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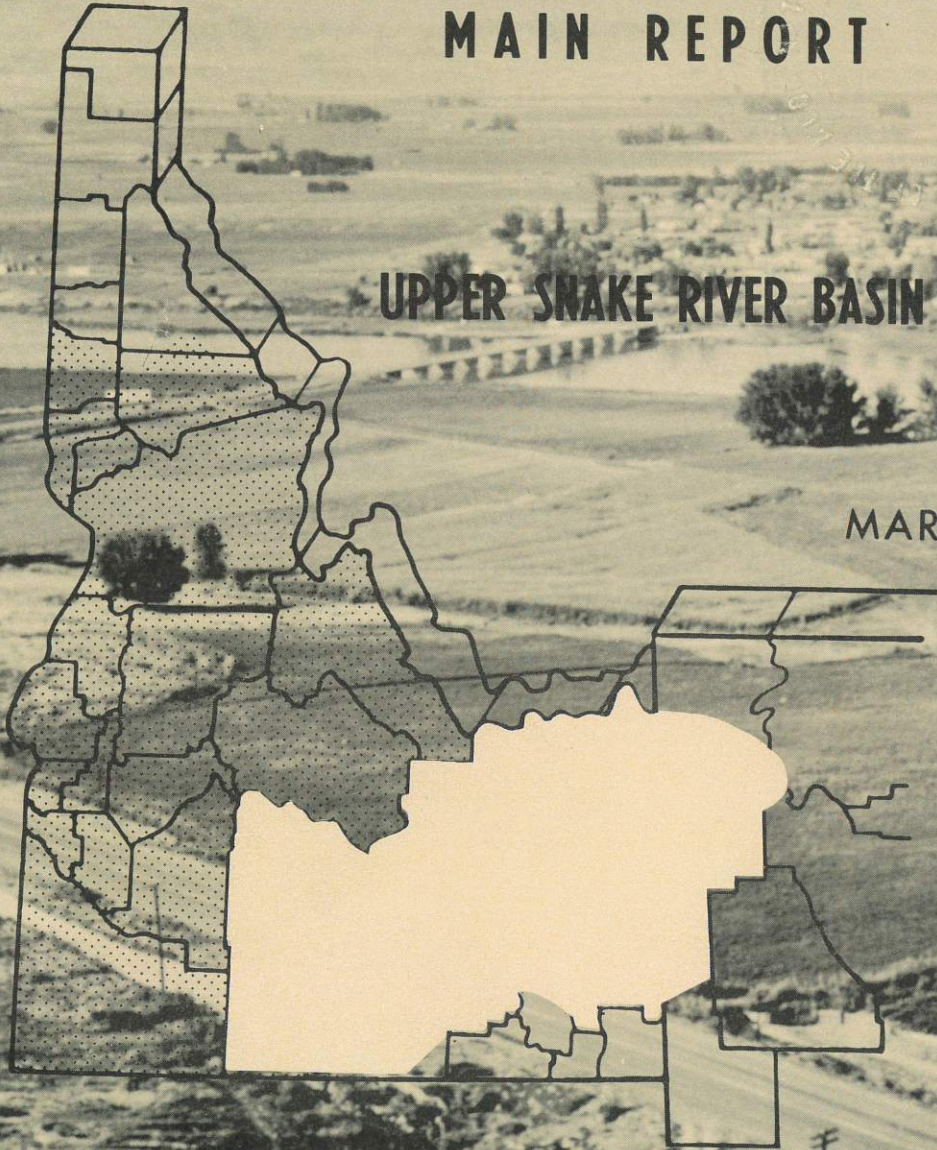
SNAKE RIVER BASIN

COOPERATIVE STUDY

MAIN REPORT

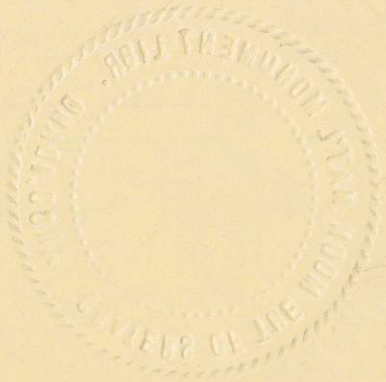
UPPER SNAKE RIVER BASIN

MARCH 1979



UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
ECONOMIC, STATISTICS, AND COOPERATIVES SERVICES
FOREST SERVICE
in
cooperation with
STATES of IDAHO, WYOMING

M7-L-23421



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P R E F A C E

This cooperative study of the water and related land resources in the Upper Snake River Basin was made under Section 6 of the Watershed Protection and Flood Prevention Act of the 83rd Congress (Public Law 566, as amended). The agencies cooperating in the study include the Soil Conservation Service, the Economics, Statistics, and Cooperatives Service, and the Forest Service of the Department of Agriculture, the Idaho Department of Water Resources (IDWR), and the Wyoming State Engineer's Office.

The Idaho Water Resource Board requested on June 10, 1968, that USDA participate in a cooperative water and land resource planning study of the Upper Snake River Basin. On March 25, 1971, the Board submitted an amendment to their previous request to include all of the Snake River Basin in Idaho in the study. On May 5, 1971, the Wyoming State Engineer's Office requested the inclusion of the Wyoming portion of the Basin in the study.

During the early planning activities, it was determined--due to the large size of the area and the need for information--this study would be limited to the Upper Snake Basin. Therefore, the area addressed in this study was that portion of the Upper Snake River Basin in Idaho and Wyoming.

Parts of the west and north hydrologic boundary of the Basin were adjusted to follow county boundaries. This was done in response to requests from State planning agencies, Soil Conservation Districts, and other local entities that data be inventoried and analyzed on a county basis.

The purpose of this study is to develop alternative solutions to specific water and related land resource problems through USDA programs. Problems addressed in this study include recreation, erosion, irrigation, and agricultural productivity.

This study provides data and information for various water and related land resource studies in the Basin including the Idaho and Wyoming Water Plans, the Pacific Northwest River Basin Commission's Comprehensive Coordinated Joint Plan, the Western Water Plan, and other water and related land resource studies.

Output from the study is currently being used extensively in 208 planning activities in Idaho. Information from the study has also been used in ongoing programs of the IDWR and other resource planning activities.

The cooperating agencies appreciate the assistance of the following who provided data and information for various parts of the study:

Bureau of Land Management
Bureau of Reclamation
Geological Survey
Heritage Conservation and Outdoor Recreation Service
Idaho Association of Soil Conservation Districts
Idaho Department of Fish and Game
Idaho Department of Health and Welfare - Division of Environment
Idaho Department of Parks and Recreation
Idaho Soil Conservation Commission
Idaho Water Users' Association
National Park Service
U.S. Fish and Wildlife Service
Science and Education Administration
Agricultural Research
Extension Service
Teton County, Wyoming
University of Idaho
University of Wyoming
Wyoming Game and Fish Commission
Wyoming Water Planning Program
Wyoming Recreation Commission

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EXECUTIVE SUMMARY

Enhancement of environmental quality and national economic development are the overriding objectives of the plan developed by the Upper Snake Cooperative River Basin Study. The plan of work identified four specific objectives to be studied: (1) enhance environmental quality, (2) reduce erosion and sedimentation, (3) improve irrigation water distribution and use, and (4) evaluate USDA opportunities to improve the economic condition of the Basin. Considering these four specific objectives, twenty-five concerns were identified and screened. The following were selected for detailed study:

- Shortage of recreation facilities
- Soil erosion
- Inadequate irrigation water delivery structures
- Unimproved on-farm irrigation systems
- Deficient rangeland condition
- Inadequate supply of wood fiber

Alternative plans were developed incorporating these concerns. Four demand level components are included or implied in these study concerns--recreation, food, wood and erosion control. Plans were evaluated using three multiple objective planning accounts--National Economic Development (NED), Environmental Quality (EQ), and Social Well Being (SWB). The Regional Development Account was not used for formulation because the impacts on primary production were not expected to effect commodity prices. The Regional Development Account and

National Economic Development Account were combined to show over all economic development effects. 1/ A Preferred Plan was selected by the study staff which would provide solutions to study concerns. Selection of the Preferred Plan utilized information developed during the study from several sources--public meetings directed by the Idaho Department of Water Resources, base studies developed during the Upper Snake Study, consultation with State and Federal agencies, and outputs of two concurrent Level B studies which were the Pacific Northwest River Basin Commission's Comprehensive Coordinated Joint Plan and the Idaho State Water Plan. These B studies were comprehensive in scope, while the Upper Snake Study was directed at the six specific concerns listed above. Initial outputs of the Upper Snake Study were used in the development of plans for both Level B studies.

The Preferred Plan (Table I) calls for development of picnic sites and campsites to provide facilities for expected increases in recreation demand. These facilities will be planned to relieve pressure on areas presently being used beyond capacity. Interpretive facilities will be established at unique cultural, historical, and natural sites to enhance appreciation of these by the public.

Additional studies will be required to identify specific size and location of recreation facilities. These studies will guide the development of new recreation facilities by determining the desires of

1/ See RB-37, Page 3, 4-2/3/78, ... USDA River Basin studies may compare resource development opportunities on the basis of overall economic development.

users and matching those desires with selected sites. This method of implementation will increase the return on recreation investment by providing desired facilities and will decrease the overall effect of recreation on the environment by reducing the impact of overcrowded or inadequate facilities.

Plan elements associated with irrigated lands are intended to improve water distribution and use and to reduce erosion, as well as increase productivity. Replacement of irrigation structures in most irrigation systems occurs on a crisis basis. The Preferred Plan would take a more comprehensive approach to replace deteriorating structures on a systematic basis. Planning replacement of deteriorating structures on a system or multi-system basis allows consideration of changes in diversion requirements, possible distribution channel consolidation, and improvements in on-farm use. Implementing the Preferred Plan would result in lower diversion requirements because of improved water management, and consequently smaller diversion structures. This would not interfere with providing on-farm water needs. An added benefit, not evaluated, would be reduction in losses resulting from distribution structure failures during the irrigation season. Planned replacement of deteriorating structures would occur during nonirrigation periods.

Irrigation efficiency will be improved, productivity will be increased, and erosion will be reduced through better irrigation water management and conversion of 80,000 acres to sprinkler systems. Reducing return flows will enhance water quality in the Basin by reducing the movement of sediment and associated agricultural chemicals.

Stubble mulch, contour farming, moisture conservation practices, and terracing will be used to reduce erosion on dry cropland. Technical assistance will be required to plan and install 552,200 acres of stubble mulching, contour farming and almost 5.8 million feet of terrace systems.

Range seeding, brush management, fencing for improved management, and water development will improve range productivity and reduce erosion on about 2.25 million acres of rangeland in the Basin. Remedial forestland activities will treat erosion problem areas such as abandoned roads and mines, gullies, lake and reservoir shorelines, burns, and harvest sites. Wood fiber production will be increased through treatment of critical erosion areas and timber stand improvement activities.

Streambanks and channels with moderate to severe erosion problems have been identified. Not all are economically feasible to treat, but it is estimated that 170,000 feet of bank or channel need treatment to protect bridges, roads, and other facilities.

Implementation of the Preferred Plan would cost approximately 463 million dollars (Table I) and create over 6,000 jobs. Approximately one-third of these jobs would be in construction with the remainder spread throughout other sectors of the economy. Employment in the trade and service sectors would also be significantly affected.

CONCLUSIONS

Data developed for this study have made, and will make further significant contributions in the future to the quality of analysis in the Idaho State Water Plan, Pacific Northwest River Basins Commission

Coordinated Joint Plan, Section 208 planning activities in Idaho, and many other associated resource planning efforts. The Field Advisory Committee (FAC) decided early in the study effort to provide finished reports to obtain the maximum timely use of inventory data and preliminary analysis. Nine reports have been published and distributed to interested individuals and agencies. These include Economic Overview and Projections, General Soils Map of Idaho, Irrigation Water Distribution and Use, Recreation, Land Resources Data, Irrigation Water Distribution and Use including a Test System Report, Environmental Quality, Erosion, and Land Productivity.

Support data for these reports were used to provide information to cooperating agencies as the information became available and as needed by current studies.

USDA programs for technical assistance, cost sharing, and grants provide a sound framework for implementing the land treatment and irrigation water use improvement elements of the study. Current emphasis on reducing non-point pollution lends additional support to the acceleration of these programs. Recreation development in the plan would occur primarily through acceleration of ongoing Forest Service programs. However, some potential exists for private development in high recreation demand areas. The Forest Service and Soil Conservation Service can provide necessary technical assistance to assure environmental compatibility and economic viability. Other USDA agencies can provide financial assistance.

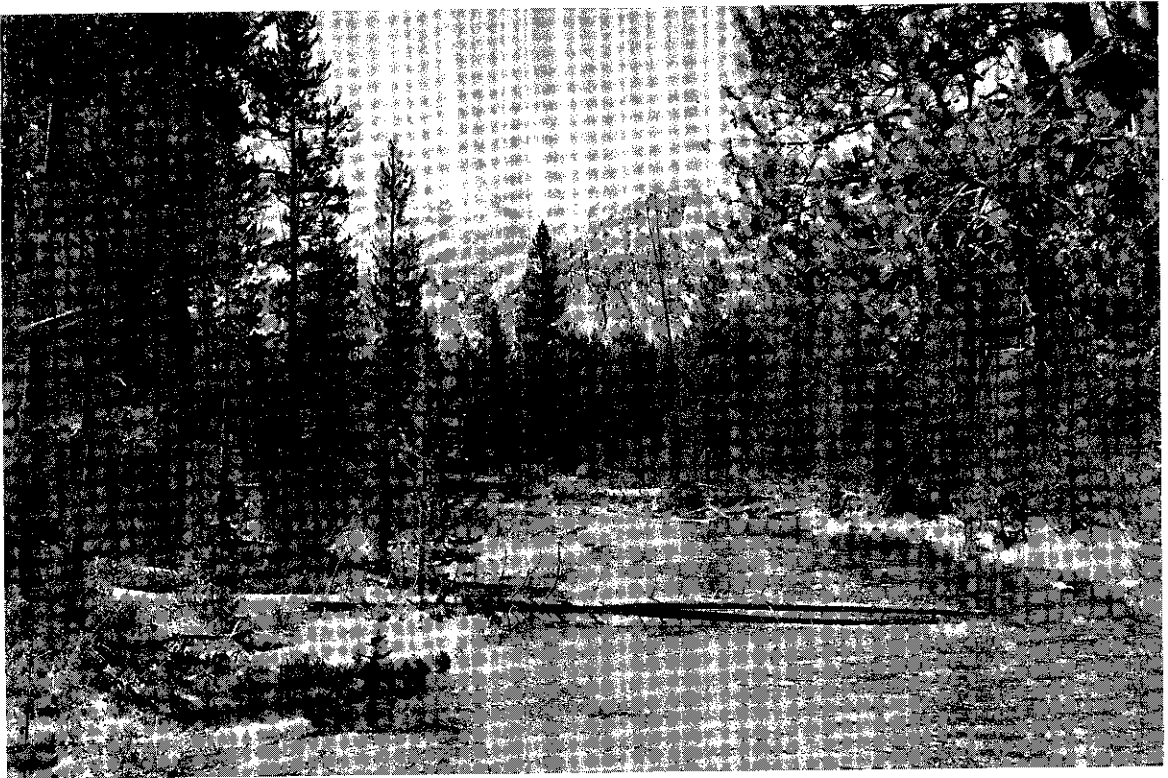
Table I--Plan elements for the Preferred Plan, Upper Snake River Basin, Year 2000

<u>Plan elements</u>	<u>Unit</u>	<u>Quantity</u>	<u>Estimated installation costs^{1/} (---thousands---)</u>
Develop picnic facilities	Sites	4,256	\$ 10,154
Develop camping facilities	Sites	9,650	30,670
Provide interpretative facilities & services:			
Visitor Centers	No.	5	4,740
Interpretative Signs	No.	60	
Brochures (10,000 copies of each type)	No.	28	
Demonstration Sites	No.	2	
Conducted Tour areas	No.	3	
Contact Stations	No.	15	
Replace irrigation water delivery system structures	No.	37,000	74,000
Irrigated cropland treatment:			
Improve on-farm surface irrigation (system layout, land leveling, structures, water management)	Acres	400,000	151,200
Convert surface irrigation to sprinkler	Acres	80,000	
Dry cropland treatment:			
Stubble mulch, contour farming, and minimum tillage	Acres	552,200	16,502
Terrace systems	Feet	5,781,000	
Rangeland treatment:			
Range seeding	Acres	1,740,000	78,154
Brush management	Acres	512,000	
Fencing for management	Miles	4,504	
Water development	No.	1,126	

Table I--Plan elements for the Preferred Plan, Upper Snake River Basin, Year 2000 (cont.)

<u>Plan elements</u>	<u>Unit</u>	<u>Quantity</u>	<u>Estimated installation costs^{1/} (---thousands---)</u>
Forest land treatment:			\$ 12,934
Gully stabilization (vegetation, side slope stabilization, check dams, gully plugs, and retention dams)	Miles	515	
Sheet erosion control (planting extra large stock, close spacing of trees, sodding, mulching, seeding, fertilization, sub-soiling, contour trenching, and furrowing)	Acres	51,013	
Rehabilitate eroding abandoned roads and trails (water bars, sloping of banks, reseeding)	Miles	788	
Restore eroding mined areas (storm water disposal, slide-damage repair, surface shaping, and revegetation)	Acres	1,796	
Stabilize eroding lake and reservoir shorelines (special plantings, mulching, gabion emplacement or riprap)	Miles	48	
Timber stand improvement	Acres	28,500	
Streambank protection and channel stabilization (riprap, stabilization of structures, jetties, shaping and seeding)	Feet	170,000	454
Total estimated project administration and technical assistance	Jobs per year for 20 years	96	76,659
Total estimated cost			\$455,467

^{1/} Estimates reflect current prices



Redfish Creek Sawtooth Recreational Area
SCS Photo

PROBLEMS AND CONCERNS

CHAPTER I

P R O B L E M S A N D C O N C E R N S

A wide range of problems and concerns were identified by the USDA-State Study Staff from public meetings and public opinion surveys conducted under the leadership of the Idaho Department of Water Resources.

From these, a list of 25 concerns that fell within the specific objectives of the Study was developed. The study staff, acting under the direction of the FAC and in conjunction with the Idaho Department of Water Resources and the Wyoming Water Planning Program, selected six of the concerns for study. Public interest and the concerns' direct relationship to agriculture and USDA or State programs were the basis for selection.

The concerns selected and their present and future without plan conditions are displayed in Table II on the following page. A brief description of each of the six concerns studied follows.

A list of all the concerns identified and a description of those not studied are included as Appendix A.

Table II--Problems and concerns, present and future without plan conditions,
Upper Snake River Basin

Concerns	Unit	Year	
		Present	2000 2020 (-----thousands-----)
Shortage of recreation facilities:			
Picnic	Recreation days	1,062	1,575 2,062
Camping	"	1,311	1,776 2,184
Interpretative facilities & services	"	662	670 850
Soil erosion on:			
Irrigated cropland	Av. ann. soil loss-tons	6,250	5,585 5,045
Dry cropland	"	6,128	5,497 4,931
Rangeland	"	2,601	2,304 1,977
Forest land	"	236	224 213
Stream channels	"	187	196 206
Banks with moderate to severe erosion	Feet	8,976	10,032 10,035
Inadequate irrigation water delivery system structures	No.	13	64 73
Unimproved on-farm irrigation	Acres	1,035	809 651
Deficient rangeland condition	"	7,000	5,915 4,500
Inadequate supply of wood fiber:			
Saw logs	Cubic feet	1,405	3,420 16,196
Other 1/	"	0	37 282

1/ Poles, posts, fuelwood, pilings, etc.

SHORTAGE OF RECREATION FACILITIES

The increase in visitors to Yellowstone and Teton National Parks is causing overuse and crowding of popular areas, especially on national forestlands bordering the parks. The areas around Island Park Reservoir and Henrys Lake are also experiencing overuse by recreationists.

Gateway communities to the parks will be further impacted in light of the Park Service policy to limit overnight camping within the Parks.

Outdoor recreation in this area is projected to increase by over 50 percent by the year 2000.

Increases in population, income, leisure time, and interest in the parks and wilderness experience, plus greater mobility of recreationists, are contributing to greater demands on the recreation facilities and resources of the area.

The present rate of development has not kept pace with the demand for picnic sites, camping facilities, and interpretative facilities.

Many developed areas were not designed to protect and perpetuate natural resources or to disperse recreationists. Concentrated recreation is creating inconvenience, overcrowding, and resource deterioration in popular areas. Areas of intense recreation use is displayed on Map I-1.

The total combined resident and nonresident recreation demand was determined by prorating the demand shown in the Idaho and Wyoming State Comprehensive Outdoor Recreation Plans (SCORP) from state planning

subareas to the study area. Present and projected recreation demand in recreation 1/ days were determined for the years 2000, and 2020. As projections for the year 2020 were not available in the SCORP Reports, they were extrapolated by straight line projection.

The demand for interpretative facilities was determined from interviews with experienced Forest Service personnel and analysis of Forest Service data.

For a detailed explanation of the methods used to determine demand, see Appendix B.



Congested Recreation Area
USFS Photo

1/ A standard unit of recreation use consisting of one individual participating in one recreation activity during any reasonable portion of, or all, or one day.

This Basin with its 21 million acres of varied scenic land base, coupled with 352,000 acres of natural lakes, reservoirs, and streams, provides ample land and water to meet the projected area demand for outdoor recreation through the year 2020.

Picnic Facilities

Presently, there are not enough facilities to meet demands for developed picnic sites, and future demands are projected to exceed anticipated development by an average of 63 sites per year.

Camping Facilities

There are not enough facilities to meet demands for developed camp sites, and the future demand is projected to exceed anticipated development by an average of 115 sites per year.

Interpretative Facilities & Services

The increased interest in learning about cultural resources, history, and nature has created demands for additional interpretative facilities.

Presently, there are not enough facilities to meet demands for interpretative type guidance and education. This gap is expected to widen as future demands are projected to exceed anticipated developments by an average of 400 recreation days per year to the year 2000.

SOIL EROSION

The resource capacity of the Basin is sufficient to provide both the short-term and projected future food and fiber production needs (OBERS) 1/. The ability to sustain the capacity and efficiently produce the projected food and fiber demand will require reduced erosion, improvements in irrigation canal facilities, on-farm irrigation systems, and application of irrigation water, rangeland improvement and wood fiber production.

Erosion exceeds the tolerable soil loss limit "T" 2/ on about one million acres, or 25 percent, of the Basin's cropland. This causes an excessive loss of the soil resource and large sediment damages.

The Universal Soil Loss Equation was used to obtain erosion rates on cropland, rangeland, and forestland in the Basin. Erosion data is displayed on Maps I-2 and I-3 and in the Erosion Working Materials Report prepared for the Basin.

1/ OBERS is an acronym representing a nationally consistent set of agricultural and economic projections developed by the former Office of Business Economics, U.S. Department of Commerce and Economic Research Service, U.S. Department of Agriculture.

2/ "T" is defined as the maximum gross erosion rate expressed in tons per acre per year that will sustain productivity of the soil resource.

Irrigated Cropland

Approximately 400,000 acres of irrigated land have erosion rates that exceed "T". A significant amount occurs on sprinkler-irrigated land and the remainder on surface irrigated lands. Much of the eroded soil that leaves the fields finds its way into other irrigation systems to become redistributed onto other fields or deposited in ditches, or as sediment into tributary streams, reservoirs, and the Snake River.

There are areas of sandy soil very susceptible to wind erosion that can benefit by sprinkler irrigation. These areas have high intake rates and fields tend to be rough. The application of sprinkler irrigation permits a more rapid recovery of plant protection cover.

The principle cause of erosion on these sprinkler irrigated lands is overland flow occurring in the winter from melting snow. This can be aggravated by planting and harvesting in an up-and-down hill direction making it easier for water to accumulate in and to follow furrows and machinery tracks.

Excessive erosion occurs on steep slopes irrigated by surface methods when large irrigation streams are applied. Erosion may occur in the upper portion of the field with deposition of the eroded material on the lower portion. Irrigation waste water is frequently returned to lower lying waterways through steep, unprotected channels or released directly onto hillsides and streambanks. The results are localized areas of critical erosion and land loss. The largest areas of erosion from surface irrigation occur on undulating lands on approximately 224,000 acres in the Rupert-Twin Falls-Gooding areas.

Improved irrigation water management can reduce erosion and associated sediment damages on all irrigated lands; however, the application of the practice has been lagging. This is due to the time and effort required, plus the difficulty of keeping competent irrigators. The result is an excess application of water on many surface irrigated acres and a corresponding increase in erosion. As more acres of surface irrigated land are converted to sprinklers, there is opportunity for both the quantity of water applied and the rate of erosion to be reduced. Energy costs could limit increase in sprinkler irrigation in the future. Energy costs may also affect conversions of dry cropland and rangeland to sprinkler irrigated land due to the location of such lands at higher elevations with greater pump lifts and costs required.

Dry Cropland

Excessive soil erosion is occurring on about 550,000 acres or 44 percent of the 1,250,000 acres of dry cropland in the Basin. Erosion on these lands is estimated at 4.5 million tons or about 8 tons per acre per year average. This is almost twice the allowable soil loss limit for these soils on this land. Erosion on all dry cropland is estimated at 6.1 million tons per year. Approximately 700,000 acres or 56 percent of the dry cropland is adequately protected.

Surface runoff from the land caused by rainstorms and snowmelt is the major cause of soil erosion. Farming practices, such as moldboard plowing and excessive tillage, bury or destroy surface residues leaving the land bare and unprotected. This promotes conditions

favorable to soil movement. Farming up-and-down hill leaves equipment and tillage marks that also promote runoff and erosion.

Most dry land farmers are aware of their erosion problems and are interested in reducing erosion on their land. Although some have been successful in applying a good stubble mulch program, others have experienced five to seven bushels loss in grain yield per acre. There is a general lack of understanding of how stubble mulching affects the carbon-nitrogen balance in the soil and the importance of the proper timing of the first fallow operation in the spring.

Terrace systems, although effective in reducing erosion, are costly to install and maintain and make farming more inconvenient and costly.

Long-term crop losses caused by soil erosion are a serious problem. Some soils such as the Wheelville series have lost virtually all their top soil. Measurements show crop yields decrease two bushels per acre per year for each acre inch of top soil eroded from a field. On deep soils, diminishing crop returns caused by erosion can sometimes be made up by added increments of fertilizer, technology, and financial expenditures. Where soils are shallow, however, it is difficult or impossible to make up the crop decrease. If the present rate of erosion continues, approximately 8.4 percent or 105,000 acres of the dry cropland will lose its productive capabilities within the next 50 years.

Sediment from the eroding land is often deposited on public roadways, farmlands, irrigation systems, and in the Basin's water bodies. Costs of its removal are high and it creates water quality problems in streams, lakes, and reservoirs.

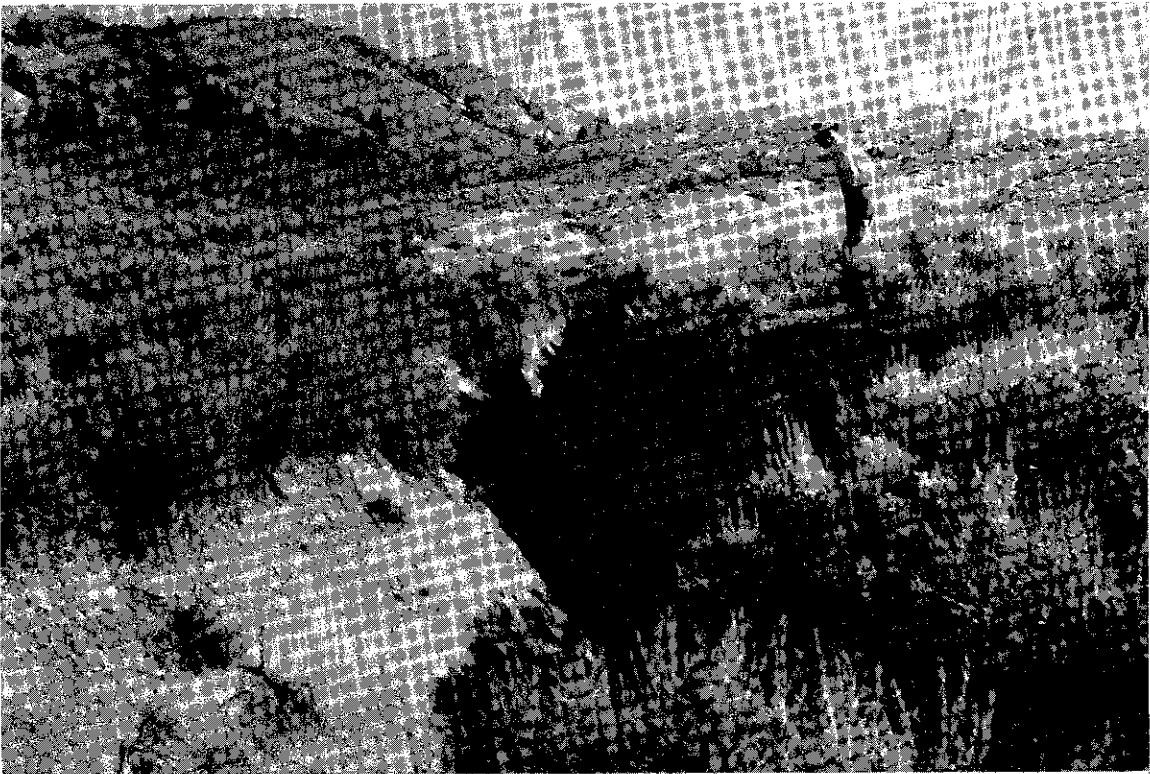


Erosion on Dry Cropland
SCS Photo

Rangeland

Rangeland erosion is not excessive in the Basin in terms of tolerable soil loss "T" values; however, due to the large amount of rangeland, rates are high enough to produce large quantities of sediment. Approximately 53 percent, or 11 million acres, of the Basin is rangeland. A significant volume of sediment is produced from this vast area even though the average annual rate of erosion is less than one ton per acre. Erosion on rangeland can be critical however, on overgrazed, burned-over, and construction areas.

There is an overall concern for the total sediment that is getting into the water and causing damage to roads, ditches, drains, etc. Range sediment production does not get the attention of that from cropland because the erosion is usually less obvious and rangeland sediment is deposited along with cropland sediment at lower elevations. The most severe erosion problems on rangeland in the Basin were found in southern Fremont County on about 53,500 acres of eroding dunes. There are also wind erosion problems in Bannock, Bingham, Bonneville, Cassia, Gooding, Jerome and Minidoka Counties.



Erosion on Rangeland
SCS Photo

Forestland

Erosion on undisturbed forestland is very low. These areas normally have adequate vegetative cover for soil protection. Problems arise after a burn or when roads are built in the forests and timber is harvested without special care to minimize erosion. There are nearly 8,999 miles of abandoned roads and trails in need of rehabilitation. Overall, there has been a general improvement in road building techniques and erosion control on forestlands in recent years. Generally, erosion control on forestlands is expected to improve in the future.



Erosion on Forestland
USFS Photo

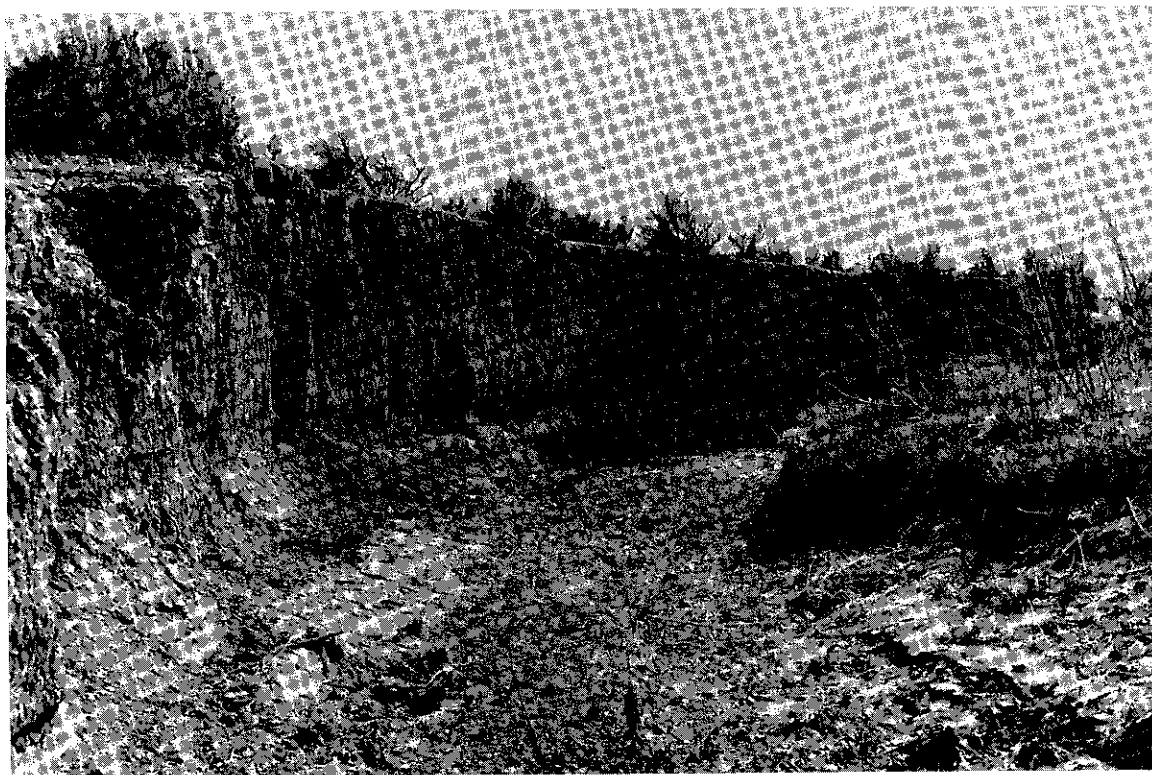
There is concern about sediment that has been delivered to streams from harvested areas in the past and the practice of allowing free burning to occur. Burned-over lands produce good browse for big game animals, but increased soil loss and reduced tree growth usually occur unless practices are applied to control erosion.

Stream Channels

There are about 1,700 bank miles of moderate and severe channel erosion in the Basin, some occurring in almost every county. Most of those channels have banks five feet or more high. Channel entrenchment and enlargement usually occur during exceptionally large runoff events. Once developed, the channels rarely return to their original condition. On cropland, a channel eroded deeper than can be removed by tillage equipment represents a large soil loss and also dissects field resulting in increased costs of operation in time and energy.

As farm acreage expands there will be an increased growth of gullies and channel erosion. Little has been done to stabilize channels by controlling runoff. Eroded channels handle greater flows than the original cross sections. Their growth rate has been relatively slow except during periods of large runoff, but their banks remain unstable and continue to erode.

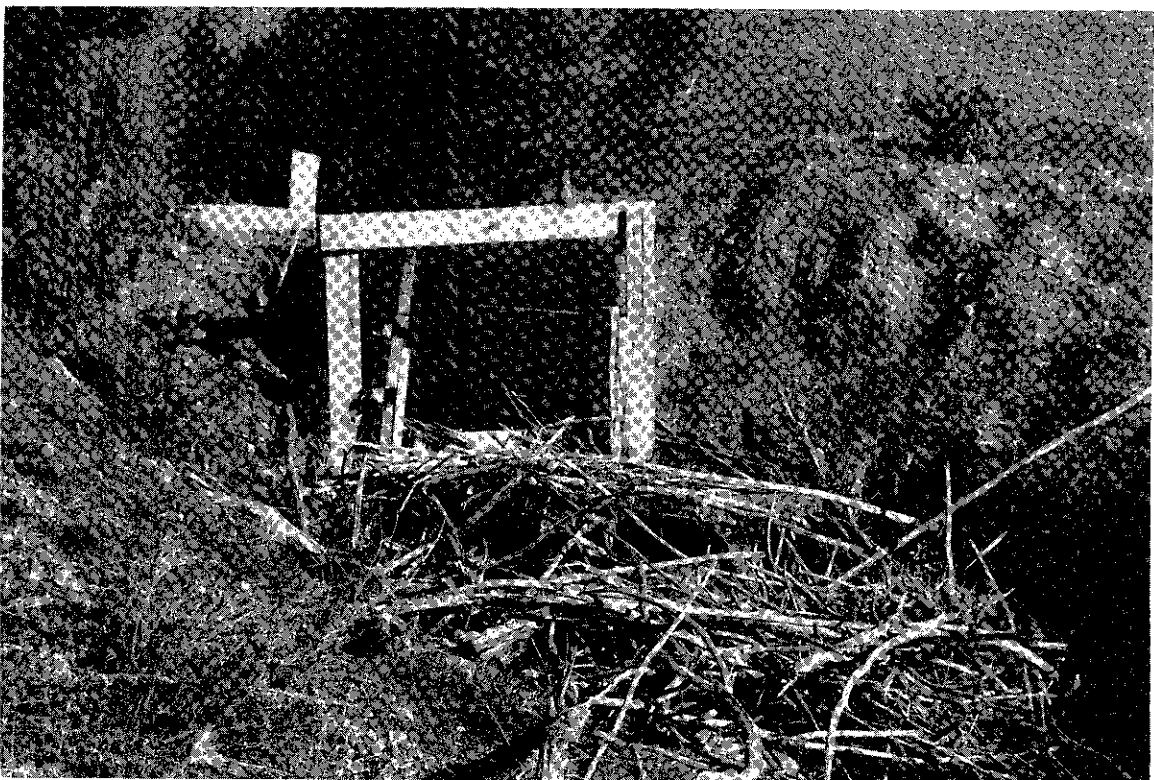
Most entrenched channels are located on rangeland and are usually associated with accelerated runoff from adjacent cropland. Infiltration rates on cropland are usually not sufficient to permit percolation of melting snow or rainfall from summer storms. A large percentage of the water from precipitation, therefore, runs off to cause erosion on fields and channels.



Channel Erosion
SCS Photo

INADEQUATE IRRIGATION WATER DELIVERY SYSTEM STRUCTURES

There is a general concern about the condition of "old" irrigation facilities and certain adverse conditions caused by excessive water losses. Throughout the Basin many water control structures have deteriorated to the point of near failure or lack capability to adequately regulate water flow within the irrigation system. The foregoing problems, coupled with the current emphasis on environmental and energy issues, further accentuate the need for improvements in the distribution and use of irrigation water.



Irrigation Water Delivery Structure Needing Replacement
IDWR Photo

In the Upper Snake River Basin, more than 320 irrigation organizations are presently delivering water through unlined open canal networks consisting of more than 2,700 miles of canals and laterals. Many of the 110,000 structures in (or across) the channel network have reached obsolescence or are approaching it. Annual operation and maintenance cost of the canal systems have increased, particularly the annual costs to maintain older water control structures. Operation and maintenance and replacement costs will continue to increase in the future. Many irrigation organizations have not assessed the useful life of their structures nor established a schedule for replacement of deteriorated or obsolete structures.

A certain amount of "extra" water is conveyed through many of the older systems to maintain a flow and head at farm turnouts. Additional water is also conveyed to meet the demands of unimproved surface irrigation on the land. Providing on-farm improvements can be achieved and water requirements reduced, deteriorated obsolete structures could be replaced with smaller, less costly structures.

In many instances excess diversion for irrigation results in excess tailwater that filters into the Snake Plain aquifer and becomes a water supply for a variety of uses. During this study, certain concepts regarding the advantages of improving irrigation efficiencies were placed in perspective. The advantage of improving irrigation efficiencies within individual systems was apparent, but basin-wide effects could not be adequately defined. As a result, it was concluded that comprehensive studies of irrigation water use are needed to

ascertain the effect on water supplies, storage (aquifer and reservoir), and water distribution within the Upper Snake River Basin. The rehabilitation of delivery system structures for more efficient control of the surface water would not necessarily infringe on groundwater recharge but would provide better management of this storage resource as well as the surface water system. Extensive hydrogeologic-hydrologic studies will be required to adequately define the effect of irrigation on water distribution and use.

Financing of structure replacement is of major concern. Many water associations or groups operating irrigation delivery systems are small groups which operate on forced account. They have no funds, equipment, or capital value to secure loans for major construction. Loan repayment then becomes a personal liability. Federal or state grants or contributions are sought after but difficult to acquire. Such grants are normally not available to many of these small groups.

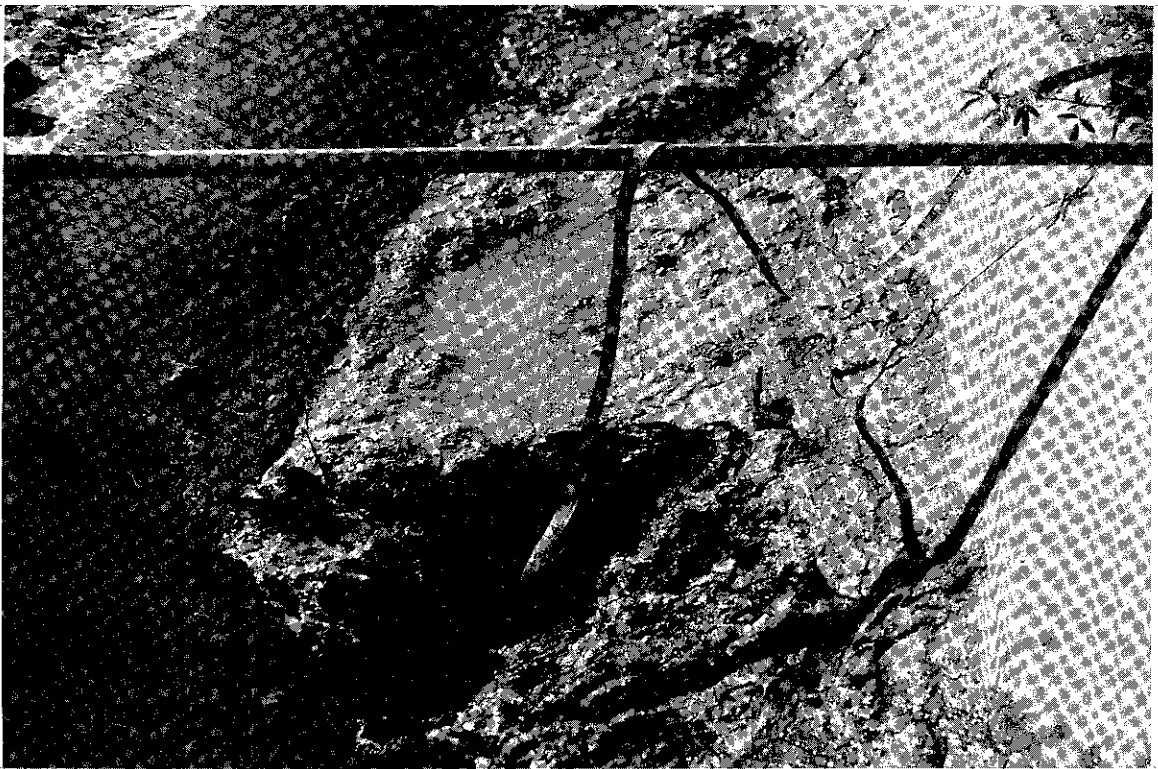
Larger irrigation companies and districts are limited by law as to the indebtedness that can be incurred. Costly and time consuming elections are required to obtain approval for project funding for costs beyond that normally provided for by the district's anticipated annual O&M revenues. Where indebtedness already exists, it is unlikely that further indebtedness would be voted upon favorably by the district members. Policies set by loaning institutions further restrict the availability of funds to irrigation groups.

UNIMPROVED ON-FARM IRRIGATION

Several thousand acres of land are surface irrigated with unimproved farm systems. Problems common to these systems which contribute to inefficient agricultural production, waste the Basin's basic resources, and adversely impact the environment are:

- *Reduced crop yields from excessive application of water.*
- *Restricted land use and land damage from elevated water tables.*
- *Soil erosion and sediment damage from excessive irrigation application.*
- *Point and non-point pollution from irrigated lands.*
- *Substitution of land and water resources for labor (improper management).*
- *Obsolete field layouts and on-farm distribution facilities.*
- *Obsolete water control structures and inadequate regulation of canal deliveries.*
- *Inadequate canal organizational arrangements and/or financial restrictions to bring about improvements.*

Overcoming the preceding problems will involve considerable capital investment. At this time sources of private capital and the present opportunities for state and federal assistance are not adequate to provide for the desirable rate of system improvement.



Sediment in Concrete Lined Irrigation Ditch
SCS Photo

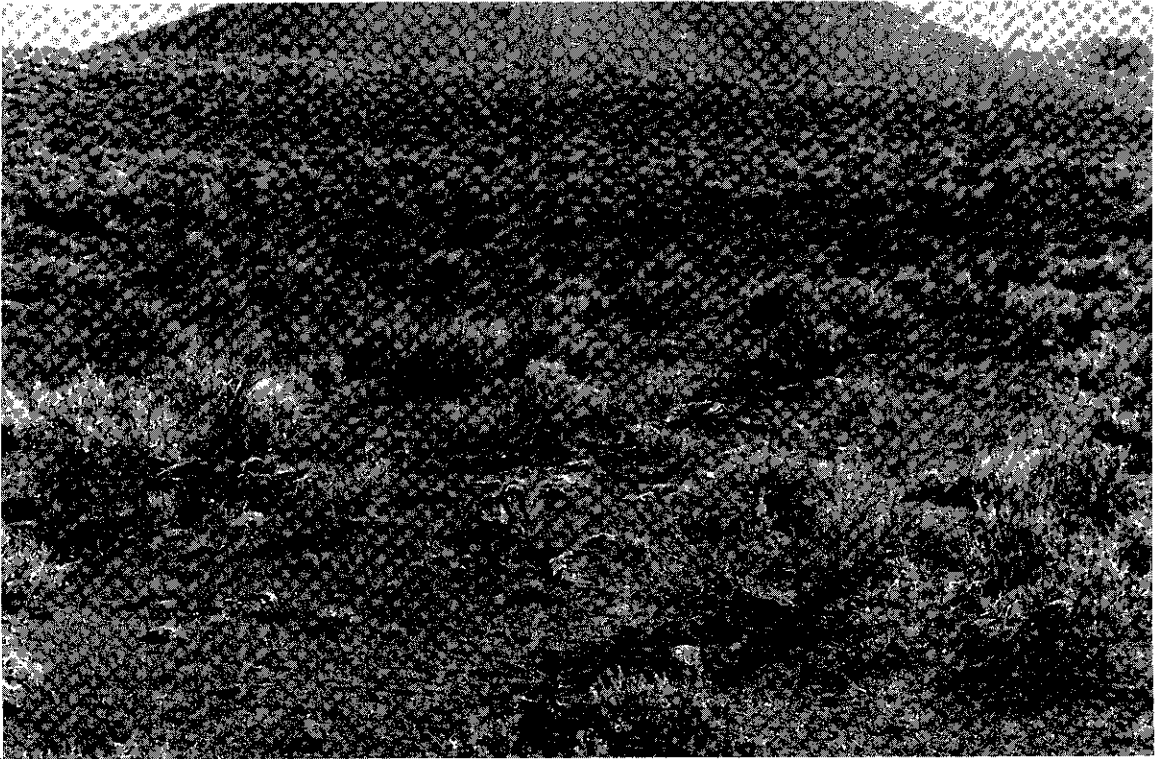
RANGELAND IMPROVEMENT

There are approximately 7,000,000 acres of rangeland, mainly in the foothills of the Basin, which are producing at one-third their potential. Overgrazing by livestock during the free range period of our history greatly reduced rangeland productivity. The lack of proper range management, especially during drought periods over the last fifty years, has reduced the range's ability to recover.

There has been slight improvement in range condition over the last twenty years except in areas where it has been abused by heavy concentration of either domesticated stock or wildlife. Heavy concentrations of domesticated stock still occur around some water holes. This is due to the lack of adequate water and cross fence development for proper grazing systems.

Heavy concentrations of wildlife are occurring in and around protected wildlife areas. The wild horse problem in the Challis area and the elk problem in and around the national parks in the north-eastern corner of the study area are prime examples.

Red meat produced from rangeland is one of the more energy efficient foods consumed in this country. As the population of the world grows and energy becomes more valuable, rangeland becomes more important as a source of red meat. The rangeland in the Basin is capable of producing 140 million pounds of additional red meat under proper treatment and management.



Rangeland Needing Improvement
SCS Photo

The cattlemen desire range improvements which will enable them to increase herd sizes and improve their ranching income. The sportsmen desire improved hunting success. The environmentalist wants to protect the wildlife, reduce erosion and stream sediment, and improve the qualities of the rangeland. The consumer wants to be able to purchase red meat at a reasonable price.

There is general agreement that something should be done to improve the range resource, but there is strong disagreement between special interest groups on how. Most of the special interest groups would like to see an improvement in the vegetative cover on the rangeland. The cattlemen would like to see the poor condition rangeland reseeded to improved grasses and brush control on both the poor and fair condition rangeland. The sportsmen would like to see the cattle and fences removed from all federal rangeland so there would be more forage for wildlife.

Range and wildlife research have increased the understanding of the range-livestock-wildlife interrelationships. Research has shown that a complementary value exists between livestock and wildlife interests when proper grazing management is applied to a well-balanced vegetative mix of palatable forbs, shrubs, and grasses in a healthy condition. Education of special interest groups about the research findings is essential to significant long-term range improvements.

WOOD FIBER DEMAND

Timber production in the Upper Snake subregion occurs primarily in the northeastern part of the Basin. The Basin's ability to produce timber on a sustained yield basis has not met the demand for wood fiber. Consequently, the spread between supply and demand has become larger over time and is expected to continue to widen in the future as shown in Figure 1.

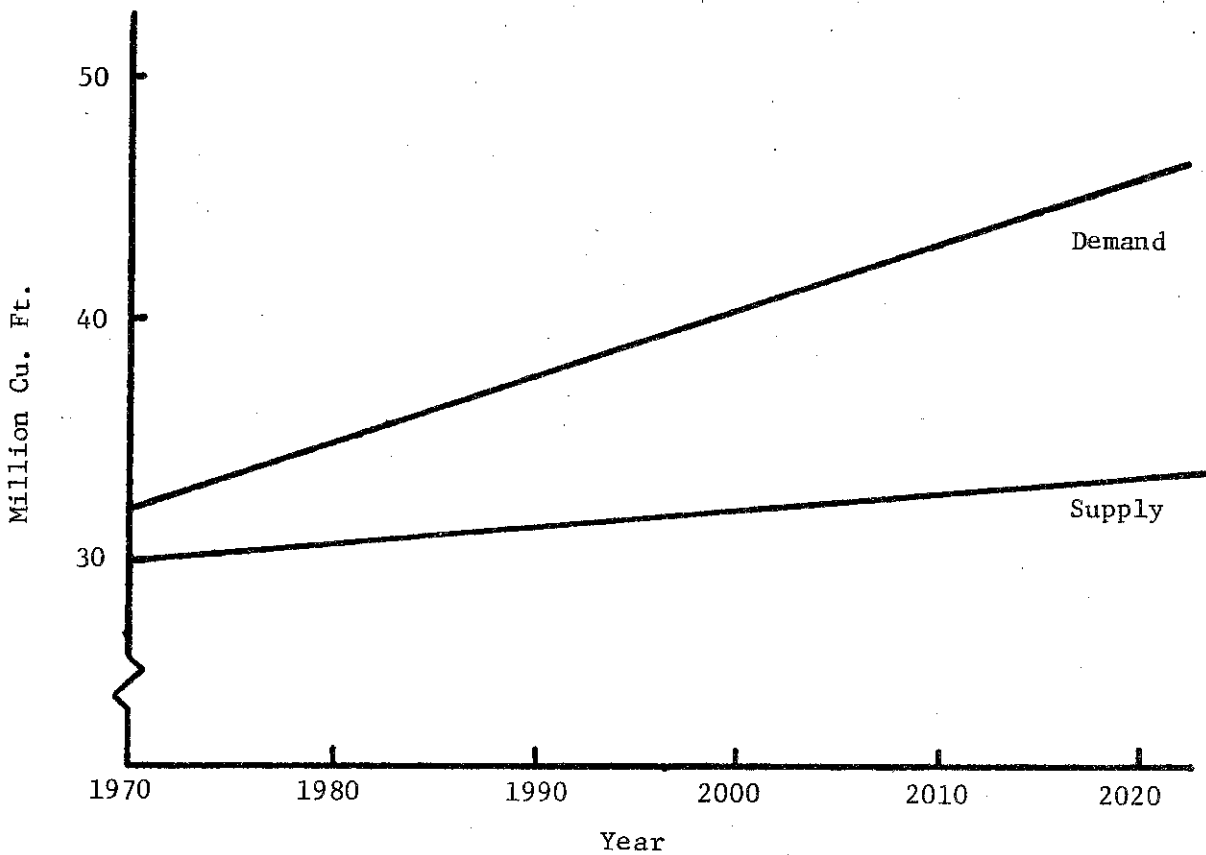


Figure 1. Wood Fiber Supply and Demand Over Time,
Upper Snake River Basin

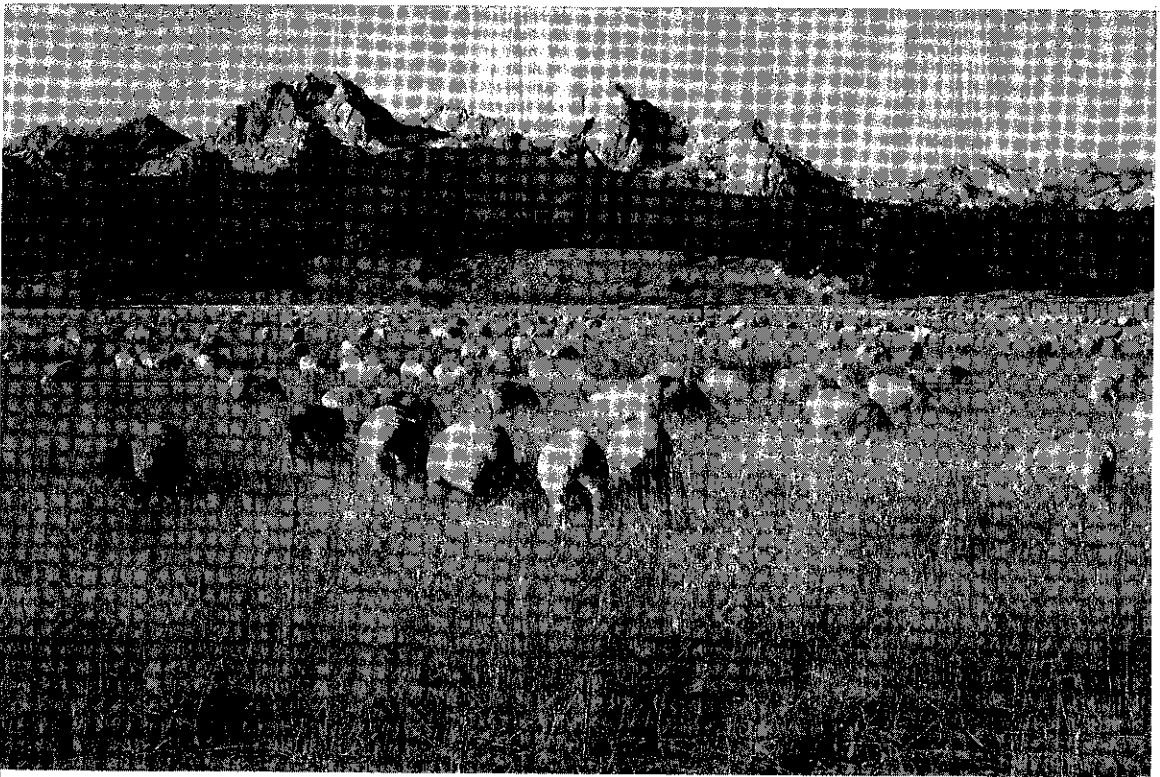
SOURCE: Forest Survey Data, USFS

Projected future conditions are based upon continued population growth with its associated increase in wood fiber demand. Current timber management plans have been used to develop the supply estimates. Reforestation and timber stand improvement reports were also used. It is anticipated that with intensified timber stand improvement, wood fiber production can be increased five percent by the year 2000 on the five national forests in the Upper Snake Basin. A similar rate of increase is expected on the state and private forestlands.

Wood fiber production amounted to 30 million cubic feet in 1970. Employment associated with lumber and wood products was less than 500 jobs in 1970 but is projected to increase in the future.



Forestland Harvest
SCS Photo



Sheep Grazing in Sawtooth Valley
SCS Photo

PREFERRED PLAN

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II

CHAPTER II

P R E F E R R E D P L A N

INTRODUCTION

The Preferred Plan was developed from the Environmental Quality (EQ) and National Economic Development (NED) alternatives in Chapter IV. These alternatives were developed to solve specific problems related to environmental enhancement, erosion and sedimentation reduction, irrigation water use, and USDA programs with potential for increasing economic development in the Basin.

Erosion control measures on cropland, rangeland, and forestland are from the EQ alternative.

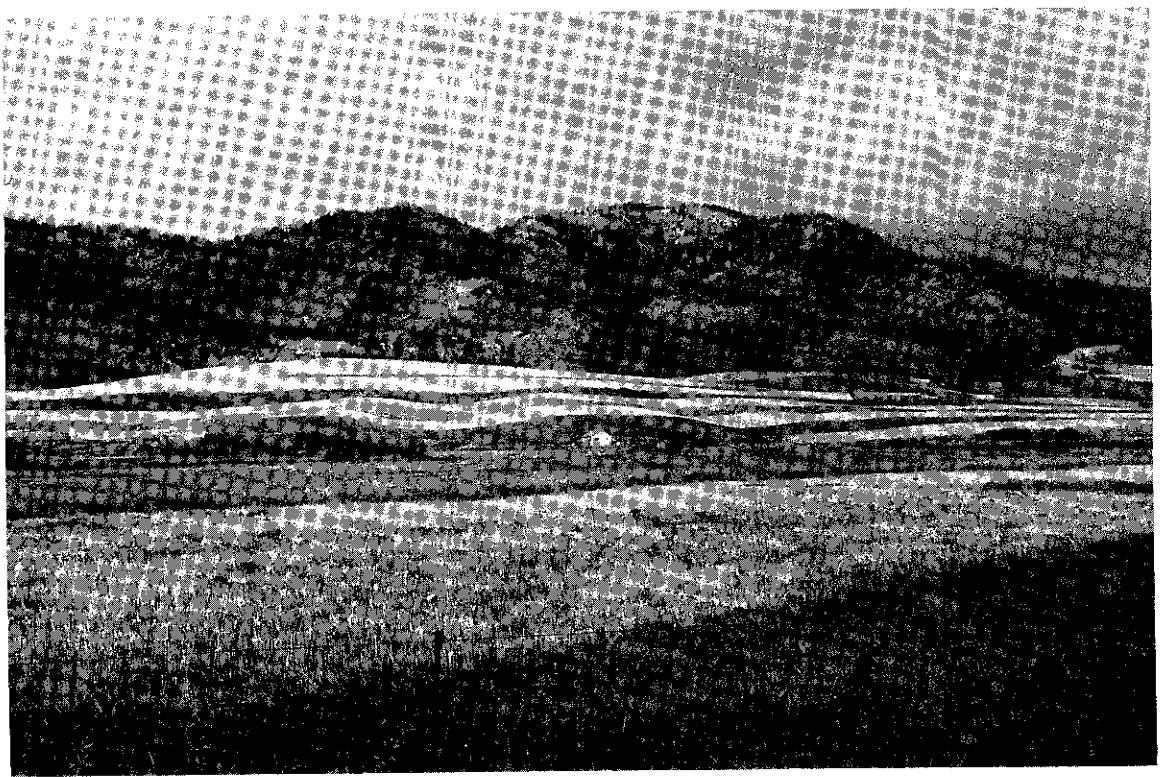
Improved irrigation and rangeland conditions and increased wood fiber productions are from the NED alternative.

Development of recreational facilities and stream bank protection and channel stabilization are from both EQ and NED alternatives.

The Upper Snake River Basin Cooperative Study was conducted concurrently with two other studies--the Idaho State Water Plan and the Pacific Northwest River Basin Commission's Comprehensive Coordinated Joint Plan. Public meetings were held in conjunction with these study activities. Over a two-year period, water and related land resource concerns were discussed in approximately 50 public meetings. Telephone surveys were conducted over a three-year period during the development of the State Water Plan. Information received from public meetings and telephone surveys was used to select concerns for study and establish the levels set forth in the Preferred Plan.

The Coordinating Staff, made up of representatives of the three USDA agencies, the Idaho Department of Water Resources, and the Field Advisory Committee with concurrence from the Wyoming Water Planning Program and the USDA Washington Advisory Committee, made final determination for the elements included in the Preferred Plan.

The elements, their unit amounts, and estimated installation costs are displayed in Table III. Following this table is a narrative discussion of the Preferred Plan in terms of recreation, irrigation, dry cropland, rangeland, forestland, and stream banks and channels. Table IV displays impacts of the Preferred Plan in three accounts--environmental quality, economic development, and social well-being. Present and projected plan effects of the Preferred Plan are displayed in Table V. A summary of significant environmental impacts follows the Table.



Dry Cropland Treatment in the Portneuf River Drainage
SCS Photo

Table III--Plan elements for the Preferred Plan, Upper Snake River Basin, Year 2000

<u>Plan elements</u>	<u>Unit</u>	<u>Quantity</u>	<u>Estimated installation costs^{1/} (---thousands---)</u>
Develop picnic facilities	Sites	4,256	\$ 10,154
Develop camping facilities	Sites	9,650	30,670
Provide interpretative facilities & services:			
Visitor Centers	No.	5	4,740
Interpretative Signs	No.	60	
Brochures (10,000 copies of each type)	No.	28	
Demonstration Sites	No.	2	
Conducted Tour areas	No.	3	
Contact Stations	No.	15	
Replace irrigation water delivery system structures	No.	37,000	74,000
Irrigated cropland treatment:			
Improve on-farm surface irrigation (system layout, land leveling, structures, water management)	Acres	400,000	151,200
Convert surface irrigation to sprinkler	Acres	80,000	
Dry cropland treatment:			
Stubble mulch, contour farming, and minimum tillage	Acres	552,200	16,502
Terrace systems	Feet	5,781,000	
Rangeland treatment:			
Range seeding	Acres	1,740,000	78,154
Brush management	Acres	512,000	
Fencing for management	Miles	4,504	
Water development	No.	1,126	

Table III--Plan elements for the Preferred Plan, Upper Snake River Basin, Year 2000 (cont.)

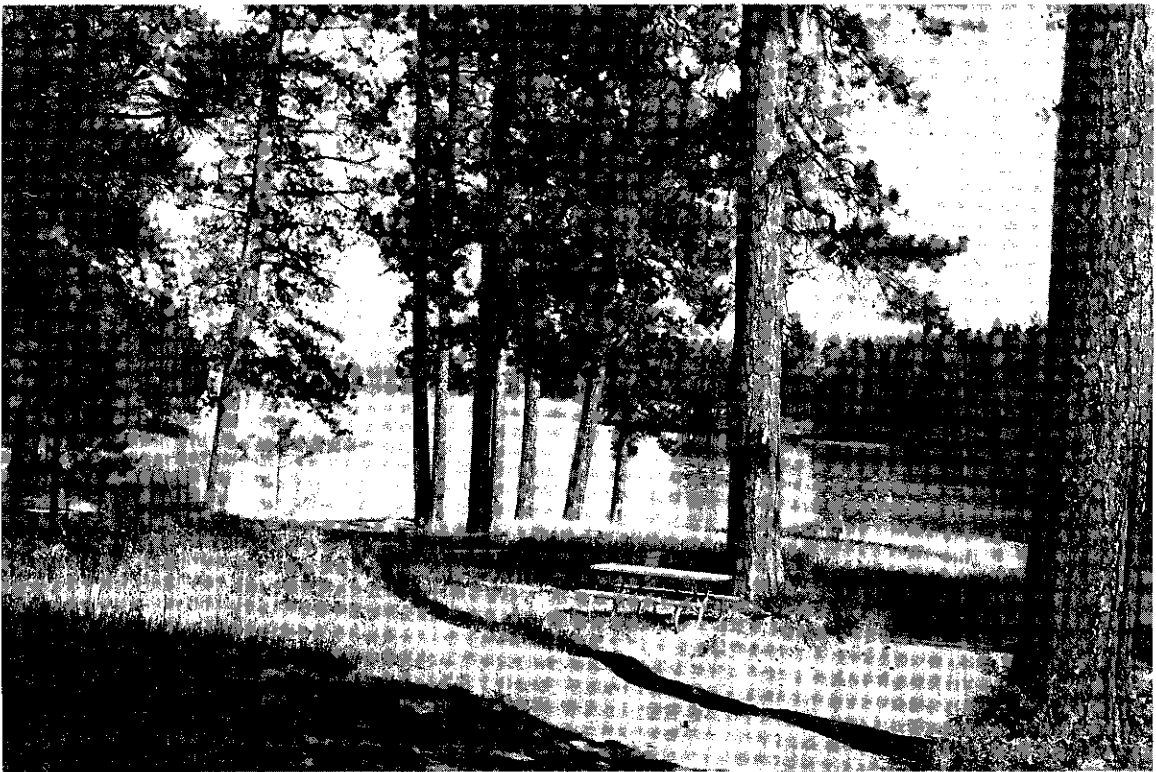
<u>Plan elements</u>	<u>Unit</u>	<u>Quantity</u>	<u>Estimated installation costs^{1/} (---thousands---)</u>
Forest land treatment:			\$ 12,934
Gully stabilization (vegetation, side slope stabilization, check dams, gully plugs, and retention dams)	Miles	515	
Sheet erosion control (planting extra large stock, close spacing of trees, sodding, mulching, seeding, fertilization, subsoiling, contour trenching, and furrowing)	Acres	51,013	
Rehabilitate eroding abandoned roads and trails (water bars, sloping of banks, reseeding)	Miles	788	
Restore eroding mined areas (storm water disposal, slide-damage repair, surface shaping, and revegetation)	Acres	1,796	
Stabilize eroding lake and reservoir shorelines (special plantings, mulching, gabion emplacement or riprap)	Miles	48	
Timber stand improvement	Acres	28,500	
Streambank protection and channel stabilization (riprap, stabilization of structures, jetties, shaping and seeding)	Feet	170,000	454
Total estimated project administration and technical assistance	Jobs per year for 20 years	96	76,659
Total estimated cost			\$455,467

^{1/} Cost estimates reflect current prices

THE PLAN NARRATIVE

Recreation

The Preferred Plan includes development of picnic, camping, and interpretative sites which will affect 2,286 acres in the study area. The number of picnic sites and campsites were taken from the NED plan while the number of interpretative facilities for visitor information is from the EQ plan. Installation of these facilities will satisfy projected recreation demand in the Basin through year 2000.



Picnic Area
SCS Photo

Installation of these facilities will alleviate crowding of popular recreation areas in the Teton-Yellowstone National Parks which have been subject to overuse and accelerated deterioration. Appreciation of the out-of-doors by visitors will increase, erosion and sedimentation will be reduced, and water quality improved. Development of new sites will degrade the environment in the areas of installation, but proper planning and development will minimize the environmental impacts over time by dispersing recreation use.

Implementation of this plan will affect less than one-tenth of one percent of the Basin area and will allow an increased number of people to enjoy the natural environment more fully through increased outdoor recreation.

Irrigation

The Preferred Plan involves the replacement of 37,000 irrigation structures, on-farm improvement of 400,000 acres of irrigated land, and conversion of 80,000 acres of surface irrigation to sprinkler irrigation.

Replacement of 37,000 irrigation delivery system structures as indicated in the NED plan will result in better control and management of water and less leakage and waste, thus reducing diversion requirements and improving stream flow. During construction, there will be a temporary disturbance of the area including turbidity of water in flowing streams and removal of vegetation where it interferes with construction.

Improvement of on-farm irrigation of 400,000 acres will involve land leveling and ditch construction which will cause temporary dust conditions during construction. However, irrigation improvement will result in better water distribution to cropland, less agricultural field water runoff, diminished return flows to the streams, less land damage from water logging, and reduced wetlands and marshes.



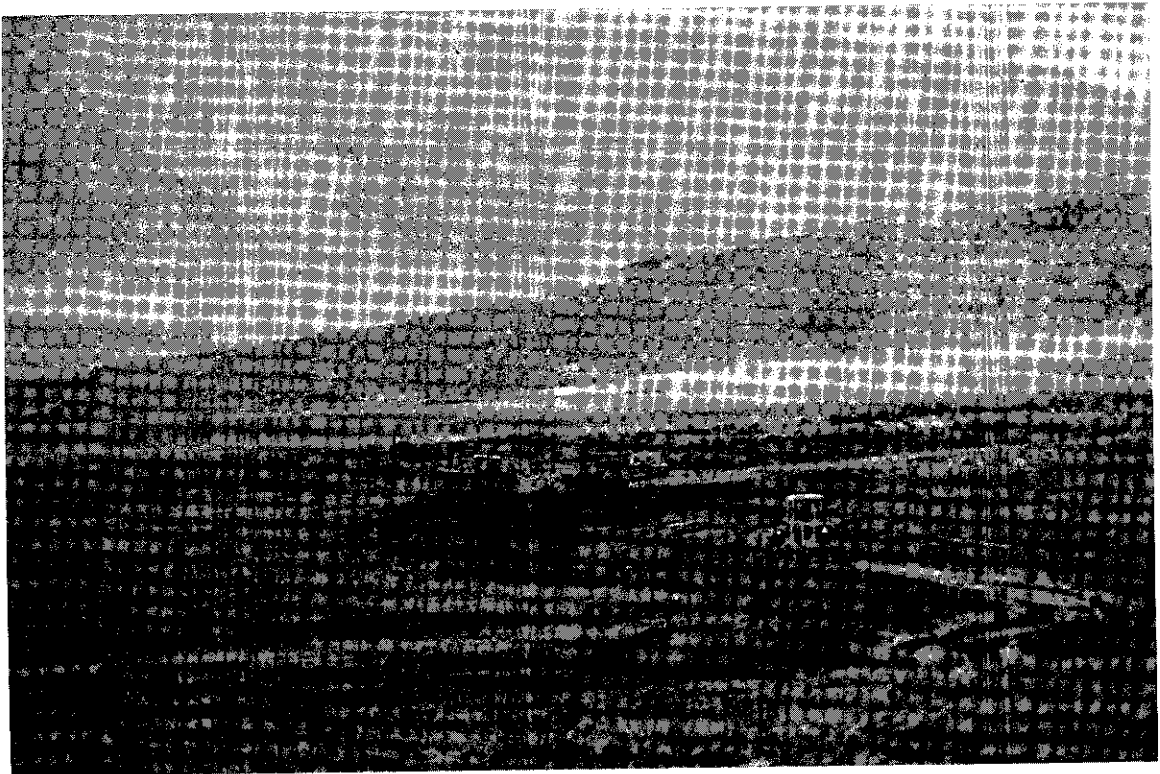
Improved On-farm Irrigation
SCS Photo

Conversion of 80,000 acres of surface irrigation to sprinkler systems will reduce water diversion requirements, waste water runoff, return flows, and erosion. This will result in improved water distribution on cropland and improved stream flows.

Implementation of the Preferred Plan will reduce erosion on 480,000 acres of irrigated cropland by 1,290,000 tons annually. However, 122,500 acres will continue to have erosion rates greater than tolerable soil loss limits. The EQ plan will reduce erosion to tolerable limits on all 480,000 acres by applying additional practices including terraces, chiseling, and conversion of land to less intensive use. The Preferred Plan and NED Plan are the same for irrigated land. Erosion control will reduce sediment damages in the Upper Snake Basin and areas downstream. This will enhance long-term soil productivity and water quality and prolong reservoir life by reducing sediment. There will be increased energy demands for construction and operation of improved irrigation systems.

Dry Cropland

Implementation of the Preferred Plan on dry cropland will reduce erosion and sediment damage, conserve moisture for crop production, improve water quality, reduce flooding, increase minimum stream flow, increase productivity of soil resource, improve fish and wildlife habitat, and improve the visual quality of the landscape. Reduction in erosion and runoff will help to minimize non-point pollution problems in the Basin and areas downstream.



Terrace Being Constructed
SCS Photo

The Preferred Plan will adequately protect 101,000 acres more than the NED alternative and 175,000 less than the EQ alternative. Erosion rates on 65 percent of the 175,000 acres, although reduced, will still be too high to support cropping indefinitely. Erosion was not reduced to tolerable soil loss limits due to high economic and social costs. However, at the reduced rate, the soil resource will last more than 50 years. Additional land protection could have been included in the Preferred Plan by installing 21,167,000 more linear feet of terrace systems, 79,200 more acres of strip cropping, and converting 25,780 acres of cropland with high erosion rates to permanent cover as stated in the EQ plan. These practices were not included in the Preferred Plan. They may become acceptable at a later date and if the cost share rate is increased.

Rangeland

The Preferred Plan follows the criteria of the EQ and NED plans for rangeland and will increase the desirable vegetative cover to achieve a better balance between grasses, forbs, and shrubs. A healthy, vigorous, well-balanced vegetative cover is complementary to both livestock and wildlife. It controls erosion, reduces sediment, and enhances water quality in the Basin as well as downstream.



Rangeland Improved
SCS Photo

Erosion is generally within tolerable soil loss limits on rangeland, but a small reduction in erosion and sediment would have large impacts because of the large quantity of rangeland in the Basin.

This plan provides for a rangeland improvement program that will accelerate the ongoing program by expanding range seeding, brush control, fencing, and livestock water developments. These practices improve environmental quality in the long run. Brush management and

seedbed preparation for reseeding may, however, have short-term, adverse impacts, particularly when the land is subjected to severe climatic conditions.

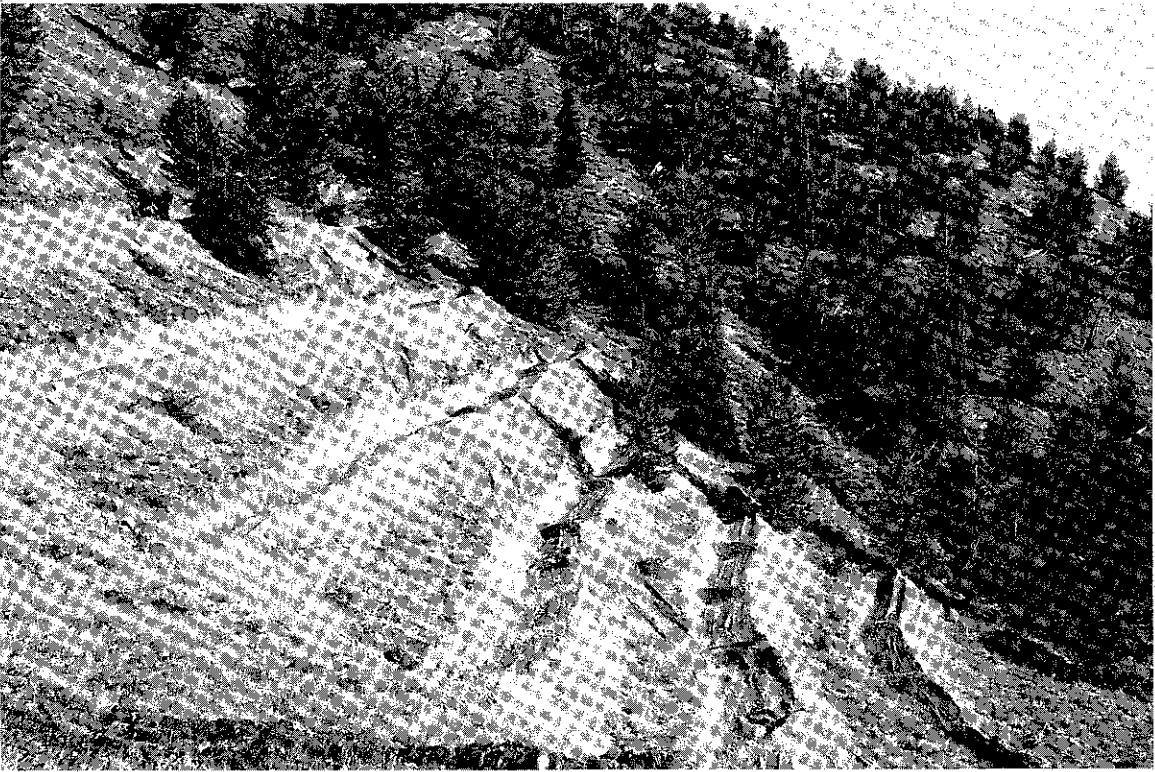
There are no additional irreversible or irretrievable commitments associated with this portion of the plan.

Forestland

Forestlands have low erosion rates except where disturbed by roads, mines, fires, and harvest. The plan, as outlined in Table III, will treat these areas and minimize future effects where disturbances occur. Implementation of the Preferred Plan will reduce erosion, improve water quality, and enhance the forest resource.

The plan recommends an acceleration of the present forest management program that will reduce gully erosion, control sheet erosion on burned and cutover areas, rehabilitate eroding abandoned roads and trails, restore vegetative cover on eroding mined areas, stabilize eroding lake and reservoir shorelines, and improve timber stands. This will also improve fish and game habitat in the Basin and downstream.

Implementation of the plan will enhance environmental quality and increase wood fiber production in the long run.



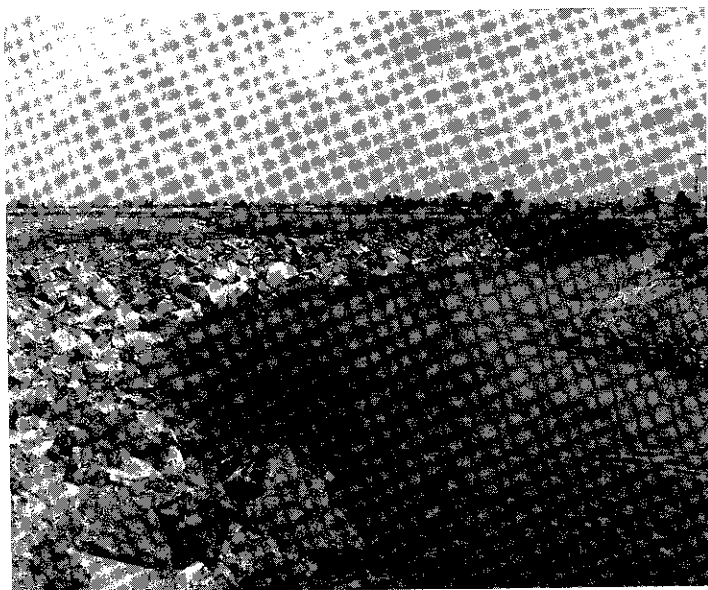
Erosion Control on Forestland
SCS Photo

Streambanks and Channels

The plan will accelerate the protection and stabilization of critically eroding streambanks and channels. Implementation of the plan will reduce streambank and channel erosion and sediment damages to lakes, reservoirs, and irrigation systems. Installation of structural measures will cause short-term increases in turbidity during construction. Fisheries and wildlife habitat will be adversely affected

in the short term along stream reaches involved. However, vegetative cover will be regenerated, enhancing the long-term effect on wildlife habitat. Certain fishery habitat may be permanently altered. Some installations will result in improved cover for wildlife and reduced turbidity in the stream. This will reduce siltation and improve spawning beds and other fishery needs. Streambank protection and channel stabilization will be installed primarily in streams near roads, bridges, and other critical eroding areas with high potential for economic loss.

Irreversible commitment of resources will occur where streambank and channel stabilization structures permanently alter the character of a stream segment. The Preferred Plan will minimize stream alteration by treating short, critical segments of selected streams. Implementation will be in compliance with local land use plans and policies.



Streambank Protection
SCS Photo

Table IV--Impacts of the Preferred Plan, Upper Snake River Basin, Year 2000

<u>Environmental Quality Account</u>	
<u>Concern and Measures of Effects</u>	<u>Concern and Measures of Effects</u>
<u>Beneficial and Adverse Effects</u>	
A. Areas of natural beauty	B. Quality considerations (cont.)
Installation of picnic sites, campsites, and interpretative facilities will impact 2,286 acres of natural area. Development will require 138 sewage treatment stations, 133 sanitary landfills, and 152 miles of road construction.	Reduction of 1,545,000 tons of erosion on 552,500 acres of dry cropland will enhance the quality of the land resources, and enhance the quality conservation and timely distribution of water.
Installation of picnic sites, campsites, and interpretative facilities will reduce the adverse impacts on areas currently experiencing overuse and resource deterioration, enhancing the recreation experience.	Installation of 1,095 miles of terrace systems will enhance the quality of land and water resources.
Land treatments to increase production of forest land, rangeland, and cropland will reduce erosion, improve visual quality and enhance wildlife habitat through improved vegetative cover.	Reduced sedimentation through erosion control will improve stream water quality.
B. Quality considerations of air, land, and water resources	Erosion control measures will reduce dust and improve air quality.
	Reduction of 1,290,000 tons of erosion on 480,000 acres of irrigated land will enhance the quality of the land resources and reduce sedimentation of receiving streams, improving water quality
Installation of picnic sites, campsites, and interpretative facilities will alleviate overcrowding in areas experiencing resource deterioration, enhancing the recreation experience.	Improved on-farm irrigation will:
	- lower the water table in certain areas
	- reduce wetlands and marshes
	- reduce land damage caused by elevated water tables
	- reduce diversion requirements and increase streamflows in some reaches.

Table IV--Impacts of the Preferred Plan, Upper Snake River Basin, Year 2000 (cont.)

Environmental Quality Account	
Concern and Measures of Effects	Concern and Measures of Effects
Beneficial and Adverse Effects	
B. Quality considerations (cont.)	B. Quality considerations (cont.)
- reduce irrigation return flows and improved water quality in receiving streams - reduce irrigation applications which will reduce leaching and decrease farm chemical requirements Reforestation and timber stand improvement will enhance the forestry resource and improve visual quality Treatment of gullies, burns, abandoned roads, harvested areas, mined areas, and lake-reservoir shorelines on forest land will: - improve forest lands - reduce erosion - reduce sediment and improve water quality - improve scenic quality Applying rangeland management practices on 2,265,000 acres to reduce erosion by 661,000 tons will: - reduce erosion - reduce sediment to receiving streams - improve vegetative cover - improve range resource - enhance wildlife habitat - enhance water conservation and timely distribution of water	Channel stabilization and protection of 142,000 feet of stream bank will: - reduce erosion - reduce sediment instream - improve visual quality - alter fishery and wildlife habitat - protect certain road embankments, bridges, and commercial and industrial properties. C. Biological resources and selected ecosystems Aquatic ecosystems will be enhanced by: - increased streamflows from reduced diversion - improved stream quality from reduced return flows - reduced erosion and sedimentation - land treatment which conserves and enhances the timely distribution of water

Table IV--Impacts of the Preferred Plan, Upper Snake River Basin, Year 2000 (cont.)

<u>Environmental Quality Account</u>	
<u>Concern and Measures of Effects</u>	<u>Concern and Measures of Effects</u>
Beneficial and Adverse Effects	
C. Biological resources (cont.)	D. Archeological and historical
Waterfowl habitat will be altered by:	Implementation of plan elements will not encroach upon historical, archeological, or cultural resources.
- changes in stream flow regime during nesting and migratory resting periods	
- reduced runoff from improved irrigation	E. Irreversible or irretrievable commitments
water management will reduce number and size of ponding areas and marshes	Channel stabilization and streambank protection structures on 170,000 feet of streambank represents an irreversible commitment of resources.
- land treatments will increase availability and location of cover and feed	Installation of picnic and campsites will commit 2,286 acres of natural areas to recreation development.
Upland bird habitat will be:	
- decreased by conversion of 80,000 acres from surface to sprinkler irrigation	
- decreased by improved surface irrigation which will reduce cover and location of habitat areas	
- improved by 552,500 acres of stubble mulch	
- altered by sage brush removal and reseeding of rangeland.	
Improved irrigation water management will reduce vector control problems	

Table IV--Impacts of the Preferred Plan, Upper Snake River Basin, Year 2000 (cont.)

National Economic Development Account

		<u>Average annual^{1/}</u>	<u>Average annual^{1/}</u>
Beneficial Effects			
Value to users of increased outputs of goods and services			Value of resources required for a plan
Increase picnic recreation benefits by 1,574,830 recreation days		\$ 3,149,700	Installation cost OM&R costs \$ 724,200 2,447,600
Increase camping recreation benefits by 1,775,600 recreation days		7,102,400	Installation cost OM&R costs 2,187,400 3,223,500
Increase interpretative recreation benefits by 655,440 recreation days		655,400	Installation cost OM&R costs 338,100 481,800
Cost savings from replacement of irrigation water delivery structures		5,865,300	Structure replacement Installation cost OM&R costs 5,277,700 148,000

Table IV--Impacts of the Preferred Plan, Upper Snake River Basin, Year 2000 (cont.)

National Economic Development Account

	<u>Average annual^{1/}</u>	
	<u>Average annual^{1/}</u>	<u>Average annual^{1/}</u>
Beneficial Effects		
Land Treatment		
Irrigated cropland	\$26,299,000	Installation Cost OM&R costs \$10,783,600 6,791,000
Dry cropland	1,535,000	Installation cost OM&R costs 1,176,900 134,800
Rangeland	8,237,200	Installation cost OM&R costs 5,573,900 2,157,400
Forest land	412,000	Installation cost OM&R costs 922,400 588,900
Streambank protection and channel stabilization ^{2/}	38,000	Installation cost OM&R costs 32,400 9,100
		Project administration and technical assistance 5,467,300
Total beneficial effects	<u>\$53,294,000</u>	Total adverse effects <u>\$48,466,000</u>
		Net beneficial effects \$ 4,828,000

^{1/} 1978 Price base amortized at 6 7/8 percent interest for 50 years.

^{2/} Includes only benefits from the NED plan, no attempt was made to evaluate portion from the EQ plan.

Table IV--Impacts of the Preferred Plan, Upper Snake River Basin, Year 2000 (cont.)

Social Well-Being Account

Beneficial and Adverse Effects

A. Employment and income 1/	B. Life, health, and safety (cont.)
Creates 6,100 new jobs during the evaluation period.	Streambank protection will reduce hazards associated with bank, bridge, and road failures.
Creates secondary benefits distribution of \$13.7 million during the evaluation period.	Improved irrigation efficiency will decrease the number of stagnant ponds, thereby reducing vector control problems.
B. Life, health, and safety	Timely replacement of obsolete irrigation systems will remove hazards associated with structural failures.
Additional picnic and camping facilities will reduce these activities in undesignated areas, thereby reducing traffic, personal safety hazards, and waste disposal problems.	C. Recreational opportunities
Development of additional recreational facilities and services will increase the availability of emergency assistance to recreationists.	Creates 4,005,870 recreation activity days.
Erosion control will reduce sediment deposits on roads reducing road hazards.	Reduced irrigation diversion will increase in-stream flow, thus increasing fish population and fisherman recreation days.
Reduced runoff from treated lands will reduce problems associated with undercutting along roadbeds and bridges and contamination of domestic water supplies.	Reduced number and size of ponded areas will diminish and relocate waterfowl and shift the location of hunting.

1/ These figures represent an average annual impact on employment and income throughout the 50-year evaluation period. Most of this will occur in the first 20 years, when construction will be taking place.

Table V--Present condition and projected plan effects, Preferred Plan, Upper Snake River Basin

Concerns	Unit	Year 2000				Year 2020		
		Present Condition	Without Plan	With Plan		Without Plan	With Plan	Plan Effects (C. 5-6=7)
				Condition	Effects (C. 2-3=4)			
		1	2	3	4	5	6	7
(-----thousands-----)								
Shortage of recreation facilities:								
Picnic	Recreation days	1,062	1,575	0	1,575	2,062	486	1,575
Camping	Recreation days	1,311	1,776	0	1,776	2,184	408	1,776
Interpretative facilities and services	Recreation days	662	670	15	655	850	195	655
Soil erosion on:								
Irrigated cropland	Av. ann. soil loss-tons	6,250	5,585	4,295	1,290	5,045	4,445	600
Dry cropland	" "	6,128	5,497	1,595	3,902	4,931	3,952	979
Rangeland	" "	2,601	2,304	1,643	661	1,977	1,594	383
Forest land	" "	236	224	220	4	213	210	3
Stream channels	" "	187	196	182	14	206	192	14
Banks with moderate to severe erosion	Feet	8,976	10,032	9,862	170	10,035	9,865	170

Table V--Present condition and projected plan effects, Preferred Plan, Upper Snake River Basin (cont.)

Concerns	Unit	Year 2000				Year 2020			
		Present Condition	Without Plan	With Plan		Without Plan	With Plan	Effects (C. 5-6=7)	Plan Effects (C. 5-6=7)
				Condition	Effects (C. 2-3=4)				
		1	2	3	4	5	6	7	
(-----thousands-----)									
Inadequate irrigation water delivery system structures 1/	No.	13	64	27	37	73	36	37	
Unimproved on-farm irrigation	Acres	1,035	809	329	480	651	331	320	
Deficient rangeland condition	"	7,000	5,915	3,650	2,265	4,500	3,250	1,250	
Inadequate supply of wood fiber:									
Saw logs	Cubic feet needed	1,405	3,383	2,091	1,292	16,196	14,904	1,292	
Other	"	0	37	11	26	282	156	26	

1/ Obsolescence of deteriorating structures, although difficult to assess, was determined to occur at the end of the planning period.

Note: The plan effects for the years 2000 and 2020 are the same for some concerns due to the continued decline of the without plan condition.

SUMMARY OF SIGNIFICANT ENVIRONMENTAL IMPACTS

1. Environmental Impacts

Installation of picnic sites, campsites, and interpretative facilities will impact 2,286 acres of natural area. This will reduce adverse impacts caused by overcrowding on areas currently experiencing overuse and resource deterioration.

Land treatment to increase forest production by controlling sheet erosion on 5],000 acres and timber stand improvement on over 28,000 acres will

- *increase visual quality*
- *improve water quality*
- *improve wildlife habitats*

Improved on-farm irrigation on 400,000 acres will

- *reduce areas of wetlands and marshes*
- *reduce vector problems*
- *lower the water table in certain areas*
- *reduce leaching of fertilizer to the groundwater*
- *increase stream flows*
- *reduce return flows*
- *reduce wildlife habitats in certain areas*
- *enhance fish habitat*

Conversion of 80,000 acres of surface irrigated land to sprinkler will

- *reduce wildlife habitat*
- *almost eliminate return flows*

Application of soil and water conservation measures on 552,200 acres of dry cropland will decrease soil erosion by 1.5 million tons and will

- *improve vegetative cover*
- *add to underground water supply*
- *stabilize stream flows*
- *reduce channel erosion*
- *reduce sediment in streams*
- *improve visual quality*
- *enhance fish habitat*
- *enhance upland bird habitat*
- *enhance soil fertility*

Rangeland treatment will reduce erosion by 660,000 tons and will

- *enhance the soil and water resources*
- *enhance wildlife habitats in most areas*
- *alter wildlife habitat in areas of brush removal*
- *enhance visual quality*

Streambank protection and channel stabilization will

- *enhance the soil resource*
- *improve visual quality*
- *enhance fish and wildlife habitats*

2. Adverse Impacts Which Cannot Be Avoided

Upland bird habitat will be reduced by conversion of 80,000 acres of surface irrigated land to sprinkler and improved surface irrigation on 400,000 acres.

Improved irrigation will reduce wildlife habitat in wet areas.

Recreational visitor traffic will be increased in the Basin.

3. Alternatives

One alternative to the elements of the Preferred Plan would be "future without plan." Present trends would continue in the Basin including shortage of recreation facilities, inadequate treatment of eroding lands, inefficient irrigation and rapid deterioration of irrigation structures, deficient rangeland conditions, and inadequate supply of wood fiber. There is progressive action in most aspects but accomplishments are slow.

The EQ alternative to the Preferred Plan emphasizes elements for environmental quality preservation and enhancement. Results are displayed in Table VII. Compared to the Preferred Plan, this plan would have fewer recreational facilities, more intense land treatment, nearly 22 million more feet of terraces, 27,000 acres converted to permanent cover, 56,000 acres planted to close-growing crops, 2 million more bank miles of streambank and channel stabilization, and no timber stand improvement.

The NED alternative to the Preferred Plan emphasizes elements for economic development. Results are displayed in Table VII. Compared to the Preferred Plan, this plan would have no terraces and no forestland treatment except timber stand improvement which is the same as in the Preferred Plan. The NED plan also has 38,000 less feet of stream-bank protection and channel stabilization.

For further comparisons of these alternatives and the Preferred Plan, see Table III.

4. Relationship Between Short-term Uses of the Environment and the Maintenance of Long-term Productivity

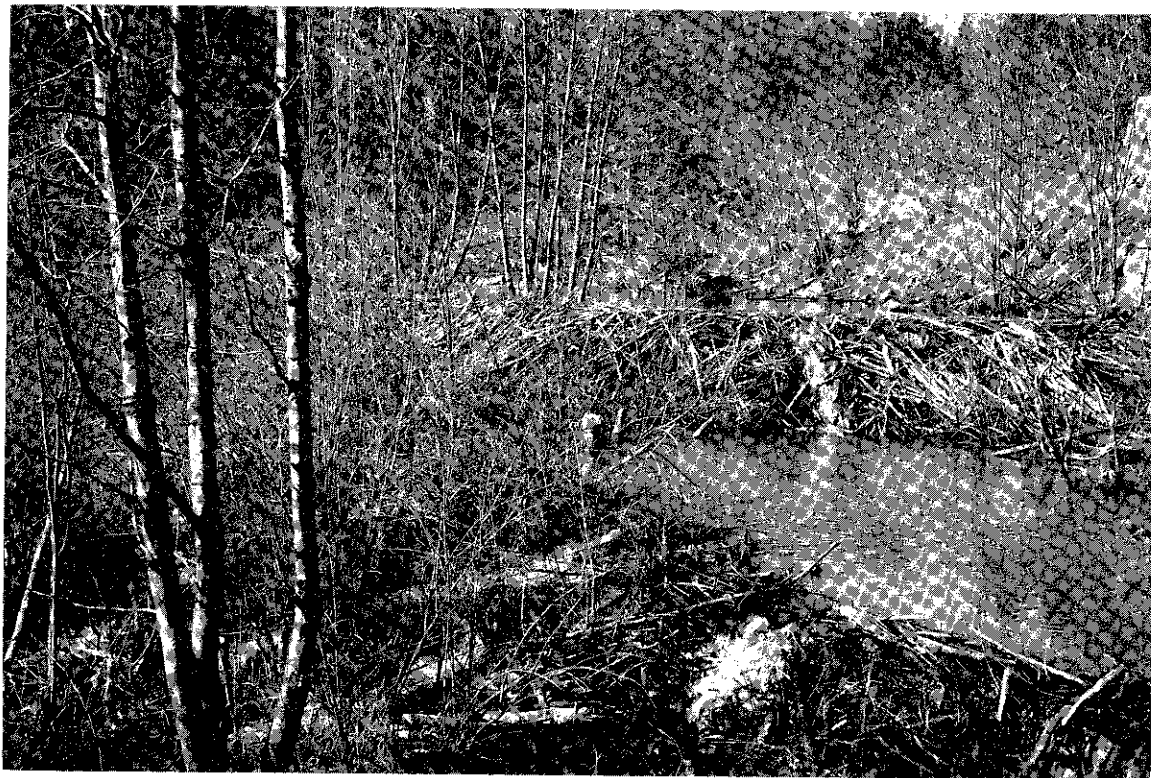
The Preferred Plan will contribute toward proper use of agricultural and forested lands by dispersing recreation and by encouraging the maintenance and improvement of the productive capacity of lands in the Basin. Land treatment measures will permit better use of the land while conserving it for use by future generations.

Measures for the protection of the Basin's resources will enhance the fish and wildlife habitat and have a sustaining positive impact on the environment.

5. Irreversible and Irretrievable Commitment of Resources

Installation of picnic sites and campsites will commit 2,286 acres of natural areas to recreation development.

Channel stabilization and streambank protection structures on 170,000 feet of streambank represent an irreversible commitment of resources.



Fish and Wildlife Habitat
SCS Photo

OPPORTUNITIES FOR IMPLEMENTING
THE PREFERRED PLAN

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III

CHAPTER III
O P P O R T U N I T I E S F O R I M P L E M E N T I N G
T H E P R E F E R R E D P L A N

INTRODUCTION

Concerns addressed in the Upper Snake River Basin Cooperative Study and the related elements in the Preferred Plan are familiar to the people in the Basin and the USDA agencies. The Plan, however, brings the concerns and the elements necessary to satisfy them into focus.

Several ongoing USDA programs offer opportunities for implementing the elements in the Preferred Plan. It will require a considerable acceleration of these programs, however, to accomplish it.

Implementation of much of the Preferred Plan depends on the private landowner and his interest, desire, and understanding of the need to properly manage and use the water and land resources under his control.

Over the last several years considerable progress has been made toward satisfying some aspects of the Preferred Plan. However, to implement the plan elements by the year 2000 at the rate set forth, it will require a greatly expanded effort.

The implementation of the Preferred Plan in some instances has both adverse and beneficial impacts on fish and wildlife and other environmental resources. Full consideration should be given to these resources in planning for implementation of the Preferred Plan.

The following discussion presents some of the activities that will be carried out to promote implementation of the Preferred Plan. Table VI summarizes USDA programs and opportunities for implementation of the Preferred Plan.

Recreation

The Preferred Plan includes development of 4,256 new picnic sites, 9,650 new campsites, and interpretative facilities and services including the development of five visitor centers. The cost of implementing these plan elements is estimated to be \$45.6 million.

These facilities would be located in areas experiencing the most use or in locations designed to disperse outdoor recreationists from areas of overuse. Map I-1 indicates intensity of outdoor recreation use in the Basin.

Implementation will be promoted through contacts with agencies which plan and program recreation development including the U.S. Forest Service, Pacific Northwest Regional Commission, Pacific Northwest River Basin Commission, Heritage Conservation and Recreation Service, Bureau of Land Management, Yellowstone and Teton National Parks, Soil Conservation Districts, Soil Conservation Commissions, Idaho Department of Water Resources, State Forestry Planning Committees, State Foresters, Idaho Parks and Recreation Department, Wyoming Water Planning Program, State highway departments, State historical societies, county planners, and local citizens. A slide-tape presentation will be made available to service clubs and other interested parties.

Replace Irrigation Water Delivery System Structures

The Preferred Plan includes the replacement of 37,000 irrigation water delivery structures by the year 2000, costing approximately \$74.0 million.

These structures are located in systems which extend from the upper to the lower end of the Basin involving all of the irrigated lands. The major irrigated land areas are broad valleys located adjacent to the river systems in the Basin as shown on Map V-5.

Over a hundred thousand irrigation water delivery system structures throughout the Basin are used to deliver water to the user's headgate. These structures are intended to control and regulate the flow of water so that it is delivered in a timely manner and in sufficient volume to the users.

It is common practice within the Basin to allow irrigation structures to deteriorate to the point where they no longer function before action is taken to replace them. Failures occur at inopportune times creating crop failure or other damages resulting in construction conditions which increase replacement costs. Some structures become obsolete and, although they do not fail, they need to be replaced in a timely manner with more adequate structures.

Scheduling replacement on a planned basis will result in more efficient use of irrigation water and greater economic returns to water users.



Irrigation Water Delivery System Structure
SCS Photo

Studies will be made of selected irrigation systems to provide detailed information to facilitate solving irrigation water distribution and use problems.

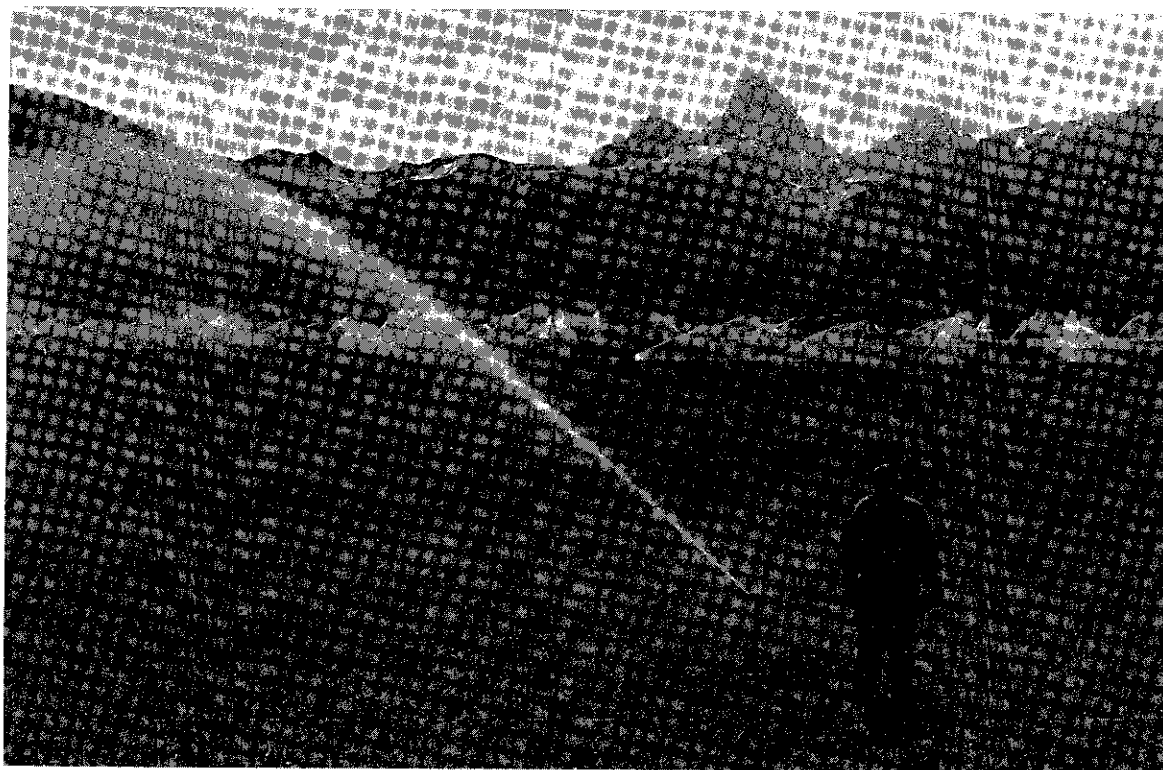
Implementation of this portion of the Preferred Plan will be promoted through contacts with USDA agency employees, Soil Conservation District cooperators, other federal and state water resource agencies, local citizens groups, and irrigation organizations.

There are several USDA programs available to help implement this aspect of the Preferred Plan. They include Soil Conservation Service (SCS) Assistance in Conservation Districts - PL-46, Small Watershed Program - PL-566, Resource Conservation and Development Program (RC&D), Agricultural Conservation Program (ACP), and Community Development Loan Programs (FmHA). However, the present technical and/or financial assistance under these programs is not adequate to provide the needed opportunities to implement this element of the Preferred Plan by the year 2000. See Table VI for further details on the opportunities under USDA programs to implement the Preferred Plan.

Irrigated Cropland Treatment

Treatment to control erosion on irrigated land, outlined in the Preferred Plan, includes improved irrigation on 400,000 acres and converting 80,000 acres of surface irrigated land to sprinkler irrigation by the year 2000. Implementation of this plan element is estimated to cost \$15.2 million. Irrigated cropland problem areas are scattered in the Basin and occur wherever too much water is applied or where slopes are too steep for surface irrigation. Map V-5 shows the irrigated land in the Basin.

Implementation of this portion of the Preferred Plan will be promoted by contacting USDA employees, Soil Conservation District cooperators, other federal and state water resource agencies, and irrigation organizations.



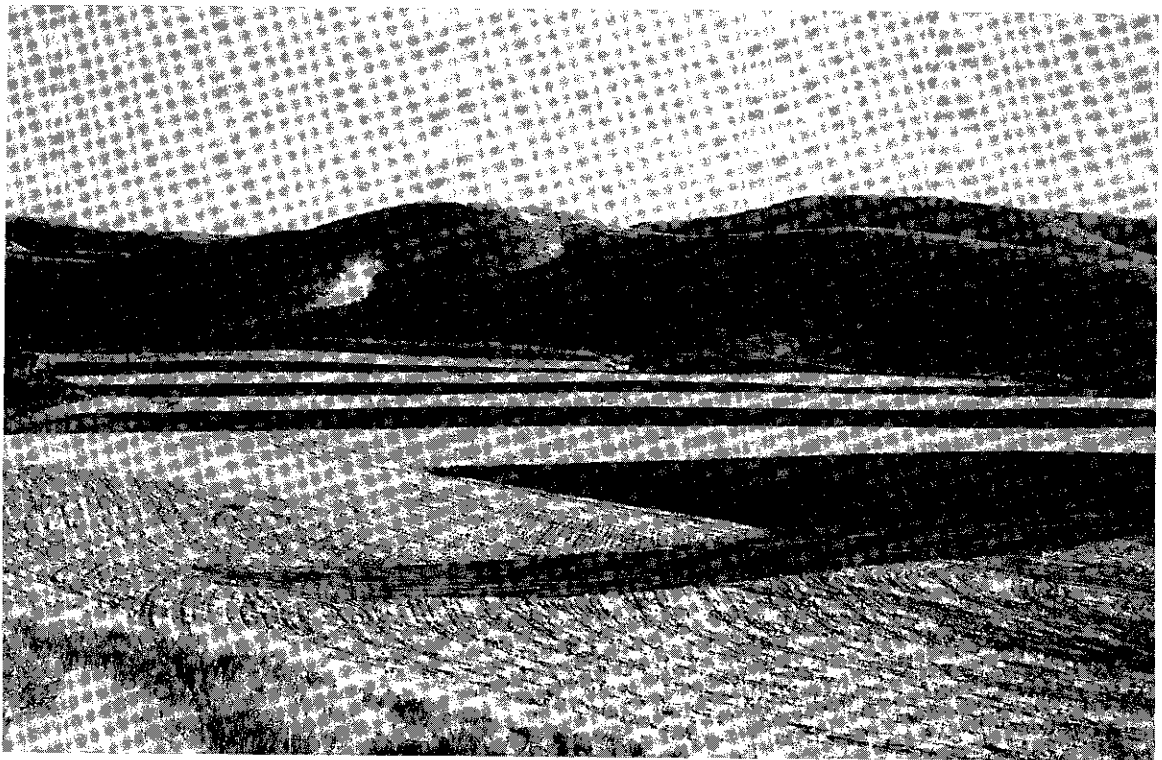
Sprinkler Irrigation in Teton Valley
SCS Photo

USDA programs available to assist in implementation include SCS Assistance to Conservation Districts (PL-46), Section 208 of the Clean Water Act (PL 92-500), the Soil and Water Resources Conservation Act (PL 95-192), Small Watershed Program (PL-566), the Agriculture Conservation Program (ACP), Cooperative Extension Program, and Community Development Loan Program (FmHA).

Additional funding and technical assistance is needed, however, for present programs to implement this element of the Preferred Plan by the year 2000.

Dry Cropland Treatment

Dry cropland treatment to control erosion as outlined in the Preferred Plan includes installation of over 550 thousand acres of stubble mulch and contour farming and 5.8 million feet of terrace systems by the year 2000. Implementing this plan element is estimated to cost \$16.5 million. The dry cropland erosion problem areas generally flank the Snake River Valley and tributaries located between the irrigated land and rangelands. Map V-4 shows the location of the dry cropland in the Basin.



Terrace System on Dry Cropland
SCS Photo

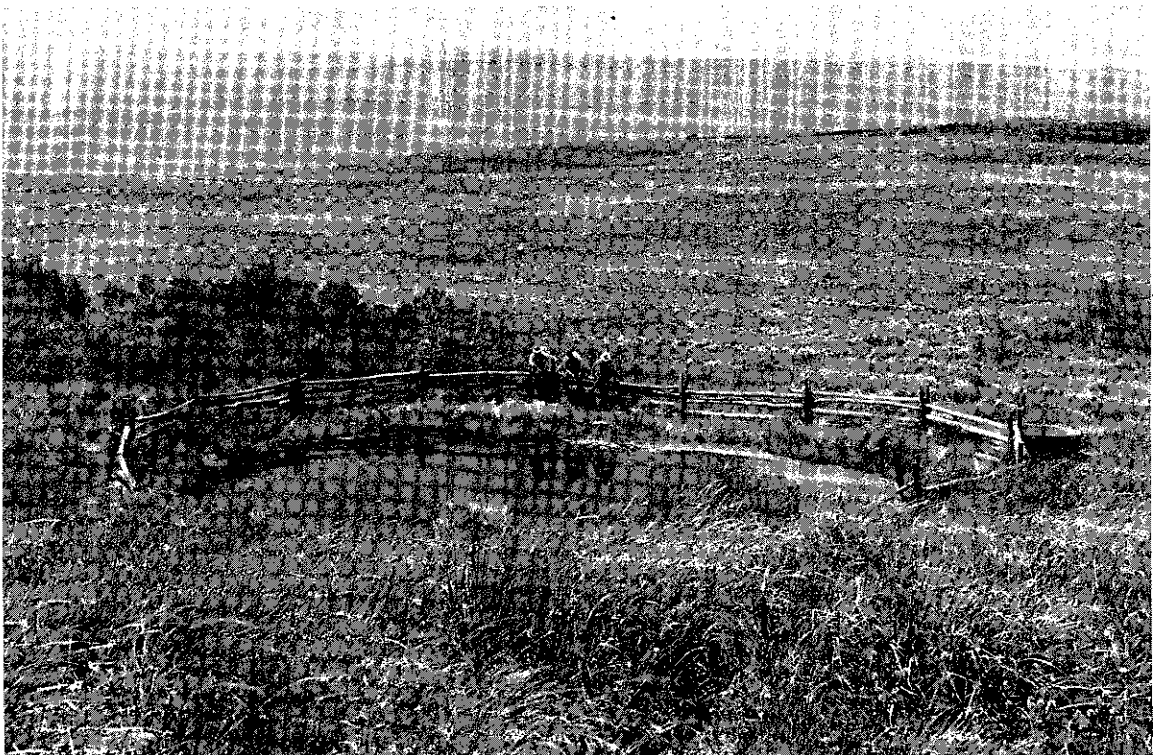
Implementation of dry cropland treatment will be promoted by intensifying educational activities to make SCS personnel, landowners and operators, and others more aware of the seriousness of the erosion problem areas of the Basin. The need and value of implementing the dry cropland element in relationship to its resulting impact on water quality and 208 planning will be stressed.

USDA programs that provide opportunities to assist in the implementation of this portion of the Preferred Plan include SCS Assistance to Soil Conservation Districts - PL-46, the land treatment aspects of the Small Watershed Program - PL-566, the Agriculture Conservation Program (ACP), the Community Development Loan Program (FmHA), and the Cooperative Extension Program. The present level of technical and financial assistance available under these programs, however, is not adequate for the total implementation of the dry cropland plan elements by the year 2000.

The Clean Water Act of 1977 (Public Law 95-217) provides some opportunities for implementation of the dry cropland plan elements in the problem areas identified in the state's agricultural pollution abatement plans (208 Plan).

Rangeland Treatment

The rangeland treatment element of the Preferred Plan includes range seeding of 1,740,000 acres, brush management on 512,000 acres, 4,504 miles of fencing for management, and 1,126 new water developments. The cost of implementing this plan element is estimated at \$78.2 million. The rangeland generally lies between the cropland areas at the lower elevations and the forested areas at the higher elevations throughout the Basin. Approximately 7 of the 11 million acres of rangeland need improvement. Map V-4 shows the location of rangeland in the Basin.



Stock Water Development
SCS Photo

Implementation will be promoted by contacting concerned government agencies and special interest groups. Many misconceptions presently exist between and within the above groups and need to be corrected. This will require tours to range and wildlife research centers, slide-tape programs, special rangeland management modeling techniques, and on-site planning experience. Rangeland management models need to fully illustrate both the complementary and competitive values of proper range management for the different planned uses.

There are a number of USDA programs that can help implement this aspect of the Preferred Plan. These are listed in Table VI.

Forestland Treatment

The Preferred Plan includes forestland treatment of the following: 515 miles of gully stabilization, sheet erosion control on 51,013 acres, rehabilitation of 788 miles of eroding abandoned roads and trails, restoration on 1,796 acres of eroding mined areas, stabilization of 48 miles of eroding lake and reservoir shorelines, and timber stand improvement on 28,500 acres. The cost to implement this aspect of the Preferred Plan is estimated at \$12.9 million.

Forested lands are located mainly in the northern section of the Basin. The remaining forestland is scattered along the high mountain areas in the southern and western parts of the Basin. Map V-4 illustrates the location of forested lands in the Basin.

Erosion problems on forestland are usually associated with disturbed areas such as roads, burns, and harvested sites and are not confined to a particular ownership. Timber stand improvement activities are performed primarily on commercial forestland to increase the production of wood fiber, although some erosion control results from this activity.

The Preferred Plan can be implemented on national forestlands under authority of the Forest Service Multiple Use - Sustained Yield Act, and on state and private lands through the Cooperative Forestry Assistance Act and other USDA programs listed in Table VI.



Reforestation of Burned Over Area
USFS Photo

Implementation will be promoted by State and U.S. Forest Service personnel and consultants, contacting and working with forestland owners and managers to carry out forest management practices. However, acceleration of funding is needed for present programs to implement these elements of the Preferred Plan by the year 2000.

Streambank Protection and Channel Stabilization

The Preferred Plan for streambank protection and channel stabilization includes treatment measures on 170,000 feet of streambank at an estimated cost of \$0.5 million.



Streambank Stabilization
USFS Photo

Segments of moderate and severe stream bank erosion are found in almost every county in the Basin (Map I-2). Channel erosion is extensive and expensive to treat, only portions of the total will be selected for treatment. Promotion for implementation will be made for selected areas where the most benefits can be accomplished.

Implementation of the stream erosion element of the Preferred Plan will be promoted by increased educational contacts with specialists of SCS, FS, BLM, and other federal, state, county, and local people.

Landowners and operators should become more aware of causes and effects of stream system changes. Segments of channels to be treated will also be selected.

Channel erosion can be reduced or controlled by watershed treatment that reduces runoff. Some federal programs that could accomplish this are the Forest Service Watershed Improvement Program, FS Cooperative Forestry Assistance Program, Small Watershed Program (PL-566), Resource Conservation and Development Program (RC&D), SCS Assistance to Soil Conservation Districts (PL-46), Rural Clean Water Program (PL 95-217), the Soil and Water Resources Conservation Act of 1977 (PL 95-192), BLM Conservation Program, and the Agricultural Conservation Program (ACP).

IMPLEMENTATION

The Preferred Plan will be presented to the public in selected meetings throughout the Basin. A summary brochure and a slide-tape program will be developed to use in the presentations and discussions.

Opportunities through USDA programs for technical and financial assistance for implementation will be presented. The plan elements and their significance in the Basin including recreational developments, irrigation delivery system structure replacement, on-farm irrigation improvement, dry cropland, rangeland and forestland treatment, and streambank protection and stabilization will be discussed.

It is estimated a three to six month period will be needed to develop the information materials and present the plan to various groups throughout the Basin. It is estimated it will require approximately 200 week-days and \$35,000 to promote the implementation of the Preferred Plan.

Table VI--USDA programs and opportunities for implementation of the Preferred Plan,
Upper Snake River Basin, Year 2000

<u>Plan elements</u>	<u>USDA program</u>	<u>Opportunities</u>
Develop picnic facilities	Forest Service recreation program	Construction, operation, and maintenance of facilities; technical assistance and leasing for private development on national forest lands.
Develop camping facilities	(Multiple Use-Sustained Yield Act)	
Provide interpretative facilities and services	SCS assistance to conservation districts - PL-46	Technical assistance for development on private land.
	Small Watershed Program - PL-566	Technical and financial assistance for development of facilities in approved project.
	Resource Conservation and Development Program	Technical and financial assistance for development of water based recreation facilities in project areas.
	Community Development Loan Programs	Loans for development of facilities.

Table VI--USDA programs and opportunities for implementation of the Preferred Plan,
Upper Snake River Basin, Year 2000 (cont.)

<u>Plan elements</u>	<u>USDA program</u>	<u>Opportunities</u>
Irrigated cropland treatment:		
Replace irrigation water delivery system structures	SCS assistance to conservation districts - PL-46	Technical assistance in planning design and installation of structures.
	Small Watershed Program - PL-566	Technical assistance in planning and design and cost-sharing assistance for installation of structures in approved projects.
	Resource Conservation and Development Program	Technical assistance in planning and design and cost-sharing assistance for installation of structures in project areas.
	Agricultural Conservation Program	Cost-sharing assistance for installation of structures.
	Community Development Loan Programs	Loans for installation of structures.

Table VI--USDA programs and opportunities for implementation of the Preferred Plan,
Upper Snake River Basin, Year 2000 (cont.)

<u>Plan elements</u>	<u>USDA program</u>	<u>Opportunities</u>
Improve on-farm surface irrigation	SCS assistance to conservation districts - PL-46	Technical assistance for improved irrigation water management and for planning, design, and installation of on-farm irrigation systems.
	Small Watershed Program - PL-566	Technical assistance in planning and design and cost-sharing assistance for on-farm irrigation system improvement in approved projects.
	Agricultural Conservation Program	Cost-sharing assistance for installation of on-farm irrigation systems.
	Cooperative Extension Program	Educational and technical assistance to improve on-farm irrigation.
	Community Development Loan Program (FmHA)	Loans for installation of on-farm irrigation system.
	Rural Clean Water Program	Cost-sharing assistance for installation of best management practices in designated project areas where erosion is creating critical water quality problems.

Table VI--USDA programs and opportunities for implementation of the Preferred Plan,
Upper Snake River Basin, Year 2000 (cont.)

<u>Plan elements</u>	<u>USDA program</u>	<u>Opportunities</u>
Convert surface irrigation to sprinkler	SCS assistance to conservation districts - PL-46	Technical assistance in planning, design, and installation of sprinkler irrigation systems.
	Small Watershed Program - PL-566	Technical assistance in planning and design and cost-sharing assistance for converting surface irrigation to sprinkler in approved projects.
	Agricultural Conservation Program	Cost-sharing assistance for installation of sprinkler system in project areas.
	Community Development Loan Program	Loans for installation of sprinkler systems.
	Rural Clean Water Program	Cost-sharing assistance for installation of best management practices in designated project areas where erosion is creating critical water quality problems.

Table VI--USDA programs and opportunities for implementation of the Preferred Plan,
Upper Snake River Basin, Year 2000 (cont.)

<u>Plan elements</u>	<u>USDA program</u>	<u>Opportunities</u>
Dry cropland treatment:		
Stubble mulch	SCS assistance to conservation districts - PL-46	Technical assistance in planning and application of stubble mulch, contour farming, minimum tillage and terrace systems.
Contour farming		
Minimum tillage		
Terrace systems	Small Watershed Program - PL-566	Technical assistance in the planning and design and cost-sharing assistance for installation of terrace systems in approved projects.
	Rural Clean Water Program	Cost-sharing assistance for installation of best management practices in designated project areas where erosion is creating critical water quality problems.
	Agricultural Conservation Program	Cost-sharing assistance for installation of terrace systems.
	Cooperative Extension Program	Education and technical assistance in the application of stubble mulch and minimum tillage.
	Community Development Loan Program	Loans for the installation of terraces.

Table VI--USDA programs and opportunities for implementation of the Preferred Plan,
Upper Snake River Basin, Year 2000 (cont.)

<u>Plan elements</u>	<u>USDA program</u>	<u>Opportunities</u>
Rangeland treatment:		
Range seeding	Forest Service Range Management Program (Multiple Use-Sustained Yield Act)	Develop, manage, and protect the range resources on Forest Service administered lands.
Brush management		
Fencing for management	SCS assistance to conservation districts - PL-46	Technical assistance in the planning and application of the needed range management practices on the private rangeland in the basin.
Water development	Small Watershed Program - PL-566	Technical assistance in planning and cost-sharing assistance to accelerate application of needed range management practices in approved projects.
	Agricultural Conservation Program	Cost-sharing assistance for implementation of needed range management practices in project areas.
	Community Development Loan Program	Loans to individuals and groups for rangeland development and management.
	Rural Clean Water Program	Cost-sharing assistance for installation of best management practices in designated project areas where erosion is creating critical water quality problems.

Table VI--USDA programs and opportunities for implementation of the Preferred Plan,
Upper Snake River Basin, Year 2000 (cont.)

<u>Plan elements</u>	<u>USDA program</u>	<u>Opportunities</u>
Forest land treatment:	Forest Service Watershed Improvement Program (Multiple Use-Sustained Yield Act)	Accelerate present program on Forest Service lands.
Gully stabilization		
Control sheet erosion	Timber Management program (Multiple Use-Sustained Yield Act)	Accelerate present timber management program on National Forest lands.
Rehabilitate eroding abandoned roads and trails	Forest Service Cooperative Forestry Assistance Program - PL 95-313	Technical and financial assistance on State and private forest land, through State Forest Management Agency.
Restore eroding mined areas	SCS assistance to conservation districts - PL-46	Technical assistance on private forest lands to prevent wind and water erosion of lands using windbreaks and shelterbelts.
Stabilize eroding lakes and reservoir shorelines	Small Watershed Program - PL-566	Technical assistance in planning and cost-sharing assistance to accelerate application of needed forest management practices in approved projects.
Timber stand improvement	Resource Conservation and Development Program	Technical assistance in planning and cost-sharing assistance to accelerate application of needed forest management practices in project areas.
	Cooperative Extension Program	Educational and technical assistance in forest land management.
	Community Development Loan Program	Loans for installation of forest management programs.

Table VI--USDA programs and opportunities for implementation of the Preferred Plan,
Upper Snake River Basin, Year 2000 (cont.)

<u>Plan elements</u>	<u>USDA program</u>	<u>Opportunities</u>
Forest land treatment (cont.)	Agriculture Conservation Program	Cost-sharing assistance for forest land treatment.
	Forestry Incentives Program	Cost-sharing assistance to small private land-owners for reforestation and timber stand improvement.
	Rural Clean Water Program	Cost-sharing assistance for installation of best management practices in designated project areas where erosion is creating critical water quality problems.

Table VI--USDA programs and opportunities for implementation of the Preferred Plan,
Upper Snake River Basin, Year 2000 (cont.)

<u>Plan elements</u>	<u>USDA program</u>	<u>Opportunities</u>
Streambank protection and channel stabilization	Forest Service Watershed Improvement Program (Multiple Use-Sustained Yield Act)	Accelerate present watershed improvement program on Forest Service lands.
	Forest Service Cooperative Forestry Assistance Program - PL 95-313	Technical and financial assistance on State and private forest lands through State Forest Management Agency.
	SCS assistance to conservation districts - PL-46	Technical assistance in planning and installation of streambank protection and channel stabilization measures.
	Small Watershed Program - PL-566	Technical assistance in planning and cost-sharing assistance to accelerate the streambank protection and channel stabilization in approved projects.
	Resource Conservation and Development Program	Technical assistance in planning and cost-sharing assistance to accelerate the streambank protection and channel stabilization in project areas.
	Agricultural Conservation Program	Cost-sharing assistance for streambank protection and grade stabilization.
	Community Development Loan Program	Loans for installing streambank protection and channel stabilization.
	Rural Clean Water Program	Cost-sharing assistance for installation of best management practices in designated project areas where erosion is creating critical water quality problems.

USDA PROGRAMS

Forest Service Multiple Use - Sustained Yield Act

Recreation

This Act provides for the management and development of the recreation resource on national forests. Forest Service recreation programs are coordinated with the private sector and other government agencies to avoid duplication of effort and to assure that programs are complementary. The private sector is encouraged to provide needed public recreation facilities on national forestlands. Implementation of the plan would require additional funding for planning, construction, and operation of needed recreation facilities.

Rangeland

Under authorities of this Act, forest resources on national forestlands are managed to conserve the land and its natural vegetation while providing feed for domestic livestock and wildlife. Under the multiple use management concept, grazing lands are also required to be managed for their watershed, wildlife, and recreation values. Intensive programs for rehabilitating low-producing forest range areas to increase the potential for forage production are an important part of the Forest Service range program.

Timber Management Program

This program includes the various management practices designed to improve the vigor, stocking, composition, productivity, and quality of forest stands. A goal of timber management is to make forests more profitable through sustained production of more and better timber products.

The Preferred Plan requires an increase in timber stand improvement (TSI) activity that is approximately double the on-going program. This higher rate would eliminate the backlog of needed TSI work by the year 2000.

Watershed Improvement Program

This program involves planning and implementing measures for the protection, conservation, and improvement of land and water resources.

Forest Service Cooperative Forestry Assistance Act of 1978 - Public Law 95-313

Under this program the Forest Service is authorized to work through and in cooperation with State Foresters and equivalent State officials in implementing Federal programs affecting non-federal forestland by providing assistance in (1) advancement of forest resource management; (2) encouragement of the production of timber; (3) prevention and control of insects and diseases affecting trees and forests; (4) prevention and control of rural fires; (5) efficient utilization of wood and wood residues, including the recycling of wood fiber; (6) planning and conduct of urban forestry programs; (7) improvement and maintenance of fish and wildlife habitat; and (8) forest resource planning, training, and technology implementation.

This program complements the policies and direction set forth in the Forest and Rangeland Renewable Resources Planning Act of 1974.

Soil Conservation Service Assistance to Conservation
Districts - Public Law 46

Under the authorities of this program, the Soil Conservation Service through local conservation districts assists both individuals and groups in the planning and application of needed soil and water conservation on private lands. The implementation of a large portion of the elements in the Preferred Plan could be accomplished through this program with an acceleration of technical assistance to soil conservation districts.

The Small Watershed Program - Public Law 566

The Small Watershed Program (PL-566) administered by the Soil Conservation Service provides assistance to sponsoring local organizations in planning and carrying out a program for the development, use, and conservation of the soil and water resources of a small watershed area.

The Preferred Plan elements in approved watershed projects including erosion control, irrigation, and recreation could be implemented. Treatment and protection of federally owned lands within such project could be included.

A substantial increase in the level of this program will be needed if the opportunities it provides for implementing the Preferred Plan are to be realized.

Resource Conservation and Development Program (RC&D)

The Resource Conservation and Development Program (RC&D) administered by the Soil Conservation Service is designed to expand the economic opportunity for people in a given area. Under the program, USDA agencies provide technical, cost-sharing, and loan assistance to local sponsors by developing and carrying out action plans for conservation and improvement, development, and wise use of natural resources. The RC&D Program can be utilized to implement the Preferred Plan in approved RC&D project areas where group action is needed to solve erosion, irrigation, recreation, and related problems.

The RC&D Program provides an alternative vehicle for implementing the Preferred Plan in approved RC&D project areas. As the Preferred Plan is implemented, opportunities for RC&D action can be identified and proposed.

Agricultural Conservation Program (ACP)

The Agricultural Conservation Program (ACP) administered by the Agricultural Stabilization and Conservation Service provides funds for cost-sharing with individuals and groups of landowners and operators for the installation of conservation practices. To be effective in the acceleration of the land treatment, as outlined in the Preferred Plan, the present level of cost-sharing assistance under the program would need to be increased.

The ACP program could be used to implement the plan elements associated with irrigated land, dry cropland, rangeland, private forestland and streambank stabilization.

Farmers Home Administration Loan Programs (FmHA)

The Farmers Home Administration is authorized to make loans to various non-federal landholders for the implementation of various land and water development measures. Landholders eligible for these loans are public and quasi-public bodies, nonprofit corporations, and private individuals or groups owning land.

Loan assistance is available for plan elements associated with the development of recreation areas, irrigation facilities, forestry, and land treatment measures including erosion control. Loans from FmHA may also be used to pay the local share of most watershed projects and RC&D measures.

The total annual local commitment to implement the Preferred Plan is approximately 6.8 million dollars (Table VII). The FmHA loan program would need to provide a significant portion of this amount.

Table VII--Estimated cost^{1/} for implementation of the Preferred Plan,
Upper Snake River Basin, Year 2000

Plan elements	Total (-----thousands-----)		
	Federal	Local	
Develop picnic facilities	507.7	456.9	50.8
Develop camping facilities	1,533.5	1,380.1	153.4
Provide interpretative facilities & services	237.0	237.0	N.A. ^{2/}
Replace irrigation water delivery system structures	3,700.0	1,850.0	1,850.0
Irrigated cropland treatment	7,560.0	3,780.0	3,780.0
Dry cropland treatment	825.1	660.1	165.0
Rangeland treatment	3,907.7	3,126.2	781.5
Forest land treatment	646.7	614.3	32.4
Channel protection & stabilization	22.7	22.7	N.A. ^{2/}
Technical assistance	3,833.0	3,833.0	None

^{1/} Dollar requirement per year for 20 years (1980-2000).

^{2/} N.A. "Not Available" - These local costs are normally identified with land rights costs.



Stanley Lake
SCS Photo

ALTERNATIVE PLANS

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IV

CHAPTER IV

ALTERNATIVE PLANS

INTRODUCTION

Enhancement of Environmental Quality (EQ) and National Economic Development (NED) are the ultimate objectives of the Upper Snake River Basin Cooperative Study. Only specific problems were addressed in the study. It is comprehensive in the sense that alternative plans were developed to achieve some degree of economic development or environmental enhancement for which USDA programs could provide solutions. These solutions are identified as alternative plan elements.

Two alternative plans were formulated--a plan emphasizing environmental quality and a plan emphasizing economic development. All elements in the plans are intended to address one or both of the objectives, enhancing EQ or developing the economic base (NED).

The "Without Plan Condition," a third alternative, includes the activity that would occur without the Cooperative River Basin study effort. It is displayed in Tables X and XII along with the EQ and NED plans to provide an aid in selecting the Preferred Plan. The Without Plan also provides a measure of plan effectiveness.

A large number of possible elements were considered by the study staff. Those selected for inclusion represent the best judgment of the study staff tempered by input from state agencies and public inputs received through the Idaho State Study Team. 1/

1/ Representatives of state and federal agencies associated with Pacific Northwest River Basin Planning in Idaho.

Tables VIII-XII display the two alternative plans, their costs, benefits, impacts, and effectiveness. Three accounts were used to display plan effects--national economic development, environmental quality, and social well being.



Fishing in the Lost River Area
SCS Photo

Table VIII--Plan elements for the environmental quality (E.Q.) and national economic development (N.E.D.) alternative plans, Upper Snake River Basin, Year 2000

<u>Plan elements</u>	<u>Unit</u>	<u>E.Q. plan</u>	<u>N.E.D. plan</u> ^{1/}
Develop picnic facilities	Sites	1,850	4,256
Develop camping facilities	Sites	5,000	9,650
Provide interpretative facilities and services:			
Visitor Centers	No.	5	-
Interpretative Signs	No.	60	-
Brochures (10,000 copies of each type)	No.	28	-
Demonstration sites	No.	2	-
Conducted Tour areas	No.	3	-
Contact Stations	No.	15	-
Replace irrigation water delivery system structures	No.	-	37,000
Irrigated cropland treatment:			
Improve on-farm surface irrigation	Acres	400,000	400,000
Convert surface irrigation to sprinkler	"	80,000	80,000
Chisel row cropland in the fall	"	64,920	-
Plant close-growing crops	"	56,350	-
Terrace systems	Feet	728,900	-
Convert to permanent cover	Acres	1,220	-
Dry cropland treatment:			
Stubble mulch, contour farming, & minimum tillage	Acres	526,420	552,500
Terrace systems	Feet	26,948,100	-
Strip cropping	Acres	79,200	-
Convert to permanent cover	Acres	25,780	-

Table VIII--Plan elements for the environmental quality (E.Q.) and national economic development (N.E.D.) alternative plans, Upper Snake River Basin, Year 2000 (cont.)

<u>Plan elements</u>	<u>Unit</u>	<u>E.Q. plan</u>	<u>N.E.D. plan</u>
Rangeland treatment:			
Range seeding	Acres	1,740,000	1,740,000
Brush management	"	512,000	512,000
Fencing for management	Miles	4,504	4,504
Water development	No.	1,126	1,126
Forest land treatment:			
Gully stabilization	Miles	515	-
Sheet erosion control	Acres	51,013	-
Rehabilitate eroding abandoned roads and trails	Miles	788	-
Restoration of eroding mined areas	Acres	1,796	-
Stabilize eroding lake and reservoir shorelines	Miles	48	-
Timber stand improvement	Acres	-	28,500
Streambank protection and channel stabilization	Feet	2,323,000	132,000

1/ Although all plan elements have economic benefits, they were not included in the N.E.D. Plan unless they were cost effective.

RECREATION FACILITY DEVELOPMENT

Projected increases in population, per capita income, leisure time, and mobility will increase the demand for recreation activity in the Basin. Proper planning will necessitate research on user attitudes and preferences for the type and location of recreational experience the public desires. Recreationists need to be informed of remote or little-known areas and their unique features to entice them away from heavily used areas. Barriers such as poor accessibility, inadequate facilities, etc. need to be removed.

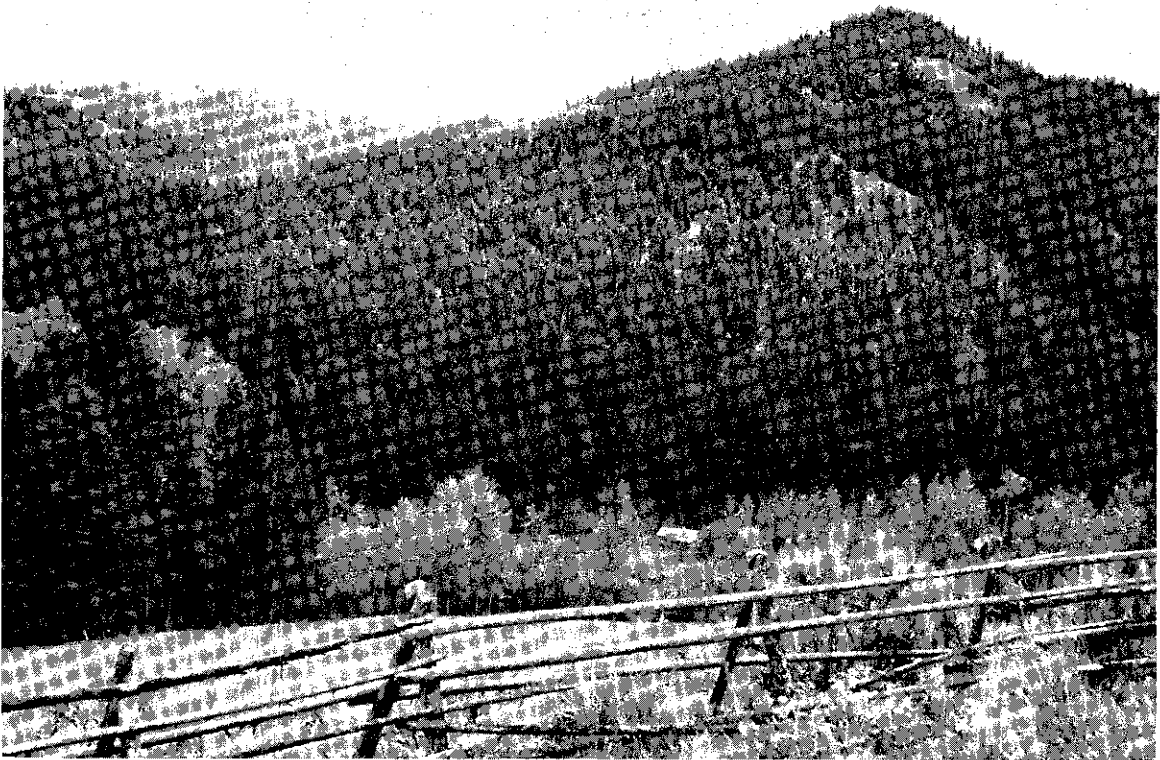
The Without Plan Condition represents current levels of planning, public information, and facility development. This will result in continued overuse and deterioration of the recreational resource in some areas of the Basin.

The EQ plan emphasizes the need to increase research on user attitudes to plan substitute outdoor recreation areas and/or activities. Facilities would be planned and developed to disperse recreationists and reduce their impact on an area with a minimum disturbance of the natural environment.

The development of interpretative facilities and other public information programs would enhance environmental quality by guiding recreationists away from overused areas.

The NED plan calls for increased recreational development on private, state, and federally owned lands. This additional development would complement present recreational sites and reduce the impact on overused facilities.

Entrepreneurs would be provided with technical, legal, and financial assistance to encourage recreational development where it is needed, especially near population centers. Long-term leasing of publicly owned lands where appropriate would be encouraged.



Ranch Developed for Recreational Use
SCS Photo

REPLACE IRRIGATION WATER DELIVERY SYSTEM STRUCTURES

The analysis of irrigation efficiency considers the complexity of water supplies, present diversions, and reuse patterns to draw conclusions about potential impacts of improvements in irrigation water distribution.

The Without Plan presumes structures would be replaced or renovated on a crisis basis. Surface irrigation systems would be improved on about 50 percent of the projected unimproved irrigated acres. Irrigation water management would be improved on about 25 percent of the irrigated cropland.

The NED plan would provide for the replacement and renovation of structures which will become obsolete by the year 2000. Surface irrigation systems would be improved on 80 percent of projected unimproved irrigated acres for both the NED and EQ alternatives. Irrigation water management would be improved on about 70 percent of the irrigated cropland.



Irrigation Water
Delivery Structure
SCS Photo

LAND TREATMENT

The public must be made aware of the erosion problem and its impact on the land users, consumers, and the nation's productive capacity now and in the future. In order to conserve the soil resource, erosion on all land should be reduced to a tolerable rate "T". 1/ The Without Plan Condition represents the present rate of applying conservation measures for reducing soil erosion.

The EQ plan would include the application of conservation practices necessary to reduce erosion to tolerable soil loss rates and maintain most agricultural production. All agricultural lands would be adequately protected by the end of the planning period (the year 2000). The NED plan emphasizes the control of erosion to the extent economically feasible.

Under the Without Plan Condition, USDA financial and technical assistance will continue at their present rate. The EQ plan would require substantially more USDA assistance to reduce the erosion to tolerable rates. The NED plan would require less assistance than the EQ plan but more than the Without plan.

1/ "T" is defined as the maximum gross erosion rate expressed in tons per acre per year that will sustain productivity of the soil resource.

Irrigated Cropland Treatment

The EQ plan calls for controlling erosion to allowable limits and improving on-farm irrigation. Conservation practices would be applied in the following sequence until the goals are accomplished; (1) on-farm irrigation improvement, (2) convert surface irrigation to sprinkler, (3) chisel row cropland in the fall, (4) plant close growing crops, (5) terrace systems, and (6) convert to permanent cover. Only practices (1) and (2) would be applied with the NED plan.



Improved Irrigated Cropland Pasture
SCS Photo

Dry Cropland Treatment

The following practices would be applied to dry cropland to reduce erosion. The order in which the practices are listed indicates the sequence in which they would be applied in the EQ plan to attain allowable limits. These practices are (1) stubble mulch, contour farming, and minimum tillage, (2) terrace systems, (3) strip cropping, and (4) convert to permanent cover. Practices applied under the NED plan would be limited to item (1) above.

Rangeland Treatment

Erosion rates on rangeland are lower than the established tolerable rate necessary to protect the land resource. Range management and treatment practices to increase forage production are included in the NED plan and are generally economically feasible. These practices are also included in the EQ plan because of the vast area involved and the concern of ranchers and sportsmen in the Basin with improving the range condition. Generally this will require an increase in the desirable vegetative cover to achieve a better balance between grasses, forbs and shrubs. A healthy, vigorous well-balanced vegetative cover is complementary to both livestock and wildlife.

Forestland Treatment

Erosion rates on most forestlands are usually less than the established tolerable rate necessary to protect the land resource. Forestland erosion problems are generally associated with disturbed

areas such as harvest sites, burned areas, and roadways. Adequate reforestation of burns and harvested sites is accomplished under present forest management practices.

Treatment for erosion control under the EQ plan consists of one or more of the following: gully stabilization, sheet erosion control, rehabilitation of abandoned roads and trails, mine area restoration, and lake and reservoir shore stabilization.

The EQ plan emphasizes esthetic values and provides for increased wood fiber production on all forestlands. Harvesting methods and other management practices would be directed at minimizing environmental deterioration.

The NED plan stresses improved management and cooperative assistance to increase wood fiber production. Primary emphasis is on timber stand improvement activities to increase the supply of harvestable timber. Economic feasibility will determine management practices including harvesting sites and methods.

STREAMBANK PROTECTION AND CHANNEL STABILIZATION

Erosion of streambanks and channels is divided into two categories--moderate and severe. The EQ plan would treat selected reaches of both moderate and severely eroded streambanks and channels. The NED plan would treat portions of the severely eroded streambanks and channels. The Without Plan treatment applies only to the most critical areas as defined by the hazard of continued erosion to nearby structures such as roads, canals, reservoirs, and urban development.

Table IX--Impacts of the environmental quality alternative, Upper Snake River Basin, Year 2000

Environmental Quality Account

Beneficial and Adverse Effects

A. Areas of Natural Beauty	B. Quality considerations (cont.)
Installation of picnic sites, campsites, and interpretative facilities will impact 1,144 acres of natural areas. This development requires 67 sewage treatment stations, 62 sanitary dumps, and 78 miles of road construction. Installation of picnic sites, campsites, and interpretative facilities will reduce the recreation impact on areas currently experiencing overuse and resource deterioration. Reduced erosion will enhance the visual quality of forest land, rangeland, and cropland through improved vegetative cover.	The 27,000 acres of cropland committed to permanent cover will enhance the quality of land and water resource. The 5,104 miles of terrace systems will enhance quality of land and water resources and increase protection. Reduction of 2,552,000 tons of erosion per year on 552,200 acres of dry land will enhance the quality of the land resource and enhance the quality, conservation, and timely distribution of water. Reduced sedimentation through erosion control will significantly enhance stream quality.
Quality considerations of water, land, and air resources.	Installation of interpretative facilities, picnic sites, and campsites will help to alleviate overcrowding in areas experiencing deterioration; and enhance the recreational experience.

Table IX--Impacts of the environmental quality alternative, Upper Snake River Basin, Year 2000 (cont.)

Environmental Quality Account

Beneficial and Adverse Effects

B. Quality considerations (cont.)

Erosion control will reduce dust and improve air quality.

Improved on-farm irrigation will:

- lower the water table in certain areas
- reduce wetlands
- provide additional land use alternatives
- reduce diversion requirements and increase streamflows in some reaches
- reduce irrigation return flows and improve water quality in receiving streams
- reduce irrigation applications which will reduce leaching and decrease farm chemical requirements

Treatment of gullies, burns, abandoned roads, harvested areas, mined areas, and lakes and reservoir shorelines on forest land will:

- improve forest resource
- reduce erosion
- reduce sediment and improve water quality
- improve scenic quality

Rangeland management practices will:

- reduce erosion
- reduce sediment
- improve visual quality
- improve vegetation cover
- enhance range resource
- enhance conservation and timely distribution of water

B. Quality considerations (cont.)

Channel stabilization and protection of 2,323,000 feet of streambank will:

- reduce erosion
- reduce sediment
- improve visual quality
- alter fish and wildlife habitat
- protect the land resource from stream encroachment

C. Biological resources and selected ecosystems

Aquatic ecosystems will be enhanced by:

- reduced diversions which increase streamflows
- improved quality of irrigation return flows
- reduced quantity of return flows
- reduced erosion
- reduced sediment
- land treatment which conserves and enhances timely distribution of water

Waterfowl habitat will be altered by:

- changes in water flow during nesting and resting periods
- reduced waste water runoff will decrease the size and number of ponds and marshes
- land treatments which will increase the availability of feed and cover

Table IX--Impacts of the environmental quality alternative, Upper Snake River Basin, Year 2000 (cont.)

Environmental Quality Account

Beneficial and Adverse Effects

C. Biological resources (cont.)

Upland bird habitat will be:

- decreased by conversion of 80,000 acres of sprinkler irrigation development
- decreased by improved surface irrigation that will reduce cover and location of habitat areas
- increased by dry cropland treatments including 526,420 acres of stubble mulch, 26,948,100 feet of terraces, 19,200 acres of strip cropping, and 25,780 acres converted to permanent cover
- altered by sagebrush removal and reseeding of rangeland
- improved irrigation water management will reduce vector control problems

D. Archeological and historical

- implementation of plan elements will not encroach upon historical, archeological, and cultural resources
- interpretative facilities will increase public knowledge and understanding of historical, archeological, and cultural resources

E. Irreversible or irretrievable commitments

- channel stabilization and streambank protection on 2,323,000 feet of streambank represents an irreversible commitment of resources
- installation of picnic sites, campsites, and interpretative facilities will commit 1,144 acres of natural areas to recreation development
- conversion of 27,000 acres of cropland to permanent cover

Table IX--Impacts of the environmental quality alternative, Upper Snake River Basin, Year 2000 (cont.)

National Economic Development Account

<u>Average annual^{1/}</u>		<u>Average annual^{1/}</u>	
Beneficial Effects		Adverse Effects	
Value to users of increased outputs of goods and services		Value of resources required for a plan	
Increase picnic recreation benefits by 685,000 recreation days	\$ 1,369,000	Installation cost OM&R costs	\$ 314,800 1,063,900
Increase camper recreation benefits by 920,000 recreation days	3,680,000	Installation cost OM&R costs	1,133,200 1,670,000
Increase interpretative recreation benefits by 655,000 recreation days	655,400	Installation cost OM&R costs	338,100 481,800
Land Treatment			
Irrigated cropland	18,562,000	Installation cost OM&R costs	10,843,600 6,892,000
Dry cropland	722,500	Installation cost OM&R costs	2,722,400 558,200

Table IX--Impacts of the environmental quality alternative, Upper Snake River Basin, Year 2000 (cont.)

National Economic Development Account

		<u>Average annual^{1/}</u>	<u>Average annual^{1/}</u>
Beneficial Effects			
Land Treatment (cont.)			
Rangeland		\$ 8,237,200	Installation cost OM&R costs \$ 5,573,900 2,157,400
Forest land		Not evaluated	Installation cost OM&R costs 790,300 588,900
Streambank protection and channel stabilization		Not evaluated	Installation cost OM&R costs 262,600 73,600
			Project administration and technical assistance 5,425,800
Total beneficial effects		\$33,226,100	Total adverse effects \$40,890,500
			Net beneficial effects -\$ 7,664,400

^{1/} 1978 price base amortized at 6-7/8 percent interest for 50 years.

Table IX--Impacts of the environmental quality alternative, Upper Snake River Basin, Year 2000 (cont.)

Social Well-Being Account

Beneficial and Adverse Effects

A. Employment and income 1/

Creates 4,300 new jobs during the evaluation period.

Creates secondary benefits distribution of \$11.1 million during the evaluation period.

B. Life, health, and safety

Additional picnic and camping facilities will reduce activities in undesignated areas, thereby reducing traffic, personal safety hazards, and waste disposal problems.

Development of additional recreational facilities and services will increase the availability of emergency assistance to recreationists.

Erosion control will reduce sediment deposits on roads reducing road hazards.

Reduced runoff from treated lands will reduce problems associated with undercutting along roadbeds and bridges and contamination of domestic water supplies.

B. Life, health, and safety (cont.)

Streambank protection will reduce hazards associated with bank, bridge, and road failures.

Improved irrigation efficiency will decrease the number of stagnant ponds, thereby reducing vector control problems.

Timely replacement of obsolete irrigation systems will remove hazards associated with structural failures.

C. Recreational opportunities

Creates 2,259,940 recreation activity days.

Reduced irrigation diversion will increase in-stream flow, thus increasing fish population and fisherman recreation days.

Reduced number and size of ponded areas will diminish and relocate waterfowl and shift the location of hunting.

1/ These figures represent an average annual impact on employment and income throughout the 50-year evaluation period. Most of this will occur in the first 20 years, when construction will be taking place.

Table X--Present condition and projected plan effects, environmental quality alternative,
Upper Snake River Basin

Concerns	Unit	Present Condition	Year 2000			Year 2020		
			Without Plan	With Plan	Plan Effects (C. 2-3=4)	Without Plan	With Plan	Plan Effects (C. 5-6=7)
			2	3	4	5	6	7
(-----thousands-----)								
Shortage of recreation facilities:								
Picnic	Recreation days	1,062	1,575	890	685	2,062	1,377	685
Camping	Recreation days	1,311	1,776	856	920	2,184	1,264	920
Interpretative facilities and services								
	Recreation days	662	670	15	655	850	195	655
Soil erosion on:								
Irrigated cropland	Av. ann. soil loss-tons	6,250	5,585	3,888	1,697	5,045	4,046	999
Dry cropland	" " "	6,128	5,497	2,945	2,552	4,931	2,945	1,986
Rangeland	" " "	2,601	2,304	1,643	661	1,977	1,594	383
Forest land	" " "	236	224	220	4	213	210	3
Stream channels	" " "	187	196	126	70	206	136	70
Banks with moderate to severe erosion								
	Feet	8,976	10,032	7,709	2,323	10,035	7,709	2,326

Table X--Present condition and projected plan effects, environmental quality alternative,
Upper Snake River Basin (cont.)

Concerns	Unit	Year 2000			Year 2020		
		Present Condition	Without Plan	With Plan Effects (C. 2-3=4)	Without Plan	With Plan Condition	Plan Effects (C. 5-6=7)
		1	2	3	4	5	6
		-----thousands-----					
		(------)					
Inadequate irrigation water delivery system structures 1/	No.	13	64	64	0	73	73
Unimproved on-farm irrigation	Acres	1,035	809	329	480	651	331
Deficient rangeland condition	"	7,100	5,915	3,650	2,265	4,500	3,250
Inadequate supply of wood fiber:							1,250
Saw logs	Cubic feet needed	1,405	3,420	3,420	0	16,196	16,196
Other	"	0	37	37	0	282	282

1/ Obsolescence of deteriorating structures, although difficult to assess, was determined to occur at the end of the planning period.

Note: The plan effects for the years 2000 and 2020 are the same for some concerns due to the continued decline of the Without Plan Condition.

Table XI--Impacts of the national economic development alternative,
Upper Snake River Basin, Year 2000

Environmental Quality Account

Beneficial and Adverse Effects

A. Areas of natural beauty

Installation of picnic sites and campsites will impact 2,276 acres of natural area. Development will require 133 sewage treatment stations, 133 sanitary landfills, and 152 miles of road construction.

Installation of picnic sites and campsites will significantly reduce the adverse impacts on areas currently experiencing overuse and resource deterioration, enhancing recreation experiences.

Land treatments to increase production of forest land, rangeland, and cropland, will reduce erosion and improve visual quality through improved vegetative cover.

B. Quality considerations of air, land, and water resources

Installation of picnic sites and campsites will alleviate overcrowding in areas experiencing deterioration, enhancing the recreation experience

B. Quality considerations (cont.)

Reduction of 1,408,000 tons of erosion on 552,000 acres of dry cropland will enhance the quality of the land resources, and improve quality, conservation, and timely distribution of water.

Erosion control will reduce sediment and improve stream quality.

Erosion control will reduce dust and improve air quality.

Improved on-farm irrigation will:

- Lower the water table in certain areas
- reduce wetlands
- reduce land damage caused by elevated water table
- Reduce diversion requirements and increase streamflows in some reaches
- reduce irrigation return flows and improve water quality in receiving streams
- reduce irrigation applications which will reduce leaching and decrease farm chemical requirements

Table XI--Impacts of the national economic development alternative,
Upper Snake River Basin, Year 2000 (cont.)

Environmental Quality Account

Beneficial and Adverse Effects

B. Quality considerations (cont.)	C. Biological resources and selected ecosystems
Reforestation and timber stand improvement will enhance the forest resource and visual quality.	Aquatic ecosystems will be enhanced by: - increased streamflows from reduced diversions - improved stream quality from reduced return flows
Rangeland management practices will: - reduce erosion - reduce sediment - improve vegetative cover - improve range resource - enhance wildlife habitat - enhance water conservation and timely distribution of water	- reduced erosion and sedimentation - land treatment which conserves and enhances timely distribution of water
Channel stabilization and protection of 132,000 feet of streambank will:	Waterfowl habitat will be altered by: - changes in streamflow regime during nesting and migratory nesting periods - reduced runoff from improved irrigation water management which will reduce number and size of ponding areas and marshes - land treatments will increase availability and location of cover and feed
- reduce erosion - reduce sediment - improve visual quality - alter fishery and wildlife habitat - protect certain road embankments, bridges, and commercial properties	

Table XI--Impacts of the national economic development alternative,
Upper Snake River Basin, Year 2000 (cont.)

<u>Environmental Quality Account</u>		
Beneficial and Adverse Effects		
C.	Biological resources (cont.)	E. Irreversible or irretrievable commitments
	Upland bird habitat will be:	
	- decreased by conversion of 80,000 acres to sprinkler irrigation	Installation of picnic and campsites will commit 2,276 acres of natural areas to recreation development.
	- decreased by improved surface irrigation which will reduce cover and location of habitat areas	Channel stabilization and streambank protection structures on 132,000 feet of streambank represents an irreversible commitment of resources.
	- improved by 552,500 acres of stubble mulch	
	- altered by sagebrush removal and reseeding of rangeland	
	- improved irrigation water management will reduce vector control problems	
D.	Archeological and historical	
	Implementation of plan elements will not encroach upon historical, archeological, or cultural resources.	

Table XI--Impacts of the national economic development alternative,
Upper Snake River Basin, Year 2000 (cont.)

National Economic Development Account

<u>Average annual</u> ^{1/}		<u>Average annual</u> ^{1/}	
Beneficial Effects		Adverse Effects	
Value to users of increased outputs of goods and services		Value of resources required for a plan	
Increase picnic recreation benefits by 1,574,830 recreation days	\$ 3,149,700	Installation cost OM&R costs	\$ 724,200 2,447,600
Increase camper recreation benefits by 1,775,600 recreation days	7,102,400	Installation cost OM&R costs	2,187,400 3,223,500
Cost savings from replacement of irrigation water delivery structures	5,865,300	Installation cost Maintenance costs	5,277,700 148,000
Irrigated cropland	26,299,000	Land treatment (including improved irrigation systems) Installation cost OM&R costs	10,783,600 6,791,000

Table XI--Impacts of the national economic development alternative, Upper Snake River Basin, Year 2000 (cont.)

National Economic Development Account

Average annual ^{1/}		Average annual ^{1/}	
Beneficial Effects		Adverse Effects	
Dry cropland	\$ 1,592,500	Installation cost OM&R costs	\$ 696,400 0
Rangeland	8,237,200	Installation cost OM&R costs	5,573,900 2,157,400
Forest land	412,000	Installation cost OM&R costs	132,100 0
Reduction in loss of property from streambank protection and channel stabilization	38,000	Installation cost OM&R costs	28,200 7,500
		Project administration and technical assistance	5,711,400
Total beneficial effects	\$52,696,100	Total adverse effects	\$45,889,900
		Net beneficial effects	\$ 6,806,200

1/ 1978 price base amortized at 6-7/8 percent interest for 50 years.

Table XI--Impacts of the national economic development alternative,
Upper Snake River Basin, Year 2000

Social Well-Being Account

Beneficial and Adverse Effects

A. Employment and income 1/	B. Life, health, and safety (cont.)
Creates 5,900 new jobs during the evaluation period.	Streambank protection will reduce hazards associated with bank, bridge, and road failures.
Creates secondary benefits distribution of \$13.4 million during the evaluation period.	Improved irrigation efficiency will decrease the number of stagnant ponds, thereby reducing vector control problems.
B. Life, health and safety	Timely replacement of obsolete irrigation systems will remove hazards associated with structural failures.
Additional picnic and camping facilities will reduce activities in undesignated areas, thereby reducing traffic, personal safety hazards, and waste disposal problems.	C. Recreational opportunities
Development of additional recreational facilities and services will increase the availability of emergency assistance to recreationists.	Creates 3,350,430 recreation activity days.
Erosion control will reduce sediment deposits on roads reducing road hazards.	
Reduced runoff from treated lands will reduce problems associated with undercutting along roadbeds and bridges and contamination of domestic water supplies.	

1/ These figures represent an average annual impact on employment and income throughout the 50-year evaluation period. Most of this will occur in the first 20 years, when construction will be taking place.

Table XII--Present condition and projected plan effects, national economic development alternative,
Upper Snake River Basin

Concerns	Unit	Year 2000			Year 2020			
		Present Condition	Without Plan	With Plan Condition	Plan Effects (C. 2-3=4)	Without Plan	With Plan Condition	Plan Effects (C. 5-6=7)
(-----thousands-----)								
Shortage of recreation facilities:								
Picnic	Recreation days	1,062	1,575	0	1,575	2,062	486	1,575
Camping	Recreation days	1,311	1,776	0	1,776	2,184	408	1,776
Soil erosion on:								
Irrigated cropland	Av. ann. soil loss-tons	6,250	5,585	4,295	1,290	5,045	4,445	600
Dry cropland	" "	6,128	5,497	4,089	1,408	4,931	4,044	887
Rangeland	" "	2,601	2,304	1,643	661	1,977	1,594	383
Forest land	" "	236	224	224	0	213	213	0
Stream channels	" "	187	196	177	19	206	187	19
Banks with moderate to severe erosion	Feet	8,976	10,032	8,844	1,188	10,035	8,847	1,188

Table XII--Present condition and projected plan effects, national economic development alternative, Upper Snake River Basin (cont.)

Concerns	Unit	Year 2000				Year 2020			
		Present Condition	Without Plan		Plan Effects (C. 2-3=4)	Without Plan		With Plan Condition	Plan Effects (C. 5-6=7)
			Plan	2		Plan	5		
		1		3	4		6		7
(-----thousands-----)									
Inadequate irrigation water delivery system structures 1/	No.	13	64	27	37	73	36	37	
Unimproved on-farm irrigation	Acres	1,035	809	329	480	651	331	320	
Deficient rangeland condition	"	7,000	5,915	3,650	2,265	4,500	3,250	1,250	
Inadequate supply of wood fiber:									
Saw logs	Cubic feet needed	1,405	3,383	2,091	1,292	16,196	14,904	1,292	
Other	"	0	37	11	26	282	156	26	

1/ Obsolescence of deteriorating structures, although difficult to assess, was determined to occur at end of the planning period.

Note: The plan effects for the years 2000 and 2020 are the same for some concerns due to the continued decline of the Without Plan Condition.

OTHER ALTERNATIVES

Following is a brief discussion of other alternatives or other plan elements considered and an explanation of why they were not included.

Recreation

Other alternatives considered included upgrading existing picnic and camping sites to meet established standards. These alternatives were not given further consideration because data on how many sites and what degree of upgrading was necessary to accomplish this was not available.

From the supply/demand analyses, there was an unmet demand in 1978 for additional interpretative trails and audio visual programs. Ongoing program planners anticipate these needs will be met by the year 2000; therefore, these alternatives were not given further consideration.

Other plan elements considered included programs for research on public attitudes and preferences for type and location of recreation experience desired. Also considered was an information and education program to disperse recreationists. These elements were not included in the alternative plans because the National Forest System and Experiment Stations have programs which address these concerns.

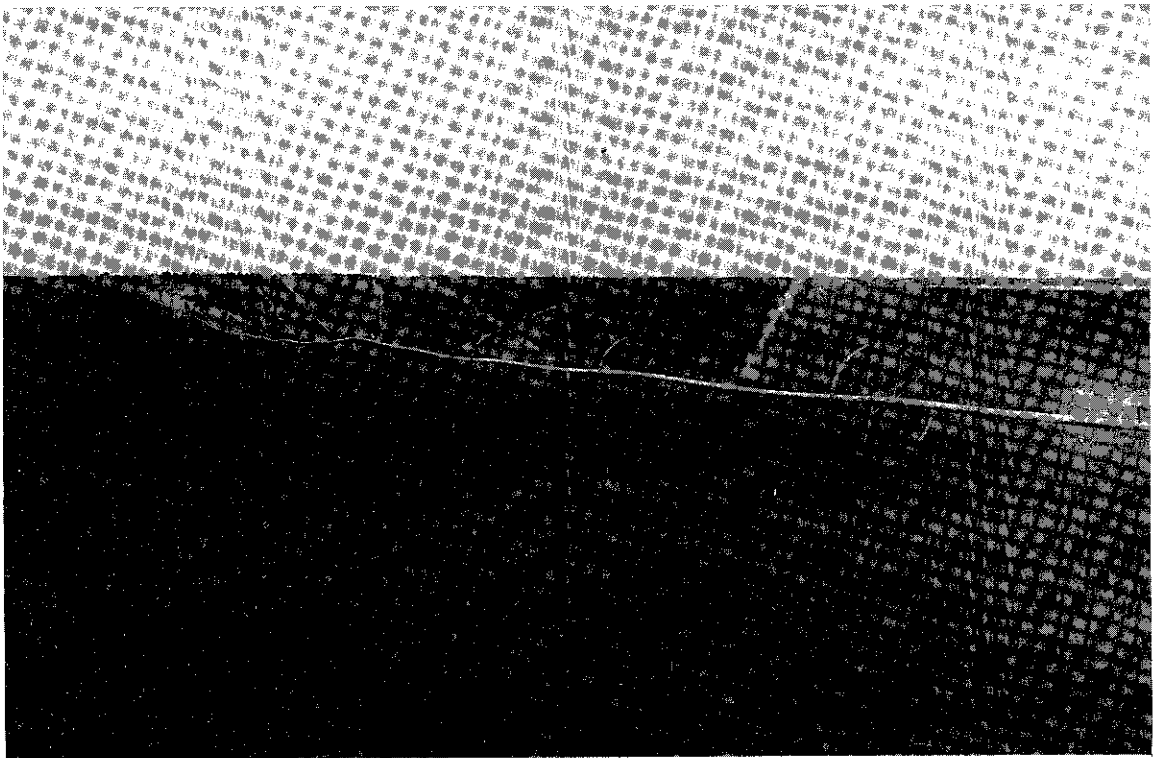
Hiking and walking, hunting, boating and water skiing, and downhill skiing were other outdoor recreational plan elements considered. Inventories indicated a surplus of land and water areas available for these activities; therefore, these alternatives were not given further consideration.

Cropland

Various alternative land treatment measures are available to reduce erosion. The level at which these treatment measures are applied will determine the amount of erosion reduction achieved. Alternative levels of land treatment were considered in developing the NED, EQ, and Preferred Plans including land treatments to reduce erosion to minimum levels. These were not included because they were both economically and socially unacceptable.

Irrigation

A more ambitious program of converting surface irrigation to sprinkler irrigation was considered to reduce erosion, reduce diversion requirements, and improve on-farm irrigation efficiency. The loss of groundwater recharge, increased energy requirements, and social and economic costs of production and operation limited the plan element considered to those lands needing to be converted to sprinkler due to topography or soil texture problem.



Sprinkler Irrigation System in Blackfoot Area
SCS Photo

The irrigation plan elements listed do not emphasize irrigation efficiency, per se, due to potential adverse effects on recharge to the Snake Plain Aquifer. Losses could be reduced by lining canals, system renovation, and canal consolidation. However, these did not warrant consideration as plan elements, since they could not be evaluated site specific. When applied generally in the Basin, canal lining, system renovation, and canal consolidation were not cost effective. Ongoing and proposed special irrigation studies will address individual system needs and application of remedial measures to carry through the concern expressed in this report.

Rangeland

Elimination of livestock grazing on certain rangeland was considered as a plan element. It was recognized however, as too impractical and unacceptable to the local people. Planned grazing systems will bring about an acceptable level of range management in a reasonable time frame.

Forestland

Reforestation was considered as a plan element to both control erosion and increase wood fiber production. Reforestation on federal forestlands is required on timber cut areas. State and private cooperative seedling programs provide for reforestation of non-federal forestlands. These two programs were considered to be adequate in the Upper Snake River Basin. Therefore, reforestation was not included in the plan elements for the alternative plans.



Planting a Seedling on Harvested Area
USFS Photo

RESOURCE BASE

CHAPTER V

R E S O U R C E B A S E

LOCATION

The Snake River Basin includes portions of Wyoming, Idaho, Utah, Nevada, Oregon, and Washington. This study, however, included only the portion in Wyoming and the portion in Idaho up stream of the Elmore-Gooding county line near King Hill. The area is referred to as the Upper Snake River Basin (Map V-1).

The Wyoming portion includes parts of Teton, Fremont, Sublette, and Lincoln Counties; Grand Teton National Park; and part of Yellowstone National Park.

The Idaho portion includes a small part of Yellowstone Park and all or part of Fremont, Teton, Madison, Bonneville, Caribou, Bannock, Bingham, Jefferson, Clark, Butte, Custer, Blaine, Power, Cassia, Minidoka, Twin Falls, Jerome, Lincoln, and Camas Counties.

The total study area is 21,089,000 acres, or 32,952 square miles. There are 3,251,000 acres, or 5,080 square miles in Wyoming and 17,838,000 acres, or 27,872 square miles in Idaho.

CLIMATE

Climate of the Upper Snake River Basin is influenced by air masses from the Pacific Northwest, from the Gulf of Mexico, and from Central Canada.

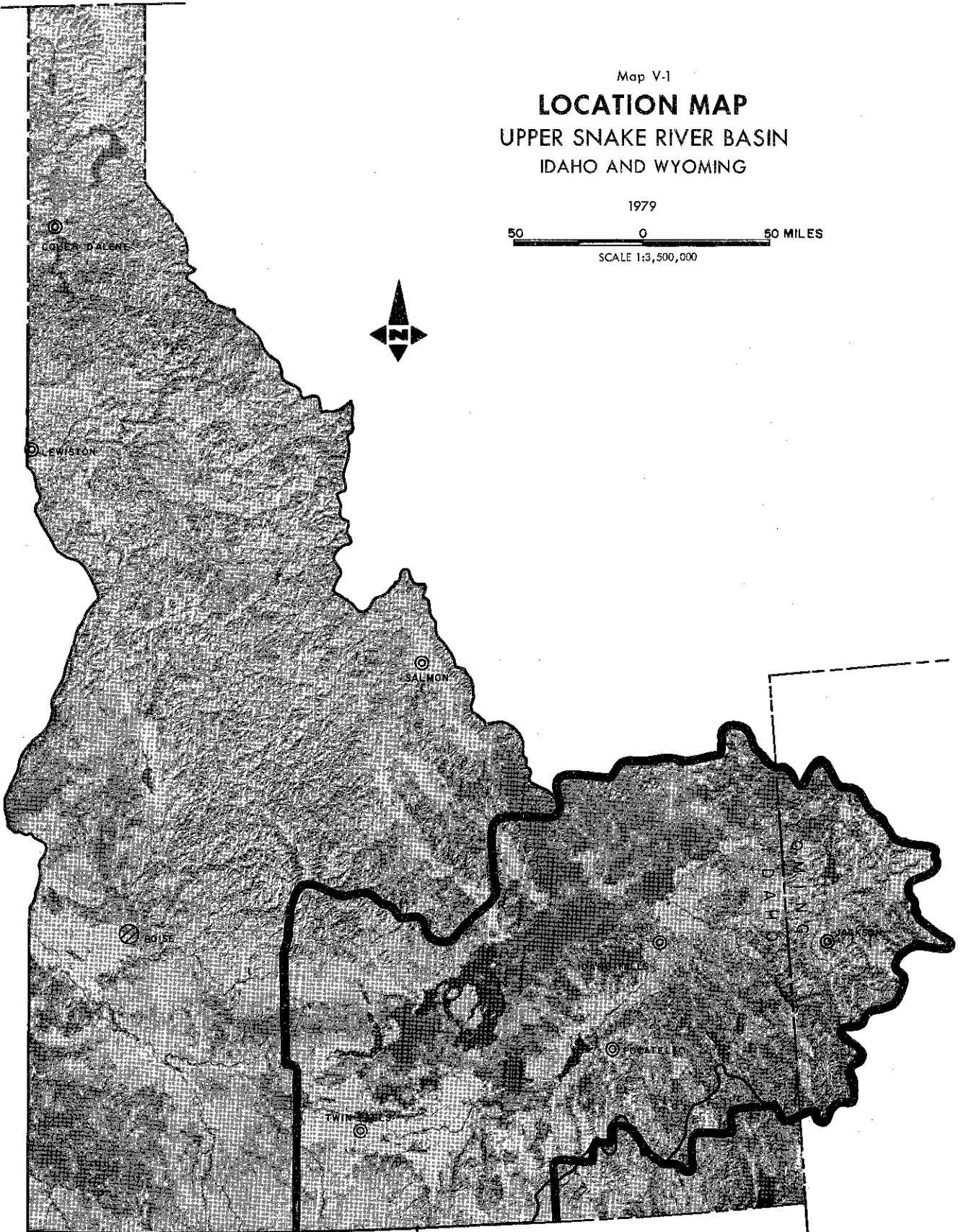
Average annual precipitation is 50 inches or more in the higher mountains, 15 to 20 inches in the foothill dry farm area, and 10 to 14

Map V-1

LOCATION MAP UPPER SNAKE RIVER BASIN IDAHO AND WYOMING

1979

50 0 50 MILES
SCALE 1:3,500,000



inches on the Snake River Plain where most of the irrigated cropland is located (Table XIII; Map V-2). Annual precipitation is almost uniformly distributed among the 12 months in the east side of the Basin, but July and August are rather dry in the west side.

Temperatures vary widely with season, elevation, and geographic location. Growing seasons are determined by the temperature regime of the location in question which results in a wide variation in cropping patterns throughout the Basin. The average annual frost-free period varies from 60 days in high valleys such as Driggs (6000 ft.) to 140 days at Burley (4200 ft.). Average annual frost-free periods and average dates of last and first frost are shown for representative climatological stations in Table XIII.

LAND

Topography

The land in the Basin consists of three general physiographic areas and four major land uses. The elevation ranges from 2600 feet near King Hill to almost 14,000 feet above sea level in the Teton Range.

The Northern Rocky Mountains on the east and north sides of the Basin have a forest cover of variable density and make up about 22 percent of the Basin. Multiple use of the forestland and rangeland occurs except on some of the alpine areas on these high mountainous uplands. The soils are stable under good vegetative cover, but become unstable from logging road construction or other disturbances. The elevation of the mountains ranges from 6500 to almost 14,000 feet above sea level.

Table XIII--Average Precipitation and Temperatures at Representative Stations,
Upper Snake River Basin

Station	Latitude		Longitude		Elev Ft.MSL	Average Annual Precip Inches		Average Temp January		Average Temp July		Average Date Below 28°	
	Deg. Min.	Deg. Min.	Deg. Min.	Deg. Min.		Of.	Of.	Of.	Of.	Of.	Of.	last first	last first
Bondurant, Wyo.	43	14	110	26	6504	23.3	33.1	7.4	56.3	1/			
Moran, Wyo.	43	52	110	35	6440	21.3	34.7	10.6	57.9	5/31	99	9/9	
Jackson, Wyo.	43	29	110	46	6244	14.8	38.0	14.2	60.9				
Driggs, Id.	43	44	111	07	6097	15.8	40.1	17.3	63.7	6/21	60	8/20	
Palixades Dam, Id.	43	20	111	12	5397	19.6	43.0	19.9	66.7				
Ashton, Id.	44	04	111	27	5220	16.9	41.5	18.1	64.5	6/10	86	9/4	
Dubois E.S., Id.	44	10	112	13	5148	10.9	43.0	17.8	69.4	5/27	118	9/22	
Idaho Falls, AP Id.	43	41	112	04	4730	8.7	44.6	19.3	69.2	5/22	122	9/21	
Mackay, Id.	43	55	113	37	5897	9.3	42.1	16.9	66.8	6/7	98	9/13	
Pocatello, AP Id.	42	55	112	26	4444	10.8	47.1	23.0	71.9	5/10	142	9/29	
Burley, AP Id.	42	32	113	46	4146	9.5	47.6	25.2	71.1	5/9	143	10/3	
Sun Valley, Id.	43	27	111	22	5240	17.0	37.5	14.4	59.5	6/3	96	9/17	
Gooding, Id.	42	58	114	43	3564	8.9	47.8	24.4	72.8	5/20	123	9/20	
Hill City, Id.	43	18	115	03	5000	14.7	40.8	15.3	65.8	6/21	61	8/21	

1/ Growing season - Average number of days above 28°

High grassy plateaus lie between the mountains and the Snake River Plain to the north and east and extend to the boundary of the Basin on the south. The plateaus make up about 60 percent of the Basin with approximately 92 percent in rangeland and 8 percent in dry cropland and other uses. The soils of the area are highly erodible by either wind or water when disturbed. The elevation of these plateaus ranges from 5000 to 7500 feet above sea level.

The Snake River Plain and its valleys make up the central part of the Basin and extend westward to the boundary of the Basin. They make up about 18 percent of the Basin containing the bulk of the Basin's population and irrigated cropland, plus small amounts of dry cropland, rangeland, and other land uses.

Soils are principally loess with alluvium in the valleys and are very erodible. Wind drift patterns and the shape of underlying basalt flows account for most land forms on the Plain. The elevation on the Plain ranges from 3200 to 5500 feet above sea level.

The combination of ownership, soils, climate, and present land use greatly influences the present and future utilization of the land resource in the Basin.

Land Ownership

Of the approximately 21 million acres in the Basin, approximately 12.4 million acres, or 60 percent of the land area, are controlled by the federal government (Map V-3; Table XIV). Approximately 7.4 million acres, or 36 percent, are privately owned. State, county, and municipal

ownerships totaling about 1 million acres make up the balance. Of the Federal lands about 5.9 million acres are administrated by the Forest Service, 5.1 million acres by the Bureau of Land Management, 0.7 million acres by the National Park Service, 0.6 million acres in the National Engineering Laboratory Reservation, and 0.1 million by other federal agencies. Slightly more than 500,000 acres of the private land are Indian lands held in trust by the federal government.

Land Use

Land use in the Basin falls into four major use categories: cropland, pasture and rangeland, forestland, and other land (Table XIV; Map V-4).

Cropland

Approximately 3.9 million acres, or 19 percent of the land areas of the Basin, are cropland. About 1.3 million acres, or 33 percent, are dry cropland. Of the 2.6 million acres of irrigated cropland, about 60 percent is surface irrigated; the remainder, or about 1 million acres, is irrigated by sprinkler.

Crops grown on the dry land consist mostly of winter wheat and barley with some oats and alfalfa for hay. The irrigated crops grown include potatoes, sugar beets, beans, small grains, corn, and alfalfa. Some seed potatoes are grown in the far eastern portion of the Basin.

Irrigated cropland has the greatest potential for expansion (Table XV; Map V-5). Large areas of rangeland and substantial areas of dry cropland have soil, topography, and climate suitable for

irrigated crops and water is physically available. Three important factors control the expansion of irrigated agriculture in the Basin.

Ownership. Most of the rangeland suitable for irrigation is federally owned and transfer to private ownership at present is difficult and slow. Large areas of the National Engineering Laboratory reservation are among the most suitable for irrigation.

Legal Water Supply. For some irrigable areas, water is available physically, but not legally, because prior appropriators have obtained right to use more water than is necessary to produce crops.

Economics. Some potentially irrigable land remains undeveloped only because the financial returns are not great enough to attract the necessary capital to develop it.

Pasture and Rangeland

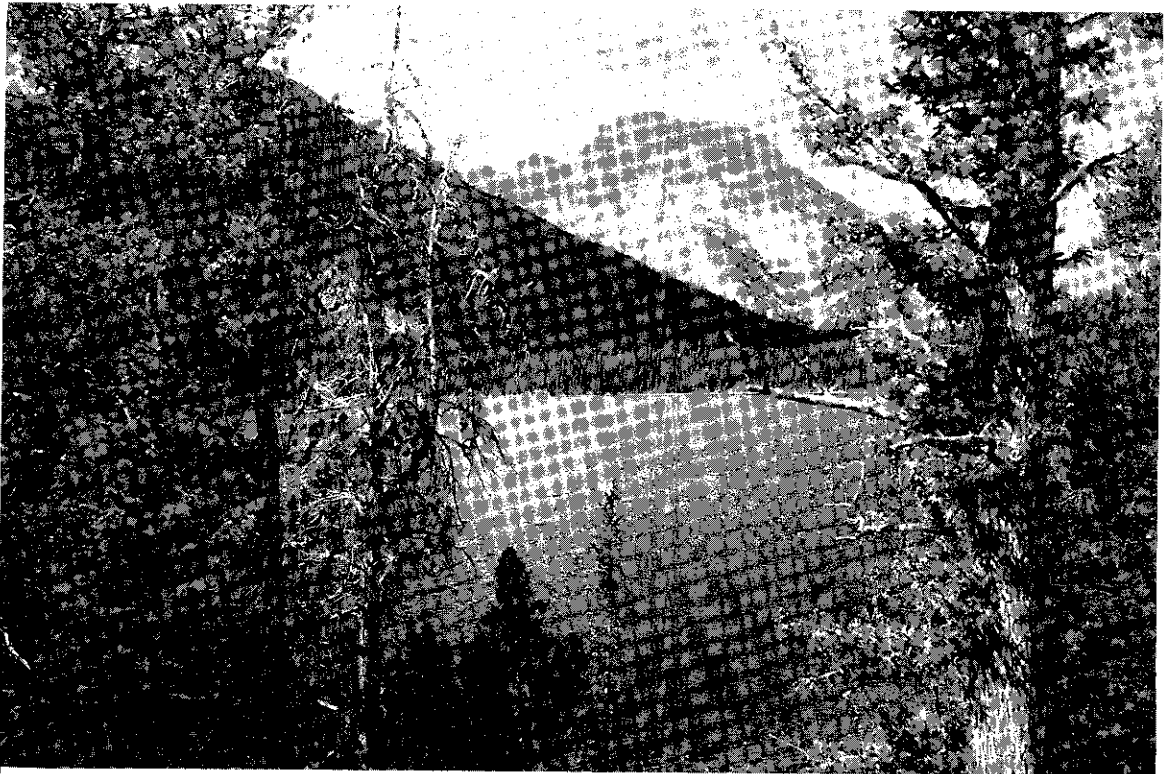
About 11.4 million acres, or 55 percent of the land areas in the Basin, are used for pasture and rangeland. The rangeland is distributed throughout the Basin except for the forested areas in the northeastern portion and the cultivated areas adjacent to the Snake River. Sagebrush is the predominant cover on 75 percent of the rangeland area. Perennial grasses, forbs and small areas of meadowland make up about 20 percent of the pasture and rangeland area. Annual grasses and forbs make up the cover on areas that have been heavily over-used.

Forestland

More than 4.5 million acres, or 22 percent of the land areas, are classified as forestland. Of this, more than 90 percent is publicly owned with about 77 percent of the public land administered by the Forest Service. Most of the forested lands are in the eastern and northern parts of the Basin.

About 2.5 million acres, or 56 percent of the forestlands, are classified as commercial forest. Douglas fir and lodgepole pine make up most of the inventoried volume with some true fir and spruce in the higher elevations. The remaining 44 percent is classified as noncommercial forestland. Of this, 38 percent is classified as productive but reserved from cutting. The balance is classified nonproductive from a commercial forest standpoint.

More than 2 million acres of forestlands are classified as forest range and are grazed by cattle, sheep, and big game.



Jenny's Lake in the Teton Range
SCS Photo

Forestlands are important watershed areas in the Basin. Although only 22 percent of the land area of the Basin is forested, 52 percent of the total runoff is estimated to originate on these lands. Almost all of the irrigated land and nearly 50 percent of the Basin's urban population depend on the forested watersheds for their source of water.

Forest areas are extremely important as part of the Basin recreation resource. Of primary interest to recreationists are; Island Park, Teton Wilderness, Craters of the Moon, Grand Teton, and part of the Yellowstone National Park. These areas provide a variety of opportunities for outdoor experiences.

Other Land

Other land uses such as roads, railroads, farmsteads, urban and industrial uses, along with lava, and other rock outcrops account for almost a million acres, or about 4 percent of the land area of the Basin.

Prime Lands

The loss of lands well suited to the production of food, forage, and timber is occurring in localized areas throughout the Basin.

Prime lands are those lands with good soil and gentle slopes, and the farmland is generally irrigated. The identification and mapping of the prime lands in the Basin is in progress. No estimate has been made of the total acres of these lands in the Basin at this time. It has been estimated, however, that 4000 acres of these lands are being converted annually to urban, second home, and recreational uses.

Table XIV--Summary of land use and land ownership for Idaho by county and Wyoming

County	L A N D U S E					L A N D O W N E R S H I P				
	Total	Water	Forest	Pasture and Range	Crop-land	Other Land	Total Land	Federal Land	State Land	Private Land
	Land & Water Area						Acres			
Idaho										
Bannock	741	23	154	331	213	20	718	212	19	475
Bingham	1,352	18	81	771	350	132	1,334	391	120	817
Blaine	1,708	14	272	1,302	67	53	1,694	1,205	79	405
Bonneville	1,212	37	175	570	365	65	1,175	593	83	494
Butte	1,434	1	139	1,185	67	42	1,433	1,192	37	202
Camas	678	3	184	356	122	13	675	439	20	214
Caribou	1,140	23	436	432	235	14	1,117	432	112	570
Cassia	1,638	10	183	1,043	390	12	1,628	911	57	657
Clark	1,121	1	179	874	63	4	1,120	711	88	320
Fremont	1,220	27	518	427	212	36	1,193	707	103	382
Gooding	464	3	-	333	105	23	461	250	14	196
Jefferson	710	8	-	420	269	13	702	342	23	337
Jerome	383	3	-	188	170	22	380	150	7	220
Lincoln	770	-	-	652	108	10	770	578	31	161
Madison	306	3	46	66	178	13	303	59	46	196
Minidoka	483	3	-	284	179	17	480	226	7	244
Power	930	26	77	422	340	65	904	265	48	588
Teton	294	1	60	105	120	8	293	94	8	190
Twin Falls	1,254	8	40	902	289	15	1,246	650	31	562
TOTAL	17,838	212	2,544	10,663	3,842	577	17,626	9,407	933	7,230
Wyoming	3,251	50	2,035	728	115	323	3,201	2,981	9	211
TOTAL	21,089	262	4,579	11,391	3,957	900	20,827	12,388	942	7,441
										12

Table XV - Land Use, Present and Future,
Upper Snake River Basin

Land Use	Present	2000	2020
	-----Thousand Acres-----		
Forest	4,579	4,553	4,527
Range	11,391	11,116	10,970
Dry Cropland	1,320	1,201	1,165
Surface Irrigated Land	1,593	1,395	1,209
Sprinkler Irrigated Land	1,044	1,495	1,686
<i>Total Irrigated</i>	<i>2,637</i>	<i>2,890</i>	<i>2,895</i>
<i>Total Cropland</i>	<i>3,957</i>	<i>4,091</i>	<i>4,060</i>
Other (Urban, etc.)	900	1,067	1,270
TOTAL	20,827	20,827	20,827

SOURCE: Snake River Basin Cooperative Study Data



Irrigated Cropland Near Stanley
SCS Photo

WATER

Surface Water

Quantity

The Snake River, its tributaries and those streams along the northern edge of the Basin, mainly the Big and Little Lost Rivers which disappear into basalts of the Snake River Plain, drain the entire Basin. Major surface tributaries include the Buffalo Fork, Gros Ventre, Hoback, Greys, and Salt Rivers in Wyoming and the Henrys Fork, Blackfoot, Portneuf, and the Big and Little Wood Rivers in Idaho.

The discharge of the Snake River at King Hill at the lower end of the Basin represents the total runoff from the Upper Snake River Basin after depletion by upstream use. The average discharge from the Basin has been estimated at 6.2 million acre-feet annually. This averages .26 cfs per square mile. There are 24 reservoirs in the Basin having storage capacities greater than 5000 acre-feet. See Table XVI. Nine of these are on the main stem of the Snake River above American Falls or in the Henrys Fork Sub-Basin. Murtaugh Lake and Wilson Lake are off stream regulatory reservoirs. The remainder are on the tributary streams where their use is local.

Quality

Stream flows near the source areas of most tributaries in the Basin are of high quality having 100 mg/l (milligrams per liter) or less of dissolved solids. However, quality shows a marked decrease as the water flows downstream. The dissolved solids content of some streams

Table XVI--Reservoirs with a capacity greater than 5,000 acre-feet,
Upper Snake River Basin

Name	Stream	Total Storage (ac-ft)	Active Storage (ac-ft)	Surface Area (acres)	Purpose ^{3/}
American Falls	Snake R.	1,700,000	1,700,000	56,000	IP
Blackfoot R. (Blackfoot- Marsh Reservoir)	Blackfoot R.	413,000	350,000	17,300	I
Cedar Cr.	Cedar Cr.	29,930	28,200	-	I
Fish Cr.	Fish Cr.	13,500	13,500	558	I
Grays Lake	Willow Cr.	100,000 ^{1/}	40,000	22,000	I
Grassy Lake	Grassy Lake	15,450	15,180	310	I
Henry's Lake	Henry's Fork	83,200 ^{1/}	79,400	6,356	I
Island Park	Henry's Fork	127,600	127,200	7,794	I
Jackson Lake	Snake R.	847,000	847,000 ^{2/}	25,540	FI
Lake Walcott	Snake R.	210,000 ^{2/}	95,000 ^{2/}	11,700	IP
Little Wood R.	Little Wood R.	30,000	30,000	571 ^{1/}	CFIR
Lower Salmon	Snake R.	18,800	5,600	840 ^{1/}	P
Mackay	Big Lost R.	44,500	44,350	1,360	I
Magic	Big Wood R.	192,000	191,500	3,904	I
Milner Lake	Snake R.	28,200	22,000	3,020	I
Mud Lake	Camas & Beaver Creeks	61,660	60,000 ^{1/}	6,600	I
Murtaugh Lake (Dry Cr. Res.)	Snake R. (offstream)	12,000	3,000	-	I
Oakley (Goose Cr. Res.)	Goose Cr.	74,350	74,350	1,250	I
Palisades	Snake R.	1,402,000	1,200,000	16,240	CFIMPR
Portneuf-Marsh Valley	Portneuf R.	23,695		1,593	I
Ririe	Willow Cr.	100,000	90,000	1,560	CFIR
Salmon Falls Cr.	Salmon Falls Cr.	228,000	182,700	3,400	I
Twin Lakes	McKinney Cr.	31,240	-	4,040	I
Wilson Lake	Snake R. (offstream)	-	18,500	1,432	I

^{1/} Estimated.

^{2/} Under normal operation.

^{3/} M-municipal, P-power, F-flood control, R-recreation, I-irrigation,
C-fish and wildlife conservation.

SOURCE: Columbia North Pacific Framework Study, April 1970.

as they enter the Snake River has been found to be several times greater than that in their headwaters. The main stem of the Snake River shows downstream changes in chemical quality which reflect both man's use and the effects of waters of different natural quality entering the stream.

Dissolved oxygen levels of the Snake River and its tributaries are usually near the saturation level. However, reduced concentrations have at times been a problem in some reaches of the Snake River.

The biological quality of the Snake River is variable. High concentrations from pollutants have been a problem near some of the industrial areas.

Densities of coliform organisms below some populated areas along the Snake River have been high enough to make the water unsuitable for water contact recreation.

Suspended sediment concentrations are a problem in some isolated reaches of the River and streams in the Basin. However, average annual quantitative sediment contributions from most of the Basin are unknown due to lack of data. Estimated sediment yields are shown on Map A-3.

Local, state, and federal governments and industrial users of the Basin's water resource have made significant progress in recent years in correcting conditions that were degrading the water quality in the Basin.

Agriculture affects the quality of the river system whenever surface runoff occurs and when irrigation return flows enter a water course during the irrigating season.

Most runoff from the mountains is clean and clear with little dissolved mineral matter. Rangeland and forestland contribute small amounts of sediment from snowmelt each spring while steep cropland often adds a large amount. Irrigated lands that drain directly to streams add large amounts of sediment throughout the irrigation season. However, some have no surface outlet and retain sediment on the land.

The steep topography of some areas in Wyoming occasionally produce large volumes of sediment due to slumping of saturated soils into the stream systems. This condition is generally associated with high precipitation or a large snow pack on unstable soils.

There are solutions to the dry cropland and irrigated cropland erosion and sediment problems; most involve the application of farm-management techniques such as careful control of irrigation water and crop residue management. A large amount of construction is needed to develop irrigation tailwater reuse systems and dry farm terrace systems to facilitate management techniques that provide sediment control that is otherwise impossible.

Groundwater

Groundwater levels are associated with surface water management in the Upper Snake River Basin. Most of the Snake Plain and tributary valleys have permeable aquifers and most of the water is high quality. The Snake River loses water to the regional water table in most of the Basin. Infiltrated water moves westward through the Snake Plain aquifer and that portion not pumped from wells discharges in springs near the head of American Falls Reservoir and Thousand Springs in Hagerman Valley. Wells producing several cubic feet per second can be developed almost anywhere from the Snake River Plain aquifer, but only portions of the alluvial tributary valleys bordering the aquifer are permeable enough for large well development. Appendix Map A-1 shows the location of the Snake River Plain Aquifer.

SOILS

The geology and associated soils of the Upper Snake River Basin can be divided into three broad classes: (1) sedimentary and metamorphic rocks of the mountains, (2) alluvial or lacustrine deposits of the valleys, and (3) lava flows.

The mountains, generally over 6,000 feet, consist primarily of sedimentary rocks consisting of sandstone, limestone, and shale with associated quartzites and argillites. The land forms are generally steep to very steep with shallow and rocky or stony soils.

Broad intermountain valleys have shallow to thick loess-covered alluvial fans and lacustrine sediments. These sediments are nearly level to steep with some areas very steep.

The lava flows vary in age with thicker soils generally occurring on older beds. There are some flows so young that soil is generally absent. Soils are loess formed on nearly level, gently rolling to undulating plains and hills.

The soils have been organized into seven major groups with those occupying similar positions on the landscape grouped together. These groups have been subdivided into 25 soil associations. The soils' map, Map V-5, shows their location. The accompanying descriptions give their important characteristics.

The texture terms refer to the surface layer. The depth classes are very shallow, less than 10 inches deep; shallow, 10 to 20 inches deep; moderately deep, 20 to 40 inches; and deep, more than 40 inches.

Slope classes are nearly level, 0 to 2 percent; sloping, 7 to 12 percent; undulating, 2 to 12 percent complex slopes; moderately steep, 12 to 30 percent; and steep, more than 30 percent. Dark-colored soils have Munsell color values darker than 5.5 when dry and light-colored soils have values lighter than 5.5 when dry.

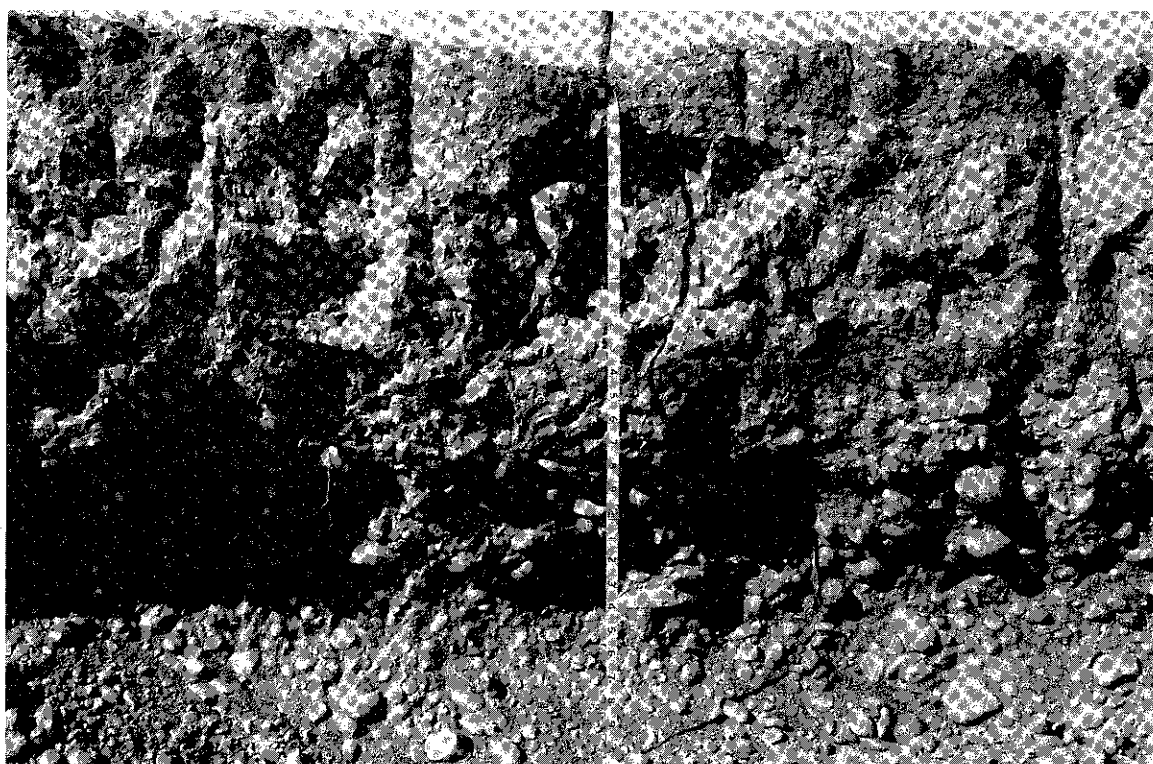
Soil names listed in parentheses after the description of the major groups are soil order names and are defined in "Soil Taxonomy" ^{1/}. The description of each association is followed by (in parentheses) the subgroup name of major soils and soil series name (underlined) of the major soil series if they are known.

Approximately 50 percent of the Basin's 21 million acres have detailed soil survey information on which to base detailed resource management and planning. Ten of the counties have been completed and the data is available in published form or is awaiting publication. The remaining counties have soil surveys in progress with expected completion dates of 1981 through 1984.

^{1/} United States Department of Agriculture. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. Soil Conservation Service, U.S. Department of Agriculture, Handbook 436, 754 pp., illustrated.



Soil Surveying
SCS Photo



Typical Soil Profile
SCS Photo

AIR QUALITY

Air quality is generally good over most of the Basin. The Pocatello area, however, has a localized air pollution problem mainly from industrial sources. Wind erosion during the spring of the year on unprotected fields causes a seasonal dust problem in some areas.

OUTDOOR RECREATION

The increase in visitors to Yellowstone and Teton National Parks is causing overuse and crowding of popular areas, especially on National Forest lands bordering the parks. The areas around Palisades and Island Park Reservoirs and Henrys Lake are also experiencing overuse by outdoor recreationists. Gateway communities to the parks will be further impacted by a Park Service policy limiting overnight camping within the parks.

Outdoor recreation in this area is projected to increase from 18 million recreation days in 1978 to 27 million in 2000. Increases in population, income, leisure time, and interest in the parks and wilderness experience, plus greater mobility of recreationists are creating greater demands on the recreation facilities and resources of the area.

The present rate of facility development has not kept pace with the demand for picnic, camping, and interpretative sites. Many developed areas are not designed to protect and perpetuate natural resources from concentrated recreation, and this is creating inconvenience, overcrowding, and resource deterioration in popular areas.

The total combined resident and nonresident recreation demand was determined by prorating the demand shown in the Idaho and Wyoming State Comprehensive Outdoor Recreation Plans from state planning subareas to the study area. Present and projected recreation demand in recreation days were determined for the years 1970, 1978, 2000, and 2020. As projections for the year 2020 were not available in the "SCORP" Report, they were extrapolated by straight line projections. The demand for interpretative facilities was determined through Forest Service personal knowledge and records.

This subregion, with its 21 million acres of varied scenic land base, coupled with 262,000 acres of natural lakes, reservoirs, and streams, provides ample land and water to meet the projected area demand for outdoor recreation through the year 2020. Presently, there are not enough facilities to meet demands for developed picnic sites, and future demands are projected to exceed anticipated development by an average of 73 sites per year. There are not enough facilities to meet demands for developed camp sites, and the future demand is projected to exceed anticipated development by an average of 116 sites per year.

The increased interest in cultural resources, history, and nature has created demands for additional interpretative facilities. Presently, there are not enough facilities to meet demands for interpretative-type guidance and education. This gap is expected to widen as future demands are projected to exceed anticipated developments by almost 30,000 recreation days per year for the next 22 years.

POPULATION

Population of the Upper Snake River Basin has been growing at a rate lower than both the total Snake River Basin and the State of Idaho. Population growth for the period 1930-1970, by county, is presented in Table XVII. For a more complete analysis of population change in the basin, see the Economic Overview and Projections Report (1975).

The 1970 population of the Idaho portion of the Basin totaled 296,058 inhabitants. Population density of the Basin was 9.1 inhabitants per square mile compared to the State of Idaho at 8.6, Middle Snake at 10.8, and Lower Snake at 4.0. Rural population equaled 144,589 inhabitants, or 49 percent of the Basin. In the decade of the 1960's, rural population declined by 3.4 percent while urban population increased 14.6 percent. Since 1930, five of the nineteen Idaho counties in the Basin have experienced a decline in population. These include Camas, Clark, Fremont, Lincoln, and Teton. The two most rapidly growing counties of the 1960's were Teton County, Wyoming; and Madison County, Idaho.

There were 72,410 families in the Idaho portion of the Basin in 1970. The mean family income was \$9,521. The mean non-farm, self-employed income was \$6,882 whereas the farm self-employed was \$4,610. There were 2,341 families on public assistance or welfare. More than 11 percent of the families had income below the poverty level.

Table XVII--Population of counties, by subregion, Snake River Basin, 1930-70

Political subdivision	1930	1940	1950	1960	1970
	----- Numbers of persons -----				
IDAHO TOTAL.....	445,031	524,873	588,637	667,191	712,567
SNAKE RIVER BASIN TOTAL.....	366,811	436,596	500,048	577,805	622,576
UPPER SNAKE AREA.....	193,323	223,008	247,115	281,873	296,058
Bannock.....	31,266	34,759	41,745	49,342	52,200
Bingham.....	18,561	21,044	23,271	28,218	29,167
Blaine.....	3,768	5,295	5,384	4,598	5,749
Bonneville.....	19,664	25,697	30,210	46,906	51,250
Butte.....	1,934	1,877	2,722	3,498	2,925
Camas.....	1,411	1,360	1,079	917	728
Caribou.....	2,121	2,284	5,576	5,976	6,534
Cassia.....	13,116	14,430	14,629	16,121	17,017
Clark.....	1,122	1,005	918	915	741
Fremont.....	9,924	10,304	9,351	8,679	8,710
Gooding.....	7,580	9,257	11,101	9,544	8,645
Jefferson.....	9,171	10,762	10,495	11,672	11,619
Jerome.....	8,358	9,900	12,080	11,712	10,253
Lincoln.....	3,242	4,230	4,256	3,686	3,057
Madison.....	8,316	9,186	9,156	9,417	13,452
Minidoka.....	8,403	9,870	9,785	14,394	15,731
Power.....	4,457	3,965	3,988	4,111	4,864
Teton.....	3,573	3,601	3,204	2,639	2,351
Twin Falls.....	29,828	36,403	40,979	41,842	41,807
Wyoming counties.....	7,508	7,779	7,186	7,686	9,258

Table XVIII -- Industry of employed persons for the Upper Snake River Basin, Idaho and Wyoming, 1950-1970

	1950	1960	1970
---Number of Persons---			
POPULATION.....	239,929	274,187	296,058
TOTAL EMPLOYMENT.....	83,011	96,396	105,367
PARTICIPATION RATE (percent).....	.346	.352	.367
Agriculture, forestry & fisheries.....	26,064	21,538	16,937
Mining.....	376	169	430
Construction.....	6,269	6,441	5,983
All manufacturing.....	4,136	9,903	14,139
Furniture, lumber & wood products.....	311	338	427
Metal industry.....	80	211	601
Machinery, except electrical.....	171	415	468
Electrical machinery.....	15	39	72
Transportation equipment.....	20	73	127
Other durable goods.....	409	824	1,315
Food & kindred products.....	2,156	4,661	8,486
Textiles.....	32	108	360
Printing & publishing.....	647	857	758
Chemicals.....	294	2,377	1,525
Transportation.....	6,786	6,291	5,967
Communications.....	953	1,073	1,089
Utilities & sanitary services.....	1,342	1,663	1,881
Wholesale trade.....	3,811	4,615	5,455
Retail trade.....	13,202	15,551	18,441
Finance, insurance, & real estate.....	1,720	2,858	3,689
Business & repair services.....	2,487	3,685	5,138
Personal service.....	4,560	5,468	4,770
Entertainment & recreation.....	925	738	930
Medical & health.....	1,887	1,897	4,576
Educational services.....	3,590	5,448	8,843
Professional & related services.....	909	2,881	2,717
Public administration.....	2,838	4,111	4,382
Industry not reported.....	1,158	2,048	--

Table XIX-- Final demands, outputs, imports, and exports of the Idaho economy, 1/ 1967

Economic sector	Final demand <u>2/</u>	Exports	Gross output	Imports
----- Million dollars -----				
Livestock & livestock products..	77.28	69.62	222.66	7.33
All crops.....	143.58	139.76	297.24	33.64
Forestry & fishery prod. & agric.				
forestry & fishery services....	3.33	0.00	25.59	55.06
Mining.....	53.62	59.07	109.93	7.97
Construction.....	298.73	99.33	316.17	122.03
Food processing.....	580.00	447.43	759.14	40.50
Lumber & wood products.....	272.10	247.50	384.61	0.00
Pulp & paer.....	59.89	61.85	63.36	0.00
Newspaper & printing.....	16.82	11.35	22.59	5.60
Chemicals & fertilizers.....	173.96	162.99	251.18	0.00
Concrete products.....	4.29	4.27	19.36	0.84
Primary metals.....	211.02	216.36	266.50	0.00
Fabrication, metals production...	2.65	2.04	14.58	11.82
Machinery & electronic mfg.....	55.44	44.90	66.23	0.00
Trans. equip. & misc. mfg.....	30.04	24.98	31.90	58.35
Transportation & communication...	68.94	3.59	220.02	58.35
Utilities.....	35.90	0.00	108.96	41.59
All trade.....	308.07	6.09	425.26	22.82
Finance, ins., & real estate.....	141.52	62.40	224.21	281.43
All services.....	62.39	0.00	100.86	338.28
All government expenditures.....	859.46	848.87	892.10	0.00

1/ 21-sector model aggregated from Rafsnider (1971) by J. R. Wilkins, Economic Research Service.

2/ Exports are included in final demand; inventory changes cause exports to exceed final demand in some cases.

UNIQUE AND SPECIAL FEATURES

Historical and Archaeological Sites

About 6,900 years ago, Mount Moyama, a huge volcano in Oregon, erupted creating a layer of volcanic ash that covered a wide area including the Teton Range in Wyoming in what is now Yellowstone National Park. These ash layers provide rather precise dating indexes for identifying prehistoric sites.

Evidence that humans inhabited the area many years ago is known from more than 1,500 inventoried historical and archaeological sites in the Basin. Of this total, thirty-five are listed in the National Register of Historic Places.

Old battlegrounds, Indian rock writings, charcoal kilns, and ruts of the Oregon Trail are only a sample of the historic and archaeological sites identified in this area.

Soon after the Lewis and Clark Expedition, fur hunters moved into the area from Canada and St. Louis, creating a flourishing fur trading business. The early trappers established trails and named landmarks. Many of these names remain today.

By 1839, white settlement was pushing westward. The California and Oregon Trails were developed. The California Trail reached full development by 1848. No other emigrant wilderness road of similar length in the United States came close to matching the use this trail received. Thousands of rumbling, westward-bound covered wagons gouged marks into the earth so deeply they can still be seen today.

With proper planning, landmarks which make up an important part of our heritage will be retained for future generations to enjoy.

UNIQUE GEOLOGIC FEATURES

Unique geologic features occur in the Upper Snake River Basin where adjustments have taken place in the earth's crust through geologic time.

The Teton Range in the eastern portion of the Basin are very young mountains (10 million years old) in the Rocky Mountain chain. These mountains have been faulted and uplifted very strongly on the west side and deeply eroded by glaciation. The highest peak in the range, the Grand Teton, is 13,766 feet above sea level.

Farther south, in southeastern Idaho and southwestern Wyoming, marine sedimentary rocks were first folded, then broken by compressive forces from the west, causing younger rocks to be overridden by older ones. This fracturing of the earth's crust, called overthrusting, exemplified by the Bannock overthrust and associated thrust faults, has created a highly complex geologic environment which has exposed the vitally important phosphate-rich Phosphoria formation and formed a structural environment which has been found to contain commercial quantities of gas and oil in Wyoming and Utah.

The Snake River Plain lies north of Snake River. This geologic feature was caused by downwarping of the earth's crust due in part to removal of vast quantities of lava from beneath the Plain to the surface through fissures and vents. These lavas, interfingering with sediments eroded from the adjacent highlands, form a sequence several thousand feet thick. Eruptions of lava, thought to have begun over 12 million years ago, have continued intermittently until about a thousand years ago.

Some of these most recent flows are so spectacular that the Craters of the Moon National Monument was formed to both protect and display the products of these volcanic events. Associated lava flows and features include the Great Rift, the Wapi Lava field, Hells Half Acre lava field, and the King's Bowl lava field. Lava tubes in these flows sometimes sustain temperatures low enough to maintain ice in them year around, as in Shoshone Ice Caves and Crystal Ice Caves.

The Realm of the Buttes is a distinctive geologic area used as a landmark by the early emigrants. Here three extinct craters, seemingly out of place, rise more than 1,000 feet above the relative flat desert area west of Idaho Falls.

Northwest of the Buttes, the Lost River Range includes Mt. Borah with an elevation of 12,662 feet, the highest peak in Idaho. To the southeast of this Range and north of the Buttes, the Big Lost River, Little Lost River, and Birch Creek flow from the mountains onto the Plain and disappear into the highly fractured basalt.

Figures 2 and 3 are geologic profiles of the Upper Snake Basin that display generalized attractions and characteristics for the Idaho and Wyoming portions, respectively.

Figure 2

GEOLOGIC PROFILE Upper Snake River Basin - Idaho

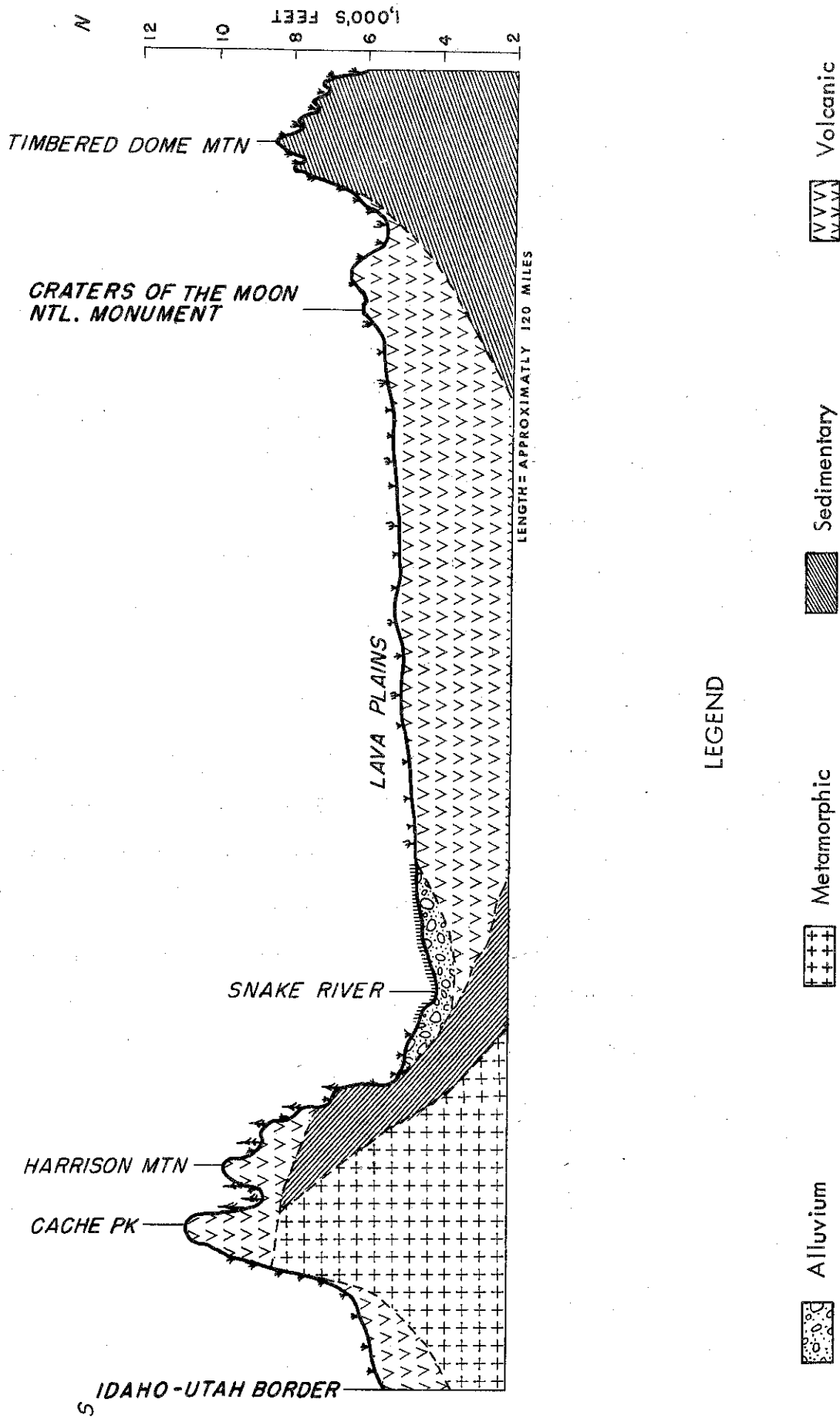
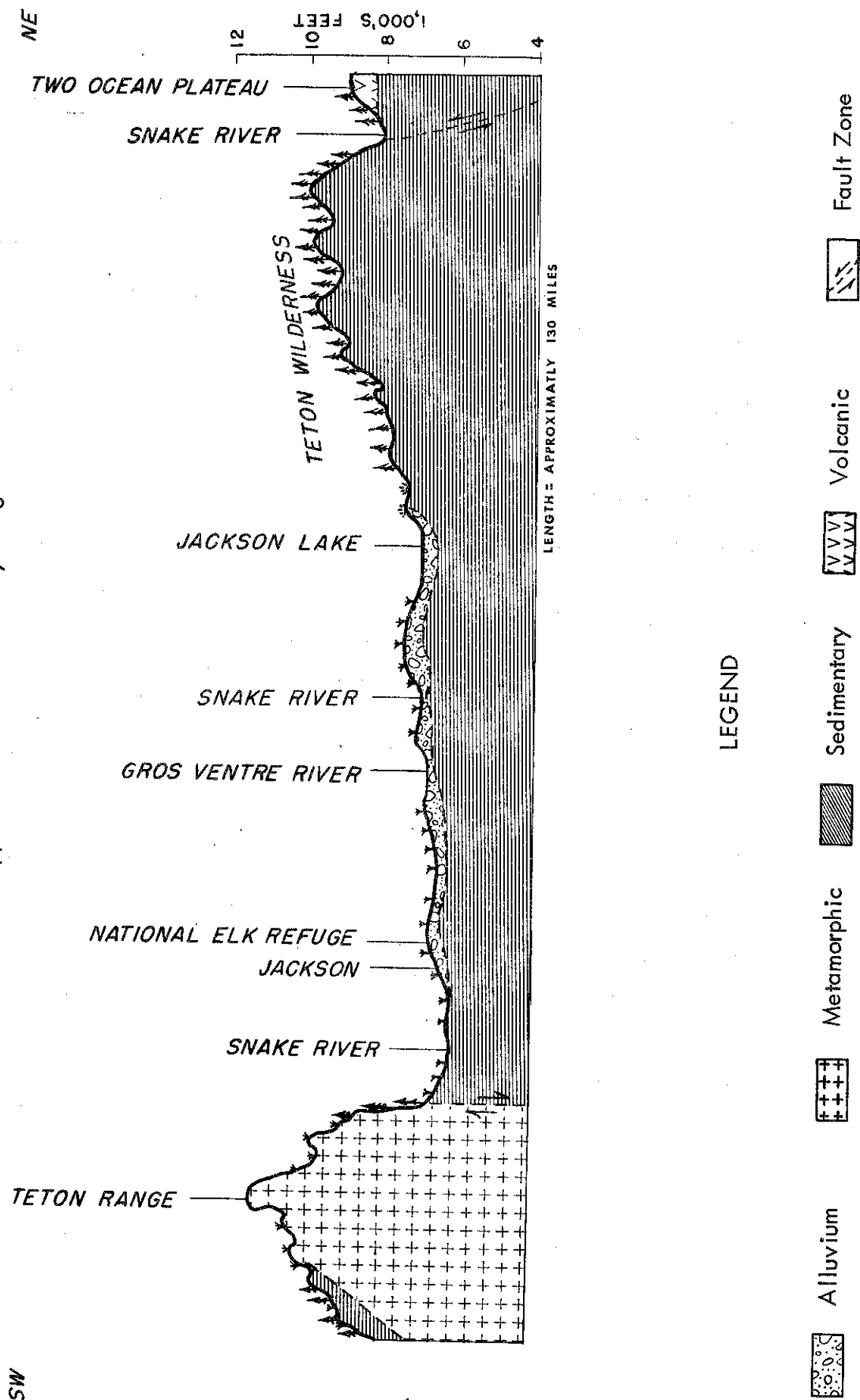


Figure 3

GEOLOGIC PROFILE
Upper Snake River Basin - Wyoming



USE OF THE RESOURCE BASE

More than 99 percent of the consumptive use of water in the Basin is used by crops. The water yield of the Basin is estimated at a little less than 12 million acre-feet annually. Sixteen and three quarter million acre-feet are being diverted for agricultural purposes. Agriculture accounts for over 5 million acre-feet of use or depletion leaving approximately 6.2 million acre-feet outflow from the Basin. Of the quantity being diverted, approximately 11.6 million acre-feet return to the Basin's water system.

The value of agricultural production in the Basin has increased from 355 million dollars in 1959 to over 822 million in 1974.

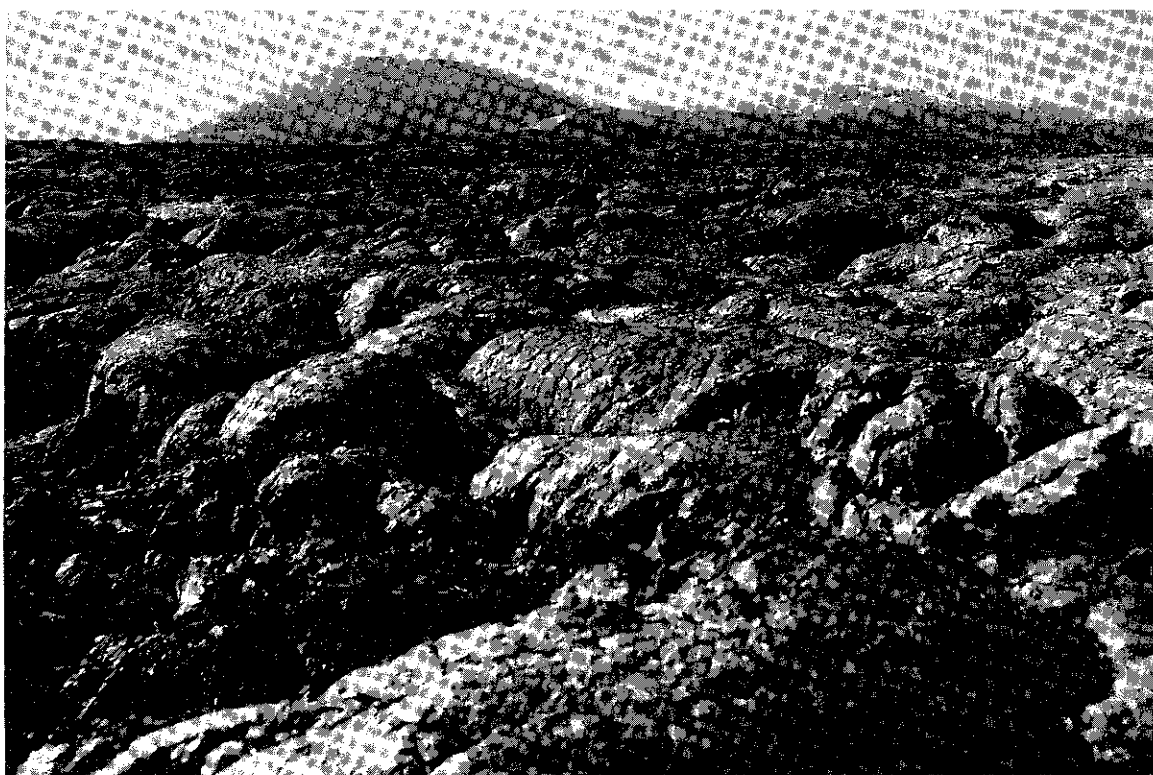
The Upper Snake River Basin produces 86 percent of all the potatoes grown in Idaho. The Basin's potato production in 1975 was 68,820,000 cwt. or 42 percent more than the next highest producing state (Washington). As the total value of agricultural production increased, the proportionate value of crops sold versus livestock and livestock products sold has been as follows: 1959 - 61 versus 39 percent, 1969 - 49 versus 51 percent, and 1974 - 66 versus 34 percent.

Industrial influence and growth have been concentrated in three general areas of the Basin--atomic energy research and development in the Idaho Falls area, phosphate industry in the Pocatello area, and certified seed production in the Twin Falls area. These three areas also process the majority of all agricultural products processed in the Basin.

The 4.5 million acres of forested land in the Basin produced 36 percent of the lumber processed from the entire Snake River drainage in 1973. It takes from 120 to 130 years to produce a sawlog on most of the forestland in the Basin.

There is no known shortage of municipal and industrial water in the Basin. Most of the M&I water used is of high quality from groundwater sources.

Important economic activities in the basin include retail trade (17.5%), agriculture, forestry and fisheries (16%), manufacturing (13.4%), and educational services (8.4%). Percentage figures, in parentheses, indicate share of work force (Table XVIII). Table XIX presents a 21-sector Input-Output (I-O) tabulation of economic activity in the State of Idaho. The state-wide I-O model was used to estimate output and employment impacts of the alternative plans and the preferred plan.



Pahoehoe Lava Flow - Craters of the Moon National Monument
National Park Service Photo

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APPENDIX A
PROBLEMS AND CONCERNS IDENTIFIED
FOR STUDY

The following is a listing of the problems and concerns identified by the USDA-State Study Staff. Information from public meetings and public opinion surveys, opportunities under USDA and State programs to solve the problems, and the relationship of the problems and concerns to the four specific objectives of the study were used as criteria to establish the list.

Six of the concerns were selected for inclusion in the study. These are presented in Chapter 1.

Following the listing is a brief description of the concerns not selected for study.

- Food production
- Economic considerations
 - Rural income distribution
 - Underemployment in rural areas
 - Rural institutions
- Water rights
 - Instream flow requirements
 - Appropriation doctrine
 - Indian Claims
 - State vs Federal Regulation
 - Beneficial use
- Snake River Aquifer
- Federal - Nonfederal land ownership patterns
- Recreation impacts on natural resources
 - Shortage of Recreation Facilities
 - Picnic
 - Camping
 - Interpretative facilities and services
 - Areas of heavy use
 - Coordination of recreation facility development
 - Hunting and fishing
 - Back packing, cross-country skiing, snowmobiling, and whitewater floating

*Safety and other social considerations
Insufficient information on supply and demand
projections*

- *Preservation of natural environment*
 - Wilderness areas*
 - Free-flowing streams*
- *Fish and Wildlife Habitat*
- *Endangered and threatened plants and animal species*
- *Open and green space*
- *Preservation of unique historical, archeological and cultural resources*
- *Radioactive waste disposal*
- *Summer home development*
- *Loss of prime land*
- *Effects of agriculture on water quality*
- *Mining*
- *Riparian vegetation management*
- *Soil erosion*
 - Irrigated cropland*
 - Dry cropland*
 - Rangeland*
 - Forestland*
 - Streambanks and channels*
 - Roadside*
- *Dust from wind erosion*
- *Sedimentation damage*
- *Flooding*
- *Inadequate irrigation water delivery structures*
- *Unimproved on-farm irrigation*
- *Deficient rangeland condition*
- *Inadequate supply of wood fiber*

FOOD PRODUCTION

Capacities for food and fiber production in the Upper Snake River Basin have been analyzed in detail by two concurrent studies 1/ in which USDA participated. The general conclusion from these studies is that sufficient land resources exist to satisfy projected demands

1/ Idaho State Water Plan and Pacific Northwest River Basin Commission's Comprehensive Coordinated Joint Plan (CCCJP).

for food production. Adequate water for all competing uses and the energy costs associated with new irrigation appear to be the limiting factors associated with future irrigation development. Based upon present applications for water rights, it appears the private sector will develop sufficient lands to meet future production levels without federal project action. There are cases where development might be more efficiently accomplished with state or federally funded projects. Identification of these is an ongoing effort of the Bureau of Reclamation and other agencies with irrigation development missions.

Changes in the distribution and use of the Basin's water resources will be necessary if water is to be made available for additional irrigation. About 290,000 acres of new irrigation is projected to be in production by the year 2000. Coordination of use permits would facilitate a more orderly development which could result in more efficient distribution and use of water. Present and potentially irrigable lands are outlined on Map A.

A linear programming analysis of the Basin indicates that currently developed land could produce at projected production levels if the crops were grown in the most cost-efficient pattern. Although it is not reasonable to attain this pattern of production in the immediate future, the solution provides us with a current frame of reference to identify trends in future production.

Plan elements were not identified specifically for food and fiber production. The study staff determined that little additional data

could be developed in this study since projections and analyses in the Idaho State Water Plan and the River Basin Commission's studies were relatively current. Many plan elements designed to alleviate addressed problems and concerns affect the output of goods from the agricultural sector. Impacts of plan elements affecting agricultural production were measured and are presented in preceding chapters of this report.

ECONOMIC CONSIDERATIONS

Between 1870 and 1920, agriculture became the leading economic activity of the Basin. Irrigation of lands adjacent to the Snake River and its tributaries by settlers from Utah set the pattern for agricultural development. During this period, population growth exceeded an average of 94 percent per decade while average decennial growth for the United States was under 22 percent.

During the 50-year period ending in 1970, the population and economy of the Basin stabilized. Increase in irrigated land was largely offset by growth in farm size. Above average growth for the area occurred during the 1930's because the Snake River Basin did not suffer the "dust bowl" phenomena of the Great Plains.

Since 1970 urban expansion in the Basin has pushed the population growth rate to an average of over 2.5 percent per year. The 1975 estimated population for counties in the Basin was 333,210, or about 12.5 percent higher than the 1970 census (Table XX). This rate of population increase is almost five times the rate of increase that occurred during the preceding decade.

Table XX ---Population of counties, Upper Snake River Basin, 1930-1975

Area	1930	1940	1950	1960	1970	1975 1/
	Number of persons					
IDAHO.....	445,031	524,873	588,637	667,191	712,567	814,447
SNAKE RIVER BASIN.....	336,811	436,596	500,048	577,805	622,576	709,475
UPPER SNAKE RIVER BASIN.....	193,323	223,008	247,115	281,873	296,058	333,210
Bannock.....	31,266	34,759	41,745	49,342	52,200	57,493
Bingham.....	18,561	21,044	23,271	28,218	29,167	31,427
Blaine.....	3,768	5,295	5,384	4,598	5,749	7,489
Bonneville.....	19,664	25,697	30,210	46,906	51,250	58,023
Butte.....	1,934	1,877	2,722	3,498	2,925	3,069
Camas.....	1,411	1,360	1,079	917	728	783
Caribou.....	2,121	2,284	5,576	5,976	6,534	7,450
Cassia.....	13,116	14,430	14,629	16,121	17,017	18,600
Clark.....	1,122	1,005	918	915	741	875
Fremont.....	9,924	10,304	9,351	8,679	8,710	9,616
Gooding.....	7,580	9,257	11,101	9,544	8,645	10,088
Jefferson.....	9,171	10,762	10,495	11,672	11,619	13,116
Jerome.....	8,358	9,900	12,080	11,712	10,253	13,369
Lincoln.....	3,242	4,230	4,256	3,686	3,057	3,469
Madison.....	8,316	9,186	9,156	9,417	13,452	16,576
Minidoka.....	8,403	9,870	9,785	14,394	15,731	16,916
Power.....	4,457	3,965	3,988	4,111	4,864	5,306
Teton.....	3,573	3,601	3,204	2,639	2,351	2,591
Twin Falls.....	29,828	36,403	40,979	41,842	41,807	46,535
Wyoming Counties.....	7,508	7,779	7,186	7,686	9,258	10,419

SOURCE: U.S. Department of Commerce, Bureau of the Census, 1930-1970

1/ Population and Employment Forecast - State of Idaho, Idaho Department of Water Resources and Boise State University Center for Research Grants and Contracts, July, 1976.

Employment and income levels are somewhat below national figures, but are comparable to state levels. The difference between average income in the Basin and the U.S. has been diminishing.

Employment opportunities exist in the larger communities in the Basin. However, many counties are losing population as farms get larger, families get smaller, and employment opportunities attract the younger members of the labor force away. This pattern becomes evident when one considers that three of the five fastest-growing communities, and three of the five fastest-declining counties in the state are located in the Upper Snake River Basin. Teton County, Wyoming, has the highest growth rate of any county in the Basin.

No specific socio-economic problems were identified which would require changing USDA programs to bring about solutions. Therefore, no plan elements address specific socio-economic problems. The impacts of all plan elements on socio-economic indicators were identified and are presented in the Preferred Plan and Alternative Plans, Chapters II and IV.

WATER RIGHTS

Efficient distribution and use of available water supplies, now and in the future, should consider a total resource management concept. However, a basin-wide efficiency concept cannot be implemented until it has more emphasis on the present institutional arrangements that govern water use.

Over time, a complex legal arrangement has evolved that requires a considerable administrative effort to govern water use. Since eastern laws governing water use were unacceptable to the western setting and purposes, local rules and customs were adopted by the early water users in the Basin. Settlers obtained a property right for private use of a public resource by diverting streamflow from sources that were readily available. Court decisions (and legislation that followed) have supported the proprietary concept of water use under the principle of "first in time, first in right". With population increases in the Basin, competition for water grew; new uses required the development of new sources. New sources of irrigation water were developed by federal and state reclamation programs and by private interests. Along with the expansion of irrigated farming and other competing water demands, a unique set of institutional arrangements has been created by societal and governmental reactions to the problems of diverting, storing, distributing, and using the available water sources. Neither federal sanctions nor state statutes totally complement efficient basin-wide distribution and use of a limited water supply. To promulgate advanced resource management methodologies, future enactments should promote a more intensive use of existing supplies and reallocation of preempted water to other contemporary uses. Considering the public nature of water, misuse or wasting of such a vital resource must be discouraged--not perpetuated by laws and institutions that govern use.

In view of overall concerns in the Basin, specific institutional constraints are presented under the following headings:

Appropriation Doctrine

In total, a large volume of water in the Basin has been appropriated for agriculture and most water rights are attached to the land. There may be no legal procedure for the farmer to transfer water "saved" by good management to an adjoining acreage and preserve his full water right. Under the law, there is no apparent advantage for an individual appropriator to conserve water, since benefits accrue to junior appropriators taking water from a common source (although actual practice may be to the contrary during times when water is scarce). As a result, irrigated agriculture has neither been willing to relinquish any water it has been accustomed to receiving, nor motivated to bear the expense of more intensive use of existing supplies.

Basin-wide water needs have changed since the initial claims were filed. Water management technology has advanced considerably. Yet the estimates of usage (and crude methods of measuring flow) that established the early rights are still in effect today. To a major extent, these rights dictate the conceptual solution to many natural resource problems and hamper attempts to more efficiently use and manage water and related land resources in the Basin.

Federal Regulation

Historically, the federal government has deferred the administration of water rights to states. Recent federal proposals are threatening to disrupt the state's long-term administration of water rights. Since the principle source of water originates from mountain snowmelt on federally managed lands, federal officials have considered imposing more sanctions on water resource administration and management. The problem of federal vs state control of water resources (and the resulting impact on existing uses) remains unresolved. At issue is the federal claim to water that the state has already appropriated.

Indian Claims

The Winter's Doctrine and Federal Regulations clouds the issue of federal vs state water control. After considerable debate, this issue remains unresolved.

Beneficial Use

Recent court decisions and legislative enactments have extended the definition of beneficial use. In-stream flows and aquifer recharge are respectively two such examples. Although the broad application of the term is restricted by present statute provisions, additional, more inclusive, concepts have been considered by the Idaho State Legislature.

Instream Flow Requirements

If additional diversions are required to meet increasing irrigation water demands, there is a concern that stream flows will be further reduced. Certain stream segments are now dry for varying periods during the irrigation season. Increased stream flows could improve water quality, fishery habitat, and esthetic values and provide a greater potential for power production on some streams.

Minimum stream flows were recommended in the State Water Plan and the CCCJP report; the concept has been considered, but no action has been taken by the Idaho State Legislature. Considering the present political inclination, minimum flows could be established after further studies and a better understanding of benefits.

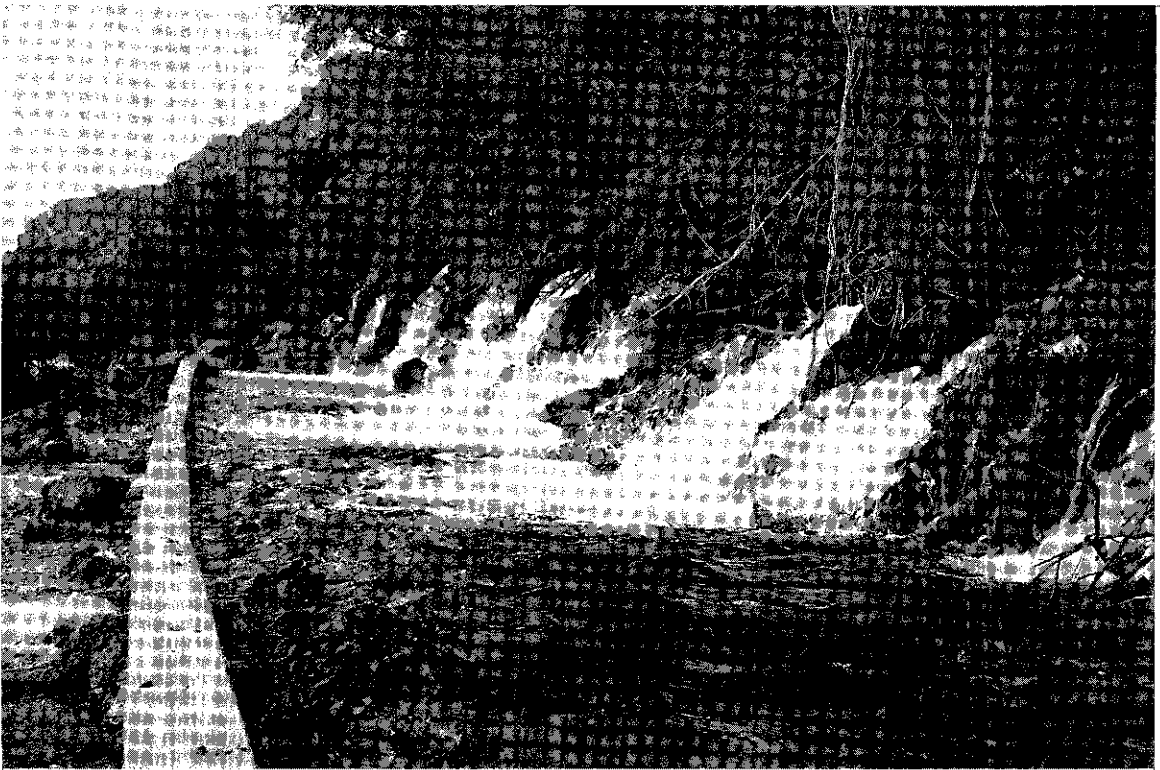
Stream Classification

In the Basin, over 1,200 miles of streams (or segments of streams in Idaho and Wyoming) are being considered for classification under the Wild and Scenic River Act. Although stream designation under a national (or state) system preserves the unique features or qualities of a stream, it imposes a single purpose concept on stream flow. It is another institutional arrangement that restricts water use. Since the State Water Plan, the Commissions Joint Plan, and the Snake River Basin Level B Study addressed this subject, this Study has not pursued it further.

SNAKE PLAIN AQUIFER

Early spring flows in the upper reaches of the Basin exceed the capacity of the present surface reservoir facilities. Providing a program can be developed to inject flows into the Snake Plain Aquifer, excess water could be stored in this vast reservoir for later use (Map A-1). Recent legislation amends the existing law to declare the appropriation and underground storage of water a beneficial use and authorizes creation of aquifer recharge districts. Unappropriated waters of the Snake River and tributaries may be stored in certain counties in Idaho.

Public opposition or other institutional limits may restrict use or management of the aquifer as a water source. There is a concern about the quality of the water to be injected and the resulting effects this could have on the water quality and transmission capabilities of the aquifer. Additional detailed studies (beyond the scope of a cooperative study) are needed to determine the effects.



Crystal Springs Near Hagerman
SCS Photo

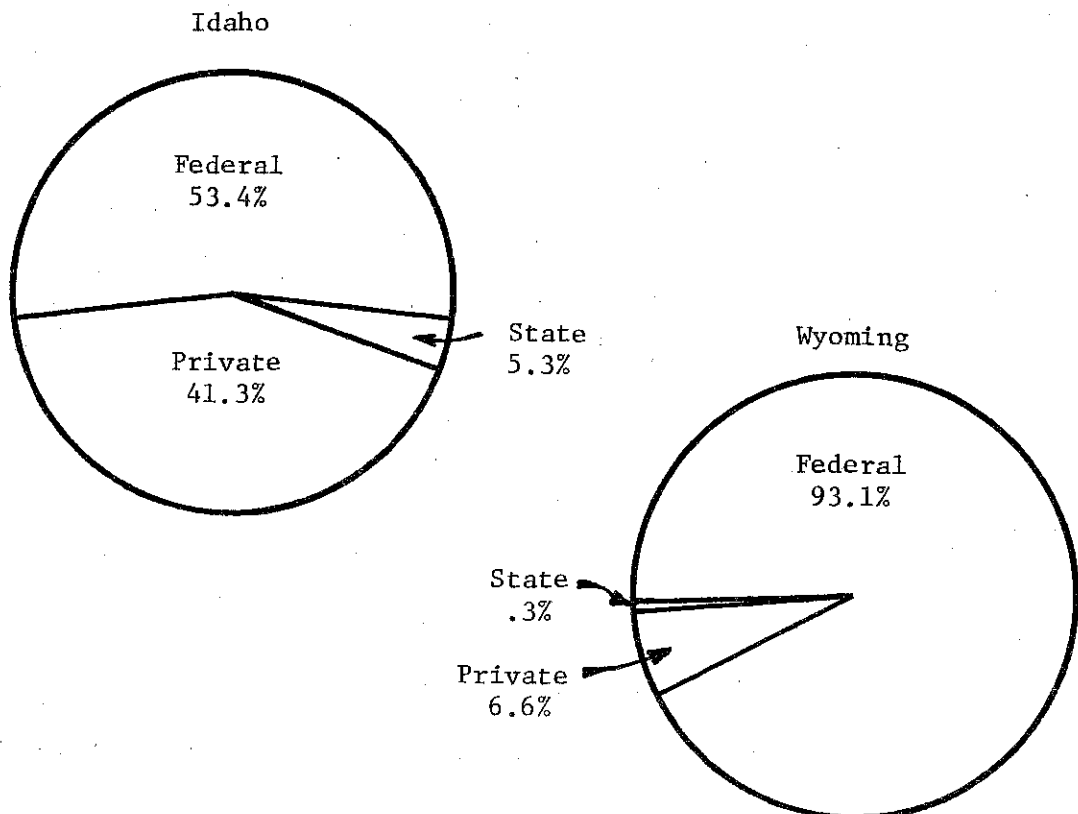
FEDERAL - NONFEDERAL LAND OWNERSHIP PATTERNS

Land ownership patterns cause problems in implementating a management policy for land use. This usually occurs at the fringe areas where competing uses overlap.

Meandering braided streams that are continually changing course make it difficult to establish permanent ownership boundaries. Legal mitigations are in process along part of the Snake River in Wyoming and it appears they will continue into the future.

Over fifty percent of the land in Idaho and more than ninety percent of the land in Wyoming in the Basin is in federal ownership.

Figure 4. Land Ownership in Upper Snake River Basin, 1976.



Federally owned land is the main source of water in the Basin. Consequently, there are problems with coordinating, planning, and administering federal water claims, state laws, and private water rights.

Real estate transactions between public and private owners are going on continuously. These transactions are usually consummated to facilitate management of public lands and provide better access to private lands. Over time, most conflicts will be resolved.

RECREATION IMPACTS ON NATURAL RESOURCES

Areas of Heavy Recreational Use

Popular outdoor recreational areas are subject to heavy use in undeveloped areas, especially in proximity to Yellowstone and Teton National Parks. Increasing interest in the wilderness experience is creating overuse of popular trails, lakes, and streams near the Parks, Palisades and Island Park Reservoirs, Sun Valley, and Henrys Lake areas. Intensity of outdoor recreation use is displayed in Map I-1.

This area contains attractions supportive of all types of recreational preferences. Participation in outdoor recreational activities is projected to increase by more than 50 percent by the year 2000. Overuse, scenic blight, and environmental deterioration will continue unless future planning and development are in accordance with the capacity of the resource to sustain recreational activities.

Limited or inconvenient access to substitute areas is contributing to the problem, especially in the Henrys Fork and Silver Creek areas.

Coordination of Recreation Facility Development

The need for better coordination of recreational facility development is evident if the environmental character and economic stability of the Basin are to be maintained.

Although ample acreage suitable for recreational activities exists, some areas are overcrowded while others are underutilized.

Cooperation between state, federal, and private landowners is an important aspect of alleviating problems of concentrated use in some areas, directing recreationists to underused existing facilities, and planning for projected recreational needs to protect and perpetuate natural resources.

One of the most important roles of the federal government is managing the unique natural and cultural resources of the Basin. This is a monumental task as management of resources for their multiple uses is the subject for endless debate; without coordinated planning and development, there will continue to be areas of overuse resulting in resource deterioration.

The coordination problem has been treated in both the Idaho and Wyoming State Comprehensive Outdoor Recreation Plans.

Backpacking, Cross-Country Skiing, Snowmobiling, and White Water Floating

These activities are rapidly increasing in popularity. Many problems are associated with too rapid growth of an activity. Facilities and safety programs to enhance these activities have not kept pace. Accidents and drownings have increased as some areas are over impacted.

Data to determine specific needs, locations for facilities and safety programs have not been developed.

Hunting and Fishing

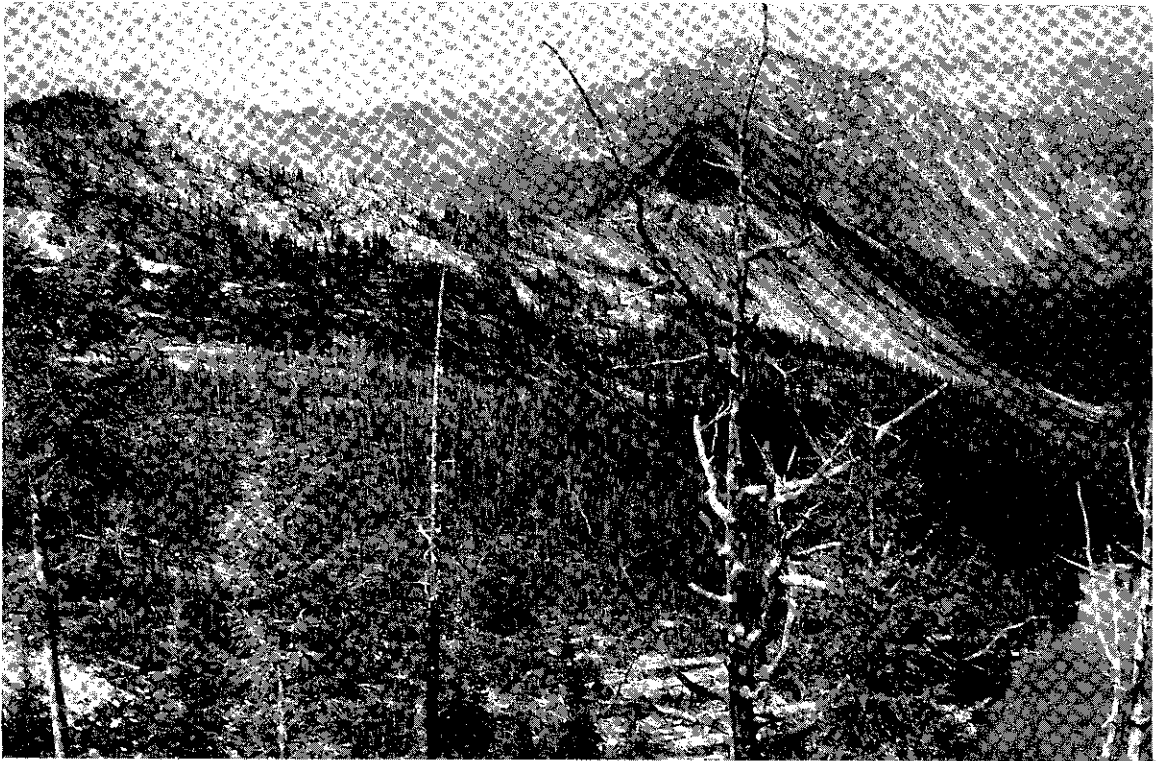
Much of the attraction to this area, for residents and nonresidents alike, is the abundant supply of fish and wildlife. In some popular areas, fishing and hunting activities are impairing ecological resources and creating environmental deterioration along streams, lakes, reservoirs, and on wilderness trails and campsites.

There is not enough detailed information available for planning purposes or management control.

Wilderness Areas

Wilderness as a part of the American Heritage had largely disappeared by the early 1920's; however, due to the efforts of a few far-sighted individuals, certain portions of the National Forest System were set aside for preservation as Wilderness, Primitive, Wild, or Canoe areas during the 1920's. This early beginning led to enactment by Congress in 1964 of the Wilderness Act. This act established

a Congressional policy "... to secure for the American people of present and future generations the benefits of an enduring resource of wilderness". 1/



Wilderness Area
USFS Photo

1/ Western U.S. Water Plan, Wilderness, Potential Wilderness, Research Natural Areas and Natural Landmarks, November 1973, page 2.

Safety and Other Social Considerations

With the expanding interest and participation in dispersed type recreational activities, safety and other social considerations become a concern. These activities occur at random in undesignated areas without adequate consideration for the hazards to users or the environment.

Data to determine specific needs and site criteria for dispersed type recreational activities are not available.

Insufficient Information on Recreation Supply and Demand Projections

Insufficient information on supply and demand projections for popular activities such as river floating, snowmobiling, cross-country skiing, and hunting is creating a void in planning for this area.

Trial and error evaluations will continue to be used for analysis instead of known facts which would produce a more reliable projection of needs.

PRESERVATION OF NATURAL ENVIRONMENT

Areas of national fame within this Basin include Grand Teton National Park, a portion of Yellowstone National Park, and Craters of the Moon National Monument. Other natural areas of interest include Thousand Springs, Balanced Rock, Shoshone and Twin Falls, Massacre Rocks and the Big Lost River Sinks.

Existing wilderness areas include only those areas within the National Wilderness Preservation System as enacted by Congress in PL 88-577 and subsequent acts. The Teton Wilderness Area in Wyoming is the only designated wilderness area in the Basin and consists of 557,311 acres. It is a region of high plateaus, large valleys, and mountain meadows. It is the summer range for the Jackson Hole elk herd and is noted for mountain climbing, fishing, and elk hunting.

Soon after passage of the Wilderness Act, it was recognized that there were, in addition to primitive areas, areas that should be considered for inclusion in the National Wilderness Preservation system. To achieve the goal of determining which areas are needed to round out a quality National Wilderness Preservation System, an inventory and evaluation of potential roadless and undeveloped areas was undertaken by the Forest Service and Bureau of Land Management.

The inventory phase has been completed and the evaluation process begun. There are 2,044,000 acres in the Idaho portion of the Upper Snake and 1,518,000 in the Wyoming portion that meet the minimum criteria for wilderness designation.

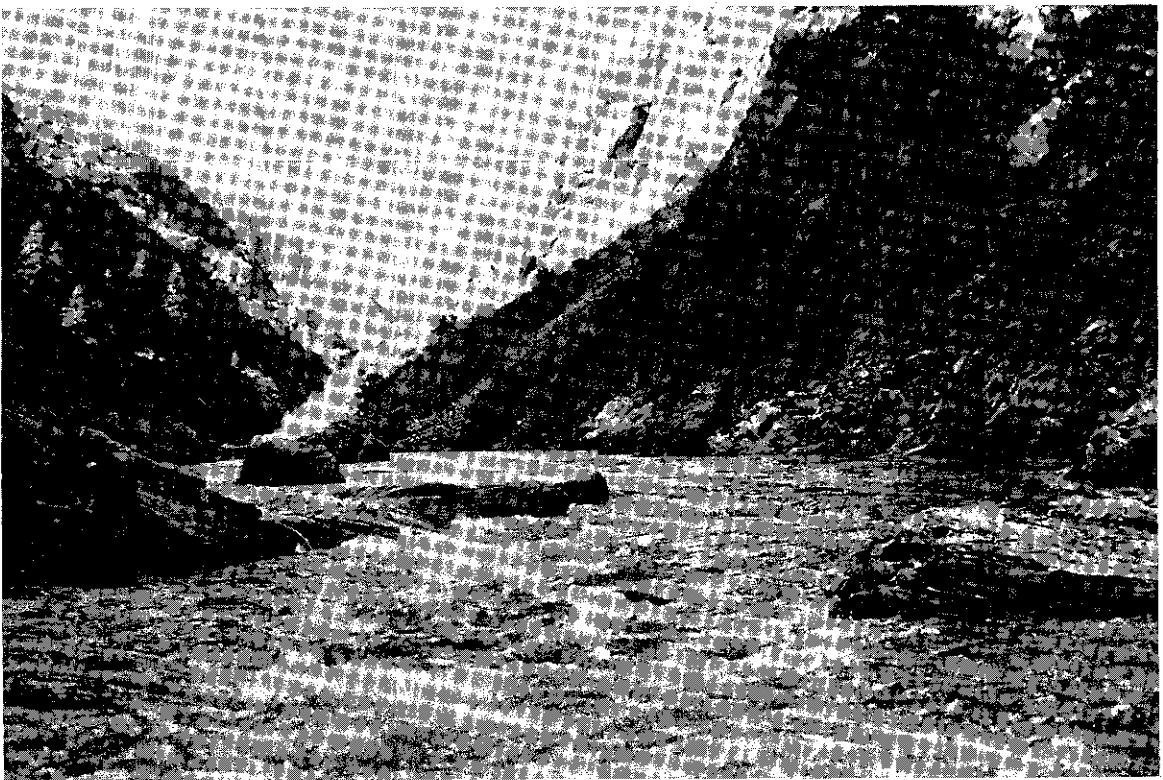
Free-Flowing Streams

Certain of the Nation's rivers and streams which possess outstanding scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values have been selected to be preserved in a free-flowing condition. This policy of the United States was declared in the Wild and Scenic Rivers Act, PL 90-542, October 1968.

The rivers and their immediate environments are to be protected for the benefit and enjoyment of present and future generations.

Congress, in 1976, designated 58 rivers for study and potential addition to the National System. The Snake River from Teton National Park to Palisades Reservoir is being studied for potential inclusion in the system.

Map A-2 presents rivers which the States of Idaho and Wyoming have identified as having potential for preservation.



Wild and Scenic River
USFS Photo

FISH AND WILDLIFE HABITAT

Idaho's fish and wildlife habitats occur throughout the agricultural and urban areas, coniferous forests, and alpine ecosystems, providing a wide spectrum of fish and wildlife.

Fish and wildlife habitat is being impacted by increased agricultural, industrial, and urban development. Expanding human population is placing greater demands on these resources. However, there are opportunities to improve habitat for a variety of wildlife species through coordination with various resource management activities.

Game and nongame species including fish, birds, and mammals will benefit and have less detrimental impacts through proper planning prior to project implementation.



Upland Wildlife Habitat
SCS Photo

ENDANGERED AND THREATENED PLANT AND ANIMAL SPECIES

Public Law 93-205, the Endangered Species Act of 1973 and the Endangered Species Act Amendments of 1978, have has provided for protection of endangered and threatened plants and animals.

An endangered species is one considered to be in danger of extinction throughout all or a significant portion of its range. Threatened species, on the other hand, are those likely to become endangered within the foreseeable future.



Bald Eagle, An Endangered Species
SCS Photo

The University of Idaho has recommended a total of 54 plants to be placed in an endangered and threatened species status. However, to date, no endangered and threatened species have been given an officially recognized regional or national designation.

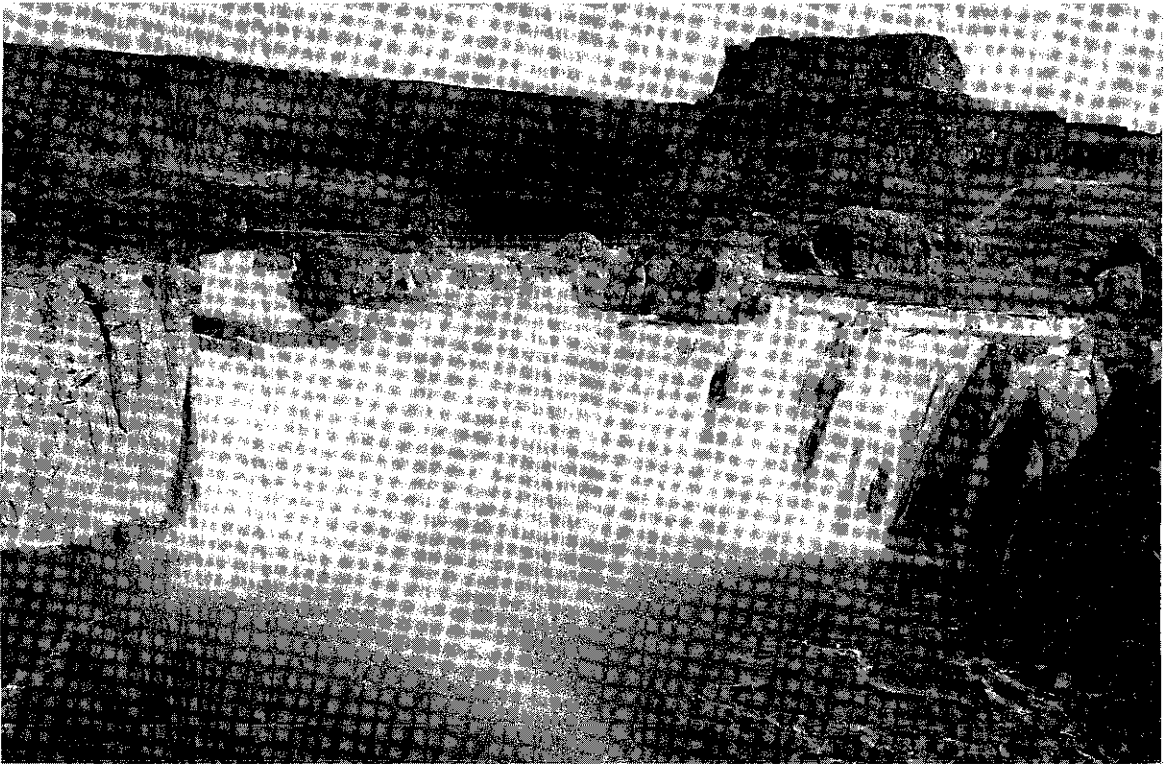
There are four endangered animal species in the Upper Snake River Basin. They are the Peregrine Falcon, the Bald Eagle, the Whooping Crane, and the Northern Rocky Mountain Wolf. The only threatened species is the Grizzly Bear.

OPEN AND GREEN SPACE

The need for open space with desirable patterns of settlement are goals that are contrary to certain types of present urban expansion and economic development. Until open space goals are definitively identified, they cannot be adequately included in the planning or the decision making process.

PRESERVATION OF UNIQUE HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

Evidence that humans inhabited the area so many years ago is known from inventoried historical and archaeological sites. There are over 1,400 state inventoried sites and 35 National Register sites in the Idaho portion of the Basin. There are 22 state inventoried sites and 5 National Register sites in Teton County, Wyoming, the only county in Wyoming with available data.



Shoshone Falls on Snake River
SCS Photo

Although the elements are destroying historic structures and sites, a more serious problem is human related. Destruction occurs from development, vandalism and thievery.

There are over 250 pieces of Federal legislation which affect historic preservation in some way. The Act which probably brought about the greatest change is the National Environmental Protection Act of 1969, P.L. 91-190, which requires all Federal agencies to consider the impact of any proposed Federal action on the quality of the environment, including any federally funded or federally licensed activities.

Through legislation, Idaho and Wyoming have created State Historical Societies that have been given certain powers to identify, preserve, and protect historical and archeological sites. Federal matching grants are available to states, cities, and counties to survey and preserve sites. With proper planning, landmarks which make up an important part of our heritage can and will be retained for future generations to enjoy.

RADIOACTIVE WASTE

The Idaho National Engineering Laboratory is a significant source of radioactive wastes. Although no problems of ground water contamination have been reported, there is concern that contamination may occur in the future. The buildup of radioactivity in underground reservoirs and the possibility of an accidental discharge of this material may be a threat to southern Idaho.

SUMMER HOME DEVELOPMENT

There will be a steady expansion of home development on private lands as people become more mobile and affluent. It is a natural tendency for people to establish second homes in a rural environment.

A greater chance exists of fire spreading to range and forest areas and insects are more difficult to control because public agencies do not protect private lands.

Most development has occurred in the Ketchum - Carey, Island Park, Palisades Reservoir, and Driggs areas.



Vacation Home Near Hagerman
SCS Photo

LOSS OF PRIME LANDS

The continued loss of lands well suited to the production of food, forage, fiber, and timber to other uses is a matter of growing concern in the Basin. Major consideration must be given to prime lands and the long-range need to retain the productive capability and environmental values of American agriculture and forestry. Developments that result in irreversible land use changes represent a loss of valuable natural resources. The loss is dramatic in some local areas in the Basin.

About 4,000 acres are being converted annually to urban development, second home, recreation, and other uses. Good agricultural land is being taken out of production and irrigation systems and water rights are being interrupted. Other land exists that is suitable for irrigation but has not been developed because of ownership patterns, development costs and social acceptability.

The Department of Agriculture has numerous programs that affect the use and availability of land in public and private ownership. They can be utilized by local and state governments to retain an adequate natural resource base and to meet environmental, social, and economic needs.

EFFECTS OF AGRICULTURE ON WATER QUALITY

Agriculture and related industries are a major contributor to water quality decline in the Basin. Livestock feedlots, food processing plants, and other related industries have been classified as point sources of pollution subject to discharge permits. Responsibility for pollution from other sources such as irrigation return flows, runoff from dryland agriculture, and discharge from drainage systems is difficult to determine.

Injection wells are used to dispose of waste water at scattered locations in the Basin. IDWR has been sampling and recording chemical content of irrigation waste water injected in drain wells, but enforcement of quality standards is pending. There is a concern about the quality of water being injected and the resulting effects on the water quality of the aquifer.

Concerns discussed under "Improving On-Farm Irrigation" and "Soil Erosion on Irrigated and Dry Cropland" are not reiterated here; however, significant water quality problems stem from agricultural practices. Improving on-farm irrigation practices and water management would reduce nutrient and sediment loads in receiving streams. Additional conservation measures and improved practices on dry cropland would also result in a similar benefit during certain periods of the year.

Soil and associated material that are transported by water and wind become suspended solids in receiving streams. Studies are being conducted by other agencies to identify and evaluate this and other aspects of the water quality problem.

MINING

The Upper Snake River Basin includes an area which is the largest producer of phosphate rock in the western phosphate field. As a resource, this area has the highest concentration of potential phosphorite in the United States with Idaho ranking in the top three states in annual production.

The outlook for the phosphate industry in the Upper Snake River Basin is optimistic. There is little doubt that expansion programs will continue and that additional mines and processing plants will be established. Market areas are generally expanding, and the demand for marketable phosphate products is increasing rapidly. These factors point toward a general increase in production in this area as well as the other western states.

In addition to phosphate, the rock contains important amounts of vanadium, flourine, uranium, nickel, molybdenum, and several minor metals. Although these metals are present, the metallurgy of extraction is complex and the cost per unit saved is high. Mining companies have been reasonably reluctant to start extraction for low profit margins.



Phosphate Mine Spoil Reseeded to Grass
SCS Photo

Open-pit phosphate mining and tailings from phosphate processing result in an unsightly intrusion on the landscape. Even more serious is the air and water pollution associated with refining the phosphate ore. Nutrient discharges stimulate algae growth in streams and reservoirs reducing the dissolved oxygen in the water to the extent that fish kills can result. Therefore, surface mining and its associated processing with its potential effect on water quality is a concern.

Coal, natural gas, and oil reserves in the Upper Snake River Basin have not been fully assessed. However, reserves of gas and oil are expected to exist. Exploration of these resources is expected to begin when supply demand and cost of development provide for profitable economic production.

RIPARIAN VEGETATION MANAGEMENT

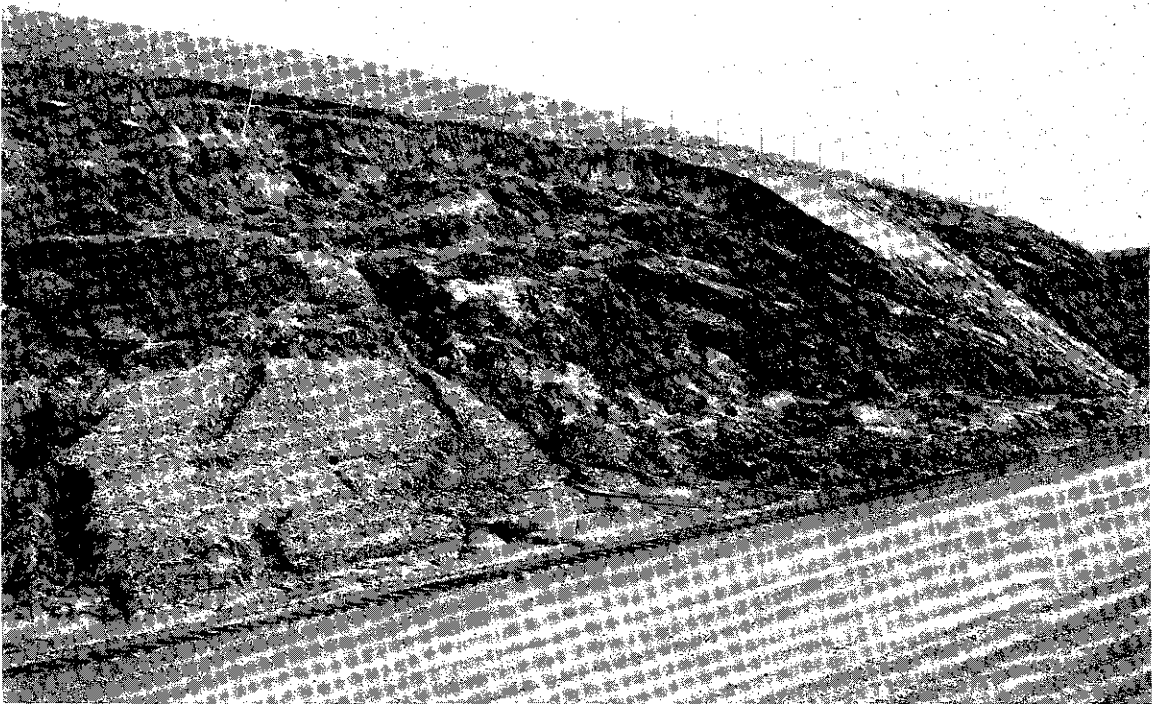
Vegetation along water courses provides both beneficial and adverse consequences. Riparian vegetation provides wildlife habitat, streambank protection, and adds diversity to the landscape. Certain phreatophytes cause water distribution problems along canal systems and use water needed for crop production.

Although riparian vegetation management is important to the solution of many water related problems, it was studied only in relationship to irrigation water distribution.

ROADSIDE EROSION

There are areas where serious roadside erosion has occurred during years of exceptionally large runoff, specifically, from adjacent lands. This can create a dangerous condition for motorists, accelerate sediment deposition downstream, and requires increased funds to repair roads.

This problem can be prevented when overland and channel flow are prevented from entering roadway areas. The alternative in terms of erosion and sediment damages is to keep the water on source areas with terraces and other land treatment. Whenever a roadway must double as a waterway, it should be protected from erosion.



Roadside Erosion
SCS Photo

DUST FROM WIND EROSION

Airborn dust is a hazard to motorists. It is prominent in the valleys of the Snake River and tributaries where sand dunes are common. The major problem areas are in Bannock, Bingham, Bonneville, Cassia, Fremont, Gooding, Jerome, and Minnidoka counties.

The problem is aggravated by strong winds, sandy soils low in organic material, and bare soils. Proper treatment of these soils and windbreaks can greatly reduce this problem.

SEDIMENTATION

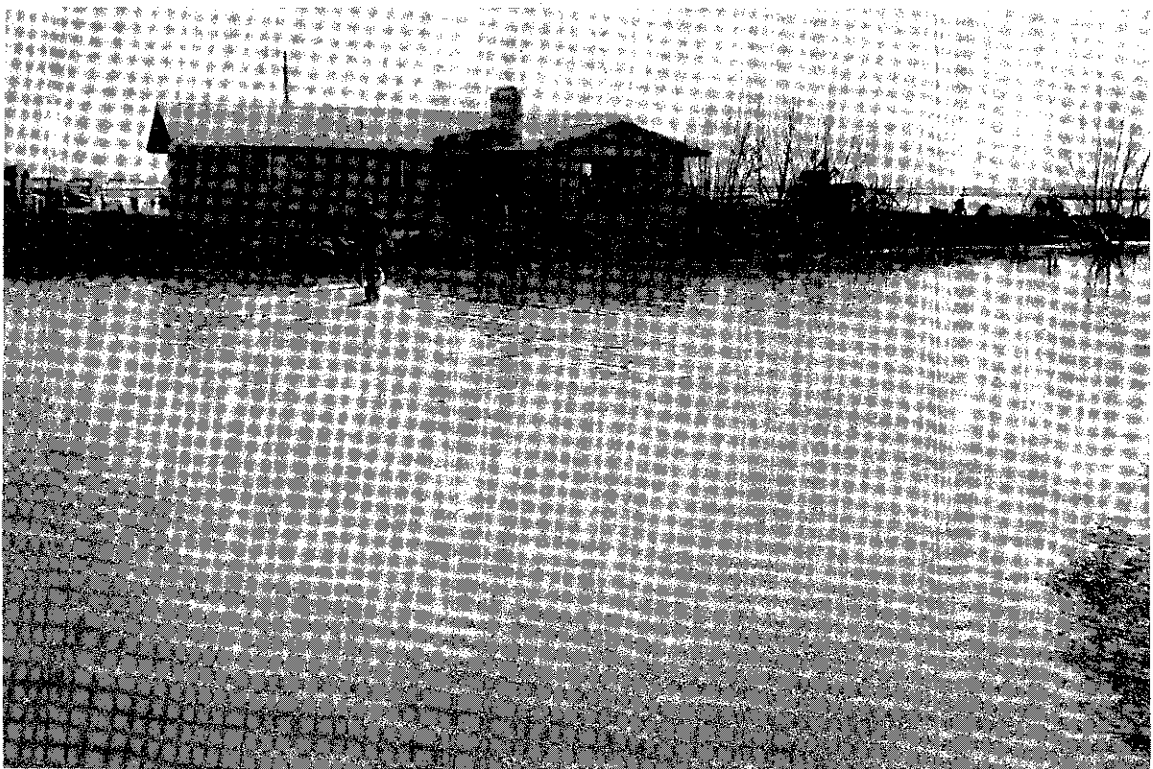
Sedimentation is a natural process resulting from geologic erosion, but human activities have accelerated it. The ultimate goal is to reduce erosion to near the natural level, to preserve the soil resource, and reduce sediment damages to land and water. Areas contributing sediment are displayed on Map A-3.

Sedimentation will continue to be a problem until significant reductions in erosion are made.

Problem areas are often scattered but are associated with erosion on cropland, timber harvest, mountain road construction, and road cuts. Sediment is most obvious after accelerated erosion due to storms, snowmelt, or from over-irrigation as in Minidoka, Twin Falls and Power counties. Sediment settles out when the wind and water velocity decrease and usually is found along streams, channels, roadways, canals, ditches, drains, and reservoirs. Sediment removal is an expensive process that must be done annually in many places. This concern was included in this study only as it relates to erosion.

URBAN AND RURAL FLOODING

Flooding problems are limited to a few communities and lowlands along the main streams of the Basin, particularly where the stream bed is not incised. . The early settlers learned from experience where the historical flood plains were and, for the most part, built out of these flood-prone areas.



Rural Flooding Near Montevieu
SCS Photo

As the land use and farming has intensified over the years, the historical flood plain is no longer adequate to handle the larger flood flows. Farming has erased some of the clues left by past flooding such as low terraces or old flood channels that have been leveled to provide more efficient irrigation.

There is concern with development taking place in flood-prone areas. The Flood Insurance Administration and other agencies have made flood plain studies to provide guidance for development and information to establish flood plain zoning. Identification of flood plains and zoning regulations will help reduce flood damages in the future. Approximately 13,000 acres of urban land and 230,000 acres of cropland and rangeland are flood prone in the Basin.

APPENDIX B

R E C R E A T I O N F A C I L I T I E S

Picnicking is a popular activity in the study area. Presently there are 1,747 sites with the capacity to provide 1,640,600 picnic recreation 1/ days. This leaves a remaining need for 2,869 sites.

Capacity was determined by using the following method: 2/

<u>Design Days</u>		<u>Daily Capacity Per Picnic Site</u>		<u>Seasonal Capacity Per Picnic Site</u>
46	X	8	=	370 <u>3/</u>

Demand was determined by using a combination of resident and nonresident participation as presented in the Idaho and Wyoming SCORP Reports.

Camping facilities number 5,408 sites with the capacity to provide 995,072 camping recreation days. This leaves a remaining need for 7,127 additional sites.

Capacity was determined by using the following method: 4/

<u>Design Days</u>		<u>Daily Capacity Per Campsite</u>		<u>Seasonal Capacity Per Campsite</u>
46	X	4	=	184

1/ A standard unit of recreation use consisting of one individual participating in one recreation activity during any reasonable portion of or all of one day.

2/ Method from the Pacific Northwest River Basin Commission.

3/ Rounded to the nearest 10.

4/ Method from the Idaho SCORP Report.

Interpretative Facilities and Services enhance and protect the cultural, historical, and natural resources of the area. The basis for developing the demand figures was a conservative estimate of 3 million activity days for 1978. This was considered conservative, as there are over 3 million visitors per year to the Jackson Hole area alone.

A method for determining the demand and seasonal capacity had not been developed for interpretative facilities and services. From a Forest Service survey, RIM statistics and personal knowledge, the following information was developed:

Interpretative Facilities and Services

<u>Category 1/</u>	<u>Present No.</u>	<u>No. Without Plan-Yr 2000</u>	<u>Recreation Days Per Facility Per Season</u>
Visitor Centers	5	6	36,000
Auto Tours (Self-Guided)	2	5	7,500
Brochures (10,000 copies each)	100	200	480
Signs	200	425	4,800
Interpretative Trails	10	25	48,000
Audio Visual Programs	100	250	1,080
Demonstrations	6	10	6,000
Conducted Tours	6	30	12,000
Contact Stations	20	250	8,400

1/ Includes Forest Service, Park Service, BLM, and State developments.

The demand for these services was projected to increase by 50 percent by the year 2000 and an additional 27 percent by the year 2020.

The on-going program was deducted from the total projected needs to determine the unmet needs. Through this evaluation process it was determined that on-going programs would not meet the demands for visitor centers, demonstrations, conducted tours, and contact stations.



Redfish Lake Visitor Center
USFS Photo

