of these measures is expected to avoid harassment of breeding northern spotted owls in the vicinity of proposed trails.

Some of the Parks' existing roads and facilities occur in suitable nesting and roosting habitat. Visitor use of these sites is highest from May to September which overlaps with the owl breeding season. Use of these roads and facilities may introduce a high level of disturbance which may affect spotted owls nesting within suitable habitat in the vicinity. This level of activity may disturb adult or juvenile spotted owls and could cause them to flush from their nest site, could cause a juvenile to prematurely fledge, or could interrupt foraging activity.

Approximately 12,300 acres of suitable nesting and roosting habitat occur within 0.25 mile of existing roads and concentrated human use areas, such as campgrounds and trailheads. Northern spotted owl surveys have determined that approximately 7,440 acres of the 12,300 acres are currently unoccupied by northern spotted owls and that barred owls occupy another 2,800 acres. There are approximately 2,059 acres of unsurveyed suitable nesting and roosting habitat within 0.25 mile of existing roads and facilities. An additional 166 acres of unsurveyed habitat occur along the 6.5 mile of the West Side Access Road proposed to be opened to the public. The Service anticipates that

disturbance associated with the use of existing and proposed roads and facilities could result in annual harassment of an undetermined number of nesting spotted owls associated with 2,225 acres of unsurveyed habitat (2,059 acres + 166 acres) annually.

The Parks are proposing to use chainsaws during the early breeding season (February 1 through July 9) to remove up to two fallen old growth trees per year from the East Side Trail. This would be the only exception to the earlier discussed timing restriction on maintenance of new trails. The Service anticipates that using chainsaws during the early breeding season (February 1 through July 9) could result in harassment of an undetermined number of nesting spotted owls associated with 250 acres of unsurveyed habitat per year along the East Side Trail.

Injury or Mortality

Scientific Basis for Injury or Mortality

In extreme cases, management activities could result in direct injury or mortality of adults, eggs, or young. The potential for northern spotted owls to be struck and killed or injured by falling trees during harvesting or exposed to high levels of smoke during prescribed burning is confined to the area relatively close to the nest tree. Individual adult spotted owls can reasonably be expected to move from the area of disturbance and avoid injury or death. However, adult spotted owls which are incubating eggs or brooding young may be reluctant to leave the area (Delaney et al. 1999) and be vulnerable to injury or death. Young spotted owls are poor fliers immediately after leaving the nest; they develop their flight skills during their first several months after leaving the nest. Thus, they are most vulnerable to being struck by falling trees during this timeframe. Young are also susceptible to smoke inhalation. They may disperse prematurely in response to disturbance such as tree falling or smoke, thus increasing the likelihood of predation or starvation outside of the nest grove. Adults may abandon eggs in response to tree felling near the nest (Drent 1972; Swensen 1979; White and Thurow 1985).

The risk of injury to eggs and young can be avoided by implementing an operating restriction for all burning and harvest activities in occupied and unsurveyed suitable nesting and roosting habitat from February 1 through September 15.

Effects of the Action – Injury or Mortality

The Parks will implement the following measures: 1) new or rerouted trail routes without current northern spotted owl surveys conducted to protocol will be surveyed prior to construction; 2) no trees will be removed within 0.25 mile of known northern spotted owl nest sites or in unsurveyed suitable nesting and roosting habitat from February 1 through September 15; and 3) removal of four miles of the West Ridge Road and the 0.2 mile of the Ossagon Road will occur from September 16 to October 15. These measures will avoid cutting trees in occupied or unsurveyed nesting and roosting habitat during the period from February 1 through September 15. Consequently, the likelihood that management actions may result in direct mortality of northern spotted owls, particularly to young or the loss of eggs, is discountable.

Summary of Project Effects on the Northern Spotted Owl Numbers, Distribution, and Reproduction

Approximately 24 acres of suitable northern spotted owl habitat will be removed as a result of the proposed watershed restoration work and approximately 14.5 acres of suitable nesting and roosting habitat will be degraded as a result of new trail construction. The impacts on northern spotted owls from habitat modification are expected to be insignificant because of the large amount of post-project suitable habitat remaining in the project areas and because no residual old-growth trees will be removed.

Approximately 2,225 acres of suitable nesting and roosting habitat may be disturbed annually due to recreational activities along roads and facilities and approximately 250 acres of suitable habitat may be disturbed annually due to trail maintenance activities. A total of 2,475 acres (2,225 acres + 250 acres) of nesting and roosting habitat will be subject to disturbance annually during the breeding season. This amount (2,475 acres) of suitable nesting and roosting habitat represents approximately 7 percent of the suitable nesting and roosting habitat (34,859 acres) in the Action Area. The majority (90 percent; 2,225 acres) of this annual disturbance is due to the future use of existing facilities and roads and only 10 percent is associated with use of a new road.

In 2005, there was only one known activity center occupied by northern spotted owls within 0.25 mile of any of the proposed or existing facilities. This activity center is located near the proposed East Side Trail. If a nest is located within the visual range of this trail, the trail will be closed from February 1 through July 9 or rerouted to avoid disturbance to nesting owls. The proposed project is not expected to impede achievement of a long-term conservation need to provide blocks of suitable nesting and roosting habitat.

Western Snowy Plover

Direct Effects - Habitat Modification

Scientific Basis for Habitat Modification

Habitat degradation caused by human disturbance, urban development, and introduced beachgrass have resulted in a decline in active nesting areas (U.S. Fish and Wildlife Service 2001). One of the most significant causes of habitat loss has been encroachment of introduced beachgrass (U.S. Fish and Wildlife Service 2001). Stabilizing sand dunes with introduced beachgrass has reduced the amount of plover nesting habitat by reducing the amount of unvegetated area above the tideline, decreasing the width of the beach, and increasing the beach's slope (U.S. Fish and Wildlife Service 2001).

Driftwood is an important component of plover breeding and wintering habitat. In Recovery Unit 2, plover nests have been located beside, on, and under elevated driftwood. In 1999, several nests were found on top of driftwood in the foredunes at the Eel River Wildlife Area and Clam Beach/Little River (Mad River Biologists 2000). Removal of driftwood may reduce the number of suitable nest sites (U.S. Fish and Wildlife Service 2001). Driftwood also provides plover's year-round protection from wind and blowing sand.

Management activities that increase human disturbance may reduce the functional suitability of nesting, roosting, and foraging areas (USDI Fish and Wildlife Service 1999). Concentrations of people may deter plovers and other shorebirds from using otherwise suitable habitats (U.S. Fish and Wildlife Service 2001). Repeated intrusions by people into nesting areas may cause birds to move into marginal habitats where their chances of reproductive success are reduced (U.S. Fish and Wildlife Service 2001).

Effects of the Action – Habitat Modification

Habitat Removal The proposed action would not remove any suitable plover habitat.

Habitat Degradation There are approximately 1,022 acres of plover habitat in the Action Area. Degradation of suitable habitat may occur as a result of human disturbance. Visitors have access to all of the Parks' beaches. High visitor use areas of particular concern on Gold Bluffs Beach include the areas near Fern Canyon, Gold Bluffs Beach Campground, Gold Bluffs Beach Picnic Area, Gold Bluffs Beach vehicle access gate, and Espa Lagoon. The Parks' education efforts and trained docents should help to inform the public about plover management issues and minimize impacts to plovers.

The proposed action allows visitors to collect only the amount of driftwood that one person can carry in their arms. The Service does not anticipate adverse effects due to removal of driftwood because of the Parks' restrictions on the size and amount of driftwood that can be removed. However, collection of wood in the dunes necessitates people walking through nesting habitat which may damage or destroy nests or disturb incubating or brooding plovers.

Direct Effects - Disturbance

Scientific Basis for Disturbance

Disturbance from human presence and activities during the breeding season may potentially disrupt the species' essential breeding behaviors by causing: 1) abandonment of the breeding effort by failure to initiate nesting or to complete incubation; 2) separation of adults from their broods; and 3) adults and broods to stay away from favored foraging areas. Disturbance during the wintering season may potentially disrupt the plovers' foraging and roosting activities, thereby decreasing energy reserves needed for migration and reproduction in the subsequent nesting season. The effects of disturbance depend on the frequency, timing, duration, location, and intensity of the recreational activities.

Recreational activities on beaches (e.g., walking, jogging, running pets, horseback riding, and off-road vehicles) are key factors contributing to the ongoing decline in snowy plover breeding sites and breeding populations throughout its listed range (USDI Fish and Wildlife Service 1993). The primary recreational use period (Memorial Day through Labor Day) for beaches on the north coast of California coincides with the snowy plover reproductive season (March 1 through September 30).

Repeated disturbances by recreationists can interrupt brooding, incubating, and foraging of adults and cause chicks to be separated from their parents. Persons (1998), in a four-year study on Vandenberg Air Force Base, found that hatching and fledging success was higher on a beach closed to all recreational use than on a beach open to recreational use from the waterline to the 7-foot tidal height. Lafferty (2001) observed disturbance to shorebirds (including snowy plovers) when people were within approximately 60 feet at Coal Oil Point Preserve in Santa Barbara County, California.

Effects of the Action – Disturbance

Disturbance may be minimized by the proposed establishment of temporary nest, brood, and winter protection areas. These protection areas will be established only when known nests, brood, or winter concentration areas are identified. Therefore, establishment of temporary protection areas is dependent on the frequency and adequacy of the plover surveys. Those nesting plovers and broods present prior to discovery and all plovers outside of the protection areas will be subject to disturbance from recreational activities. Disturbance could preclude nesting or cause abandonment of a nesting attempt.

Temporary protection areas would not provide plovers predictable refuge areas free from disturbance; however, they are expected to minimize the disturbance to plovers within their boundaries. The effectiveness of the proposed minimization measures depends on the timely establishment of protection areas, level of visitor compliance, enforcement, and adequacy plover surveys.

We anticipate that proposed recreational activities will likely result in harassment to wintering and breeding plovers on the Parks' beaches.

Direct Effects - Injury and Mortality

Scientific Basis for Injury or Mortality

The draft recovery plan (U.S. Fish and Wildlife Service 2001) summarizes the potential ways recreational activities may cause mortality of plovers. Plover chicks and eggs are highly cryptic, making them difficult to see, even at close range. Many species that predate on plover chicks are visual predators. When in the presence of danger, snowy plover chicks tend to “freeze” in place and rely on their cryptic plumage for safety. Pedestrians, vehicles, dogs, and horses on the beach may crush highly cryptic eggs or chicks and chase adults off their nests. Separation of adults from their nests and broods can cause mortality through exposure of eggs or chicks to heat, cold, blowing sand, and/or predators. Recreation use may keep incubating adults off nests during strong winds, allowing eggs to be buried or scattered (Warriner et al. 1986). Recreational activities on the waveslope may disturb adults or broods, which feed at the edge of the water.

It is rare to witness chick loss or find direct evidence of mortality; however, monitoring in 1999 and 2000 at Point Reyes National Seashore suggests that increased human recreation over weekends and holidays negatively affects chick survival (Ruhlen et al. 2003). Ruhlen et al. (2003) found that weekend and holiday chick loss was 72 percent greater than expected in 1999, and 69 percent greater in 2000 when compared to weekday

losses. Similar results were documented at Clam Beach/Little River in 2001 when half the chicks in three broods died during the 4th of July week (Colwell et al. 2001).

Effects of the Action – Injury or Mortality

The Parks may implement the following measures to minimize the likelihood of direct injury or mortality due to recreational activities: construction of temporary nest, brood, or winter protection areas; development and dissemination of educational materials; placement of signs informing visitors about plovers; and the use of docents to educate beach users about plovers.

The temporary protection areas will provide protection for adults and broods when they are within the boundaries of the established areas. However, there is little protection outside of these areas and on the waveslope. Broods hatching from undetected nests may be especially vulnerable during the period between hatching and detection by plover surveyors. However, we do not anticipate that western snowy plovers will be directly injured or killed due to recreational activities on the Parks' beaches because of the proposed minimization measures and low number of plovers currently nesting on the Parks' beaches.

Indirect Effects – Increased Risk of Predation

Indirect effects are defined as those effects that are caused by or will result from the proposed action at a later time, but are still reasonably certain to occur (50 CFR 402.02).

Scientific Basis for Increased Risk of Predation

Predation has been identified as a major factor limiting western snowy plover reproductive success at many coast sites (U.S. Fish and Wildlife Service 2001). Predation, while predominately a natural phenomenon, is exacerbated through the introduction of nonnative predators and unintentional human encouragement of larger populations of native predators (U.S. Fish and Wildlife Service 2001). Breeding Bird Surveys and Christmas Bird Count data have documented substantial increases in populations of common ravens and American crows in California over the last 30 years (Liebezeit and George 2002).

Beach litter and garbage attract plover predators such as corvids, gulls, and skunks and encourage their habitation at higher numbers than would naturally occur. Predation can result in the direct loss of adults, chicks, or eggs or the separation of chicks from adults. Substantial evidence exists that human activities are affecting numbers and activity patterns of predators (Lafferty 2001). Recreational use draws predators to the beach, where they search for food or waste left behind by people. A high correlation exists between human use of nesting habitat and predation on western snowy plovers (U.S. Fish and Wildlife Service 2001).

Corvids are the most significant cause of low productivity of snowy plovers nesting on beaches in Recovery Unit 2 (Colwell et al. 2006).

Effects of the Action – Increased Risk of Predation

The proposed action includes the following measures to address predator concerns: plover signs will be mounted so as not to provide predator perches; nest predator exclosures will be installed if necessary; corvid proof trash containers are present in Gold Bluffs Beach Campground; outreach efforts to reduce attraction of predators, and a corvid management strategy document will be developed by May 2007.

Nest exclosures may provide eggs some protection from predators and recreational activities and increase hatching success; however, there are risks associated with predator exclosures. Potential risks include increasing the risk of predation for incubating adults within exclosures and encouraging breeding plovers to nest in low quality nesting habitat where hatching success is high but fledging success is low (Colwell et al. 2006). Nest exclosures have been successfully used to limit predation of eggs; however, exclosures are not a long-term solution to poor productivity.

We anticipate that indirect effects to snowy plovers will be minimized through implementation of the Parks' proposed measures but that these measures will not eliminate the risk of predation on breeding western snowy plovers, eggs, and chicks on the Parks' beaches.

Summary of Project Effects on Western Snowy Plover Numbers, Distribution, and Reproduction

The proposed action may affect the number and productivity of snowy plovers in the Parks by annually disturbing breeding and wintering plovers and reducing the functional suitability of habitat.

In 2006, 57 breeding plovers occurred in Recovery Unit 2. This number is substantially below the draft recovery plan's management goal of 200 breeding adults for the recovery unit. During the 2004 and 2005 breeding seasons, 2 adult plovers nested annually on the Parks' beaches. In 2006, no plovers nested on the Parks' beaches.

The proposed management strategy provides limited protection for nesting and wintering plovers. The effectiveness of the minimization measures will depend on the level of visitor compliance, survey efforts, and law enforcement. This analysis of effects and our conclusions are based on the expectation that adequate surveys will be conducted, management measures will be effective, and that timely action will be taken to revise management strategies if the measures fail to minimize impacts. However, even with complete compliance with the proposed measures, adverse impacts to wintering and breeding plovers due to harassment from recreational activities are likely to occur.

5.0 CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur within the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7

of the Act. Any Federal or State Park activities that occur within the Parks' boundaries will have a Federal nexus and require section 7 consultation with the Service. There are no private or tribal lands within the action area; therefore, cumulative effects would not be likely for activities within the Action Area.

CONCLUSION

Marbled Murrelet

After reviewing the current status of the marbled murrelet, the environmental baseline, the effects of implementing the proposed action, and the cumulative effects, it is the Service's biological opinion that implementation of the Trail and Backcountry Management Plan is not likely to jeopardize the continued existence of the marbled murrelet. Critical habitat for the marbled murrelet has been designated in the state parks, however, this action does not affect that area and no destruction or adverse modification of that critical habitat is anticipated.

The Service reached the non-jeopardy conclusion based on the following factors:

1. The proposed action will not remove or degrade suitable marbled murrelet nesting habitat.
2. Nesting marbled murrelets associated with 3,763 acres of suitable habitat will be subject to harassment annually through 2017.
3. Nesting marbled murrelets associated with 11,539 acres of suitable habitat will be subject to increased predation risk annually through 2017. The majority (90 percent) of this increased predation risk is associated with recreational use of existing facilities rather than new facilities.
4. The Parks' proposed visitor education program and corvid management strategy is intended to decrease corvid predation of marbled murrelets near existing park facilities. If the target reductions in corvid densities are not achieved at the end of 2012, then the Parks will consider adopting more intensive management techniques.

Northern Spotted Owl

After reviewing the current status of the northern spotted owl, the environmental baseline, the effects of implementing the proposed action, and the cumulative effects, it is the Service's biological opinion that implementation of the Trail and Backcountry Management Plan is not likely to jeopardize the continued existence of the northern spotted owl. Critical habitat for the northern spotted owl has been designated, however, this action does not affect that area and no destruction or adverse modification of that critical habitat is anticipated.

The Service reached the non-jeopardy conclusion based on the following factors:

1. The proposed action will remove 24 acres suitable northern spotted owl nesting and roosting habitat and degrade 14.5 acres of suitable habitat. The impacts are expected to be insignificant because of the large amount and quality of the suitable nesting and roosting habitat that will remain in the project areas.
2. Nesting spotted owls associated with 2,475 acres of nesting and roosting habitat will be subject to harassment annually through 2017. The majority (90 percent) of this disturbance is associated with the future use of existing facilities and not proposed facilities.
3. New trail routes will not be located within 150 feet of any known historic or active spotted owl activity centers to protect nests from disturbance. If an active owl nest is located within visual distance of the East Side Trail, then the trail will be closed from February 1 through July 9 or rerouted.

Western Snowy Plover

After reviewing the current status of the western snowy plover, the environmental baseline, the effects of implementing the proposed action, and the cumulative effects, it is the Service's biological opinion that implementation of the Trail and Backcountry Management Plan is not likely to jeopardize the continued existence of the western snowy plover. Critical habitat for the western snowy plover has been designated, however, this action does not affect that area and no destruction or adverse modification of that critical habitat is anticipated.

The Service reached the non-jeopardy conclusion based on the following factors:

1. The proposed action will not remove suitable western snowy plover habitat.
2. Western snowy plovers associated with the Parks' beaches will be subject to harassment during 10 breeding and wintering seasons through 2017.
3. The Parks' education efforts and trained docents should help to inform the public about plover management issues and minimize impacts to plovers.
4. The relatively small number of plovers expected to occur and be affected by the proposed project. The Parks' beaches within the last three years only supported two breeding and eight wintering plovers. The numbering of breeding plovers represents 0-3 percent of the breeding plovers in Recovery Unit 2 during the last 3 years (2/64 in 2004; 2/63 in 2005; and 0/57 in 2006). The number of wintering plovers sighted during the winter window surveys on the Parks' beaches represents 1-3 percent of the wintering plovers in Recovery Unit 2 during the last 3 years (2/147 in 2004; 3/87 in 2005; and 5/163 in 2006).

INCIDENTAL TAKE STATEMENT

INTRODUCTION

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the taking of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined (50 CFR 17.3) by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns such as breeding, feeding, or sheltering. Harass is defined by the Service (50 CFR 17.3) as an intentional or negligent act or omission that creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Parks so that they become binding conditions of any grant or permit issued to an applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The Parks have a continuing duty to regulate the activity covered by this incidental take statement. If the Parks (1) fail to assume and implement the terms and conditions or (2) fail to require an applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Parks must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. [50 CFR §402.14(i)(3)]

AMOUNT OR EXTENT OF TAKE

Marbled Murrelet

The Service anticipates that an undetermined number of marbled murrelets could be taken as a result of the proposed action. The incidental take is expected to be in the form of:

Harassment of murrelets associated with 3,129 acres of occupied nesting habitat due to the operation and use of existing facilities annually for 10 breeding seasons, 2007 through 2017.

Harassment of murrelets associated with 384 acres of occupied nesting habitat due to the operation and use of new facilities annually from the date of construction through 2017.

Harassment of marbled murrelets associated with 250 acres of occupied nesting habitat due to the use of chainsaws to clear a maximum of two fallen trees from the East Side Trail annually for 10 breeding season, 2007 through 2017.

Harm of marbled murrelets associated with 10,289 acres of occupied nesting habitat due to an increased risk of corvid predation near existing facilities annually for 10 breeding seasons, 2007 through 2017.

Harm of marbled murrelets associated with 1,250 acres of occupied nesting habitat due to an increased risk of corvid predation near new facilities annually from the date of construction through 2017.

Northern Spotted Owl

The Service anticipates that an undetermined number of northern spotted owls could be taken as a result of the proposed action. The incidental take is expected to be in the form of:

Harassment of northern spotted owls associated with 2,059 acres of unsurveyed nesting and roosting habitat due to the operation and use of existing facilities annually for 10 breeding seasons, 2007 through 2017.

Harassment of northern spotted owls associated with 166 acres of unsurveyed nesting and roosting habitat due to the operation and use of new facilities annually from the date of operation through 2017.

Harassment of northern spotted owls associated with 250 acres of unsurveyed nesting and roosting habitat due to the use of chainsaws to clear a maximum of two fallen trees on the East Side Trail annually for 10 breeding season, 2007 through 2017.

Western Snowy Plover

The Service anticipates that an undetermined number of western snowy plovers could be taken as a result of the proposed action. The incidental take is expected to be in the form of:

Harassment of western snowy plovers due to disturbance from recreational activities of up to six breeding adults and their broods and 15 wintering adults on the Parks' beaches annually for 10 years, 2007 through 2017. The patterns of seasonal presence of snowy plovers are complex with breeding individuals present in the spring and summer and migratory or wintering individuals augmenting the resident population in the fall and winter. Consequently, anticipating the number

of western snowy plovers that may be taken as a result of Parks' beach management in any given year is difficult. We based this anticipated amount of take on past survey results of the number of annual breeding and wintering plovers on the Parks' beaches.

If during the course of the action, this level of incidental take is exceeded, then such incidental take represents new information requiring reinitiation of consultation. The Parks must immediately provide an explanation of the causes of the taking and review with the Service the need for possible reasonable and prudent measures.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the marbled murrelet, northern spotted owl, or western snowy plover or destruction or adverse modification of critical habitat for any of these species.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measure is necessary and appropriate to minimize impacts of incidental take of the marbled murrelet, northern spotted owl and western snowy plover:

Monitor project implementation to ensure compliance with the project description.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Parks must comply with terms and conditions which implement the reasonable and prudent measure described above. Terms and conditions are nondiscretionary.

The Service believes that marbled murrelets, northern spotted owls, and western snowy plovers will be incidentally taken as a result of the proposed action. The reasonable and prudent measure, with its implementing terms and conditions, is designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measure provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measure.

1. The Parks must fully implement all avoidance and minimization measures numbers 1- 13 described in the project description of this biological opinion.

2. The Parks must implement a corvid management strategy as described in the August 22, 2006, biological assessment and the project description of this biological opinion. This strategy includes development of a corvid management strategy document by May 2007 and implementation in 2007 of an adaptive management approach to reduce the density of corvids in and around park facilities.

MONITORING REQUIREMENTS

In order to monitor the impacts of incidental take, the Parks must report the progress of the action and its impacts on the species to the Service as specified below:

The Parks must report the progress of the proposed action and its impacts on the species to the Service in accordance with 50 CFR §13.45 and §18.27. Prior to January 31 of each year through 2017, the Parks shall provide an annual monitoring report describing the work completed, avoidance and minimization measures implemented, corvid monitoring results, and any actions identified in the 2007 corvid management strategy implemented during the previous year.

REPORTING REQUIREMENTS

Any dead or injured marbled murrelet, northern spotted owl, or western snowy plover must be reported to the Service's Law Enforcement Division (916-979-2987) or the Arcata Fish and Wildlife Office as soon as possible, and turned over to the Law Enforcement Division or a game warden or biologist of the California Department of Fish and Game for care or analysis. The Service is to be notified in writing within three working days of the accidental death of, or injury to, a marbled murrelet, northern spotted owl, or western snowy plover or of the finding of any dead or injured marbled murrelets, northern spotted owls, or western snowy plovers during implementation of the proposed action. Notification must include the date, time, and location of the incident or discovery of a dead or injured listed species, as well as any pertinent information on circumstances surrounding the incident or discovery. The Service contact for this written information is the Field Supervisor for the Arcata Fish and Wildlife Office at (707) 822-7201.

COORDINATION OF INCIDENTAL TAKE WITH OTHER LAWS, REGULATIONS, AND POLICIES

The incidental take statement provided in this biological opinion satisfies the requirements of the Act. The Service will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions, including the amount and/or number specified herein.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species and the ecosystems upon which they depend. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. Coordinate with the Service in the project planning phase to develop guidelines for avoiding or mitigating adverse effects of the Parks' management activities on listed species.
2. Survey and monitor Federally listed species within the Parks' boundaries.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed, proposed, or candidate species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the Trail and Backcountry Management Plan. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operation causing such take must cease pending reinitiation.

If you have any questions regarding this biological opinion, please contact Robin Hamlin of my staff at (707) 822-7201.

cc:

RNSP, Orick, CA (Attn: K. Bensen)

CDFG, Eureka, CA (Attn: S. Osborn)

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TABLES

Table 1. Estimated acreage of potentially occupied marbled murrelet nesting habitat at various landscape scales within the species' listed range (USDI Fish and Wildlife Service 2003).

Landscape scale ¹	Acres
Washington	
MMCZ1	No estimate available
MMCZ2	No estimate available
TOTAL	No estimate available
Oregon	
MMCZ3 and 4	408,621
TOTAL	408,621
California	
MMCZ4(CA)	67,618 ²
MMCZ5	430
MMCZ6	7,250
TOTAL	75,298
2 State (Oregon and California)	
OR	408,621
CA	75,298
TOTAL	483,919

1 MMCZ = Marbled Murrelet Conservation Zone.

2 Recently adjusted to include Humboldt Redwoods State Park acres: 8,672 from USDI Fish and Wildlife Service and USDC National Marine Fisheries Service 1999.

Table 2. Marbled murrelet population point estimates and associated 95 percent confidence intervals (CI) by Zone within the listed range.

	2000 Population Point Estimate	95 % CI	2001 Population Point Estimate	95 % CI	2002 Population Point Estimate	95 % CI	2003 Population Point Estimate	95 % CI	2004 Population Point Estimate	95% CI	2005 Population Point Estimate	95% CI
Zone 1 ¹	5,600	2,700 – 8,900	8,900	5,800 – 11,900	9,700	6,000 – 13,800	8,500	5,700 – 11,700	5,500	3,000- 7,400	8,000	4,800- 11,600
Zone 2 ¹	800	500 – 1,200	1,700	500 – 3,800	2,600	800 – 3,800	3,300	2,000 – 5,000	3,100	1,700- 4,600	2,500	1,600- 3,600
Zone 3 ¹	6,700	4,000 – 10,100	7,500	5,500 – 9,300	6,300	4,000 – 10,000	5,900	3,900 – 7,600	7,800	5,900- 9,800	5,800	3,600- 7,300
Zone 4 ¹	4,900	3,800 – 9,500	3,900	3,000 – 6,700	4,900	3,500 – 6,400	4,500	3,400 – 6,700	4,200	3,100- 9,200	3,600	2,700- 6,000
Zone 5 ¹	100	0 – 300	100	18 - 300	300	30 - 400	50	0 - 90	80	20- 200	300	100- 500
Zone 6 ²	474	337 - 668	615	515 - 733	619	476 - 805	699	567- 860	---	---		---
TOTAL	18,571		22,180		23,673		22,217		20,578		20,223	

¹ Data for Zones 1 through 5 as follows: years 2000 through 2002 from Huff et al. 2003. Year 2003 from Huff ed. in press. Year 2004 from Huff, pers. comm. Numbers are rounded to nearest 100.

² Data for Zone 6 as follows: years 2000 and 2001 from Peery et al. 2002; year 2002 from Peery et al. 2003b; year 2003 from Z. Peery, pers. comm. 2004. No survey in 2004 and 2005.

Table 3. The estimated values for demographic parameters used in four population models for the murrelet.

Demographic Parameter	Beissinger 1995	Beissinger and Nur 1997–cited in USDI ¹ 1997	Beissinger and Peery 2003	McShane et al. 2004
Juvenile to Adult Ratio	0.10367	0.124 or 0.131	0.089	0.02 - 0.09
Annual Fecundity	0.11848	0.124 or 0.131	0.06-0.12	(See nest success)
Nest Success			0.16-0.43	0.38 - 0.54
Maturation	3	3	3	2 - 5
Estimated Adult Survivorship	85 - 90%	85 - 88%	82 - 90%	83 - 92%

¹Fish and Wildlife Service

Table 4. Suitable NSO habitat removed or downgraded (1994-December 20, 2005) due to Federal management actions and natural events by physiographic province.

Physiographic Province	Estimated acres of habitat in 1994	Habitat Removed/Downgraded 1994-2005					%	Proportion of Total Range-wide Habitat Loss (%)
		Management ¹	Fire ²	Wind	Insect/disease	Total		
WA								
Olympic Peninsula	560,217	-91	-299	0	0	-390	<0.1	<0.1
East Cascades	706,849	-5,991	-5,754	0	0	-11,745	1.7	2.8
West Cascades	1,112,480	-12,181	0	0	-250	-12,431	1.1	3.0
Western Lowlands	0	0	0	0	0	0	0	0
OR								
Coast Range	516,577	-4,544	-66	0	0	-4,478	0.9	1.1
Klamath Mountains	786,298	-82,735	-	0	0	-	25.5	48.5
Cascades East	443,659	-10,595	117,622	0	-	200,357	15.7	16.7
Cascades West	2,045,763	-55,453	-4,008	0	55,000	-69,603	4.0	19.6
Willamette Valley	5,658	0	0	0	0	0	0	0
CA								
Coast Range	51,494	-250	-100	0	0	-350	0.7	<0.1
Cascades	88,237	-4,808	0	0	0	-4,808	5.5	1.2
Klamath Mountains	1,097,866	-11,080	-15,869	-100	-390	-27,439	2.5	6.6
Total	7,397,098	-187,728	-	-100	-	-	5.6	NA
			168,301		55,640	412,637		

¹ Habitat removed/downgraded from management related actions is from a December 20, 2005, query of the NWFP and section 7 consultation effects tracker. Reported acres represent acres that action agencies have consulted-on with the Service. Therefore, these acres include both realized and expected habitat modification through consulted-on federal actions.

² Habitat removed/downgraded from natural events is from Courtney et al. (2004). Because the data are not yet available, habitat effects from fires occurring since 2003 are not included in this table.

Table 5. Number of adult snowy plovers counted during breeding season window surveys along the California coast during surveys from 1977 to 2005.

Year	Adult Plovers Counted
1977-1980 ¹	1,566
1989 ²	1,386
1991 ³	1,371
2000 ³	976
2002 ³	1,387
2003 ³	1,444
2004 ³	1,904
2005 ³	1,680
2006 ³	1,723

¹ Page and Stenzel 1981;

² Page et al. 1991;

³ Point Reyes Bird Observatory 2006

Table 6. Estimated plover population size for the six recovery units (Nur et al. 1999).

Recovery Unit	Estimated Population Size
Washington and Oregon (Unit 1)	134
Del Norte through Mendocino Counties (Unit 2)	50
San Francisco Bay (Unit 3)	264
Sonoma through Monterey Counties (Unit 4)	300
San Luis Obispo through Ventura Counties (Unit 5)	886
Los Angeles through San Diego Counties (Unit 6)	316
Total	1,950

Table 7. Rangewide breeding season window survey results. Washington and Oregon Unit results are for the 2006 breeding season (U.S. Fish and Wildlife Service, no date, Newport Fish and Wildlife Office). Results for the California Units are for the 2006 breeding season (Point Reyes Observatory unpublished 2006 data).

Recovery Unit	Adult Plovers
Washington and Oregon (Unit 1)	160
Del Norte through Mendocino Counties (Unit 2)	52
San Francisco Bay (Unit 3)	99
Sonoma through Monterey Counties (Unit 4)	357
San Luis Obispo through Ventura Counties (Unit 5)	917
Los Angeles through San Diego Counties (Unit 6)	298
Total	1,883

Table 8. Management goals for number of breeding birds at important nesting locations in Recovery Unit 2 and the number of breeding plovers counted during the 2006 breeding season (U.S. Fish and Wildlife Service 2001; Colwell et al. 2006).

Western Snowy Plover Recovery Unit 2			
Location	Management Goal Breeding Numbers (adult birds) ¹	2006 Surveys	
		Breeding birds	Percent of goal
DEL NORTE COUNTY			
Smith River Mouth	8	0	0
Lake Earl	10	0	0
HUMBOLDT COUNTY			
Gold Bluffs Beach ²	NA	0	NA
Big Lagoon	16	0	0
Clam Beach/Little River	6	39	550
Mad River Mouth and Beach	12	0	0
Humboldt Bay, North Spit	8	0	0
Humboldt Bay, South Spit and Eel River North Spit (Eel River Wildlife Area)	50	8	16
Eel River Mouth to Van Duzen	40	18	45
Eel River, South Spit and Beach (Centerville Beach)	20	2	10
McNutt Gulch	10	0	0
MENDOCINO COUNTY			
MacKerricher State Park	20	0	0
Manchester State Park ²	NA	2	NA
TOTAL	200	57 ³	28.5

¹ The management goals in the draft recovery plan are about 15 percent higher than the recovery criteria subpopulation sizes.

² The draft recovery plan did not establish management goals for the number of breeding adult birds at Gold Bluffs Beach or Manchester State Park.

³ The total may not equal the sum of individual sites, since some birds may occur at more than one site.

Table 9. Number of adult snowy plovers and number of sites where adults were located during the breeding season window surveys, 1977 to 2006 (Point Reyes Bird Observatory Unpublished data).

Location	Number of Adults/Number of Sites by Year									
	1977 to 1980	1989 ¹	1991	1995	2000	2002	2003	2004	2005	2006
Del Norte County	11/2	8/?	3/1	0/0	0/0	0/0	0/0	0/0	0/0	0/0
Humboldt County	54/6	32/?	30/6	19/4	39/3	49/4	38/4	37/4	32/5	49/5
Mendocino County	15/1	2/?	0/0	4/1	1/1	0/0	1/1	3/1	9/2	3/1
TOTAL	80/9	42/?	33/7	23/5	40/1	49/4	39/5	40/5	41/7	52/6

Table 10. Wintering locations in Recovery Unit 2 identified as important for recovery (U.S. Fish and Wildlife Service 2001, Appendix B). Survey data presented are of varying efforts, for example window surveys and monthly surveys. Blanks represent no data.

Wintering Location	Number of Adult Plovers									
	1979-1985 ¹	1992 ²	1993 ³	1998 ⁴	2001 ⁵	2002 ⁵	2003 ⁵	2004 ⁵	2005 ⁵	2006 ⁵
DEL NORTE COUNTY										
Smith River					1	0	0	0	0	0
Lake Earl	1				0	0	0	0	0	0
HUMBOLDT COUNTY										
Gold Bluffs	2				0	0	0	2	3	5
Stone Lagoon	9			0	0	0	0	0	0	0
Big Lagoon				0	6	5	6		0	10
Clam Beach Little River	11	30	16	40	32	55+	44	45	31	52
Mad River Mouth					0	0	0	0	0	0
Humboldt Bay, North Spit	2				0	0	0	0	0	0
Humboldt Bay, South Spit	27		9		0	0	0	0	5	1
Eel River Wildlife Area	6	2	6		0	0	0	0	0	0
Eel River, Spit	6	5			75	22	69	38	1	42
McNutt Gulch					0	0		0		
MENDOCINO COUNTY										
MacKerricher	23				37	41	41	50	33	41
Manchester	2				4		8	12	14	12

¹ Median of the maximum bird numbers (Page et al. 1986). This paper mentions a report of 6 wintering birds at the mouth of the Smith River; Mad River beach was not completely surveyed.

² Median number per survey; Humboldt County surveys in January (Fisher 1992).

³ Monthly means; Humboldt County surveys in February (Fisher 1993)

⁴ Maximum observed. Surveys were only conducted at Big Lagoon, Stone Lagoon, and Clam Beach/Little River (Griggs 1998).

⁵ Window survey data.

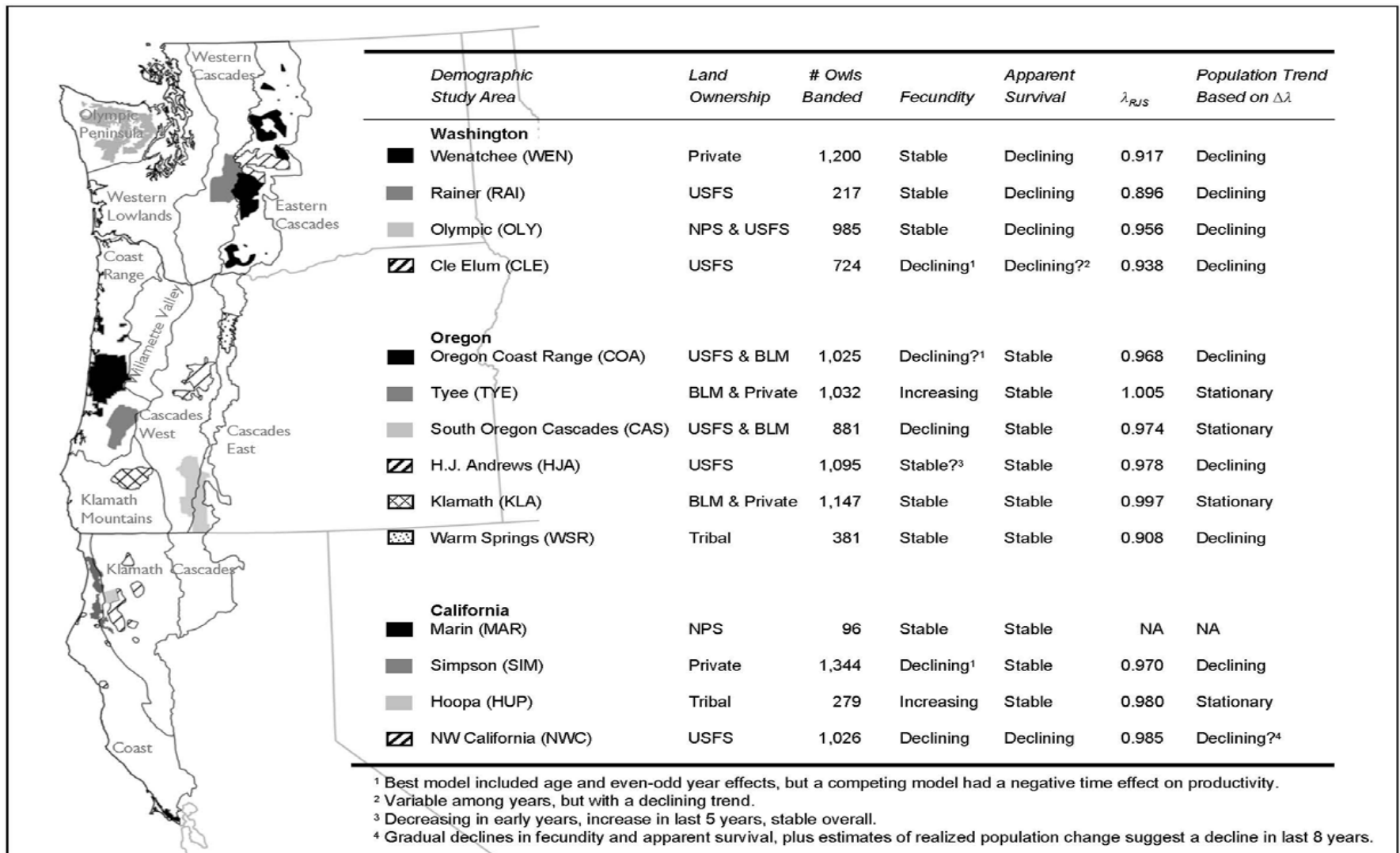


Figure 1. Physiographic provinces, northern spotted owl demographic study areas, and demographic trends. (Anthony et al. 2004).