United States
Department of
Agriculture

Soil Conservation
Service

Economic
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Forest Service

Idaho Department
of Water
Resources

SNAKE RIVER BASIN COOPERATIVE STUDY IDAHO

Lower Snake Main Report

July, 1982

SNAKE RIVER BASIN
COOPERATIVE STUDY
IDAHO

LOWER SNAKE
MAIN REPORT

COVER PICTURE
COURTESY IDAHO TOURISM

U.S. Department of Agriculture
1 Soil Conservation Service
2 Economic Research Service
3 Forest Service
and
4 Idaho Department of Water Resources

July 1982

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PREFACE

PREFACE

Authority For Study

Cooperative studies of the water and related land resources in the Snake River Basin were 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 these studies include the Soil Conservation Service, the Economic Research Service, and the Forest Service of the Department of Agriculture and the Idaho Department of Water Resources. The Wyoming State Engineer's Office participated in the Upper Snake River Basin Study.

Request For Study

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.

Area Studied

During the early planning activities, it was determined--due to the large size of the area and the need for information--to carry out only the inventory, and evaluation portion of the study in the whole Basin within Idaho and Wyoming. After this was completed and the working materials reports prepared, the plan formulation phase was to be carried out independently for the Upper, Middle and Lower Basin Area's, respectively. The Upper Snake River Basin formulation phase has been completed and the main report prepared. The area addressed in this part of the study is the Lower Snake River Basin in Idaho.

Part of the hydrologic boundary of the Basin was 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.

Purpose

The purpose of this study was to develop alternative solutions to specific water and related land resource problems of the Snake River Basin through USDA Programs. Problems addressed in the study include erosion, sediment, recreation, agricultural productivity, and wood fiber productivity.

Use

The study provides data that confirms and further emphasizes the critical erosion problem in the Basin and the resulting sedimentation. The data has and will continue to broaden the awareness of the problem and the real need to take corrective action.

The study has provided some much needed technology and has demonstrated its effectiveness in evaluating erosion and planning for its treatment through USDA project implementation.

The data on outdoor recreation facility needs and development and wood fiber production has and will continue to be useful in the development of recreation and forest management plans for both public and private lands.

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 Idaho Department of Water Resources (IDWR) and other water and related land resource planning activities in the state.

Report Content and Format

This study was made and the report prepared consistent with the Principles and Standards for planning water and related land resources published by the Water Resources Council September 10, 1973, and the USDA Procedures developed for implementing the Principles and Standards, March 1974.

The tables displaying the material follows the Principles and Standards and the USDA Procedures. The narrative material follows the outline in the Soil Conservation Service National Basin and Area Planning Manual, August 31, 1981.

Report Content and Format (Cont.)

In addition to the Preface, this report includes:

1. A summary of the study.

2. A discussion of the concerns studied and how they were selected, Chapter I.

3. A discussion and display of two alternative plans formulated; the Environmental Quality Alternative and the National Economic Development Alternative. They are each displayed in the Environmental Quality Account, the Economic Development Account and the Social Well Being Account of the Principles and Standards, Chapter IV.

4. A Preferred Plan - Developed from the Environmental Quality and the Economic Development Alternative. It is presented in Chapter II also in the Prin ciples and Standards Account format.

5. Opportunities for implementing the Preferred Plan, Chapter III.

6. A discussion of the Resource Base as it pertains to the study is included in the Appendix.

Other Agency Assistance

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

Agricultural Research Service
Bureau of Indian Affairs
Bureau of Land Management
Bureau of Reclamation
Geological Survey
Heritage Conservation and Outdoor Recreation Service
Idaho Association of Soil Conservation Districts
Idaho Department of Employment
Idaho Department of Fish and Game
Idaho Department of Health and Welfare - Division of Environment
Idaho Department of Parks and Recreation
Idaho Historical Society
Idaho Soil Conservation Commission
Idaho Water Users' Association
National Park Service
University of Idaho
Cooperative Extension Service
U.S. Fish and Wildlife Service

LS–1

LOCATION MAP

LOWER SNAKE RIVER BASIN

IDAHO

1981

50 0 50 MILES

SCALE 1:3,500,000

Source:
Base map prepared by SCS, WTSC Carto Unit from Landsat 1, Band 7, Mosaic (Formerly ERTS).
U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE USDA SCS-PORTLAND, OR 1981

M7-L-24023-4

SUMMARY

SUMMARY

National Objectives

National objectives of enhancement of environmental quality and economic development are the overriding objectives of the plan developed in the Lower Snake River Basin Cooperative Study.

Specific Study Objectives

Specific objectives of the study focused on (1) Protection of the Land Resource Base, (2) Enhancement of the environment, (3) Improvement of the quality of the Basin's water, (4) Improvement of the outdoor recreation experience, (5) Evaluation of USDA opportunities to improve the economic condition of the Basin.

Concerns Studied

Considering the above five specific objectives some twenty-five concerns were identified and screened. The following were selected for detailed study.

Soil Erosion On:
Irrigated cropland, dry cropland, rangeland, forest roads, and stream channels

Sediment From:
Irrigated cropland, dry cropland, rangeland, forest roads, and stream channels

Shortage of Outdoor Recreation Facilities

Inadequate Supply of Wood Fiber:

Plan Formulation

Two alternative plans were formualted incorporating these concerns and the respective plan elements. One plan emphasized Environmental Quality (EQ Plan). The other emphasized Economic Development (NED Plan).

Planning Accounts

The alternative plans were evaluated using three Economic multiple objective planning accounts--National 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. Therefore, the Regional Development Account and National Economic Development Account show the same overall economic development effects.

Plan Selection

Using the alternative plans as a basis a Preferred Plan was selected by the study staff which would provide feasible, practical solutions to the study concerns. The selection process utilized information developed during the study from several other sources, including public meetings directed by the Idaho Department of Water Resources, discussions with local, State and Federal agencies, outputs of the Pacific Northwest River Basin Commission's Comprehensive Coordinated Joint Plan, the Idaho State Water Plan, and base studies made within the Lower Snake Study.

Irrigated Land and Treatment

The Preferred Plan includes the conversion of 30,000 acres from surface to sprinkler irrigation other irrigation improvements on 25,000 acres. Irrigation water distribution and use will be improved, productivity increased and erosion and sediment from these lands reduced. Irrigation return flows will be reduced enhancing water quality in receiving streams by reducing movement of sediment and associated chemicals to streams.

Dry Cropland Treatment

Dry cropland treatment including, elimination of summer fallow, contour farming, conservation tillage systems, divided slope farming and stripcropping on 940,000 acres will reduce erosion by 4.3 million tons (4.6 tons/acre) and sediment delivery by 2.5 million tons annually.

Rangeland Treatment	Rangeland seeding, brush control fencing, water development and proper grazing on 2.7 million acres will improve range forage production, reduce erosion by 125 thousand tons and sediment by 73 thousand tons annually.
Forest Road Treatment	Forest road treatment, primarily seeding, will reduce erosion on some 53,900 acres of roads by 1.2 million tons and sediment by 2,000,000 tons annually.
Stream Channel Treatment	Stream channels with moderate to severe erosion problems were identified. Treatment of 16,000 feet of these problem areas will reduce erosion and sediment by 6,000 tons annually.
Erosion and Sediment Reduced	Planned treatment includes some 3.7 million acres and would result in a combined reduction in erosion of 5.6 million tons annually and a reduction of sediment by 2.8 million tons annually.
Environment Enhanced	The visual quality of the landscape will be enhanced, the land resource base protected, sediment delivery to the Basin's streams, rivers, lakes, and reservoirs reduced, water quality enhanced and fish and wildlife habitat improved.
Outdoor Recreation Facility Development	The Preferred Plan includes a number of outdoor recreation facility developments including those for camping and picnicking, boating, swimming, skiing and snowmobiling. This development would reduce the unmet demand for recreation by 3.8 million recreation days per year by the year 2000.
Outdoor Experience Enhanced	New outdoor recreation developments will be planned to relieve pressure on areas being used beyond their capacity, thereby, reducing the impact of recreation on the environment and enhance the outdoor recreation experience.

Wood Fiber Production

Elements to increase the wood fiber production include felling and bucking, sawmill and timber stand improvement. This would increase the supply of wood fiber by 29 million cubic feet and eliminate 90 percent of the projected supply deficit.

Economic Impacts

Implementation of the Preferred Plan would cost approximately 100 million dollars and create over 4,000 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.

Use Of Study Data

Data developed for this study have made and will continue to make significant contributions to various planning and implementation activities throughout the Basin. Section 208 Planning under the Rural Clean Water Program, PL-566 Planning, RC&D Planning Soil Conservation District Program Planning, are some of the program activities presently benefiting.

Reports Prepared

The Field Advisory Committee (FAC) decided early in the study to provide finished reports of inventory data and preliminary analysis as soon as available in order to obtain the maximum timely use and benefit from the study activities. Twelve reports have been published and distributed to interested individuals and agencies. These include reports of Economic Overview and Projections, General Soils, Recreation, Land Resources Data, Environmental Quality, Erosion, Land Productivity, and the Analysis of Erosion and Sediment on Lolo Creek, an Assessment of the Forest Resource, Irrigation Water Distribution and Use-Upper Snake River Basin, Irrigation Water Distribution and Use-Test Case Upper Snake River Basin Main Report.

Data from these reports was provided to local and state cooperating agencies as the information became available.

Opportunities For Implementation

There are a number of ongoing USDA Programs of technical assistance, cost sharing, loans and grants that provide a sound framework for implementing the land treatment elements of the study. Lack of adequate funding, however, is a major deterrent in the rate of progress that can be made. Current emphasis on reducing non-point pollution lends support to the acceleration of the land treatment elements.

Outdoor recreaction facility 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 technical assistance to assure environmental compatibility and economic viability.

Increase in wood fiber supply will occur primarily through acceleration of ongoing Forest Service, Soil Conservation Service, and Extension Service Programs.

Comparison of Impacts of the Plans

The table on the following page gives a comparison of the impacts of the Preferred Plan, the Environmental Quality Plan and the National Economic Development Plan and the present and without plan conditions for the concerns addressed in the study.

The "without plan" is the term used to identify future conditions that would be expected if no plan elements were implemented.

Table I.--Comparison of the present and without plan condition with the Preferred Plan, the Environmental Plan, and the Economic Development Plan effects, Lower Snake River Basin, 1978

Concerns	Unit	Present condition	Year 2000			
			Without plan	Preferred plan	Environmental Quality Plan	Economic Development Plan
		thousands				
Soil erosion on:						
Irrigated cropland	Av. ann. soil loss-tons	307	304	275	275	275
Dry cropland	"	7,881	7,007	2,742	2,178	2,742
Rangeland	"	613	575	522	450	522
Forest roads	"	2,205	2,440	1,220	489	1,220
Stream channels	"	31	34	28	22	28
Banks with moderate to severe erosion	Linear feet	520	570	554	435	554
Sediment from:						
Irrigated cropland	Av. annual tons	123	122	110	110	110
Dry cropland	"	4,367	3,883	1,392	1,148	1,392
Rangeland	"	357	335	304	262	304
Forest roads	"	342	384	192	78	192
Stream channels	"	31	34	28	22	28
Shortage of recreation facilities:						
Developed camping	Recreation days	404	837	837	0	837
Dispersed camping	"	943	1,952	1,406	0	1,406
Developed picnic	"	240	528	329	0	329
Dispersed picnic	"	445	980	619	0	619
Boat access	"	113	725	127	0	127
Swimming	"	302	1,267	380	0	380
Cross-country skiing	"	72	194	128	0	128
Downhill skiing	"	1/	554	0	0	0
Snowmobiling	"	2/	340	0	0	0
Inadequate supply of wood fiber:	Cubic feet	16,495	32,305	3,305	0	3,305

1/ Surplus of 130,000 recreation days.

2/ Surplus of 105,000 recreation days.

CONCERNS - CHAPTER I

CONCERNS - CHAPTER I

How Identified

A wide range of water and related land resource problems and concerns were identified by the USDA-State Study Staff from the public meetings held and the public opinion surveys conducted under the leadership of the Idaho Department of Water Resources. A number of inter-related physical, social, economic and environmental issues came forth.

Selection For Study

The Study Staff, acting under the direction of the Field Advisory Committee and in conjunction with the Idaho Department of Water Resources selected four concerns for study. The selection of concerns was based on public interest and the direct relationship of the concerns to agricultural programs of U.S.D.A. and the State of Idaho.

Concerns Studied

The concerns studied and their present and future without plan conditions are displayed in Table II on the following page. The future without plan condition assumes continuation of present programs. A brief narrative description of the concerns studied follows the table.

Table II--Problems and concerns, present and future without plan conditions, Lower Snake River Basin, 1978, 2000, and 2020

Concerns	Unit	Year 1978	2000	2020
		--------thousands----------		
Soil erosion on:				
Irrigated cropland	Av. ann. soil loss, tons	307	304	301
Dry cropland	"	7,881	7,007	5,980
Rangeland	"	613	575	551
Forest roads	"	2,205	2,440	2,694
Stream channels	"	31	34	38
Banks w/moderate to severe erosion	Ln. feet	520	570	630
Sediment from:				
Irrigated cropland	Av. ann. sediment, tons	123	122	120
Dry cropland	"	4,367	3,883	3,314
Rangeland	"	357	335	321
Forest roads	"	342	384	426
Stream channels	"	31	34	38
Shortage of recreation facilities:				
Developed camping	Recreation days[1/]	404	837	1,395
Dispersed camping	"	943	1,952	3,255
Developed picnic	"	240	523	772
Dispersed picnic	"	445	980	1,801
Boat access	"	113	725	1,659
Swimming	"	302	1,267	2,690
Cross-country skiing	"	72	194	377
Downhill skiing	"	[2/]	554	979
Snowmobiling	"	[3/]	340	979
Inadequate supply of wood fiber	Cu. feet	16,495	32,305	64,902

1/ Recreation day - a standard unit of recreation use consisting of one individual participating in one recreation activity during any reasonable portion or all of 1 day.
2/ Surplus of 130,000 recreation days.
3/ Surplus of 105,000 recreation days.

SOIL EROSION

Soil Resource

The soil resource of the Basin is sufficient to provide both the short-term and projected future food and fiber production needs (OBERS). 1/ To maintain this resource and efficiently produce the projected food and fiber demand it will be necessary to reduce erosion on cropland, rangeland, and forest land.

Erosion Rates

Erosion exceeds the tolerable soil loss limit "T" 2/ on about 580,000 acres, or 49 percent, of the Basin's cropland. This amounts to a substantial loss of the soil resource and sediment damage. However, recent emphasis placed on water quality improvement and the need to protect the soil resource for crop production has provided incentives for reducing erosion.

Use of USLE

The Universal Soil Loss Equation (USLE) was used to obtain erosion data displayed in the Lower Snake River Basin Erosion Report. 3/ These results have been correlated with data obtained from the SCS National Inventory (LIM) for Idaho and surveys made by the Soil Conservation Service, Forest Service, and Geological Survey.

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 in tons per acre per year that will sustain productivity of the soil resource.

3/ One of several reports prepared by the Planning Staff during interim of this study.

IRRIGATED CROPLAND EROSION

Problem

More than 300,000 tons of soil are eroded annually from the irrigated cropland. Fifteen hundred acres were identified as having excessive erosion. Eroded soil that leaves the fields finds its way into irrigation systems or streams and becomes redistributed onto fields or as sediment in ditches, borrow pits, tributary streams, rivers, and reservoirs. Erosion on these lands occurs both from irrigation and from overland flow of snowmelt and flood waters due to the lack of adequate vegetative protection during periods of winter runoff.

IRRIGATED CROPLAND EROSION

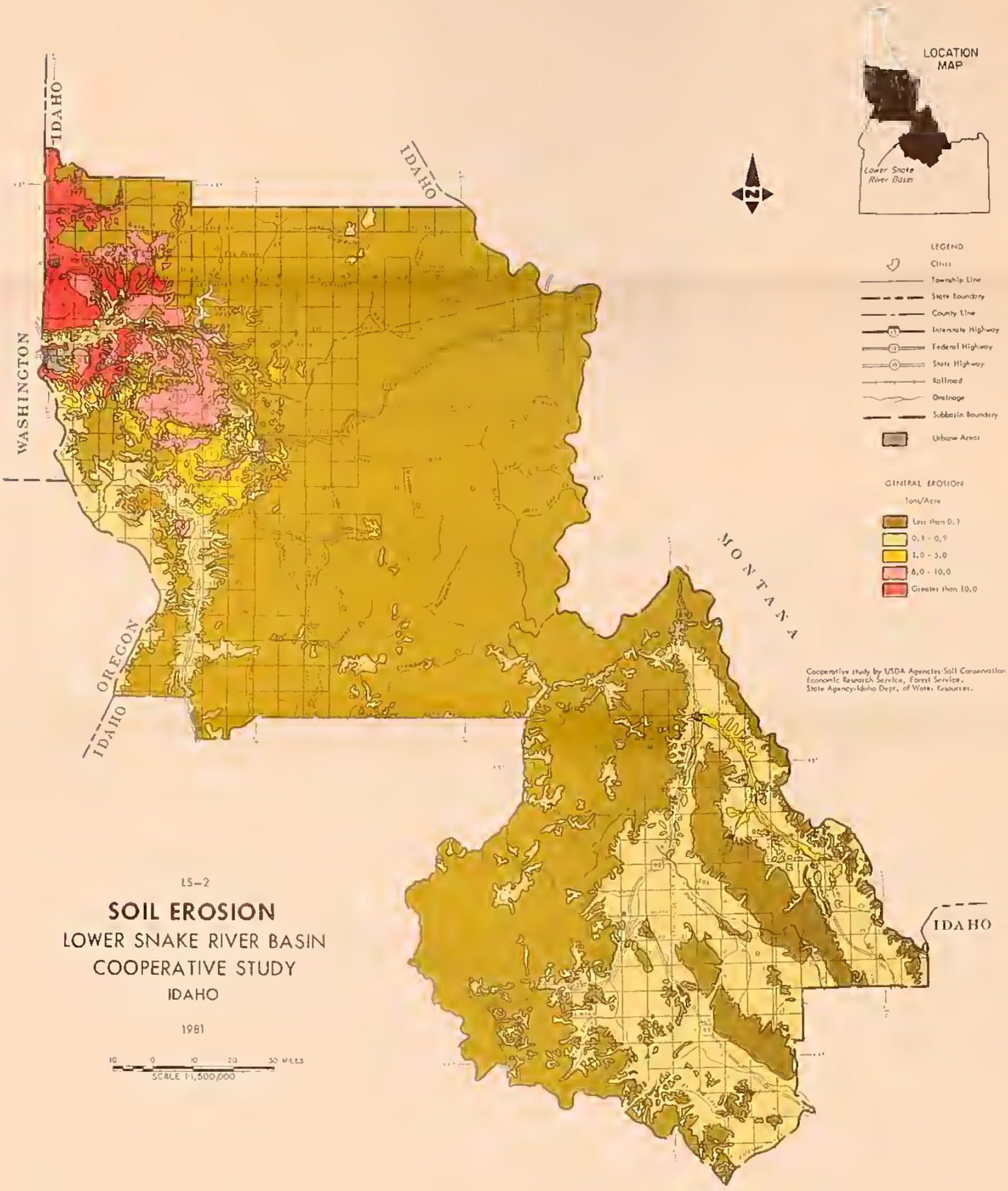
Solutions

Opportunities exists for converting some of the wild flooding methods employed along the Lemhi, Pahsimeroi, and Salmon Rivers with small community gravity sprinkler irrigation systems from tributary streams. Along the Big Lost River the main opportunities that exist deals with improvement of their existing on-farm surface irrigation systems.

DRY CROPLAND EROSION

Problem

Excessive erosion occurs on about 564,000 acres of the 947,000 acres of dry cropland in the Basin. This represents 60 percent of the total. Erosion on these lands is estimated at 6.7 million tons or about 12 tons per acre per year on the average. This causes nearly 4 million tons of excessive soil erosion in the Basin by today's standards of soil loss tolerance. Erosion on all dry cropland is nearly 7.9 million tons per year. Approximately 200,000 acres or 21 percent of dry cropland is adequately protected.



Source:
Base map prepared by SCS, WTSC Cartographic Unit from USGS 1:1,000,000 Nat. Atlas.
Thematic detail compiled by state staff.
U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

M7-ON-24023-I

Erosion over the last 50 years has reduced potential productivity on 60 percent of the dry cropland by 23 percent, the equivalent of 20 bushels of wheat per acre.

Erosion and Sediment in the Palouse -- SCS Photo

Major Cause

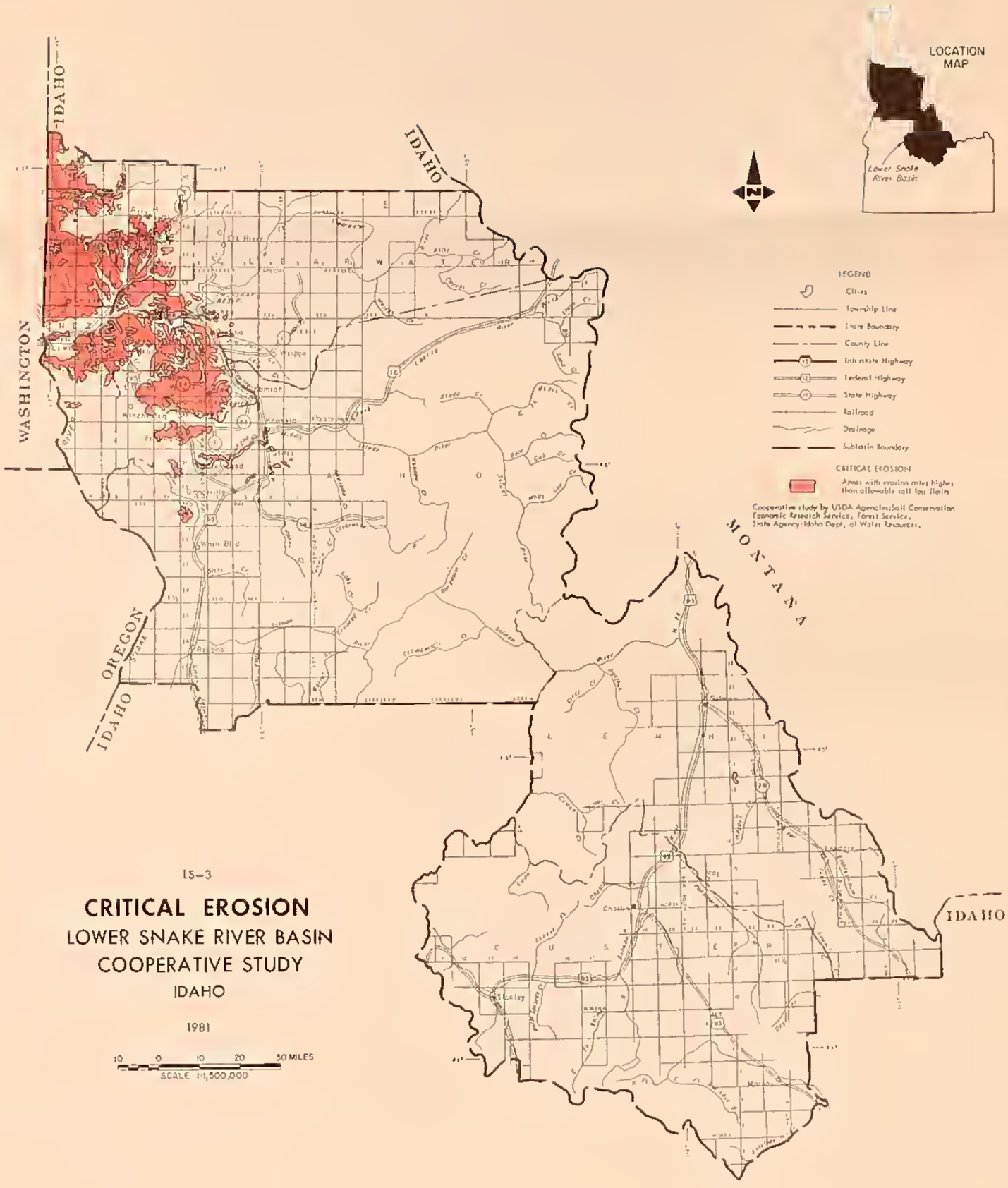
Surface runoff from rainstorms and snowmelt over unprotected land is the major cause of soil erosion on dry cropland in the Basin. Improper tillage operations tend to bury surface residues and break down soil structure leaving the soil bare, and unprotected. These conditions promote runoff and soil movement. Tillage direction is very important too. Farming on or near the contour tends to hold precipitation on the field while up-and-down hill operations leave equipment and tillage marks that increase runoff and erosion in the furrows.

Solutions

The complexity of the dry cropland resources due to the wide variations in topography, precipitation, and soil profile characteristics, limited the analysis of the land treatment practices to those applicable to the more significant parts of the Basin. Practices included; elimination of summer fallow, convert to contour farming, convert to conservation tillage, implement divided slope farming with a change in cropping pattern, and the installation of stripcropping. Water control systems were excluded from the study due to the lack of an adequate data base and their site specific characteristics. Water control systems, however, will be an integral part of many watershed protection plans in the Basin.

Impact On Crop Production

Long-term crop reductions from soil and fertility losses caused by soil erosion is a serious problem. Measurements show grain yields decrease from one to five bushels per acre for each acre inch of top soil eroded from a field. On deep soils, diminishing crop returns caused by soil loss can sometimes be compensated for by added increments of fertilizer, technology, and other financial expenditures. Where soils are shallow, however, it is difficult or impossible to compensate for soil loss.



LS-3

CRITICAL EROSION

LOWER SNAKE RIVER BASIN COOPERATIVE STUDY

IDAHO

1981

10 0 10 20 30 MILES

SCALE 1:1,500,000

Source:
Base map prepared by SCS, WTSC Carto Unit from USGS 1:500,000 series.
Thematic detail compiled by state staff.

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE USDA-SCS PORTLAND, OR 1982

M7-ON-24023-2

RANGELAND EROSION

Problem

Rangeland erosion is not excessive in the Basin in terms of tolerable soil loss ("T" values), however, due to the large amount of rangeland, a significant quantity of sediment is produced. Approximately 28 percent, or four million acres of the Basin is rangeland.

Major Cause

Most soils erode when vegetative cover is removed or disturbed on steep slopes. This is particularly true of the loose sandy rangeland soils of the Idaho Batholith. Improperly constructed roads, trails, range fires, and overgrazing have caused serious local erosion. Steep cut-and-fill slopes have been constructed often leaving poorly compacted soils vulnerable to overland and stream flows. Roads collect runoff which erodes fill, cut bank, and ditch areas. When released downhill, water severly erodes the fill unless adequately controlled in a non-erosive waterway.

Rangeland is grazed by livestock which disturbs the soil structure by compaction and physically moves the soil downslope. This is most obvious on steeper south and west facing slopes in areas of lower precipitation where vegetation is sparse. Livestock also prefer to graze along the streambanks, close to water, which results in soil disturbance, loss of vegetative cover and degradation of water quality.

Impact On Range

There will be greater demands for red meat from rangefed livestock in the future, will create a need for improved range conditions. Beef production will increase on rangelands in fair and good condition. Improved range conditions with more forage and vegetative cover also offers increased protection from erosion. Maintaining soil depths on rangeland can be critical for keeping vigorous vegetative growth because the soils are usually thin and marginal for forage production.

FOREST ROAD EROSION

Problem

Roads are the leading source of erosion on the forest lands. Erosion rates may range from 7 to 105 tons per acre per year. The most intense and rapid rate of erosion occurs the first year after the soil is disturbed in road building.

There has been a general improvement in road building and harvesting techniques to prevent erosion on forest land in recent years. However, there is a backlog of approximately 950 miles of abandoned roads in need of rehabilitation. New roads are being constructed each year that add to the total disturbed area.

Solution

Roads that are properly designed to provide proper drainage and when grass is seeded cuts and fills will minimize erosion.

Forest Road Erosion -- SCS Photo

STREAM CHANNEL EROSION

Problem

There are about 100 bank miles of moderate and severe channel erosion in the Basin, some occurring in almost every county. Most of these eroding channels have banks five feet or more high. Channel entrenchment and enlargement usually occur during exceptionally large runoff events. Once developed, the channels draining larger watersheds do not return to their original condition.

Stream Channel Erosion -- SCS Photo

On Cropland

On cropland, a channel eroded deeper than that which can be removed by tillage equipment divides the field into smaller farming areas. This results in increased costs in time and energy to farm. The channel continues to enlarge from erosion unless corrective measures are taken.

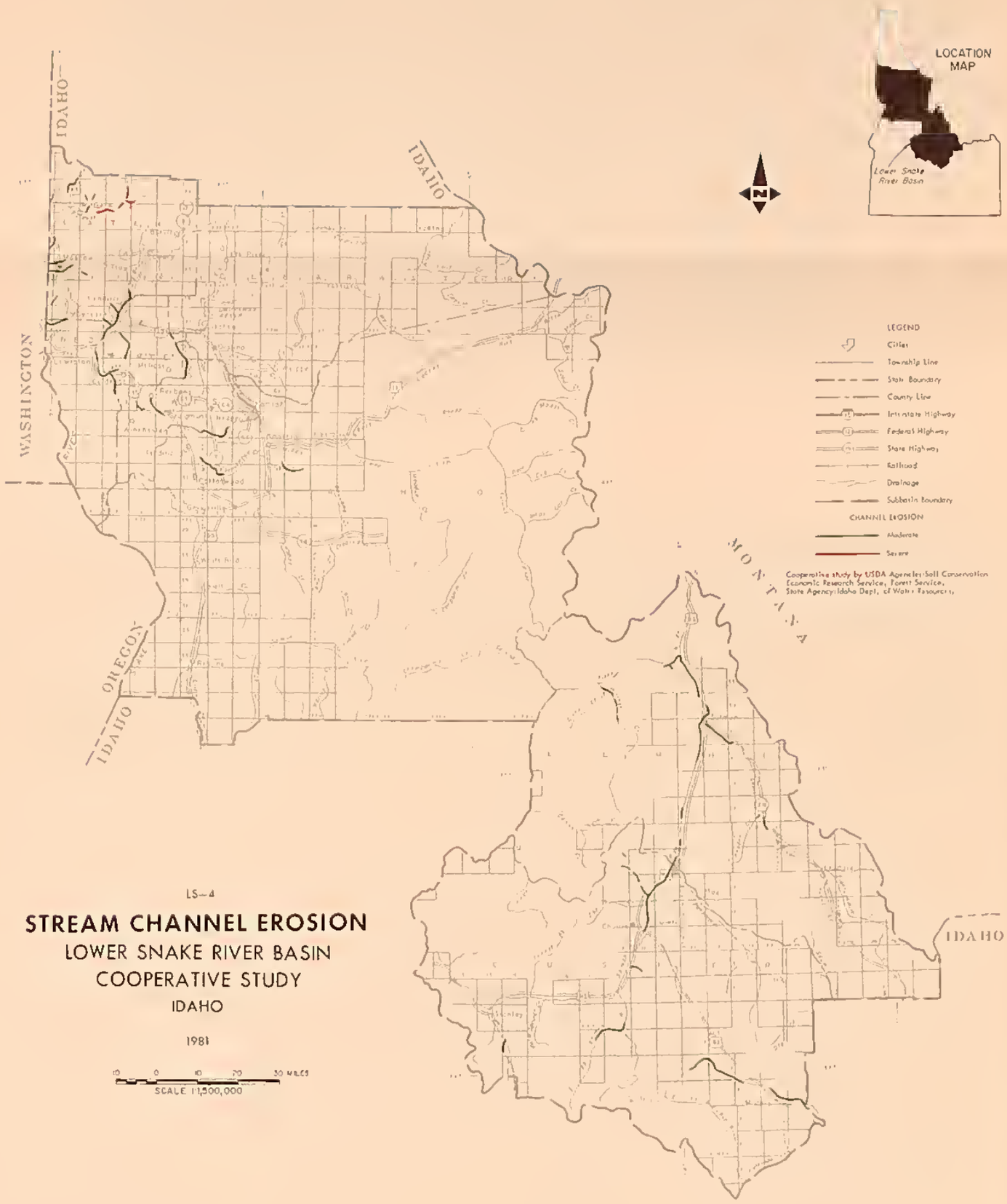
On Rangeland

Many entrenched channels are located on rangeland associated with accelerated runoff from adjacent cropland. Generally infiltration rates on cropland are too low to permit adequate percolation of melting snow or rainfall. As a result a large percentage of the water runs off causing channel erosion.

Some channels become areas of soil deposition and channel filling. It is common for soil from eroding croplands to be deposited in areas of lower gradient. These sediments are easily transported during periods of high runoff and enlarged entrenched channels are formed.

On Forest Land

Erosion and surface runoff from undisturbed forest land is very low. Consequently, conditions conducive to the formation of eroded stream channels generally do not exist except for isolated areas.



LS—4

STREAM CHANNEL EROSION

LOWER SNAKE RIVER BASIN COOPERATIVE STUDY

IDAHO

1981

Source.
Base map prepared by SCS, WTSC Carto Unit from USGS 1:1,000,000 Nat. Atlas.
Thematic detail compiled by state staff.

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

M7-ON-24023-3

SEDIMENT

Source

Sediment rates have been relatively low in the Basin especially when it is the product of slow geologic erosion. Undisturbed forests and rangeland are the major areas that can be categorized as having geologic erosion rates. When farming started, cultivation of the land caused accelerated sediment damage due to the lack of concern for the soil resource. Extensive damage occurs when sediment is deposited in areas where it cannot be utilized effectively and thus becomes an undesirable product.

Amount

Sediment and accompanying nutrients and chemicals degrade water quality as well as shorten the life of man-made structures. Average annual sediment from Idaho on the Palouse River has been estimated to be about 370,000 tons above Palouse, Washington and 833,000 tons on the Clearwater River at Spaulding. Much of the sediment from the Palouse is trapped above the locks at Monumental Dam. Sediment from the North Fork of the Clearwater is not included in this total because it is trapped in Dworshak Reservoir. These amounts represents a large amount of soil being transported from the Basin each year to reservoirs on the Lower Snake River.

Impact On Water, Crop Production, and Navigation

Emphasis is being made to improve stream water quality by reducing sediment delivery rather than controlling erosion and thereby stopping the sediment at its source. Application of proper treatment practices that reduce erosion on cropland, rangeland, and forest land will reduce pollution caused by sediment. The need to increase crop production for a growing world population should provide another strong incentive for reducing soil loss and sediment damages.

Sediment in the Clearwater River is trapped behind Lower Granite Dam. It is accumulating at a rate that has required dredging of the Port of Lewiston once since the Dam was constructed 10 years ago.

Sediment From Irrigated Cropland

Most of the irrigated land in the Basin lies along the Lemhi, Salmon, Pahsimeroi, and Big Lost Rivers. Sediment from these lands is primarily from erosion, from irrigation, and periodic flooding. Sediment reaching the rivers is quickly carried downstream.

Sediment from irrigated lands can be reduced by controlling erosion with better irrigation water management. Erosion of streambanks in irrigated areas, however, is a natural phenomenon and difficult to control on large streams except by protecting eroding sections with rock and removal of fallen trees that deflect the streams toward the bank. This is an expensive process and usually only limited results can be accomplished.

Sediment From Dry Cropland

Dry cropland is a big producer of sediment in the Basin. Steep slopes permit a large amount of eroded soil to move downhill toward the more gentle slopes and channels. Valley areas accumulate the sediment which causes damage to roads, bridges, culverts, and swamps the drainage systems. The best soil with associated nutrients is removed from the hills and deposited in the valleys, usually to be buried later by more sediment.

Virtually all of the streams in the cropland areas and those downstream suffer degradation of water quality because runoff waters from these lands are rich in sediment, nutrients, and other contaminates. It is estimated that over 307,000 tons of sediment are discharged annually into the Palouse River alone.

Sediment From Rangeland

Erosion and corresponding sedimentation rates are low on rangeland where the vegetative cover is undisturbed by road building, overgrazing or burning. There is ample precipitaion to support soil-protecting vegetative growth at most locations.

Rangeland becomes a source of sediment from channel areas when upstream runoff becomes abnormally high. This is particularly true when runoff is from dry cropland, areas of recent timber harvest, and burned-over land. Greater efforts are needed to increase vegetative cover on rangeland. This will have an economic benefit by protecting the soil and increasing the forage and livestock carrying capacity.

Sediment From Forest Roads

Road building associated with timber harvest is the major contributor of sediment from forest land. Roads tend to channel storm runoff, thereby, increasing the erosive force of the water. Sediment is carried toward the streams and eventually leaves the area unless it is trapped in vegetation and debris bedore it reaches the stream.

The estimated average annual sediment from forest roads is 342,000 tons at the present time. This quantity is projected to be 384,000 tons by the year 2000.

Sediment From Stream Channels

Sediment from channel erosion is the natural result of increased runoff from higher portions of the watershed. The eroded soil becomes unwanted sediment downstream. Soil eroded from channel banks and bottoms is swept away and doesn't settle out until the water velocity subsides. This is usually in grassed waterways, borrow pits, reservoirs, the ocean or points between.

Sediment from Land Distributing Activities -- SCS Photo

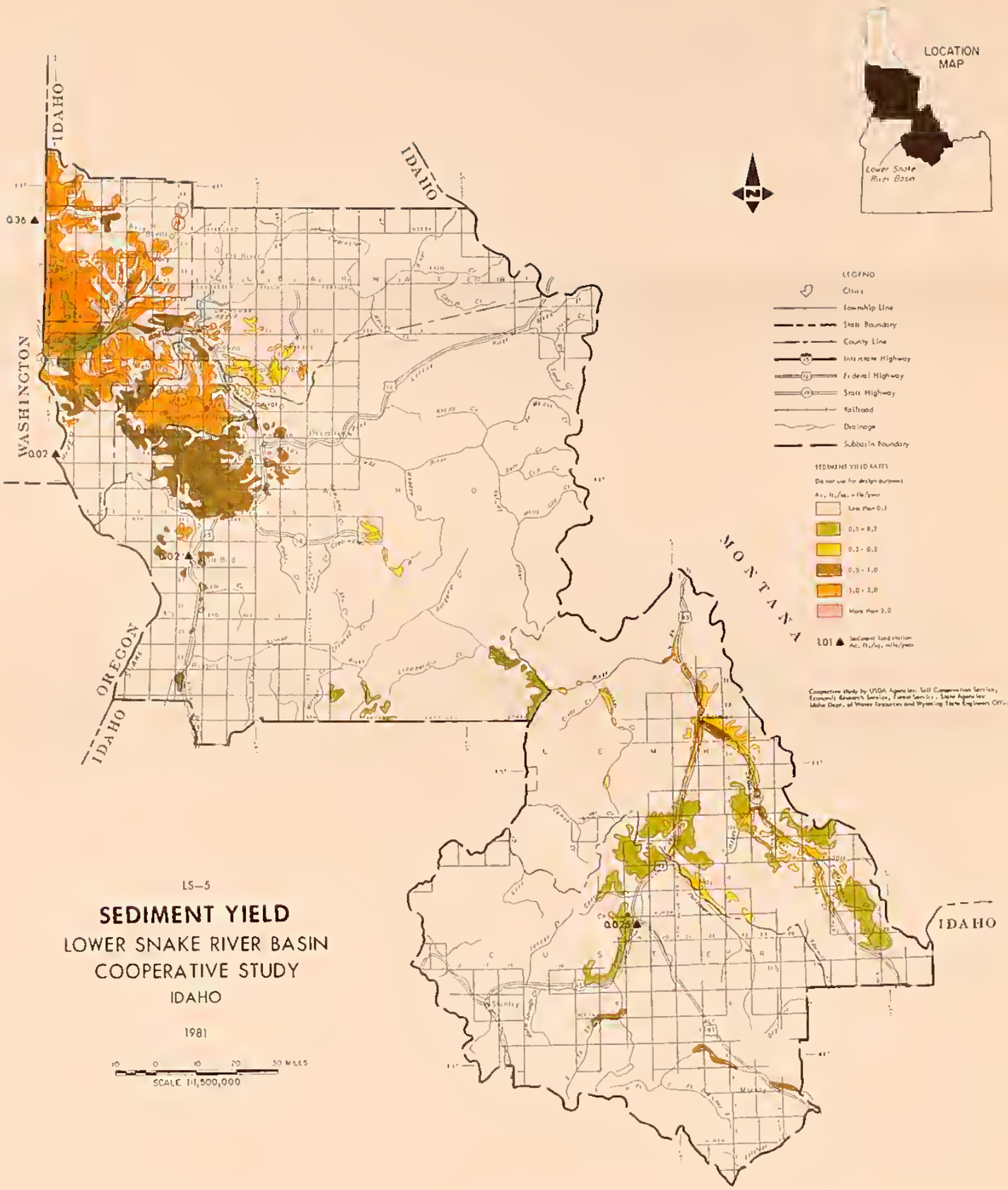
Northern Basin Area

There are numerous eroding streams in the northern portion of the Basin that contribute to the sedimentation problem. These include the Palouse and Potlatch Rivers, Lapwai Creek, Big Camas Creek, and small tributaries of the Clearwater River. These streams transport eroded soil to mainstreams and flush channel materials increasing sediment loads downstream during periods of high flow.

Southern Basin Area

The Salmon, Lemhi, and Big Lost Rivers are the big sediment contributors in the southern part of the Basin. Channel erosion rates are close to low geologic erosion caused by climatic changes and periodic large runoff years. Local areas, however, are aggravated by channel straightening, overgrazing of watersheds, and grazing adjacent to channels. Disposal of irrigation water along river banks tends to keep them saturated and vulnerable to stream energy and sediment production.

Sedimentation from the Salmon River to the Snake -- USFS Photo



LS–5

SEDIMENT YIELD

LOWER SNAKE RIVER BASIN COOPERATIVE STUDY

IDAHO

1981

Source:
Base map prepared by SCS, WTSC Cartg Unit from USGS 1:1,000,000 Nat. Atlas.
Thematic detail compiled by state staff.
U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

M7-EN-24023-5

SHORTAGE OF RECREATION FACILITIES 1/

Participation

Increases in population and greater per capita participation in outdoor recreational activities stimulated by increases in income, leisure time, and mobility will continue to expand the demand for recreational facilities and services and is creating greater demands on the resources and facilities associated with outdoor recreation.

Demand

Participation in outdoor recreation in this Basin is projected to increase by over 50 percent by the year 2000. This projection indicates an annual resident and non-resident demand of almost 69 million recreation days by the year 2000, which represents a potential benefit of over 15,800 man years of labor and more than $130 million of annual income to the Basin.

Overall recreation use continues to increase in spite of energy conservation concerns although mechanized recreation travel has dropped. Participants are not traveling as far to engage in outdoor recreation activities, but when they do, visits are extended. Gasoline costs, in comparison to overall costs, remain a bargain and at present does not represent the concern that availability presents. Information addressing how the changing energy conditions may affect recreation participation are found in the Appendix.

Shortage

Although there is an ample supply of some resources and facilities, the present rate of development will not keep pace with the demand for camping sites, designated cross-country ski trails, groomed snowmobile trails, picnic sites, swim beaches, downhill ski areas, boat ramps, and areas for boating and water skiing.

1/ SOURCE: Idaho State Comprehensive Outdoor Recreation Plan (SCORP) 1977

Camping Facilities

Presently there are approximately 2,300 camping sites with a demand for over 6,000 additional sites. Of this demand approximately 30 percent is for developed campsites and 70 percent is for dispersed types. Nonresident campers make up over 40 percent of the total. Future demands are projected to exceed anticipated development by an average of about 500 sites or 25 campgrounds per year. 1/

Family Enjoying a Developed Camp Site -- USFS Photo

Picnic Facilities

There is a current demand for 1,404 picnic tables over the 840 presently inventoried. About 35 percent of the demand is for developed sites and 65 percent is for dispersed type picnicking. Although it was assumed that this activity will have a slow rate of growth participation per capita, demand will exceed anticipated supply by over 3,000 tables by the year 2000.

1/ Using an average of 20 sites per campground.

Boating Access

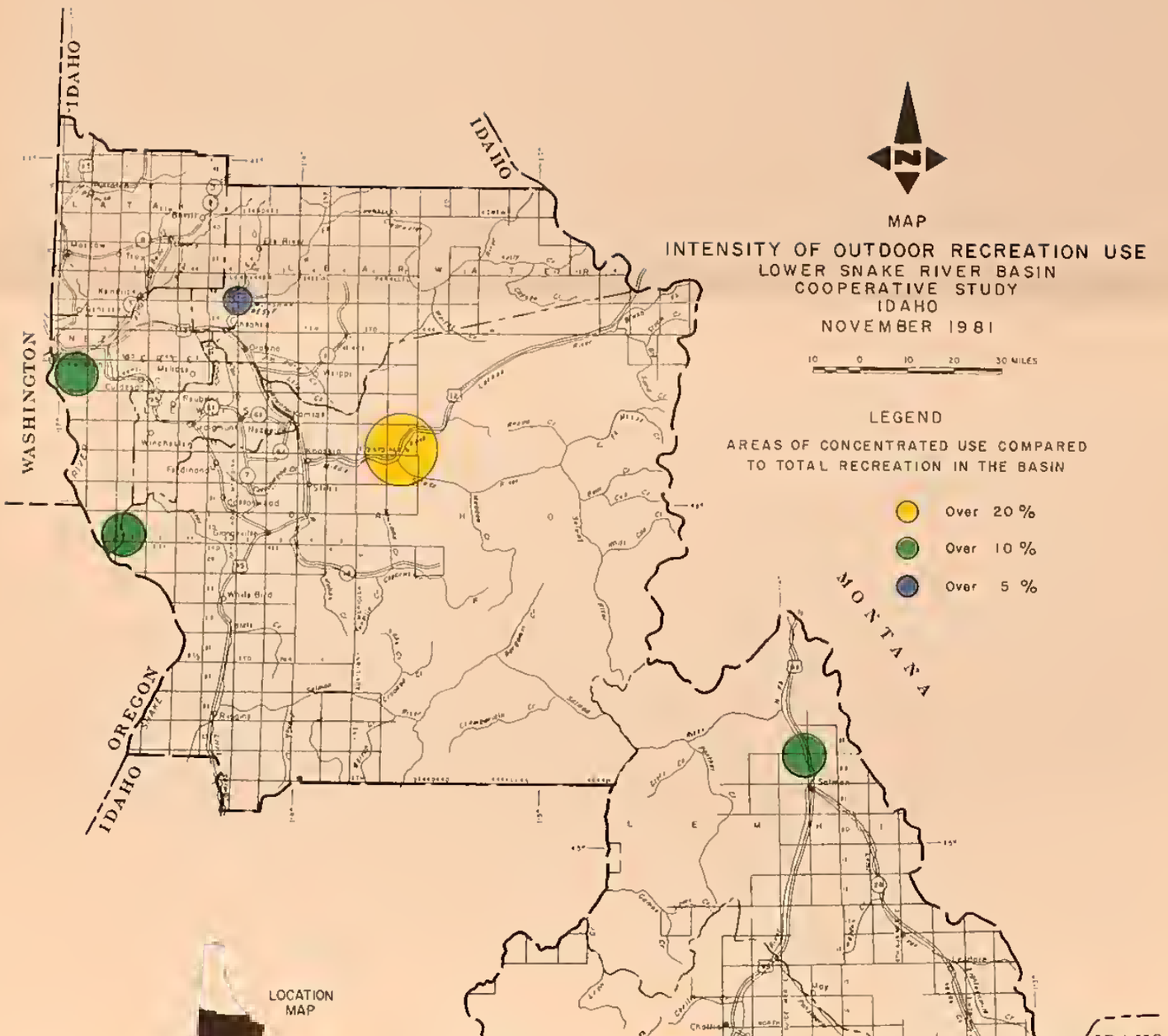
An inventory of 56 boat ramps indicates a present demand for 13 additional ramps for the sport of boating and sailing. Projections indicate a shortage of 81 ramps by the year 2000. This is a conservation estimate as no attempt was made to determine boat access in connection with fishing, water skiing or other water activities.

Swimming Area at one of the Basin's Many Lakes -- USFS Photo

Swimming

Although the State of Idaho has ample supply of water facilities to meet recreation demands well into the twenty-first century, there is a present shortage of this area of 1,800 linear feet of beach suitable for swimming. This is especially evident near population centers. By the year 2000, the unmet demand is anticipated to be over 7,500 linear feet of beach.

Cross-Country Ski Trails	Presently there are 23 miles of designated trails in the Basin. The fast increasing participation in cross-country skiing has created a present demand of approximately 44 additional miles of designated trails. By the year 2000, unmet demand is projected to be over 117 miles of trails.
Downhill Skiing	Presently there are 822 acres of developed downhill ski areas. The increasing demand will soon exceed the surplus of downhill skiing capacity available today. This demand is expected to exceed anticipated supply by an average of 20 acres per year or almost 900 acres by the year 2000.
Snowmobile Trails	The Basin area has over 850 miles of groomed trails. The rapidly increasing demand for groomed snowmobiling trails, especially the access trails, will soon exceed today's surplus of about 150 miles. Anticipated development is projected to fall short of demands by about 500 miles by the year 2000. Without grooming, popular access trails soon become so bumpy they are intolerable to use, especially by elderly participants.
Boating and Water Skiing	There is a present supply of 37,062 surface acres of water available for boating and water skiing. This indicates a slight surplus today but it is anticipated that by the year 2000 there will be an unmet demand of 10,035 surface acres. This concern was not addressed by the study team due to the surplus of available sites near the Basin and the willingness of participants to travel for the purpose of this sport.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INTENSITY OF OUTDOOR RECREATION USE
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COOPERATIVE STUDY
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AREAS OF CONCENTRATED USE COMPARED
TO TOTAL RECREATION IN THE BASIN
Over 20 %
Over 10 %
Over 5 %
LOCATION
MAP
Lower Snake
River Basin

INADEQUATE SUPPLY OF WOOD FIBER

Importance Of Timber

Timber resources in the Lower Snake River Basin are an important part of Idaho's economy. The lumber and wood products industry generates employment for over 5,600 people and represents 18 percent of total employment in the Basin.

Supply Depletion

Demand for wood products has exceeded the timber harvest from national forests for several years and has partially depleted the commercial timber inventory. Timber production is currently being sustained by increasing the harvest from state and private forest lands. There is a limit to how long this practice can continue because a large part of the forest resources, approximately 79 percent of the nearly 7 million acres of commerical forest land in the Basin, is owned by the Federal Government.

Projected Demand

The market (demand) for Idaho's timber is national in scope. The projected demand for sawtimber produced in the Lower Snake River Basin is 214 and 258 million cubic feet for the years 2000 and 2020, respectively.

Projected Supply

Historically, the Lower Snake River Basin has produced approximately 40 percent of Idaho's timber. The projected timber supply from the Basin is 181 and 193 million cubic feet for 2000 and 2020, respectively. The supply of wood fiber produced in the Basin does not meet present demand and the deficiency is projected to increase over time. The present deficiency is approximately 16.5 million cubic feet. The projected deficiency for the future without plan condition is expected to nearly double by the year 2000 and be four times as great by 2020. These relationships are illustrated in Figure 1.

Figure 1-- Wood Fiber Supply and Demand Over time, Lower Snake Basin

PREFERRED PLAN - CHAPTER II

PREFERRED PLAN
CHAPTER - II

Introduction

The Preferred Plan was developed from the Environmental Quality (EQ) and National Economic Development (NED) Alternative Plans in Chapter IV. These alternatives were developed to solve specific problems related to environmental enhancement, erosion and sedimentation reduction, recreation enhancement, improved utilization of wood fiber, and USDA Programs with potential for increasing economic development in the Basin.

Plan Elements

Plan elements are the actions necessary to achieve the level of problem solution identified in the selected plan. Selection of plan elements considered both environmental and economic factors. Elements of the Preferred Plan are a mixture of the NED and EQ plan elements from chapter IV.

Public Input

Public input to this study was obtained initially from meetings held in conjunction with the State Water Plan and Coordinated Joint Plan of the Pacific Northwest River Basins Commission. Information received from public meetings and surveys was used to select concerns for study and establish program levels in the Preferred Plan. During this study, 19 meetings were held to present preliminary results and receive inputs from local groups.

Plan Selection

The Coordinating Staff, consisting of representatives of the three USDA agencies, and the Idaho Department of Water Resources, under the direction of the Field Advisory Committee, made final determination of elements included in the Preferred Plan. These plan elements were then reviewed and concurred in by SCS's West National Technical Center and the USDA Washington Advisory Committee.

Plan Displays

The plan elements, their unit values and estimated installation costs are displayed in Table III. Table IV displays impacts of the Preferred Plan in three accounts: Environmental Quality, National Economic Development, and Social Well-Being. Present and projected plan effects of the Preferred Plan are displayed in Table V. A narrative of each major element of the Preferred Plan and a summary of significant environmental impacts follows these tables.

Measuring Erosion with Rill Meter

Table III.--Plan elements, Preferred Plan, Lower Snake River Basin, Year 2000

Plan elements	Unit	Quantity	Estimated installation costs 1/
			$1,000
Irrigated cropland treatment:			30,768
Convert surface irrigation to sprinkler	Acres	30,000	
Other irrigation improvements	"	25,000	
Dry cropland treatment:			8,512
Eliminate summer fallow	"	86,600	
Convert to contour farming	"	691,500	
Convert to conservation tillage systems	"	621,900	
Implement divided slope farming 2/	"	241,800	
Install stripcropping	"	60,500	
Rangeland treatment:			14,222
Seed rangeland	"	178,000	
Control weeds & brush	"	341,000	
Fence for management	Miles	870	
Water development	No.	2,900	
Proper grazing	Acres	1,182,000	
Forest road treatment:			5,390
Seed grass on:			
Local roads	"	19,000	
Temporary roads over 2 years old	"	33,800	
Temporary roads under 2 years old	"	1,100	
Stream channel treatment:			96
Streambank protection & channel stabilization	Ln. ft.	16,000	

Continued

Table III. Plan elements, Preferred Plan, Lower Snake River Basin, Year 2000 (Continued)

Plan elements	Unit	Quantity	Estimated installation costs 1/
			$1,000
Outdoor recreation facility development:			23,569
Camping facilities 3/	Sites	3,472	
Picnic facilities 3/	"	1,147	
Boat access	Ramps	66	
Swimming beach	Ln. ft.	5,278	
Cross-country ski trails	Miles	41	
Downhill ski area	Acres	500	
Snowmobile trails	Miles	500	
Increase wood fiber production:			2,958
Felling and bucking	1,000 cu. ft.	120,900 4/	
Sawmill improvement	"	120,900 4/	
Timber stand improvement	Acres	49,300	
Total estimated project administration and technical assistance			17,103
Total estimated cost			102,618

1/ Cost estimates reflect current prices.
2/ Cropping change: 121,800 acres annual grain above the divided slope; 120,000 acres wheat-pea rotation below the divided slope.
3/ Includes developed and dispersed sites.
4/ Gross values of harvested timber to which improved practices are applied.

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

Environmental Quality Account

Beneficial and Adverse Effects

A. Areas of natural beauty

Land treatment measures installed on the irrigated and dry cropland, rangeland, and forest roads will reduce erosion on 3.7 million acres.

The visual quality of the lands will be enhanced through improved vegetative cover, reduced erosion scars, and reduced build up of unsightly sediment deposits.

Installation of outdoor recreation facilities will impact 2,481 acres of natural areas. The developments require 28 sewage treatment stations, 20 sanitary dumps, and 87 miles of road construction. Certain development will affect visual aesthetics.

Installation of recreation facilities will reduce impact on fragile areas and areas experiencing overuse. Some soil compaction will occur near developed sites.

Improved wood utilization will:

- Enhance natural regeneration
-Improve visual aesthetics
- Reduce debris on the ground

Timber stand improvement will:

- Increase debris on the ground
- Enhance vigor of timber stands

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

Conversion of 30,000 acres from surface irrigation to sprinkler, and 25,000 acres of other irrigation management improvements will:

- Reduce erosion by 29,000 tons annually
- Lower the water table in some areas
- Provide additional land use alternatives
- Reduce irrigation application rates and irrigation return flows
- Reduce leaching and decrease requirements for adding farm fertilizers
- Improve quality of water in receiving streams

Continued

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

Environmental Quality Account
Dry cropland treatment measures will: - Reduce erosion by 4,265,000 tons per year on 940,000 acres and will increase wheat production in 50 years by 2.3 million bushels. - Enhance the quality of the dry cropland resource - Enhance the visual quality of the landscape - Enhance the quality, conservation, and distribution of runoff water from the dry cropland Rangeland treatment measures will: - Improve the vegetative cover - Enhance the rangeland resource - Reduce erosion by 125,000 tons annually - Enhance the visual quality of the landscape - Enhance the quality, conservation, and distribution of runoff water from the rangeland - Improve wildlife habitat
Forest road treatment measures will: - Reduce erosion by 1,220,000 tons per year on 53,900 acres of roads and reduce sediment by 192,000 tons annually - Enhance the visual quality of the landscape - Enhance the quality of runoff water from the forest land Land treatment measures planned for the irrigated and dry cropland, rangeland, and forest roads will reduce sediment and phosphorous loading of the Basin's reservoirs, rivers, and streams. Channel stabilization and protection of 16,000 feet of streambanks will: - Reduce erosion on the banks - Reduce sediment in the streams - Protect the land resource from stream encroachment - Enhance the visual quality of the landscape - Improve the quality of water in the streams

Continued

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

Environmental Quality Account	
Installation of the planned outdoor recreation facilities will: - Enhance the recreational experience - Alleviate overcrowding and overuse - Alleviate excessive environmental impacts on fragile areas - Improve the rate of recovery of overused areas	Improved wood utilization will: - Require less timber cut to achieve demands - Reduce sediment and erosion - Enhance revegetation
C. Biological resources and selected ecosystems	Waterfowl habitat will be altered by: - Changes in water flow during nesting and resting periods - Land treatment measures will increase availability of food and cover

Aquatic ecosystems will be enhanced by:
- Improved quality of irrigation return flows
- Land and forest road treatment measures will:
  - Reduce erosion
  - Reduce sediment
  - Improve quality of runoff water from the land
	Upland bird habitat will be altered by:
	- Conversion of 30,000 acres from surface to sprinkler irrigation
	- 241,800 acres of divided slope farming
	- 60,500 acres of stripcropping
	- 178,000 acres rangeland seeding
	- 2,900 rangeland water developments

Selected vegetative ecosystems will be enhanced from the land treatment measures on all the land uses.	Outdoor recreation developments could adversely impact visual aesthetics, water quality, vegetation, and other fish and wildlife habitat.
Almost all water-related ecosystems will be enhanced through reduced sediment and phosphorous loading of the streams.	

Continued

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

Environmental Quality Account	
D. Archeological and historical resources	
Implementation of plan elements could encroach upon historical, archeological, or cultural resources.	
E. Irreversible or irretrievable commitments	
Channel stabilization and 16,000 feet of streambank protection represents a commitment of resources.	
Installation of recreation facilities will commit 2,481 acres of natural area to recreational development.	

Continued

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

National Economic Development Account			
Beneficial effects	Average annual[1/]	Adverse effects	Average annual[1/]
	----dollars----		----dollars---
Value to users of increased outputs of goods and services		Value of resources required for a plan	
Land treatment			
Irrigated cropland	3,911,500	Installation cost OM&R costs	2,407,000 630,000
Dry cropland	10,988,600	Installation cost OM&R costs	666,000 6,086,400
Rangeland	1,970,000	Installation cost OM&R costs	1,113,000 497,800
Forest roads	451,000	Installation cost OM&R costs	421,600 No cost
Streambank protection and channel stabilization	12,000	Installation cost OM&R costs	7,500 2,000
Increase camping recreation benefits by 778,670 recreation days	5,563,400	Installation cost OM&R costs	743,400 1,350,700
Increase picnic recreation benefits by 559,700 recreation days	3,838,700	Installation cost OM&R costs	213,400 389,000

Continued

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

National Economic Development Account			
Beneficial effects	Average annual[1/]	Adverse effects	Average annual[1/]
	----dollars----		----dollars----
Increase recreation benefits from boat ramps by 598,000 recreation days	1,913,000	Installation cost	105,800
		OM&R costs	1,453,000
Increase swimming recreation benefits by 836,800 recreation days	2,571,000	Installation cost	208,700
		OM&R costs	663,600
Increase cross-country skiing recreation benefits by 65,637 recreation days	538,200	Installation cost	4,000
		OM&R costs	5,000
Increase downhill skiing recreation benefits by 567,600 recreation days	5,676,000	Installation cost	517,000
		OM&R costs	1,524,000
Increase snowmobiling recreation benefits by 340,630 recreation days	2,793,000	Installation cost	51,500
		OM&R costs	47,700
Increase wood fiber production by 29 MM cubic feet	5,302,000	Installation cost	231,400
		OM&R costs	947,000

Continued

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

National Economic Development Account			
Beneficial effects	Average annual[1/]	Adverse effects	Average annual[1/]
	----dollars----		----dollars----
		Project administration and technical assistance	1,338,100
Total beneficial effects	45,528,400	Total adverse effects	21,624,600
		Net beneficial effects	23,903,800

Continued

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

Social Well-Being Account
Beneficial and Adverse Effects
A. Employment and income[2/]
Creates over 4,000 new jobs during the period of evaluation. Creates secondary benefit distribution to the Nation of over $9.0 million during the evaluation period.
B. Life, health, and safety
Erosion reduction would reduce traffic safety hazards associated with road washouts, damaging overflow resulting from inadequate road drainage, sediment deposits on roadways, undercutting of roadbeds and slides.
Streambank protection on 16,000 linear feet of streams will reduce hazards associated with bank, bridge, and road failures.
Erosion/sediment reduction reduces contamination of domestic and municipal water supplies.
Erosion reduction will enhance the capability of the land resource base to provide this and future generations with food and fiber.
Additional outdoor recreational facilities will reduce activity at undesignated areas thereby concentrating traffic in designated sites, reducing vehicle damage to natural areas, improve traffic flow, enhance personal safety by providing off-road parking, enhance recreation experience, improve waste management, improve water quality, and reduce health hazards associated with improperly handled sewage and other waste materials.
C. Recreation opportunities
Provides for an increase of 3.8 million recreation days per year.

1/ 1980 price base amortized at 7 5/8 percent interest for 50 years.
2/ 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, Lower Snake River Basin, 1978

Concerns	Unit	Present condition	Year 2000 Without plan	Year 2000 With plan condition	Year 2000 Plan effects (C.2-3=4)	Year 2020 Without plan	Year 2020 With plan condition	Year 2020 Plan effects (C.5-6=7)
		thousands						
Soil erosion on:								
Irrigated cropland	Av. ann. soil loss-tons	307	304	275	29	301	275	26
Dry cropland	"	7,881	7,007	2,742	4,265	5,980	2,742	3,238
Rangeland	"	613	575	450	125	551	450	101
Forest roads	"	2,205	2,440	1,220	1,220	2,694	1,347	1,347
Stream channels	"	31	34	28	6	38	32	6
Banks w/moderate to severe erosion	Linear feet	520	570	554	16	630	614	16
Sediment from:								
Irrigated cropland	Av. annual tons	123	122	110	12	120	110	10
Dry cropland	"	4,367	3,883	1,392	2,491	3,314	1,392	1,922
Rangeland	"	357	335	262	73	321	262	59
Forest roads	"	342	384	192	192	426	213	213
Stream channels	"	31	34	28	6	38	32	6
Shortage of recreation facilities:								
Developed camping	Recreation days	404	837	605	232	1,395	1,004	391
Dispersed camping	"	943	1,952	1,406	546	3,255	2,344	911
Developed picnic	"	240	528	329	199	772	486	286
Dispersed picnic	"	445	980	619	361	1,801	1,135	666
Boat access	"	113	725	127	598	1,659	299	1,360
Swimming	"	302	1,267	380	887	2,690	807	1,883
Cross-country skiing	"	72	194	128	66	377	249	128
Downhill skiing	"	1/	554	0	554	979	0	979
Snowmobiling	"	2/	340	0	340	979	0	979
Inadequate supply of wood fiber:	Cubic feet	16,495	32,305	3,305	29,000	64,902	33,902	31,000

1/ Surplus of 130,000 recreation days.

2/ Surplus of 105,000 recreation days.

Irrigated Cropland Treatment

Implementation of the Preferred Plan will reduce erosion on 55,000 acres of irrigated land by 29,000 tons and reduce sediment yield by 12,000 tons annually. The erosion rate will be reduced to less than the tolerable soil loss rate on all irrigated cropland in the Basin.

Dry Cropland Treatment

The Preferred Plan will directly or indirectly effect nearly all the 940,000 acres of dry cropland in the Basin. The treatment will reduce erosion by 4.3 million tons, sediment by 2.5 million tons annually, conserve more moisture for crop production, protect the soil resource base, improve the visual quality of the landscape, reduce flooding, increase minimum stream flow, improve fish and wildlife habitat, and help to minimize non-point pollution problems.

The EQ Alternative would reduce erosion by an additional .5 million tons and sediment by .2 million tons per year over the Preferred Plan.

Dry Cropland Treatment -- SCS Photo

Rangeland Treatment

The Preferred Plan accomplishes proper range use on more land than either the NED or EQ Plans. In the Preferred Plan proper range use would be accomplished by increasing grazing on the good condition under utilized range. Rangeland in poor and fair condition would be treated to improve its carrying capacity. The carrying capacity of the Preferred Plan will be greater than either the NED or EQ Alternative. Wildlife habitat will equal that of the EQ Alternative. The reduction in erosion and sediment yield will equal the effects of the EQ Alternative.

Forest Road Treatment

The Preferred Plan primarily treats roads as the leading source of erosion and sediment on forest land. Treating roads as planned will reduce the amount of erosion on forest land from 2.2 million tons to 1.2 million tons annually, and sediment from 342,000 tons to 192,000 tons annually.

The Preferred Plan and the NED Alternative are the same for both erosion and sediment control on forest land.

Implementation of the plan will reduce erosion, improve water quality, and enhance environmental quality of the forest resource.

Seeding Grass on Forest Road -- USFS Photo

Stream Channel Treatment

The plan will accelerate the protection and stabilization of critically eroding streambanks and channel bottoms. Plan measures applied will reduce channel erosion and sediment yield by 6,000 tons and stabilize 16,000 feet of banks by the year 2000. This will reduce sediment damages to lakes, reservoirs, navigation facilities, and irrigation systems. Fisheries and wildlife habitat will be adversely affected in the short-term along stream reaches involved. However, vegetative cover will be regenerated as the channel stabilizes, enhancing the long-term effect on wildlife and on fishery habitat.

The plan will minimize stream alteration by treating short, critical segments of selected streams.

Outdoor Recreation Facility Development

The Preferred Plan includes development of outdoor recreation facilities at the rate necessary to maintain present levels of supply versus demand.

The Preferred Plan represents the NED Plan with the addition of developed campsites. Even though analyses, based on the willingness today, did not indicate a favorable B/C ratio for developed campsites, maintaining developed camping facilities at the present supply-demand ratio was recommended. This conclusion was based on the results of an opinion survey of rec reation planners in the Basin who emphasized the unmeasured environmental and social benefits attributed to planned camping development.

The Preferred Plan will provide 232,000 recreation days over the NED Plan. The EQ Plan would have provided 3.6 million recreation days over the Preferred Plan. The EQ Plan was not selected as full utilization may not be realistic.

A review of National Forest lands and State parks indicate present shortages may not be as severe as previously thought. Therefore, recommendations for the Preferred Plan are to maintain a static recreation supply in relationship to projected demands.

Outdoor Recreation Facility Development (Cont.)	Proper planning and installation of these facilities will provide 3.8 million recreation days and, therefore, will alleviate crowding of popular recreation areas. Implementation of this plan will affect less than two tenths of one percent of the Basin area and will allow an increased number of people to enjoy the natural environment more fully through increased participation in outdoor recreational activities.
Increase Wood Fiber Production	The Preferred Plan recommends a combination of the Sawmill Improvement, Felling and Bucking and Timber Stand Improvement Programs. The planned level of development would increase the supply of wood fiber by 29 million cubic feet and remove 90 percent of the projected deficit supply. The Preferred Plan includes timber stand improvement practices where determined economically feasible. These include thinning and pruning on 49,300 acres of forested land. Less tangible values such as improved water quality, aesthetic appeal, and overall enhancement of the forest resource would be realized. The wood utilization programs would be expanded to provide more cooperative assistance to landowners and mill operators. The EQ Plan was not selected, even though economically feasible, because required program participation at the EQ level was deemed unobtainable. Other forestry practices were considered but were not selected because positive economic returns could not be realized within the planning horizon.

SUMMARY OF SIGNIFICANT ENVIRONMENTAL IMPACTS

Erosion	The Preferred Plan would reduce erosion in the Lower Snake Basin by over 5.6 million tons annually. Most of this erosion reduction comes from treating 940,000 acres of dry cropland. Reducing erosion maintains soil resources for use by future generations; improves visual quality of agricultural land; reduces the incidence of gullying; improves visual quality of roadways and campgrounds; enhances the watersheds capacity to absorb water and conserve it in the groundwater systems of the Basin; and reduces hazards associated with erosion of roadbeds and bridges.
Sediment	The Preferred Plan will reduce sedimentation by over 2.7 million tons annually. Reducing sediment enhances the environment by improving water quality; enhancing fisheries; improving visual quality along roadways and stream channels; and reducing the incidence of sediment associated chemicals in rivers, lakes and streams.
Areas of Natural Beauty	Almost 2,500 acres will be impacted by the construction of outdoor recreation facilities in the Lower Snake Basin. Compaction will occur in and around developed sites. Reducing overcrowding and overuse at other sites will enhance the natural beauty of those areas. Erosion reduction will enhance the visual quality of agricultural and rangelands.

Water Quality	Erosion and sediment reduction will enhance water quality, reduce damage to navigation and municipal water treatment facilities and improve fish habitat.
Fragile Areas	Recreation development will reduce impacts on undeveloped fragile areas and areas of overuse by concentrating recreation activities in developed sites. Planning developed sites will reduce the impact of recreation on areas chosen for development.
Aesthetic Values	Certain recreational facilities development will affect aesthetic values and could disturb historical, archaeological and cultural resources. Implementation of the Preferred Plan must consider the impact of development on these vital resources.
Fish and Wildlife	Sediment reduction will enhance fisheries by improving water quality in the fish habitat. Recreation development may have a negative impact on certain fisheries.

UNAVOIDABLE ADVERSE IMPACTS

Adverse Impacts	Upland bird habitat will be altered by conversion of 30,000 acres of irrigated land from surface to sprinkler irrigation and by controlling weeds and brush on 341,000 acres of rangeland. Recreational visitor traffic, noise, and waste control problems will increase in some areas.

Future Without Plan

One alternative to the Preferred Plan is the "future" without plan". Under this plan present trends would continue, including inefficient irrigation and deterioration of the irrigation systems; inadequate treatment of the eroding cropland, rangeland, forest roads and, stream channels, resulting in serious sedimentation of streams, rivers, lakes, and reservoirs. The shortage of outdoor recreation facilities will become critical if present trends continue. The inadequate supply of wood fiber will become more serious. There is some progressive actions presently being carried out but accomplishments are far too slow to meet the need.

EQ Alternative

The EQ Alternative emphasizes environmental quality preservation and enhancement. Compared to the Preferred Plan this plan generally has more intensive treatment for the reduction of erosion and sediment, more outdoor recreation facility developments and wood fiber production.

NED Alternative

The NED Alternative to the Preferred Plan emphasizes economic development, and is basically the same as the Preferred Plan with only slight variations in some elements.

RELATIONSHIP BETWEEN SHORT-TERM USE OF THE ENVIRONMENT AND THE MAINTENANCE OF LONG-TERM PRODUCTIVITY

Effects Of Preferred Plan

The Preferred Plan will contribute toward the proper use and management of land resources by encouraging the protection and improvement of its productive capacity and by dispersing the outdoor recreation use of the land.

The Preferred Plan measures will provide for better use of the land while conserving and protecting it for use by future generations. The treatment measures will enhance the fish and wildlife habitat and have a positive sustaining impact on the environment.

Land and Water Resources of the Basin -- USFS Photo

OPPORTUNITIES FOR IMPLEMENTING THE PREFERRED PLAN

CHAPTER - III

OPPORTUNITIES FOR IMPLEMENTING THE PREFERRED PLAN - CHAPTER III

INTRODUCTION

Concerns

Concerns addressed in the Lower Snake River Basin Study were identified through public input received during previous studies by the USDA and Idaho Department of Water Resources. Plan elements focus on those activities that will solve problems associated with the identified concerns.

Authority

Programs currently exist to implement plan elements through either USDA or State of Idaho authorities. However, implementation of the Preferred Plan will require expansion and acceleration of present programs and additional funding to achieve projected results.

The interest and concern of those who control the resources of the Basin will determine the final acceptance of the plan and the level of accomplishment.

Considerable progress has been made in implementing elements identified in the Plan through ongoing programs. However, there is a need to accelerate these programs extensively to meet the goals set forth in the Plan by the year 2000.

Impacts

Implementation of the Preferred Plan will have both beneficial and adverse impacts on the environment and the economy. These impacts are set forth in the Preferred Plan chapter and must be considered when implementation decisions are made.

Implementation

It is neither practical nor feasible at this time to consider that all elements of the Preferred Plan would or could be implemented as one effort or as a total plan. Rather, it is anticipated that this planning effort would provide information to promote detailed planning and installation of various measures needed in selected areas of the Basin at an accelerated level through various ongoing programs.

From contacts made with local groups, State and Federal agencies during the study, it is evident that the cost sharing rate and low levels of funding are major deterrents to implementing solutions to the problems studied.

USDA has a number of programs that can be used to help implement the Preferred Plan. In addition, individual landowners may need to undertake this activity using their own financial resources in many cases.

The following pages discuss, in detail, the implementation of the Preferred Plan elements, including amounts, estimated cost and USDA Programs currently available that could be used to implement various elements.

IRRIGATED CROPLAND TREATMENT

Treatment Elements and Costs

Irrigated cropland treatment elements of the Preferred Plan include the conversion of 30,000 acres of surface irrigation to gravity sprinkler systems and other irrigation improvements on an additional 25,000 acres. The cost of implementing this portion of the plan is estimated to be $30,768,000. The 160,000 acres of irrigated land in the Basin lie mainly along the river bottoms of the Lemhi, Pahsimeroi, Salmon, and Big Lost Rivers. This land is primarily used for forage production.

DRY CROPLAND TREATMENT

Treatment Elements and Costs

The dry land treatment elements of the Preferred Plan include the elimination of summer fallow on 86,600 acres, convert 621,900 acres to conservation tillage systems, convert 691,500 acres to contour farming, implement divided slope farming on 241,800 acres, and install stripcropping on 60,500 acres. The cost of implementing this portion of the plan is estimated at $8,512,000.

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 erosion problem areas of the Basin. The need and value of implementing the dry cropland elements in relationship to their resulting impact on water quality will be stressed.

RANGELAND TREATMENT

Treatment Elements and Costs

Rangeland treatment elements of the Preferred Plan Plan include range seeding on 178,000 acres, brush management on 341,000 acres, 870 miles of fencing for management, 2,900 water developments, and 1,182,000 acres of proper grazing. The estimated cost of implementing this portion of the plan is $14,222,000. Rangeland is distributed throughout the Basin mainly along the rivers and river breaks with the largest block being found in the Lemhi and Pahsimeroi drainages.

Implementation Problems

Implementation of the Preferred Plan for the rangeland in the Basin will not be easy. Many divergent views of what should be done by concerned groups and agencies exist. These divergent views will need to be compromised before real accomplishments can occur. A greater understanding of problems, concerns and how to develop and manage rangeland at a higher complementary level for both livestock and most forms of wildlife is needed.

Research Needed

More localized range research is needed to determine the forbs and shrubs that are palatable to both livestock and wildlife. Inclusion of palatable forbs and shrubs into a proper managed rangeland program will be complementary to both the livestock industry and wildlife interests. This type of accomplishment will begin to bring the divergent interests closer together with significant rangeland improvement.

FOREST ROAD TREATMENT

Treatment Elements Costs

Forest land treatment elements for the Preferred Plan includes seeding grass on 19,000 acres of and local roads and 34,900 acres of temporary roads. The cost of implementing this portion of the plan is estimated to be $5,390,000. There are over 8.9 million acres of forest land distributed throughout the Basin, mainly in the higher elevations.

Implementation

Implementation will be promoted through commitment of USDA, State, local and other agency personnel and through private landowners and operators who have responsibility for planning and managing road construction and maintenance activities.

STREAM CHANNEL TREATMENT

Treatment Elements and Cost

The Preferred Plan for streambank protection and channel stabilization includes treatment measures on 16,000 feet of stream channel at an estimated cost of $96,000.

Implementation

Segments of moderate and severe streambank erosion are found in almost every county in the Basin. Channel erosion is expensive to treat. Consequently, it is recommended that implementation be made for selected areas where the most benefits can be accomplished.

Accomplishment

Implementation of the stream erosion element of the Preferred Plan will be accomplished by increased educational contacts by specialists of SCS, FS, BLM, and other Federal, State and county resource agencies with local people. Through this effort, landowners and operators should become more aware of causes and effects of stream system changes and USDA Programs for correcting these problems.

OUTDOOR RECREATION DEVELOPMENT

Costs

The Preferred Plan includes development of outdoor recreational facilities that maximize net public benefits to the extent possible. The total cost of implementing these plan elements is estimated to be $23.6 million.

Development

These facilities would be located in areas experiencing the most use and in areas deemed technically, economically and environmentally feasible.

Planning

Proper planning will necessitate research to determine environmental carrying capacity, new methods for preserving the natural setting and energy conservation improvement. Barriers to a quality experience such as poor accessibility and inadequate or poorly maintained facilities need to be overcome.

Attractions covering a wide area of recreation preferences are offered by the vast expanses of high mountains, free-flowing white waters, abundance of fish, big game and upland game. These resources attract an ever increasing number of recreationists throughout the different seasons of the year adding a new dimension to the complexity of traditional recreation management problems.

Implementation

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

Implementation will be promoted through contacts with USDA agency employees and other State, local and Federal agencies that have responsibility to plan and program recreation development for their agency or to assist the private sector with their implementation plans. Results of analyses completed for this study may be used as a guide to change or establish new management direction needed to attain program implementation.

The map; "Identified Potential Recreation Sites", displays suitable sites. However, further study would be needed to identify other suitable sites in the Basin. USDA Program opportunities are identified in TABLE VI.

INCREASE WOOD FIBER PRODUCTION

Treatment Elements Costs

Treatment elements to increase wood fiber production include improved felling and bucking and and sawmill improvement practices on the harvested timber. These elements would be applied to 121 million cubic feet of timber estimated to be harvested. Timber stand improvement would be applied to 49,300 acres of growing timber. The estimated cost to apply these treatments is $2,958,000.

Implementation

Implementation will be promoted by expanding wood utilization and timber stand improvement programs.

7-E-24023

MAP
IDENTIFIED POTENTIAL RECREATION SITES
LOWER SNAKE RIVER BASIN
COOPERATIVE STUDY
IDAHO
NOVEMBER 1981

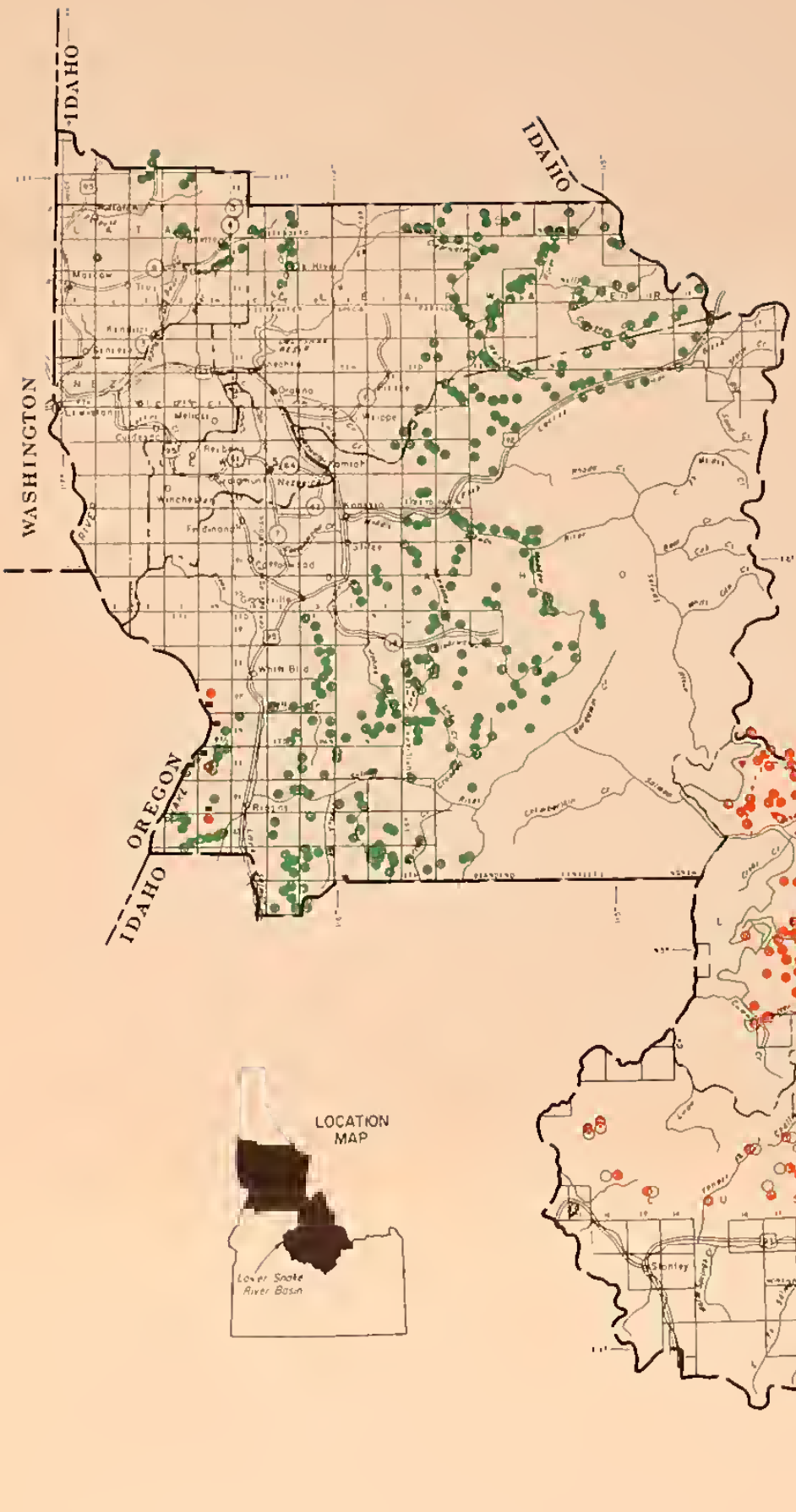
10 0 10 20 30 MILES

LEGEND

- Camping Site
- Recreation Site
- Boating Site
- Picnic Site
- Trailhead
- Interpretive Site
- Cross-Country Ski Trail
- Snowmobile Trail
- Groomed Cross-Country Ski Trail

Source - U.S.D.A. Forest Service, unpublished data.

National Forest Lands Only



Source -
Base map prepared by SCS, WTSC Cartographic Unit from USGS 1:1,000,000 Misc. Atlas.
U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

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

Plan elements	USDA programs	Opportunities
Irrigated cropland treatment:		
Convert surface irrigation to sprinkler Other irrigation improvements	SCS assistance to conservation districts	Technical assistance to improve 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.
	Resource Conservation and Development Program (RC&D)	Technical assistance in planning and cost-sharing assistance for irrigation distribution system improvements in project areas.
	Rural Clean Water Program (Section 208)	Cost-sharing assistance for installation of best management practices in designated project areas where erosion is creating critical water quality problems.
	Agricultural Conservation Program (ACP)	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.

Continued

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

Plan elements	USDA programs	Opportunities
Dry cropland treatment:		
Eliminate summer fallow Convert to contour farming Convert to conservation tillage systems Implement divided slope farming Install stripcropping	SCS assistance to conservation districts	Technical assistance in planning and application of planned dryland treatment practices.
	Small Watershed Program, PL-566	Technical assistance in the planning and design and cost-sharing assistance for installation of dryland treatment systems in approved projects.
	Rural Clean Water Program (Section 208)	Cost-sharing assistance for installation of best management practices in designated project areas where erosion is creating critical water quality problems.
	Agricultural Conservation Program (ACP)	Cost-sharing assistance for installation of approved dryland conservation practices.
	Cooperative Extension Program	Educational and technical assistance in the dry cropland management program.
	Community Development Loan Program (FmHA)	Loans for the installation of diversions.

Continued

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

Plan elements	USDA programs	Opportunities
Rangeland treatment:		
Seed rangeland Control weeds and brush Fence for management Water development Proper grazing	SCS assistance to conservation districts	Technical assistance in the planning and application of the needed range management practices on the private rangeland in the Basin.
	National Forest Management Act (NFMA)	Accelerate National Forest program for development, management, and protection of range resources on Forest Service administered lands.
	Forest and Rangeland Renewable Resources Planning Act	Accelerate present National Forest programs to meet the needs for improvement of the range resource on Forest Service administered lands.
	Small Watershed Program, PL-566	Technical assistance in planning and cost-sharing assistance to accelerate application of needed range management practices in approved projects.
	Rural Clean Water Program (Section 208)	Cost-sharing assistance for installation of best management practices in designated project areas where erosion is creating critical water quality problems.

Continued

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

Plan elements	USDA programs	Opportunities
	Agricultural Conservation Program (ACP)	Cost-sharing assistance for implementation of needed range management practices.
	Community Development Loan Program (FmHA)	Loans to individuals and groups for rangeland development and management practices.
Forest road treatment:		
Seed grass on:	Forest and Rangeland Renewable Resources Planning Act (RPA)	Accelerate present National Forest programs to meet the Nation's needs to improve the quality of soil and water.
Local roads		
Temporary roads over 2 years old	National Forest Management Act (NFMA)	Accelerate present National Forest programs to meet the Basin's need to improve the quality of soil and water.
Temporary roads under 2 years old	Rural Clean Water Program (Section 208)	Cost-sharing assistance for installation of best management practices in designated project areas where erosion is creating critical water quality problems.

Continued

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

Plan elements	USDA programs	Opportunities
	Cooperative Forestry Assistance Program	Technical and financial assistance on non-federal forest land, through the Idaho Department of Lands.
	SCS assistance to conservation districts	Technical assistance to private forest land owners and operators.
	Small Watershed Program, PL-566	Technical assistance in planning and cost-sharing assistance to accelerate application of needed forest management practices in approved projects.
	Resource Conservation and Development Program (RC&D)	Technical assistance in planning and cost-sharing assistance to accelerate application of needed forest management practices in project areas.
	Agriculture Conservation Program	Cost-sharing assistance to landowners for soil conservation practices.
	Cooperative Extension Program	Educational and technical assistance in forest land management.
	Community Development Loan Program (FmHA)	Loans for installation of forest management programs.

Continued

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

Plan elements	USDA programs	Opportunities
Stream channel treatment:		
Streambank protection and channel stabilization	SCS assistance to conservation districts	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 streambank protection and channel stabilization in approved projects.
	Resource Conservation and Development Program (RC&D)	Technical assistance in planning and cost-sharing assistance to accelerate streambank protection and channel stabilization in project areas.
	Agricultural Conservation Program (ACP)	Cost-sharing assistance for streambank protection and grade stabilization.
	National Forest Management Act (NFMA)	Accelerate present watershed improvement program on Forest Service lands.
	Cooperative Forestry Assistance Program	Technical and financial assistance on State and private forest lands through Idaho Department of Lands.

Continued

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

Plan elements	USDA programs	Opportunities
	Community Development Loan Program (FmHA)	Loans for installing streambank protection and channel stabilization.
	Rural Clean Water Program (Section 208)	Cost-sharing assistance for installation of best management practices in designated project areas where erosion is creating critical water quality problems.
Outdoor recreation facility development:		
Camping facilities Picnic facilities Boat access	National Forest Management Act (NFMA)	Accelerate National Forest programs to meet the Basin's needs for outdoor recreation facilities. Technical assistance and leasing for private development on National Forest lands.
Swimming beach Cross-country ski trails	Forest and Rangeland Renewable Resources Planning Act (RPA)	Accelerate present National Forest programs to meet the Nation's needs for outdoor recreation facilities.

Continued

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

Plan elements	USDA programs	Opportunities
Downhill ski area Snowmobile trails	SCS assistance to conservation districts	Technical assistance for recreation development on private lands.
	Small Watershed Program, PL-566	Technical and financial assistance for development of facilities in project areas.
	Resource Conservation and Development Program (RC&D)	Technical and financial assistance for development of water-based recreation facilities in project areas.
	Community Development Loan Programs (FmHA)	Loans for development of facilities.
Increase wood fiber production: Felling and bucking Sawmill improvement Timber stand improvement	Cooperative Forestry Assistance Program	Technical assistance to timber harvesters, primary and secondary wood product manufacturers, is provided directly or through the Idaho Department of Lands.

Continued

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

Plan elements	USDA programs	Opportunities
		Financial, technical, and related assistance to small private land owners for reforestation and timber stand improvement.
	Forest and Rangeland Renewable Resource Planning Act	Accelerate present National Forest programs to meet the Nation's needs for wood fiber.
	National Forest Management Act (Forest Service Regional, and Forest Plans)	Accelerate present National Forest programs to meet the Basin's need for wood fiber.
	Cooperative Extension Program	Educational and technical assistance in forest land management.

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 projects 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 this 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 elements of the Preferred Plan are implemented, opportunities for RC&D action can be identified.

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 forest land, and streambank stabilization.

CLEAN WATER ACT

Rural Clean Water Program

The objective of this act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Section 35 of this act authorizes the Secretary of Agriculture to enter into contracts to provide technical and cost-sharing assistance to owners and operators of rural land. The Rural Clean Water Program, where authorized, can be utilized to implement the plan elements associated with irrigated land, dry cropland, rangeland, forest land, and streamchannel stabilization.

COOPERATIVE FORESTRY ASSISTANCE ACT

Assistance On Non-Federal Forest Land

Under this program the Forest Service is authorized to work through and in cooperation with State Foresters or equivalent State officials in implementing Federal programs affecting non-federal forest land by providing assistance in (1) advancement of forest resource management; (2) encouragement of the production of timber; (3) prevention and control of insects and disease 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 conducting urban forestry programs; (7) improvement and maintenance of fish and wildlife habitat; (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.

THE FOREST AND RANGELAND RENEWABLE RESOURCES PLANNING ACT (RPA)

RPA

This act directs the Secretary of Agriculture to periodically assess the status of the Nation's forest and rangeland resources and recommend a Forest Service program for management and use of these resources. It requires the development of an assessment every 10 years and a Recommended Program every 5 years. The National Forest Management Act is an amendment to this act.

NATIONAL FOREST MANAGEMENT ACT (NFMA)

NFMA

This act provides the direction for program development on National Forest lands in accordance with long-range management plans.

National Forest programs could be used to implement portions of the Preferred Plan elements including forest road treatment, increase wood fiber production, and outdoor recreation facility development.

A substantial increase in funding for these programs will be needed if the Preferred Plan is to be implemented.

FARMERS HOME ADMINISTRATION PROGRAMS (FmHA)

FmHA Loans

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.

UNIVERSITY OF IDAHO COOPERATIVE EXTENSION PROGRAM

Extension Program

The Cooperative Extension Program acts as the information, education arm of USDA. University extension specialists and local county agents cooperate with other USDA agencies to provide individuals and groups information and assistance concerning the proper use and management of Idaho's soil and water resources.

Table VII.--Estimated cost[1/] for implementation of the Preferred Plan, Lower Snake River Basin, Year 2000

Plan elements	Estimated costs
	-----$1,000----
Irrigated cropland treatment	1,810
Dry cropland treatment	501
Rangeland treatment	837
Forest road treatment	317
Stream channel treatment	6
Outdoor recreation facility development	1,386
Increase wood fiber production	174
Project administration and technical assistance	1,006
TOTAL	6,067

1/ Dollar requirement per year for 17 years (1983-2000).

USDA PROGRAM OPPORTUNITIES

Areas Identified

Several areas were identified in the study as having potential through USDA Program implementation for solving the concerns addressed. They Include:

Soil Erosion and Sedimentation

Potlatch River
East Fork Potlatch
Little Potlatch Creek
Paradise Creek
South Palouse
Red Rock Creek
Shebang Creek
Stockney Creek
Meadow Creek
Big Canyon Creek
Little Canyon Creek
Cottonwood Creek (Myrtle)
Tammney Creek
Big Bear Creek
Little Bear Creek
South Fork Clearwater
Deadwood Creek
Elk Creek
American River
Ruby Creek
Orofino Creek
Five Mile Creek
Six Mile Creek

Outdoor Recreation Facility Development

See Identified Potential Recreation Sites map. Further study would be required to identify other suitable sites.

Increase of Wood Fiber Supply

Timber stand improvement programs would be carried out in areas of greatest land capability (prime timberlands). Expanded wood utilization programs would occur at mills and plants and in logging areas througout the Basin, where efficiency could be improved.

ALTERNATIVE PLANS - CHAPTER IV

ALTERNATIVE PLANS
CHAPTER IV

INTRODUCTION

National Objectives

Development of Alternative Plans for the conservation and use of water and related land resources of the Basin are based on two National Objectives (1) Protection and Enhancement of Environmental Quality (EQ) and (2) Enhancement of National Economic Development (NED).

Plan Elements

A number of plan elements were identified to satisfy problems and concerns displayed and discussed in Chapter 1. Elements included in these plans represent the judgement of the Study Staff and desires of other Federal and State agencies, and the public as received through the Idaho State Study Team. 1/

Alternative Plans

Two Alternative Plans were formulated. One emphasized Environmental Quality, which maximizes contributions to the EQ Objectives; and one emphasized Economic Development, which maximizes the contribution to the NED Objectives. The plan elements address one or both of the Objectives.

A third alternative, the without plan condition, was also developed. This alternative represents the situation estimated to occur without implementation of the Preferred Plan. It provides a base for measuring the effectiveness of the other plans and aids in selecting the Preferred Plan.

Accounts

Tables VIII through XII display the alternative plans, their estimated costs, benefits impacts and effectiveness. Three accounts were used to display the plan effects----National Economic Development (NED), Environmental Quality (EQ), and Other Social Effects (OSE).

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

Table VIII.--Plan elements for the Environmental Quality (EQ) and National Economic Development (NED) alternative plans, Lower Snake River Basin, Year 2000

Plan elements	Unit	EQ plan	NED plan[1/]
Irrigated cropland treatment:			
Convert surface irrigation to sprinkler	Acres	28,650	30,000
Other irrigation improvements	"	25,000	25,000
Wildlife planting	"	1,350	--
Wildlife water facilities	Number	150	--
Dry cropland treatment:			
Eliminate summer fallow	Acres	86,600	86,600
Convert to contour farming	"	691,500	691,500
Convert to conservation tillage system	"	621,900	621,900
Implement divided slope farming 2/	"	241,800	241,800
Install stripcropping	"	671,000	60,500
Rangeland treatment:			
Seed rangeland	Acres	178,000	178,000
Control weeds and brush	"	341,000	68,000
Fence for management	Miles	770	370
Water development	Number	2,500	400
Proper grazing	Acres	1,182,000	328,000

Continued

Table VIII.--Plan elements for the Environmental Quality (EQ) and National Economic Development (NED) alternative plans, Lower Snake River Basin, Year 2000 (Continued)

Plan elements	Unit	EQ plan	NED plan[1/]
Forest road treatment:			
Seed grass on:			
Arterial roads	Acres	37,800	
Collector roads	"	31,300	
Local roads	"		19,000
Temporary roads over 2 years old	"		33,800
Temporary roads under 2 years old	"		1,100
Seed grass, mulch, fertilize, place netting on:			
Local roads	Acres	29,500	
Temporary roads over 2 years old	"	58,000	
Plant seedlings, seed grass, fertilize, place netting on:			
Temporary roads over 2 years old	Acres	35,800	
Temporary roads under 2 years old	"	3,000	
Close and stabilize local roads	Acres	26,100	
Construct sediment traps on collector roads	Acres	31,300	
Stream channel treatment:			
Streambank protection and channel stabilization	Ln. feet	135,000	16,000

Continued

Table VIII.--Plan elements for the Environmental Quality (EQ) and National Economic Development (NED) alternative plans, Lower Snake River Basin, Year 2000 (Continued)

Plan elements	Unit	EQ plan	NED plan 1/
Outdoor recreation facility development:			
Developed camping facilities	Sites	3,700	0
Dispersed camping facilities	"	8,700	2,436
Developed picnic facilities	"	1,100	407
Dispersed picnic facilities	"	2,000	740
Boat access	Ramps	80	66
Swimming beach	Ln. feet	7,540	5,278
Cross-country ski trails	Miles	120	41
Downhill ski area	Acres	500	500
Snowmobile trails	Miles	500	500
Increase wood fiber production:			
Felling and bucking	1,000 cu. feet	151,000	120,900
Sawmill improvement	"	151,000	120,900
Timber stand improvement	Acres	49,300	49,300

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

2/ Cropping change:

EQ Plan

121,800 acres to annual spring grain above divided slope.
No change in cropping below the divided slope

NED Plan

121,800 acres to annual grain above divided slope.
120,000 acres to wheat-pea rotation below divided slope.

Table IX.--Impacts of the Environmental Quality Alternative, Lower Snake River Basin
Year 2000

Environmental Quality Account

Beneficial and Adverse Effects

A. Areas of natural beauty

Reduced erosion on 3.7 million acres will enhance the visual quality of the cropland, forest land, and rangeland through improved vegetative cover, reduced erosion scars, and reduced build up of unsightly sediment deposits.

Installation of the outdoor recreation facilities will impact 4,930 acres of natural areas. The developments require 62 sewage treatment stations, 62 sanitary dumps, and 114 miles of road construction. Certain development will affect visual aesthetics.

Installation of the recreation facilities will reduce the impact on fragile areas and areas experiencing overuse. Some soil compaction will occur near developed sites.

Improved wood utilization will:

- Enhance natural regeneration
- Improve visual aesthetics
- Reduce debris on the ground

Timber stand improvement will:

- Increase debris on the ground
- Enhance vigor of timber stands

B. Quality considerations of land, water and air resources

Conversion of 28,650 acres from surface irrigation to sprinkler and other irrigation management improvements will:

- Lower the water table in some areas
- Provide additional land use alternatives
- Reduce irrigation application rates and irrigation return flows
- Reduce leaching and decrease requirements for adding farm fertilizers
- Improve quality of water in receiving streams

Continued

Table IX.--Impacts of the Environmental Quality Alternative, Lower Snake River Basin, Year 2000 (Continued)

Environmental Quality Account
Dry cropland treatment measures will: - Reduce erosion by 4.8 million tons per year on 940,000 acres and will increase wheat production in 50 years by 2.6 million bushels. - Enhance the quality of the dry cropland resource - Enhance the visual quality of the landscape - Enhance the quality, conservation and distribution of runoff water from the dry cropland Rangeland treatment measures will: - Improve the vegetative cover - Enhance the rangeland resource - Reduce erosion - Enhance visual quality of the landscape - Enhance the quality, conservation and distribution of runoff water from the rangeland - Improve wildlife habitat Forest road treatment measures will: - Reduce erosion by 1,951,000 tons per year on 195,400 acres of roads and reduce sediment by 306,000 tons annually - Enhance the visual quality of the landscape - Enhance the quality of runoff water from the forest land Land treatment measures planned for the irrigated, dry cropland, rangeland, and forest roads will reduce the sediment and phosphorous loading of the Basin's reservoirs, rivers, and streams. Channel stabilization and protection of 135,000 feet of streambanks will: - Reduce erosion of the banks - Reduce sediment in the streams - Protect the land resource from stream encroachment - Enhance the visual quality of the landscape - Improve the quality of the water in the streams Installation of the planned outdoor recreation facilities will: - Enhance the recreational experience - Alleviate overcrowding and overuse - Alleviate excessive environmental impacts on fragile areas - Improve the rate of recovery of overused areas

Continued

Table IX.--Impacts of the Environmental Quality Alternative, Lower Snake River Basin, Year 2000 (Continued)

Environmental Quality Account

C. Biological resources and selected ecosystems
 	
Aquatic ecosystems will by enhanced by:
- Improved quality of irrigation return flows
- Land treatment and forest road treatment measures that will:
  - Reduce erosion
  - Reduce sediment
  - Improve quality of runoff water from the land
 	
Selected vegetative ecosystems will be enhanced from the land treatment practices on all the land uses.
 	
Almost all water-related ecosystems will be enhanced through the reduced sediment and phosphorous loading of the streams.
 	
Improved wood utilization will:
- Require less timber cut to achieve demands
- Reduce sediment and erosion
- Enhance revegetation
 	
Waterfowl habitat will be altered by:
- Changes in water flow during nesting and resting periods
- Land treatment measures will increase availability of food and cover
 	
Upland bird habitat will be altered by:
- Conversion of 28,650 acres from surface to sprinkler irrigation
- 1,350 acres of wildlife plantings
- 150 watering facilities
- 241,800 acres of divided slope farming
- 671,000 acres of stripcropping
- 178,000 acres of rangeland seeding
- 2,500 rangeland water developments
 	
Outdoor recreation developments could adversely impact visual aesthetics, the water quality, vegetation, and other fish and wildlife habitat.

Continued

Table IX.--Impacts of the Environmental Quality Alternative, Lower Snake River Basin, Year 2000 (Continued)

Environmental Quality Account	
D. Archeological and historical	E. Irreversible or irretrievable commitments
Implementation of the plan elements could encroach upon or affect historical, archeological, or cultural resources of the area.	Channel stabilization and 135,000 feet of streambank protection represent a commitment of resources. Installation of outdoor recreation facilities will commit 4,930 acres of natural areas to recreation development.

Continued

Table IX.--Impacts of the Environmental Quality Alternative, Lower Snake River Basin, Year 2000 (Continued)

National Economic Development Account			
Beneficial effects	Average annual[1/]	Adverse effects	Average annual[1/]
	----dollars----		----dollars----
Value to users of increased outputs of goods and services		Value of resources required for a plan	
Land Treatment			
Irrigated cropland	3,899,000	Installation cost	2,727,600
		OM&R costs	649,000
Dry cropland	9,721,000	Installation cost	1,103,300
		OM&R costs	10,077,600
Rangeland	1,706,000	Installation cost	1,026,200
		OM&R costs	459,100
Forest roads	719,100	Installation cost	23,075,000
		OM&R costs	0
Streambank protection and channel stabilization	not evaluated	Installation cost	63,400
		OM&R costs	16,200

Continued

Table IX.--Impacts of the Environmental Quality Alternative, Lower Snake River Basin, Year 2000 (Continued)

National Economic Development Account			
Beneficial Effects	Average Annual[1/]	Adverse Effects	Average Annual[1/]
	----dollars----		----dollars----
Increased camping recreation benefits by 2,790,000 recreation days	11,630,800	Installation cost OM&R costs	2,678,000 4,866,000
Increase picnic recreation benefits by 1,507,920 recreation days	5,932,600	Installation cost OM&R costs	560,000 1,253,000
Increase boat ramp recreation benefits by 729,000 recreation days	2,047,400	Installation cost OM&R costs	129,000 1,772,000
Increase swimming recreation benefits by 1,266,890 recreation days	2,924,000	Installation cost OM&R costs	401,000 948,000
Increase cross-country skiing benefits by 193,050 recreation days	872,500	Installation cost OM&R costs	12,000 15,000
Increase downhill skiing recreation benefits by 567,600 recreation days	5,676,000	Installation cost OM&R costs	517,000 1,524,000

Continued

Table IX.--Impacts of the Environmental Quality Alternative, Lower Snake River Basin, Year 2000 (Continued)

National Economic Development Account			
Beneficial effects	Average Annual[1/]	Adverse effects	Average annual[1/]
	----dollars----		----dollars----
Increase snowmobiling recreation benefits by 340,630 recreation days	2,793,000	Installation costs	51,500
		OM&R costs	47,700
Increase wood fiber production by 32 mm. cu. ft.	5,906,000	Installation costs	231,400
		OM&R costs	1,905,800
		Project administration and technical assistance	6,515,100
Total beneficial effects	53,827,400	Total adverse effects	62,623,900
		Net beneficial effects	-8,796,500

Continued

Table IX.--Impacts of the Environmental Quality Alternative, Lower Snake River Basin, Year 2000 (Continued)

Social Well-Being Account

Beneficial and Adverse Effects

A. Employment and income[2/]

Creates approximately 7,000 jobs during the evaluation period.

Creates secondary benefits distribution of 15.7 million during the evaluation period. Provides jobs in five counties identified as having persistent unemployment.

B. Life, Health and safety

Additional outdoor recreational and camping facilities will reduce activity at undesignated area thereby concentrating traffic in designated sites, reducing vehicle damage to undesignated areas. improve traffic flow, enhance personal safety by providing off road parking, enhance the recreation experience, improve water and scenic quality, and reduce health hazards associated with improperly handled waste materials.

Erosion reduction will enhance traffic safety hazards associated with road washouts (damaging overflow resulting from inadequate road drainage), sediment deposits on roadways, and undercutting of roadbeds.

Erosion/sediment reduction reduces contamination of domestic and municipal water supplies.

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

Erosion reduction will enhance the capability of the land resource base to provide this and future generations with vital food and fiber.

C. Recreational opportunities

Provides for 7.4 million recreation days.

1/ 1980 price base amortized at 7 5/8 percent interest for 50 years.

2/ 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, Lower Snake River Basin, 1978

Concerns	Unit	Present condition	Year 2000 Without plan	Year 2000 With plan condition	Year 2000 Plan effects (C.2-3=4)	Year 2020 Without plan	Year 2020 With plan condition	Year 2020 Plan effects (C.5-6=7)
		thousands						
Soil erosion on:								
Irrigated cropland	Av. ann. soil loss-tons	307	304	275	29	301	275	26
Dry cropland	"	7,881	7,007	2,178	4,829	5,980	2,178	3,802
Rangeland	"	613	575	450	125	551	450	101
Forest roads	"	2,205	2,440	489	1,951	2,694	539	2,155
Stream channels	"	31	34	22	12	38	26	12
Banks w/moderate to severe erosion	Linear feet	520	570	435	135	630	495	135
Sediment from:								
Irrigated cropland	Av. annual tons	123	122	110	12	120	110	10
Dry cropland	"	4,367	3,883	1,148	2,735	3,314	1,148	2,166
Rangeland	"	357	335	262	73	321	262	59
Forest roads	"	342	384	78	306	426	85	341
Stream channels	"	31	34	22	12	38	26	12
Shortages of recreation facilities:								
Developed camping	Recreation days	404	837	0	837	1,395	0	1,395
Dispersed camping	"	943	1,952	0	1,952	3,255	0	3,255
Developed picnic	"	240	528	0	528	772	0	772
Dispersed picnic	"	445	980	0	980	1,801	0	1,801
Boat access	"	113	725	0	725	1,659	0	1,659
Swimming	"	302	1,267	0	1,267	2,690	0	2,690
Cross-country skiing	"	72	194	0	194	377	0	377
Downhill skiing	"	1/	554	0	554	979	0	979
Snowmobiling	"	2/	340	0	340	979	0	979
Inadequate supply of wood fiber:	Cubic feet	16,495	32,305	0	32,305	64,902	26,262	38,640

1/ Surplus of 130,000 recreation days.

2/ Surplus of 105,000 recreation days.

Table XI.--Impacts of the National Economic Development alternative, Lower Snake River Basin, Year 2000

Environmental Quality Account	
Beneficial and Adverse Effects	
A. Areas of natural beauty	
Land treatment measures installed on the irrigated and dry cropland, rangeland, and forest roads will reduce erosion on 3.7 million acres.	
The visual quality of the lands will be enhanced through improved vegetative cover, reduced erosion scars, and reduced build up of unsightly sediment deposits.	
Installation of the outdoor recreation facilities will impact 2,141 acres of land area. The developments require 8 sewage treatment stations and 42 miles of road construction. Certain development will affect visual aesthetics.	
Installation of the recreation facilities will reduce the impact on fragile areas and areas experiencing overuse. Some soil compaction will occur near developed sites.	
Improved wood utilization will: - Enhance natural regeneration	-Improve visual aesthetics -Reduce debris on the ground
	Timber stand improvement will: -Increase debris on the ground -Enhance vigor of timber stands
B. Quality considerations of water, land, and air resources	
	Conversion of 30,000 acres from surface irrigation to sprinkler and other irrigation management improvements will: - Lower the water table in some areas - Provide additional land use alternatives - Reduce irrigation application rates and irrigation return flows - Reduce leaching and decrease requirements for adding farm fertilizers - Improve quality of water in receiving streams

Continued

Table XI.--Impacts of the National Economic Development alternative, Lower Snake River Basin, Year 2000 (Continued)

Environmental Quality Account

Dry cropland treatment measures will:

- Reduce erosion by 4.3 million tons per year on 940,000 acres and will increase wheat production in 50 years by 2.3 million bushels
- Enhance the quality of the dry cropland resource
- Enhance the visual quality of the landscape
- Enhance the quality, conservation, and distribution of runoff water from the dry cropland

Rangeland treatment measures will:

- Improve the vegetative cover
- Enhance the rangeland resource
- Reduce erosion
- Enhance the visual quality of the landscape
- Enhance the quality, conservation, and distribution of runoff water from the rangeland
- Improve wildlife habitat

Forest road treatment measures will:

- Reduce erosion by 1.2 million tons per year on 53,900 acres of roads and reduce sediment by 192,000 tons annually
- Enhance the visual quality of the landscape
- Enhance the quality of runoff water from the forest land

Land treatment measures planned for the irrigated and dry cropland, rangeland, and forest roads will reduce sediment and phosphorous loading of the Basin's reservoirs, rivers, and streams.

Channel stabilization and protection of 68,000 feet of streambanks will:

- Reduce erosion on the banks
- Reduce sediment in the streams
- Protect the land resource from stream encroachment
- Enhance the visual quality of the landscape
- Improve the quality of water in the streams

Installation of the planned outdoor recreation facilities will:

- Enhance the recreational experience
- Alleviate excessive environmental impacts on fragile areas
- Improve the rate of recovery of overused areas.

Continued

Table XI.--Impacts of the National Economic Development alternative, Lower Snake River Basin, Year 2000 (Continued)

Environmental Quality Account

Improved wood utilization will:
- Require less timber cut to achieve demands
- Reduce sediment and erosion
- Enhance revegetation
 	
C. Biological resources and selected ecosystems
 	
Aquatic ecosystems will be enhanced by:
- Improved quality of irrigation return flows
- Land treatment and forest road treatment measures that will:
  - Reduce erosion
  - Reduce sediment
  - Improve quality of runoff water from the land
 	
Selected vegetative ecosystems will be enhanced from the land treatment measures on all the land uses.
 	
Almost all water-related ecosystems will be enhanced through reduced sediment and phosphorous loading of the streams.

Waterfowl habitat will be altered by: - Changes in water flow during nesting and resting periods - Land treatment measures will increase availability of food and cover Upland bird habitat will be altered by: - Conversion of 30,000 acres from surface to sprinkler irrigation - 241,800 acres of divided slope farming - 60,500 acres of stripcropping - 178,000 acres rangeland seeding - 400 rangeland water developments Outdoor recreation developments could adversely impact visual aesthetics, the water quality, vegetation, and other fish and wildlife habitat.

Continued

Table XI.--Impacts of the National Economic Development alternative, Lower Snake River Basin, Year 2000 (Continued)

Environmental Quality Account	
D. Archeological and historical	
Implementation of plan elements could encroach upon the historical, archeological, or cultural resources.	
E. Irreversible or irretrievable commitments	
Channel stabilization and 68,000 feet of streambank protection represent a commitment of resources.	
Installation of recreation facilities will commit 2,141 acres of natural area to recreational development.	

Continued

Table XI.--Impacts of the National Economic Development alternative, Lower Snake River Basin, Year 2000 (Continued)

National Economic Development Account			
Beneficial effects	Average annual[1/]	Adverse effects	Average annual[1/]
Value to users of increased outputs of goods and services		Value of resources required for a plan	
Land treatment			
Irrigated cropland	$3,911,500	Installation cost	$2,407,000
		OM&R costs	630,000
Dry cropland	10,988,600	Installation cost	666,000
		OM&R costs	6,086,400
Rangeland	909,000	Installation cost	391,000
		OM&R costs	175,000
Forest roads	451,000	Installation cost	421,600
		OM&R costs	0
Streambank protection and channel stabilization	12,000	Installation cost	7,500
		OM&R costs	2,000
Increase dispersed camping recreation benefits by 546,604 recreation days	4,728,000	Installation cost	86,000
		OM&R costs	289,800

Continued

Table XI.--Impacts of the National Economic Development alternative, Lower Snake River Basin, Year 2000 (Continued)

National Economic Development Account			
Beneficial effects	Average annual[1/]	Adverse effects	Average annual[1/]
Increase picnic recreation benefits by 559,700 recreation days		Installation cost	$ 213,400
		OM&R costs	389,000
Increase boat ramps recreation benefits by 598,000 recreation days	$1,913,000	Installation cost	105,800
		OM&R costs	1,453,000
Increase swimming recreation benefits by 886,800 recreation days	2,571,000	Installation cost	208,700
		OM&R costs	663,600
Increase cross-country skiing recreation benefits by 65,637 recreation days	538,200	Installation cost	4,000
		OM&R costs	5,000
Increase downhill skiing recreation benefits by 567,600 recreation days	5,676,000	Installation cost	517,000
		OM&R costs	1,524,000
Increase snowmobiling recreation benefits by 340,630 recreation days	2,793,000	Installation cost	51,500
		OM&R costs	47,700
Increase wood fiber utilization by 29 MM cubic feet	5,302,000	Installation cost	231,400
		OM&R costs	947,000

Continued

Table XI,--Impacts of the National Economic Development alternative, Lower Snake River Basin, Year 2000 (Continued)

National Economic Development Account			
Beneficial effects	Average annual[1/]	Adverse effects	Average annual[1/]
		Project administration & technical assistance	$ 1,062,200
Total beneficial effects	$43,632,000	Total adverse effects	18,585,600
		Net beneficial effects	$25,046,400

Continued

Table XI.--Impacts of the National Economic Development alternative, Lower Snake River Basin, Year 2000 (Continued)

Social Well-Being Account
Beneficial and Adverse Effects
A. Creates approximately 4,000 jobs during the evaluation period. Creates secondary benefits distribution of 8.4 million during the evaluation period. Provides jobs in five counties identified as having persist nt unemployment.
B. Life, health, and safety Additional outdoor recreation facilities will reduce activity at undesignated areas thereby concentrating traffic in designated sites, reducing vehicle damage to undesignated areas, improve traffic flow, enhance personal safety by providing off-road parking, enhance the recreation experience, improve waste collection and removal, improve water and scenic quality, and reduce health hazards associated with improperly handled waste materials. Erosion reduction will reduce traffic safety hazards associated with road washouts (damaging overflow resulting from inadequate road drainage), sediment deposits on roadways and undercutting of roadbeds. Erosion/sediment reduction reduces contamination of domestic and municipal water supplies. Streambank protection will reduce hazards associated with bank, bridge, and road failures. Erosion reduction will enhance the capability of the land resource base to provide this and future generations with vital food and fiber.
C. Recreational opportunities Provides for 3.1 million recreation days.

1/ 1980 price base amortized at 7 5/8 percent interest for 50 years.

2/ 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, Lower Snake River Basin, 1978

Concerns	Unit	Present condition	Year 2000			Year 2020		
			Without plan	With plan condition	Plan effects (C.2-3=4)	Without plan	With plan condition	Plan effects (C.5-6=7)
		thousands						
Soil erosion on:								
Irrigated cropland	Av. ann. soil loss-tons	307	304	275	29	301	275	26
Dry cropland	"	7,881	7,007	2,742	4,265	5,980	2,742	3,238
Rangeland	"	613	575	522	53	551	507	44
Forest roads	"	2,205	2,440	1,220	1,220	2,694	1,347	1,347
Stream channels	"	31	34	28	6	38	32	6
Banks with moderate to severe erosion	Linear feet	520	570	554	16	630	614	16
Sediment from:								
Irrigated cropland	Av. annual tons	123	122	110	12	120	110	10
Dry cropland	"	4,367	3,883	1,392	2,491	3,314	1,392	1,922
Rangeland	"	357	335	304	31	321	295	26
Forest roads	"	342	384	192	192	426	213	213
Stream channels	"	31	34	28	6	38	32	6
Shortage of recreation facilities:								
Developed camping	Recreation days	404	837	837	0	1,395	1,395	0
Dispersed camping	"	943	1,952	1,406	546	3,255	2,344	911
Developed picnic	"	240	528	329	199	772	486	286
Dispersed picnic	"	445	980	619	361	1,801	1,135	666
Boat access	"	113	725	127	598	1,659	299	1,360
Swimming	"	302	1,267	380	887	2,690	807	1,883
Cross-country skiing	"	72	194	128	66	377	249	128
Downhill skiing	"	1/	554	0	554	979	0	979
Snowmobiling	"	2/	340	0	340	979	0	979
Inadequate supply of wood fiber:	Cubic feet	16,495	32,305	3,305	29,000	64,902	33,902	31,000

1/ Surplus of 130,000 recreation days.

2/ Surplus of 105,000 recreation days.

LAND TREATMENT

Erosion problems on agricultural land and forest land present a continuing problem for resource managers in both public and private sectors. Consequences of erosion, including productivity losses and sediment damage, needs to be more effectively communicated to the public. One purpose of this study was to detail the impact of erosion on land users, consumers, and the productive capacity of the Lower Snake River Basin.

Without Plan

The without plan condition represents programs at their present level of treatment. This level was used as a benchmark to measure the effectiveness of alternative plans for further reducing erosion and sedimentation in the Basin.

EQ Plan

The Environmental Quality (EQ) Plan would apply conservation practices necessary to reduce erosion to tolerable soil loss rates. Productivity and cost of treatment were used to guide the selection of alternative treatment combinations to achieve the goal of tolerable soil loss.

NED Plan

The National Economic Development (NED) Plan emphasizes productivity and net income maximization to achieve a feasible level of erosion control. Marginal cost and income effects of alterntive treatments were used to rank treatment levels for each plan. Treatments in the NED Plan represent the best judgment of the study team.

Plan Effects, Benefits and Costs

The NED Plan will reduce erosion by 5.6 million tons and sediment yield by 2.8 million tons annually. The EQ Plan will reduce erosion by 6.9 million tons and sediment yield by 3.1 million tons annually. Dredging at Lewiston area marinas has already led to expense associated with sediment from cropland and forest land in the Basin.

Plan Effects, Benefits and Costs (Cont.)

Selection of a feasible level of treatment requires a comparison of benefits and costs. Costs associated with treatment levels are presented for each plan. Comparison of these costs with benefits of erosion control cannot be made directly. Measurement of benefits on site is possible and certain downstream benefits can be assigned arbitrarily to the source of erosion. However, assignment of benefits is at best a crude approximation. Hence this report does not attempt to select optimal levels of erosion control. Its purpose is to present as much relevant information as possible for decision makers to utilize in implementing an erosion control policy.

IRRIGATED CROPLAND TREATMENT

Plan Alternatives and Effects

The major use of the 160,000 acres of irrigated land in the Basin is forage production. The forage crops include pasture, alfalfa hay, and meadow lands used for both grazing and wild hay production. Only 1,500 acres are experiencing excessive erosion. Both the NED and EQ Plans will reduce erosion by 29,000 tons annually and sediment yield by 12,000 tons. The EQ Plan would enhance wildlife habitat for upland game birds and winter feed for large game animals on 1,350 acres.

DRY CROPLAND TREATMENT

Evaluation Procedure

An erosion by crops by land capability classes and land treatment practices analysis was developed for the 940,000 acres of dry cropland in the Basin. Computer programing techniques were employed to determine the cost marginal of treatment practices. The following treatment practices were included; elimination of summer fallow, convert to conservation tillage, convert to no-till, implement divided slope farming, and install stripcropping. The value of the loss of surface soil over time was also included in the analysis along with a sediment damage factor of two dollars per ton for sediment leaving the field.

Plan Effects

The NED Plan will reduce erosion by 4.3 million tons and sediment yield by 2.5 million tons annually. The EQ Plan will reduce erosion by 4.8 million tons and sediment yield by 2.7 million tons annually.

RANGELAND TREATMENT

Multi-Purpose Use

Of the 4,117 acres of rangeland in the Basin; 1.4 million acres are considered wildlife lands, while 2.7 million acres are multi-purpose lands used by both livestock and wildlife. The overall goal for the multi-purpose lands is proper range use.

NED Plan

Under the NED Plan proper range use would be accomlished on the treatable portions of the rangeland in poor condition, and on the under utilized rangeland in good condition. The better balance between grasses, forbs, and shrubs that will be accomplished by improving the poor condition rangeland will enhance range carrying capacity for both livestock and most forms of wildlife. It will also reduce erosion by 53,000 tons and sediment yield by 31,000 tons annually.

EQ Plan

Under the EQ Plan proper range use would be accomplished on the treatable portions of the rangeland in fair and poor condition. The erosion rate would be reduced by 125,000 tons and sediment yield by 73,000 tons annually. The carrying capacity for both livestock and most forms of wildlife would also be enhanced.

FOREST ROAD TREATMENT

The undisturbed forest lands are generally stable and have a minimal amount of erosion. However, logging roads constructed and used in timber harvest activities create an erosion and sediment problem on the forest land.

Analysis

Various treatment measures were analyzed to control erosion on the forest roads using a least cost linear programing model. The model compared alternative treatments, costs and effects and selected the most effective treatments to achieve a specified level of erosion control. The analysis showed a rapid increase in costs above the 50 percent erosion reduction level.

EQ Plan

The EQ Plan represents an 80 percent reduction in erosion and associated sediment. The marginal cost at this level of reduction is very high - $204.00 per ton.

NED Plan

The NED Plan represents a 50 percent reduction in erosion and associated sediment. The marginal cost at this level of reduction is relatively low - $5.60 per ton. It was determined to be uneconomical to apply treatment measures beyond this level.

STREAM CHANNEL TREATMENT

Plan Treatment

Erosion of stream channels is divided into two categories--moderate and severe. The EQ Plan would treat selected reaches of both moderate and severely eroded stream channels. The NED Plan would treat portions of the severely eroded stream 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.

OUTDOOR RECREATION FACILITY DEVELOPMENT

Without Plan	The Without Plan condition represents current levels of planning, interpretive services and facility development. This will result in continued overuse and deterioration of the recreational resource in some areas of the Basin.
EQ Plan	The EQ Plan emphasizes the need to increase research on environmental carrying capacity and user attitudes. Areas selected for facilities would be planned and developed to reduce impacts on the area with a minimum disturbance of the natural environment. Facilities would be designed to disperse recreationists, enhance visual quality and minimize recreational impacts.
NED Plan	The NED Plan calls for increased recreational development on private, State and Federally owned land to the degree that would be economically feasible. This additional construction and reconstruction would stimulate the economy, complement present recreational sites and reduce the impact on overused facilities.
Procedures Used	The procedures used to determine the environmental effects are included in the Appendix.

WOOD FIBER PRODUCTION

Without Plan	The Without Plan condition represents current levels of planning, timber harvest, sawmill output, timber stand improvement, and reforestation. Although, there will be some increase in the supply of timber over time, the present shortage of 16.5 million cubic feet is projected to be over 32 million cubic feet by the year 2000.
EQ Plan	The EQ Plan emphasizes aesthetic values with increased wood fiber production on all forest lands. This plan emphasizes a minimum disturbance to the environment and does not require economic feasibility to justify the supply of timber. The projected deficit of 32 million cubic feet of wood fiber by the year 2000 would be removed if this plan were implemented.
NED Plan	The NED Plan calls for increased timber production on all commercial forest land whether private, State, or Federally owned. It requires economic feasibility to justify the supply of timber. The emphasis is on improved management and cooperative assistance to increase wood fiber production using the most economical methods of harvesting and processing. Implementation of the plan would remove 90 percent of the deficit supply projected for the year 2000.

APPENDIX

RESOURCE BASE

LOCATION

The Basin

The Lower Snake River Basin includes portions of the States of Idaho, Washington, and Oregon. This study included only that part of the Basin within Idaho.

Boundary Adjusted

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, parts of the hydrologic boundary were adjusted to follow county lines.

Counties Included

Counties included from north to south are Latah, Clearwater, Nez Perce, Lewis, Idaho, Lemhi, and Custer.

Size

The study area contains approximately 14,716,000 acres or 22,994 square miles.

Making Hay in a Cut Over Area -- SCS Photo

CLIMATE

Climate of the Basin varies considerably due to the wide range in elevation and topography. Air masses from the Pacific and Canada contribute to the weather variations that occur.

Precipitation

Average annual precipitation varies widely. Lewiston, located at the mouth of the Clearwater River at an elevation of 740 feet, has an average annual precipitation of about 13 inches, while Challis and Salmon in the Salmon River Drainage, average 9 to 7 inches, respectively. The elevated plateaus and mountainous areas of the Clearwater Drainage have their average annual precipitation from 25 to 50 inches.

Generally, the winter months receive the greatest precipitation. However, in the Upper Reaches of the Salmon River frequent showers and thunderstorms during May and June produce the most precipitation. The Lewiston and Grangeville areas also have the highest precipitation during these months.

Growing Season

The growing season averages about 160 to 180 days in the warmest locations, and 110 to 130 days on the prairies south of the Clearwater River. In the Sawtooth Valley and other high elevation areas, the frost-free period is near zero.

Summary

The average monthly and annual precipitation, average and extreme temperatures, and annual frost-free period and growing season for the Basin are summarized in Table 13.

Table 13.--Average precipitation and temperatures at representative stations, Lower Snake River Basin, Idaho, 1978

Station	Latitude		Longitude		Elevation	Average annual		Av. temperature		Average date below 32°		Growing season 1/
						Precipitation	Temperature	January	July			
	Deg.	Min.	Deg.	Min.	Ft. MSL	Inches	°F	°F	°F	Last	First	Days
Mackay R.S.	43	55	113	37	5,897	9.8	41.6	17.1	66.1	6/7	9/13	98
Challis	44	30	114	14	5,175	7.5	44.4	19.6	68.2	5/28	9/18	113
May	44	36	113	55	5,110	7.9	42.4	17.8	65.2	6/14	8/29	76
Salmon	45	11	113	54	3,970	9.6	44.2	18.8	68.0	6/5	9/10	97
Riggins	45	25	116	18	1,800	16.7	54.3	34.0	76.2	4/22	10/23	184
Grangeville	45	55	116	08	3,360	23.5	46.0	27.6	66.2	5/16	9/23	130
Fenn R.S.	46	06	115	33	1,585	36.9	49.4	29.0	70.7	5/4	10/10	159
Kooskia	46	09	115	59	1,260	25.7	50.6	29.9	71.4	5/7	9/28	144
Nez Perce	46	15	116	15	3,145	22.2	45.6	26.3	65.1	5/19	9/16	120
Orofino	46	29	116	15	1,027	26.1	51.7	30.9	73.1	5/1	10/7	159
Lewiston WSO AP	46	23	117	01	1,436	13.2	51.7	26.4	73.4	4/21	10/17	179
Moscow U of I	46	44	116	58	2,660	22.6	47.5	27.9	66.8	5/12	9/6	117
Potlatch	46	58	116	53	2,600	24.5	46.8	28.4	65.3	5/28	9/11	106

1/ Growing season - Average number of days above 32°.

SOURCES: Climatological Handbook, Columbia Basin States, Pacific Northwest River Basins Commission.
Climatological Data, Annual Summaries; National Oceanic and Atmospheric Administration.

LAND

Topography

The Basin lies in an area of diverse topographic relief. Elevations range from about 720 feet at Lewiston to 12,662 feet on Mt. Borah, the highest point in Idaho.

Palouse Area

The Palouse area in the northeastern part of the Basin has generally rolling topography with a veneer of thick wind blown soils. This area is used extensively for dry cropland and represents about 2 percent of the Basin.

Camas and Nez Perce Prairies

The prairie is an uplifted dome with relatively smooth profile perched between 3,000 and 4,000 feet elevation lying south of the Palouse Area and north of the Seven Devils. It is bound on the north and east by the Clearwater River, to the west with the Snake River and to the south by the Salmon River.

Seven Devils

Topographic relief in the Seven Devils ranges from about 1,000 feet on the Snake River to 8,000 feet on the peak of Smith Mountain.

Idaho Batholith

The Idaho Batholith in the central part of the Basin has been formed by erosion and dissection of a hugh granitic body extending from north of the Clearwater River to the Snake River Plain in the Middle Snake River Basin. Topographic relief ranges from approximately 1,000 feet along the Clearwater to nearly 11,000 feet in the Sawtooth Mountains.

South Eastern Area

Mountains in the southeastern part of the Basin are nearly parallel ridges trending northwest-southeast with broad valleys. The most prominent are the Lost River, Lemhi Ranges, and the Beaverhead Mountains. Elevations range from 4,000 feet at Salmon, Idaho to over 12,000 feet on Mt. Borah in the Lost River range.

GEOLOGY

Two Physiographic Provinces

The Basin falls within two physiographic provinces - Northern Rocky Mountain and Columbia Plateau. Sections included within the Northern Rocky Mountain Province are the Panhandle on the north, Idaho Batholith in the central part and Southeast Ranges to the southeast. The rolling hills of the Palouse, Craig Mountains, and the Seven Devils Sections comprise the Columbia Plateau Province.

Idaho Batholith

The Idaho Batholith consists of a large igneous intrusion that replaced and engulfed older rocks as it moved toward the surface of the earth. This section, the second largest in the Basin, encompasses over 7,000 square miles of weathered granitic rocks eroded into hills and mountains of high relief. Great compressive forces were exerted on adjacent rocks causing folding and faulting and some metamorphism. After cooling, erosion has exposed and dissected the crystalline rocks by removing most of the rock mantle that originally covered it. The intrusion is believed to have occurred during Cretaceous Time, about 100 million years ago. Since then the Batholith has been intruded by additional solutions and igneous rocks that formed veins and dikes. Lava flows were also deposited locally on the surface.

Panhandle

The Panhandle Section mostly west of the Batholith, is composed primarily of dissected metamorphic, granitic rocks with some lavas of Tertiary age. Presence of these rock units represent conditions similar to those that existed further south in the area of the Batholith prior to intrusion and erosion. About 2,800 square miles of this Section lies in the Basin.

Nearly parallel mountains make the Southeast Ranges Section unique to the Northern Rocky Mountain Province. This is the largest Section in the Basin with over 8,000 square miles. The mountains trend mostly NW-SE similar to those of the Middle Rocky Mountains to the southeast across the Snake River Plain. Compressive forces from the southwest caused folding and faulting of Paleozoic sedimentary and metamorphic rocks to form ridges and broad valleys. Mountains in the northern portion are composed of older Cambrian and Precambrian metasediments.

Panhandle
(Continued)

A variety of extrusive and intrusive igneous rocks as well as metamorphic and sedimentary rocks occupy the transitional zone along the eastern side of the Batholith. This has been an area of instability subject to large tectonic forces. Molten rocks have been forced toward the surface to be deposited as lava flows or as intrusive crystalline rocks similar to those of the Batholith.

Snake River Country

The Palouse

The Palouse Section is the Northern most Section of the Columbia Plateau Province in the Basin. It is different from the remainder of the Basin in that it consists of rather uniform underlying basalt flows capped with a thick mantle of loess. The area is used primarily for cropland and because of its undulating topography and steep slopes it is highly vulnerable to erosion. This Section occupys 2 percent of the Basin or about 400 square miles.

Craig Mountains

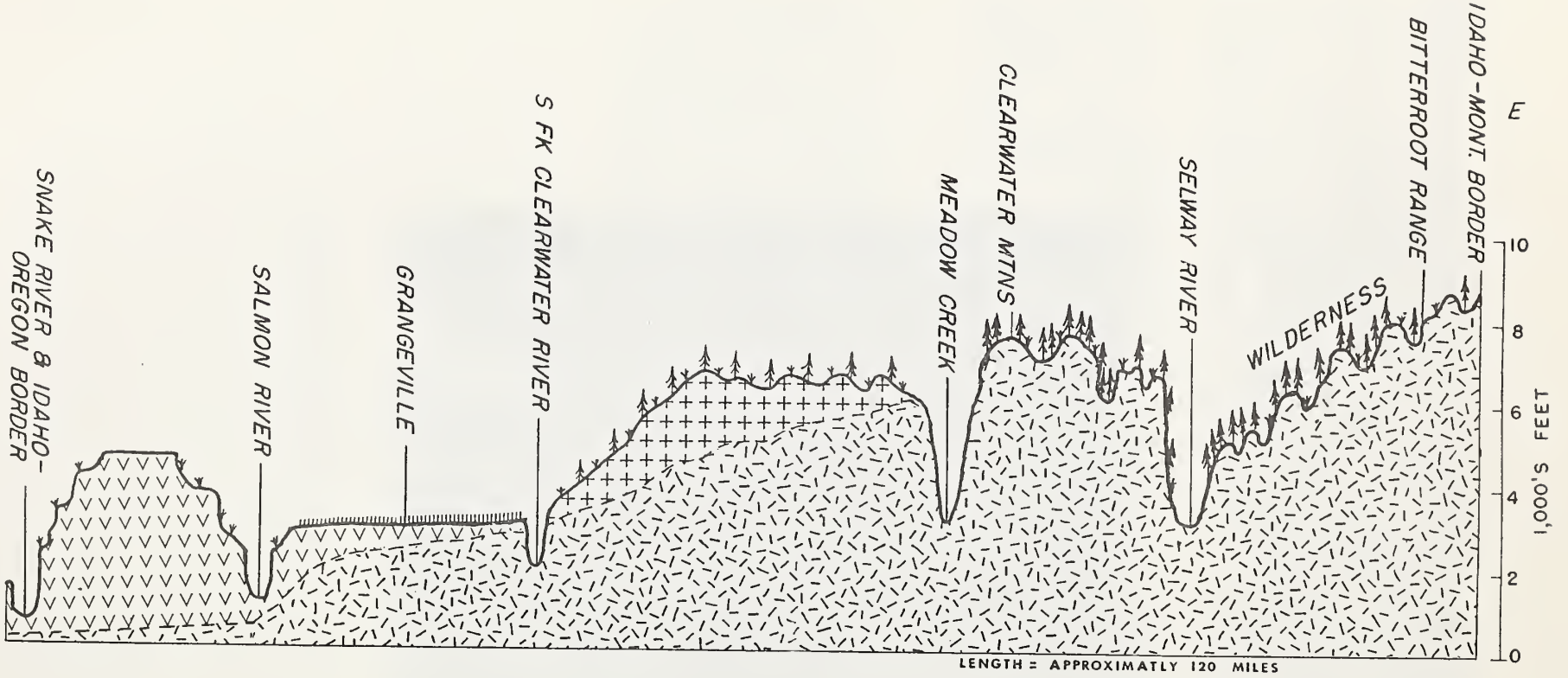
South of the Palouse is the Craig Mountain Section composed primarily of uplifted Columbia River Basalt capped with silty soil. This Section lies west and about 2,000 feet above Camas Prairie occupying 7 percent of the Basin. The highest portions of this area are over 4,000 feet above the Clearwater and Snake River Valleys to the north and west respectively.

Seven Devils

The Seven Devils Section is composed primarily of dissected Mesozoic and Cenozoic volcanics that extend westward into Oregon. This has been a zone of crustal weakness on the west side of the Idaho Batholith. There are over 4,000 feet of lava flows exposed in Hells Canyon adjacent to this Section. When about 1,000 feet is added to this figure for that which has been eroded away, the original thickness of volcanics had to be at least one mile. This Section represents 4 percent of the Basin or about 850 square miles.

GEOLOGIC PROFILE

Lower Snake - Idaho



LEGEND

Idaho Batholith and Other Igneous Rocks

Metamorphic

Volcanic

Figure 2

SOILS

Soils in the Lower Snake River Basin formed in a wide variety of parent materials, topography, vegetations, climates, and ages.

Characteristics

Soils are mostly deep with some shallow soils on lava flows and on ridgetops. Some soils in the eastern part have a cemented duripan. The soils in the eastern part are mostly neutral or alkaline; in the mountains they are neutral to slightly acid and are mainly neutral in the western part.

Parent Materials

The parent materials for the soils in the eastern part are mainly alluvium, colluvium and glacial till from the mountains that have varied materials of limestone, granites, volcanic materials, etc. The soils in the central mountains are mainly formed in alluvium, colluvium, and glacial till from volcanics and/or mixed sedimentary rocks.

The soils in the western part are mainly formed in loess from the Columbia Basin. The youngest soils have the least soil development and are formed in the recent alluvium along the Salmon River and the oldest soils have the strongest soil development are on the upper reaches of the Salmon River Valley.

Vegetative Types

The soils in the eastern part are formed under mixed grass/shrub (sagebrush). In the mountains they are mainly formed under coniferous forest or grassland/ shrub vegetation. In the western part the soils are mainly formed under prairie grassland with some forests.

Climatic Zones

The soils in the eastern part are mainly formed in a climate that had precipitation of as little as 8 inches in the lower areas to 40 inches or more in the mountains. The soils in central mountains formed in a precipitation of 16 to greater than 80 inches with most of it coming as snow. The soils in the western part formed under 16 to 24 inches precipitation which comes in winter and early spring.

The soil temperature ranges from about 47 to 52 degrees F in the lower areas to 38 to 47 degrees F in the mountains. The growing season is less than 60 days in the mountains and is 150 days or greater in the lower areas of the western part and 90 to 120 days in the eastern part.

General Information

General soil information for the Basin can be found in the publication "General Soil Map of Idaho - Selected Soil Features and Interpretations for Major Soils, River Basin Type IV Survey August 1976".

Detailed Information

Approximately 15 percent of the Basin's 14.7 million acres have detailed soil survey information on which to base detailed resource management and planning. Most of the privately owned land in Idaho and Latah Counties has been completed and the data is available in published form or is awaiting publication. The remaining counties have soil surveys of privately owned land in progress with expected completion dates of 1983 through 1985.

Information concerning the above publications can be obtained from the Soil Conservation Service, Room 345, 304 North Eighth Street, Boise, Idaho 83702.

PRIME AGRICULTURAL LAND

Characteristics

Prime agricultural land has the best combination of characteristics for producing food, feed, fiber, and oilseed crops.

Loss

The loss of prime agricultural land to other uses is a concern in the Basin. Consideration needs to be given to the need to retain the productive capability, and high environmental values of these lands. Areas of greatest concern are adjacent to urban areas where home sites spread into good agricultural lands and the expansion of rural recreational home sites.

Identification and mapping of prime agricultural lands has not been made and the total acres of these lands in the Basin is not available at this time.

PRIME TIMBERLAND

Characteristics

Prime timberland is land capable of producing timber at the rate of 85 cubic feet per acre per year or more.

Amount

There are over 6 million acres of commercial forest land in the Basin of which approximately 3.7 million or 62 percent is considered prime timberland.

Table 14.--Acres of prime timberland by ownership and management category, Lower Snake River Basin, 1980

Ownership	Productive Prime Timber Land	Nonstocked	Productive Reserved	Productive Deferred	Total
		1,000 Acres			
National Forest	1,745.2	153.7	514.7	148.5	2,562.1
Other Public	277.4	16.6			294.0
Industry	275.6	12.9			288.5
Small Private	460.4	100.6			561.0
TOTAL	2,758.6	283.8	514.7	148.5	3,705.6

Source: U.S. Forest Service data.

Loss

The loss of prime timberland to other uses is a matter of growing concern, however, further study is needed to determine the location of prime timberlands and the rate at which land use conversions are occurring.

SURFACE WATER

Quantity

The Snake River flows along the western border of the Basin from above Hells Canyon Dam to Lewiston where it turns west into Washington. Water from the Idaho portion of the Basin enters the Snake River via the Palouse, Clearwater, and Salmon River Systems. Table 15 shows the average annual discharge from these rivers and some of their major tributaries as measured at selected United States Geological Survey (USGS) gaging stations. The flows were computed using data collected from 1961 through 1978.

Reservoir Storage

Two reservoirs with capacities greater than 5,000 acre-feet are located in the Basin. The Dworshak Dam is on the North Fork of the Clearwater River near its confluence with the Clearwater River. The total storage capacity of the reservoir is 3,453,000 acre-feet with an active storage of 1,433,000 acre-feet. The surface area of the reservoir is 16,970 acres. The reservoir is used for flood control, power production, recreation, and navigation. The Hells Canyon Dam on the Snake River is used for power production. Its reservoir has a total storage of 164,000 acre-feet with an active storage of 16,000 acre-feet.

Quality

The Salmon River System has concentrations of dissolved solids that are less than 100 milligrams per liter (mg/1) except for the Lemhi and Pahsimeroi Rivers, which contain 200-300 mg/1. Water in the Clearwater River averages about 33 mg/1 dissolved solids. The Palouse River contains about 170 mg/1 at its mouth.

Quality (Cont.)

Dissolved solids concentrations in the Snake River above its confluence with the Salmon River range from near zero to 350 mg/1. This drops to about 200 mg/1 at Clarkston which is downstream from the Salmon River. At Central Ferry, Washington, which is downstream from the confluence of the Snake River and Clearwater River, the average dissolved solids concentration is less than 150 mg/1. High sediment concentrations occur in many streams during periods of high runoff. The Palouse River contains especially high concentrations during these periods.

Dissolved oxygen levels in the Basin's water are generally high. Bacterial densities vary considerably. Unsuitable conditions occur below some communities. This problem is being addressed by most communities and the situation is improving.

Table 15.--Average annual flow at selected gaging stations, Lower Snake River Basin, Idaho

USGS Gage Number	Name of Gaging Station	Average Annual Discharge in cfs 1/
13305000	Lemhi River near Lemhi, Idaho	279
13316500	Little Salmon River at Riggins, Idaho	834
13317000	Salmon River at White Bird, Idaho	12,349
13336500	Selway River near Lowell, Idaho	4,067
13337000	Lochsa River near Lowell, Idaho	3,126
13338500	South Fork Clearwater River at Stites, Idaho	1,141
13340600	North Fork Clearwater River near Canyon Ranger Station, Idaho	3,774
13342500	Clearwater River at Spalding, Idaho	16,250
13345000	Palouse River near Potlatch, Idaho	290
13290450	Snake River at Hells Canyon Dam	21,170

1/ Cubic feet per second

Source: U.S. Geological Survey

GROUNDWATER

Four Aquifers

Four aquifer units have been delineated in the Basin. Two of these furnish most of the groundwater supplies for irrigation, stock, municipal, and industrial uses. The other two are primarily in uninhabited mountainous areas and used for maintaining the base flow.

Lemhi and Pahsimeroi

Alluvial deposits including glacial outwash of Quaternary age occur as narrow flood plain and terrace deposits along many streams. This forms the first major aquifer unit. The thickest and most extensive portions of this aquifer unit are located in the headwater valleys of the Salmon River, especially along the Lemhi and Pahsimeroi Rivers. Where this aquifer is ten to fifty feet thick, wells yielding 500 to several thousand gallons per minute can be developed. Its water is generally a calcium bicarbonate type, low in fluoride and iron, with dissolved solids less than 250 mg/1.

Salmon and Clearwater

Medium to dark gray or black basalts and basaltic andesites of tertiary age in flows 25 to 100 feet thick form the second major aquifer unit. These are found primarily along the lower reaches of the Salmon and Clearwater Rivers. Deep wells which penetrate several permeable zones may yield a few hundred to several thousand gallons per minute. Water from this aquifer is a calcium bicarbonate type with dissolved solids less than 300 mg/1.

LAND OWNERSHIP

Amount By Categories

There are nearly 14.7 million acres in the Basin, of which approximately 11.1 million acres, or 76 percent of the land area, are managed by the Federal government (Table 16). Approximately 3.2 million acres, or 22 percent, are privately owned. State, county, and municipal ownership totaling about 0.4 million acres make up the balance. Of the Federal lands, about 9.5 million acres are administrated by the Forest Service, 1.5 million acres by the Bureau of Land Management, and 0.1 million by other Federal agencies. Slightly less than 90,000 acres of the private land are Indian lands held in trust by the Federal government.

LAND USE

Categories

Land use in the Basin falls into four major use categories: cropland, pasture and rangeland, forest land, and other land (Table 16).

Cropland

Approximately 1.1 million acres, or 7 percent of the land area of the Basin, are cropland, of which 940 thousand acres, or 85 percent, are dry farmed and 165 thousand acres, or 15 percent are irrigated.

Dry cropland crops consist mostly of winter wheat, barely, peas, lentil, and grass seed with some alfalfa for hay. The irrigated crops grown include small grains, pasture alfalfa, and orchards.

Multiple Use of the Basin's Resources -- USFS Photo

Pasture and Rangeland

About 4.1 million acres, or 28 percent of the land areas in the Basin, are used for pasture and rangeland. Rangeland is distributed throughout the Basin except for the forested area in the south and east portion and the cultivated areas. Perennial grasses, forbs and meadow type vegetation are the predominant cover on 65 percent of the pasture and rangeland area. About 28 percent is in good condition, 40 percent in fair condition, and 32 percent in poor condition.

Forest Land

More than 8.9 million acres or 61 percent of the land area are classified as forest land. Of this total, more than 90 percent is publicly owned with about 94 percent of the public land administered by the Forest Service. Forest cover dominates the mountainous areas, including all but the Snake River Valley, its lower tributaries, and the drier portions of the Salmon River Drainage.

About 7 million acres, or 67 percent are classified as commercial forest land. Douglas fir and true fire-spruce type predominate, with ponderosa and lodgepole pine a close second. Other major types include the larch and white pine. The remaining 33 percent is classified as noncommercial forest land. Of this, 14 percent is classified as productive but reserved from cutting. The balance is classified nonproductive from a commercial forest standpoint.

More than 3.6 million acres of forest land are classified as forest range and are grazed by cattle, sheep, and big game.

Forest areas are extremely important as part of the Basin recreation resource, providing a variety of opportunities for outdoor experiences.

Other Land

Other land uses such as roads, railroads, farmsteads, urban and industrial uses, and rock outcrops account for about 0.5 million acres, or about 3 percent of the land area of the Basin.

Table 16.--Summary of land use and land ownership by county,[1/] Lower Snake River Basin, Idaho

County	Total Land & water area	Water	Land use					Land ownership				
			Forest	Pasture & range	Crop-land	Other land	Total land	Federal land	State land	Private land	County land	Municipal land
	Thousand acres											
IDAHO:												
Clearwater	1,614	14	1,460	90	45	5	1,600	834	188	576	2	--
Custer	3,162	7	1,630	1,216	84	225	3,155	2,942	53	158	2	--
Idaho	5,454	4	3,670	1,514	230	36	5,450	4,527	85	833	5	--
Latah	698	--	351	66	250	31	698	106	39	549	4	--
Lemhi	2,936	5	1,600	1,054	76	201	2,931	2,651	43	235	2	--
Lewis	306	2	88	45	168	3	304	7	2	295	--	--
Nez Perce	547	7	141	132	259	8	540	22	14	499	4	1
TOTAL	14,717	39	8,940	4,117	1,112	509	14,678	11,089	424	3,145	19	1

1/ Land Resource Data, Snake River Basin Cooperative Study, May 1978; and unpublished Federal Land Ownership printout by the Bureau of State Planning and Community Affairs.

OUTDOOR RECREATION

Recreation Base

The Basin contains over 14 million acres of which 80 percent are in public ownership and essentially available for recreation opportunities such as hunting, fishing, backpacking, and hiking. Elevations range from about 740 feet at Lewiston and less than 1,700 feet in Hells Canyon to mountain peaks which tower to heights of over 8,000 feet. This area of Idaho possesses the greatest potential for recreation expansion. Near desert-like areas to higher lusher meadows and forested mountains provide habitat for one of the most diverse collections of plants and animals to be found in the United States. This Basin is bounded by fingerlike valleys and ranges to the southeast, the Middle Snake Basin to the southwest, the Bitterroot Range to the east and north, giving way to the rolling hills of the Palouse and the Snake River to the west.

This area remains mostly in a natural state and represents virtually all of the life zones found on the North American continent. This area also possesses one of the last free-flowing river systems in the nation.

Wild Rivers

Excellent white water floating resources include the Snake, Salmon and Clearwater Rivers and their tributaries. The Middle Fork and the main Salmon Rivers are nationally famous for providing the thrills of river floating. The steep gradient of the Middle Fork has over 155 rapids to challenge the white water enthusiast whether traveling by rubber boat, canoe or kayak. Along the 85-mile section of the main Salmon there are approximately 190 rapids, numerous campsites, outfitter lodges and dude ranches. Also scores of old mining sites are located along the river.

Wild Areas	Over 4.8 million acres in the Basin have National classification. Management of these areas is primarily oriented for recreation and related activity. Other uses and activities are permitted when their utilization does not impair the purposes for which these areas were established.
Scenic Areas	The unique topography provide some of the most scenic resources in the Nation. These sites range from beautiful lakes such as Redfish and Stanley to the scenic canyons of the Snake, Clearwater, Selway, and Salmon Rivers and are highlighted by the famous 5,500-foot deep Hells Canyon--the deepest gorge in North America.
Fishing and Hunting	The 53,790 acres of surface water provide an excellent opportunity for fishing and water sports. "Fisheries consist of resident trout (rainbow, cutthroat and Dolly Varden) as well as anadromous steelhead trout and Chinook salmon." Excellent hunting is afforded here with an abundance of elk, deer, bear, sheep, goat, cougar, and upland game birds.
Summer Homes	There are over 500 summer homes in the Basin with over 3,000 lots sold for subdivision and condominiums. Second homes are especially popular in the Stanley Basin due to its proximity to popular lakes, the National Recreation Areas, cross-country skiing, and snowmobiling opportunities.

Winter Sports

Interest in winter sports is increasing. In the winter, snow closes the back country to all but the snowmobilers and cross-country skiers who utilize logging roads on their journey to high alpine peaks and meadows. The more accessible developed areas provide opportunities for downhill skiing and other winter sports.

Interpretative Sites

The National Forest administers several visitor information centers and interpretive sites. The National Park Service administers the Nez Perce National Historical Park which represents a series of 22 sites designed to interpret the native American (Indian) history and culture of the area. There are also interpretive sites located along 133 miles of the original Lewis and Clark route.

These resources provide the setting for millions of people who enjoy outdoor recreation. Commercial airports at McCall and Lewiston make the Basin accessible to recreationists from all parts of the Nation.

FOREST LAND RESOURCE

Forest Uses

The forest land resource in the Basin has many uses, including watershed protection, grazing, recreation, wildlife, and timber production.

Watershed

Maintaining an adequate hydrologic condition is an important management aspect of the forest. This helps to insure high quality water for domestic, recreation, fish and wildlife, industrial, and irrigation purposes.

Grazing

Livestock grazing, including cattle, horses, and sheep, is a significant use of much of the Lower Snake Basin's forested area. Presently, grazing amounts to an estimated 81,600 animal-unit-months (AUM's) annually on National Forests. Summer grazing on forested areas in the Basin is an integral and essential part of many livestock operations.

Recreation

The large Idaho Primitive Wilderness and other recreation areas are located in the River Basin. Other areas include part of the Sawtooth Primitive Areas, the Salmon River Breaks Primitive Area, Hells Canyon National Recreation Area, Gospel Hump, Hells Canyon and the Selway-Bitterroot National Wilderness Area. The Basin also includes several rivers for which special classification has been made or is proposed. A significant portion of forest land in the Basin is presently being managed in a natural or near-natural state.

Wildlife

The forest land resource supports an extremely valuable and varied wildlife population by providing both food and cover. Big game, upland birds, and many nongame wildlife species depend on the forest land resource for part or all of their habitat.

Timber

The Basin has approximately 7 million acres of land suitable and available for producing commercial timber 1/. Of this, 5.3 million acres or 76 percent is on National Forests, .2 million acres is Bureau of Land Management, .4 million acres is State and County land and 1.1 million acres or 16 percent is on private land.

Ownership of commercial forest land by each county in the Lower Snake River Basin is given in Table 17.

Table 17--Ownership of commercial forest land by county, Lower Snake River Basin

County	National Forest	Bureau of Land Mgmt.	Other Fed.	State and County	Private	Total
		----1,000 acres----				
Clearwater	730	14	15	244	437	1440
Custer	990	44	-	1	13	1048
Idaho	2209	42	7	47	292	243
Latah	106	7	-	52	183	348
Lemhi	1277	50	-	-	13	1340
Lewis	-	6	6	6	69	86
Nez Perce	-	17		8	95	120
Total	5312	180	28	357	1102	6979

Source: Based on data from Forest Survey, U.S. Forest Service, Intermountain Forest and Range Experiment Station, Ogden, Utah, 1974, and does not reflect RARE II or classified wilderness areas since that date.

1/ Land capable of producing 20 cubic feet of wood or more per acre per year.

Sawtimber

The net volume of sawtimber on commercial forest land by ownership group and county is given in Table 18.

Average annual timber harvest in Idaho is about 1.7 billion board feet. The Lower Snake Basin provides about 45 percent of the total.

Growing Stock

Net volume of growing stock on commercial forest land by ownership group and county is shown in Table 19. Approximately 60 percent of both growing stock and sawtimber occur on National Forests, followed by private, land 26 percent, and other public land, 14 percent.

Lumber Industry

The lumber industry utilizes most of the annual log production. Timber harvested in the Basin have many uses including; lumber, plywood, pulp, paper, house logs, posts, poles, firewood and miscellaneous products.

In 1978, 30 mills produced more than 748 million board feet of lumber. The number of sawmills and their production class is given in Table 20.

Harvesting Timber -- USFS Photo

Table 18.--Net volume of sawtimber on commercial forest land by ownership group, by county, for Lower Snake River Basin, 1978

County	Softwood				Hardwood				Total sawtimber
	National forest	Other public	Private	Total softwood	National forest	Other public	Private	Total hardwood	
	Million board feet (International 1/4 inch Rule)								
Clearwater	7,266.7	5,429.9	9,974.5	22,671.1	--	--	--	--	22,671.1
Custer	4,006.0	290.6	86.3	4,382.9	11.0	9.6	3.1	23.7	4,406.6
Idaho	20,030.1	826.0	2,520.1	23,376.2	0.6	4.8	11.8	17.2	23,393.4
Latah	931.6	703.6	2,598.4	4,233.6	--	--	--	--	4,233.6
Lemhi	5,776.1	367.1	106.1	6,249.3	3.2	12.5	3.5	19.2	6,268.5
Lewis	--	168.2	411.8	580.0	--	--	--	--	580.0
Nez Perce	--	183.5	356.5	540.0	--	--	--	--	540.0
TOTAL	38,010.5	7,968.9	16,053.7	62,033.1	14.8	26.9	18.4	60.1	62,093.2

SOURCE: Based on current data from Forest Survey, USDA Forest Service, Intermountain Range and Experiment Station, Ogden, Utah and Forest Statistics of the U.S., 1977.

Table 19.--Net volume of growing stock on commercial forest land by ownership group, by county, for Lower Snake River Basin, 1978

County	Softwood				Hardwood				
	National forest	Other public	Private	Total softwood	National forest	Other public	Private	Total hardwood	Total sawtimber
	Million board feet (International 1/4 inch Rule)								
Clearwater	1,416.3	1,276.6	2,445.4	5,138.3	--	--	--	--	5,138.3
Custer	990.6	65.7	19.9	1,076.2	4.2	3.7	1.4	9.3	1,085.5
Idaho	4,294.6	164.3	527.8	4,986.7	0.2	1.2	2.7	4.1	4,990.8
Latah	197.3	166.1	589.6	953.0	--	0.5	1.8	2.3	955.3
Lemhi	1,632.3	83.4	22.8	1,738.5	1.3	4.7	1.1	7.1	1,745.6
Lewis	--	35.0	98.6	133.6	--	--	--	--	133.6
Nez Perce	--	32.2	84.7	116.9	--	--	--	--	116.9
TOTAL	8,531.1	1,823.3	3,788.8	14,143.2	5.7	10.1	7.0	22.8	14,166.0

SOURCE: Based on current data from Forest Survey, USDA Forest Service, Intermountain Range and Experiment Station, Ogden, Utah and Forest Statistics of the U.S., 1977.

Table 20.--Sawmills and annual capacity, by county, Lower Snake River Basin, 1978

County	Mills	Production class	Plywood production class
	Number	MM Bd. Ft.	MM Sq. Ft.
Clearwater	9	55-81	155
Custer	--		
Idaho	6	115-150	
Latah	7	125-160	
Lemhi	3	62-85	
Lewis	3	85-110	
Nez Perce	2	140-250	158
TOTAL	30	582-836	313

SOURCE: Forest Products and Utilization Directory for Idaho, Idaho State Department of Lands, 1978; and Forest Industries, 1974 Buyer's Guide and Yearbook.

Habitat

Suitable habitat for many varieties and an abundance of fish and wildlife species exists in the Lower Snake Basin. This comes from a wide range in elevation, 730 feet to 10,000 feet, many climatic conditions, land forms and vegetation types. Portions of all waters, forests, ranges, croplands, and other lands supporting vegetation provide habitat for some species of wildlife.

As Idaho continues to grow and to develop, changes will occur affecting habitat for both fish and wildlife. Habitat changes over time may result in plant and animal species becoming endangered or threatened in the Basin. There are, however, abundant opportunities for enhancing and developing fish and wildlife resources to offset the losses created by man's resource development activity.

Threatened Species

There are three threatened animal species in the Lower Snake River Basin. These include:

Peregrine Falcon

The Peregrine Falcon has never been a high density species. Population decline is occurring, however, and is generally attributed to the use of chlorinated hydrocarbons.

Bald Eagle

Historically, the Bald Eagle has nested along the Snake River. These birds are primarily fish eaters. Wintering populations are common around and along river valleys, lakes, and reservoirs where adequate food can be found.

Northern Rocky Mountain Wolf

Historically, the Northern Rocky Mountain Wolf occurred throughout most of Idaho. Settlement of the area started the decline in wolf populations. The wolf needs a continuing food supply and an environment free from undue human harassment if they are to survive.

Upland Game

Habitat for upland game includes semi-arid sagebrush rangelands, high mountain, dense coniferous forests, cultivated farmland, and brushy foothills. Such a varied habitat has a great variety of upland species.

Upland Game Species and Estimated Annual Hunter-Days 1/

Species	Hunter-Days
Ring-necked pheasant	16,620
Chukar	22,330
Hungarian partridge	17,330
Quail	20,180
Forest grouse	42,950
Sage grouse	5,620
Mourning dove	7,800
Rabbit	6,180
Total	139,010

Waterfowl

Waterfowl are found throughout the state and account for 21 percent of the total hunting effort. Fifteen or more species of ducks are found in this basin during the year. Some nest in the area and others are only in the area during seasonal migrations. There are no major duck or goose breeding areas, however, mountain meadows and meadowlands bordering streams produce ducks.

Waterfowl and Estimated Annual Hunter-Days 2/

Waterfowl Group	Hunter-Days
Ducks	8,150
Geese	4,790
Coots	1,120
Total	14,060

1/ Idaho Department of Fish and Game Data

2/ Columbia North Pacific Comprehensive Framework Study, November 1971

Population and Harvest

Duck populations have remained fairly stable over the years. They are easily attracted to protected areas and are federally regulated due to their migratory nature. The number of waterfowl hunters has increased gradually each year and the total harvest has been increasing at a rate of nearly 2 percent per year for the last 10 years.

Coots are migratory but maintain stable annual population levels. There is little hunter demand for coots. Snipes are found near water bodies and wetlands but have little hunting pressure.

Big Game

The Basin is nationally known for its exceptional opportunity to hunt, observe, photograph, or study a great variety of big game species. Big game hunting accounts for 43 percent of the total hunting effort and is the most popular hunting in Idaho.

Antelope, elk, deer, moose, bighorn sheep, mountain goat, mountain lion, and black bear are found in the Basin. Habitat for these animals includes high, rough country and extensive coniferous forests.

Big Game Species and Estimated Hunter-Days 1/

Species	Hunter-Days
Mule deer	50,890
White-tailed deer	95,480
Elk	111,430
Moose	345
Mountain goat	195
Bighorn sheep	75
Black bear	4,790
Mountain lion	255
Total	263,460

1/ Idaho Department of Fish and Game Data

Big Game (Cont.)

Several factors affect the big game resource of the Basin. Numbers depend upon trends in timber management, road construction, livestock grazing, and regulations concerning land, water, and wildlife. All of these activities, if properly planned, aid big game.

Furbearers

Thirteen species of animals are currently being trapped in Idaho for their fur. However, eight species account for 92 percent of the catch. Beaver, muskrat, and mink are found in aquatic habitat throughout the state while Marten are found in forested areas of the Basin. Red fox roam agricultural and adjacent lands, foothills, and mountain meadow areas. The racoon is found in similar surroundings. Bobcat are widespread throughout the Basin in a variety of habitat. Lynx inhabit remote heavily timbered country where winter snows are deep. Only a remnant population of wolverine remain in remote timbered areas.

Fish

Anadromous fish are important in this Basin, although most of the fish are harvested downstream. Habitat for successful reproduction and survival of anadromous salmonoid fish consists of accessible streams, with a minimum of pollution, cool water, and an abundance of spawning gravel and rearing pools, and an adequate and stable stream flow. These conditions are characteristic of the Lower Snake River Basin.

Habitat for resident fish includes many clear, cold, small streams in the higher elevations, more than 1,000 natural mountain lakes, a few reservoirs, and large rivers in the lower valleys. Several State and Federal fish hatcheries and wildlife refuges are found in the Basin.

Management Units

The following table gives the name and acreage of fish hatcheries, big game ranges, and wildlife management areas and refuges in the Lower Snake Basin in Idaho. 1/

	Acres
Spring Valley Dam Public Fishing Area	296
Elk River Dam Public Fishing Area	407
Winchester Lake Public Fishing Area	292
Waha Lake Public Fishing Area	32
Chamberlin Basin Segment	407
South Fork Salmon River Segment	4,625
Big Creek Segment	2,080
Middle Fork Salmon River Segment	1,106
North Fork Salmon River Hatching Channel	--
Jimmy Smith Lake Public Fishing Area	32
Circle C. Hatchery	--
Dworshak National Fish Hatchery	--
Total	9,277

Fish Varieties

Rainbow trout is the principal resident salmonid fish. Brook trout and cutthroat are also important. Many other types of fish provide sport fishing. Almost all Idaho lowland lakes, reservoirs, and ponds with suitable water temperatures contain rainbow trout in varying abundance. Cutthroat trout are also found in large lakes and reservoirs throughout the northern part of the state.

Economic Value

The exceptional aesthetic values related to fishing in the Lower Snake Basin probably exceed the economic values by which the fish resource is commonly measured. Because certain areas are difficult to get to, fishing capacity is unknown but considered to be above present levels.

1/ Columbia North Pacific Comprehensive Framework Study, November 1971.

Other Wildlife

Many other kinds of wildlife are found in the Basin. There is a special interest in mountain lions. Research in the Idaho Primitive Area is expected to lead to more purposeful management of mountain lions in the future. Many rodent and bird species are important to mankind. The variety of wildlife, both game and non-game is an outstanding attribute of this Basin.

UNIQUE OR SPECIAL FEATURES

Archaeological Sites

Evidence of man in the Basin has been found dating his presence back about 15,000 years during the close of the Wisconsin Ice Age. There have been 2,367 archaeological sites identified in the Basin and more are found each year.

Early People

The dominant tribe in the Basin was the Nez Perce who lived primarily in the proximity of the Clearwater River. They were primarily fisherman even after they obtained horses near the beginning of the 18th century. They were noted for their intelligence and social morality. Lewis and Clark found good friends among the Nez Perce in 1805 during their trip as did Captain Bonneville in 1834 and others through the years.

Horses played a big part in the lives of the Nez Perce for they permitted part of their tribes to travel long distances over the Lolo Pass into Montana to hunt buffalo. It is believed other tribes from the Columbia Basin, the Cayuses, Wallawallas, Yakimas, Spokanes and Coeur d'Alenes followed the Nez Perces to buffalo country and also adopted the tepee and other cultural trappings of the Plains Indians. In 1877, the Nez Perce elected to leave their homeland rather than move to a new reservation that had been reduced to one-fourth of its original size by 1863 treaty. Chief Joseph led them westward to Wyoming, then north toward Canada. He surrendered in October, north of Montana's Bear Paw Mountains.

Fur Trade	White trappers were probably present in the Basin before 1805 when Lewis and Clark came through but they left little record. Fur trapping became highly competitive with traders buying furs from Indians as well as white trappers until about 1840 when the industry went into a rapid decline.
Mining	The next large group of inhabitants were miners following 1860 when gold was found in the area. By 1862, there were more whites than Indians occupying reservation lands. Many miners left when the gold ran out or when it became uneconomical to mine but some stayed to farm, ranch or purse other occupations.
Historical Sites	The West continued to be increasingly settled by ranchers and towns people. Through the years, many of the old relic buildings and historical sites have deteriorated and are in jeopardy of extinction. The elements of man through economic growth, development, thievery and vandalism have also taken their toll on historical sites.
Preservation	There are over 250 pieces of Federal legislation which affect historic preservation. This has substantially reduced losses. In the Basin, three hundred and thirty historical sites, including twenty-seven national historical sites, have been designated for preservation.
Wilderness	Areas in this Basin designated by Congress as "wilderness area" total 2,538,978 acres and include Gospel Hump, Hells Canyon, Selway-Bitterroot, part of the Sawtooth, and over half of the recently designated River-Of-No-Return Wilderness. These areas are protected and managed by the Forest Service to preserve their natural condition.
Other Wilderness Uses	The President may, within a specific area as he deems desirable, authorize establishment and maintenance of water projects, power projects, transmission lines, road construction and other facilities needed in the public interest. Mining and mineral leases acquired prior to the effective date of the Wilderness Act are permitted until December 31, 1983, to the same extent as applicable prior to the act. Reasonable mining activities as prescribed by the Secretary of Agriculture are permitted.

Primitive Areas

The Idaho and Salmon River Breaks Primitive Areas total 1,448,769 acres and are now included in the 2,239,000-acre River-Of-No-Return Wilderness, which was designated by the President signing the Central Idaho Wilderness Act of 1980.

National Recreation Areas

There are 133,300 acres classified as National Recreation Area (NRA). This includes parts of Hells Canyon and Sawtooth NRA's. These areas are managed to provide a broad range of land uses and recreational opportunities. The Hells Canyon National Recreation Area was established by PL 94-199 on December 31, 1975. This legislation was the outcome of a lengthly contest between interests proposing additional dam construction in Hells Canyon and advocates of preservation. When the Hells Canyon NRA was established, part of this area was designated the Hells Canyon Wilderness.

Roughing it in the Wilderness -- USFS Photo

Wild and Scenic Rivers

The Wild and Scenic River's Act of 1968 came into being in order that certain rivers of the Nation, which with their immediate environments possess outstanding, remarkable, scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values which shall be preserved in a free flowing condition in that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations. Over 1,000 miles of rivers in this Basin have been identified as having free flowing values.

The NRA Establishment Act designated 68 miles of the Snake River along the Idaho-Oregon border and 27 miles of the Rapid River within the National Forest as components of the National Wild and Scenic Rivers System. An additional 33 miles of the Snake River, located upstream from the northern boundary of the Hells Canyon NRA, and the Salmon from the town of North Fork to its confluence with the Snake, have been proposed for designation under Section 5 (a) of the Wild and Scenic River Act. The Central Idaho Wilderness Act of 1980, provides for Wild and Scenic designation for the 125 mile 1/ segment of the Salmon River included in the Wilderness. The balance of the recommended designation of 237 miles is pending.

Other river systems or river segments in the Basin classified as a wild, scenic or recreation river include a 185-mile stretch of the Middle Fork of the Clearwater from Kooskia upstream to Lowell, the Lochsa River upstream to Powell Ranger Station and the Selway River from Lowell upstream to its origin, the famous Middle Fork of the Salmon and a 105-mile stretch from its origin to its confluence with the main Salmon River.

Nez Perce National Historic Park

This 2,114-acre park is located 16 miles east of Lewiston. This park, administered by the National Park Service, represents a series of sites established to interpret the Native American (Indian) history and culture of the area.

1/ The 46 mile portion from the confluence of the North Fork the Salmon downstream to Corn Creek "recreational river", and the 79 mile segment from Corn Creek to Long Tom Bar, "Wild" river.

7-E-24023

MAP
STATUS OF IDENTIFIED FREE FLOWING RIVERS
LOWER SNAKE RIVER BASIN COOPERATIVE STUDY
IDAHO
NOVEMBER 1981

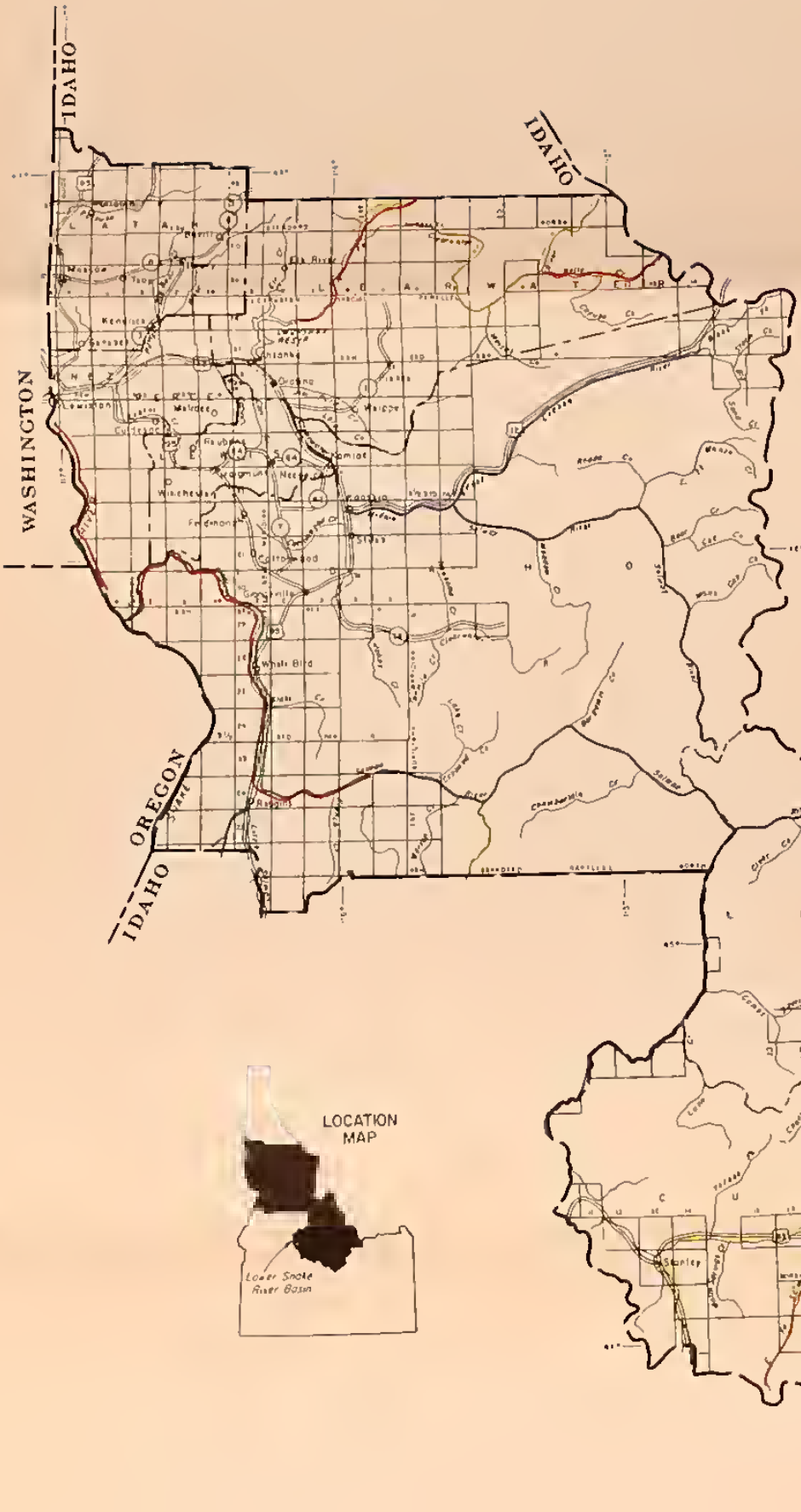
10 0 10 20 30 MILES

LEGEND

- Rivers Designated
- River Study Completed; Designation is Pending Congressional Approval.
- Natural And Free-Flowing Rivers Unclassified.
- Rivers Identified With Competing Uses.

SOURCES:

IDAHO DEPARTMENT OF FISH AND GAME NATIONWIDE RIVERS INVENTORY: A REPORT ON NATURAL AND FREE-FLOWING RIVERS IN THE NORTHWESTERN UNITED STATES; HERITAGE CONSERVATION AND RECREATION SERVICE, AUGUST 1980.



ECONOMIC PROFILE

Basin Description

The Lower Snake Basin consists of seven counties and makes up 29 percent of the State's total land area. The terrain is rugged, mountainous, and forested with the exception of the western portions of Latah County on which the rich loess soils of the Palouse Hills support soft-white-wheat production. The Camas Prairie and the rolling hills of the Clearwater Drainage also support a productive wheat-pea-lentil industry.

About 61 percent of the area is forested and a major forest products industry exists in the region. Agriculture, limited by topography and climate, is modest, yet an important industry. However, perhaps the greatest resource value lies in that the region is one of the last and largest recreational areas in the United States, existing almost wholly in its natural state. The largest landowner is the Federal government with about 75 percent of the total land area. Dealing with conflicting issues of conservation versus increased utilization and development of this region's natural resources will be of prime importance in coming years.

The Port of Lewiston (Nez Perce County) is of major economic importance to the Lower Snake River Basin. This port, located 465 miles inland from the Pacific Ocean, provides slackwater river barge service along the Columbia/Snake River System. This port became operational in 1975 with the completion of Lower Granite Dam on the Snake River. The port has general cargo and container-handling facilities, but its prime asset is a 3.8 million bushel grain storage capacity. Wheat from growers in Idaho, Montana, the Dakotas, and Wyoming is transferred from truck to river barge for transport to export facilities at Lower Columbia River ports. The Port of Lewiston has had a positive impact upon the economy of the City of Lewiston and the surrounding area.

Population

Population growth in the Lower Snake Planning Region was 10 percent (9,483 residents) during the decade of the 1970's (Table 21). This is the slowest growth rate of the five state planning regions and compares with a 32 percent population increase for the State as a whole. The 1980 population density for the Lower Snake was 4.1 residents per square mile. This compares to an average of 12 residents per square mile for the State and 65 persons per square mile for the nation.

Nez Perce and Latah Counties account for 60 percent of the region's population. Each of these counties is the site of a major commercial municipality --Moscow, in Latah County (1980 population 16,513), and Lewiston in Nez Perce County (1980 population 27,986). Clearwater County's population decreased by 4 percent (488 residents between 1970 and 1980) while the remaining four counties showed moderate increases.

In the decade of the 1960's, rural population declined by 6 percent while urban population increased by 26 percent. This change in the urban/rural population distribution continued through the 1970's.

Employment

Employment statistics for the Lower Snake Planning Region are shown in Table 22. The civilian labor force increased by 29 percent during the 1970's. Nonagricultural wage and salary employment increased by 46 percent, while agricultural employment declined by 1,172 workers (26 percent). Farm mechanization and consolidation are prime reasons for the fall in agricultural employment.

Table 21-- Population by County, Lower Snake Planning Region

County	1970	1980	Projected 1982
Clearwater	10,871	10,383	10,583
Custer	2,967	3,392	3,457
Idaho	12,891	14,724	15,008
Latah	24,891	28,667	29,220
Lemhi	5,566	7,444	7,588
Lewis	3,867	4,084	4,163
Nez Perce	30,376	33,218	33,859
TOTAL	92,429	101,912	103,878
IDAHO	712,567	943,134	961,337
% of State Total	12.9	10.8	10.8

SOURCE: Annual Planning Information Report, Idaho Department of Employment, March 1981.

Table 22-- Employment Statistics, Lower Snake, 1970 and 1979

Item	1970	1979
	No. of workers	
Civilian labor force	38,158	49,276
Total employment	35,560	46,526
Unemployment	2,548	2,712
Unemployment rate (%)	6.0	5.0
Agricultural	4,499	3,327
Nonag. wage and salary	26,088	38,182
Manufacturing	6,996	8,172
Food processing	273	201
Lumber	4,554	5,685
Paper	--	1,025
Chemicals	--	--
Primary metals	--	--
Fabricated metals	--	656
Machinery except electrical	--	--
Electrical equipment	--	--
Transportation equipment	--	--
Nonmanufacturing	19,092	29,997
Mining	83	145
Construction	1,661	1,394
Transp., comm., & utilities	1,425	1,735
Trade	5,785	8,508
Wholesale trade	--	1,726
Retail trade	--	6,784
Finance, insurance, & real estate	709	1,640
Service and miscellaneous	3,297	5,692
Government	6,132	10,882
Administration	--	4,457
Education	--	6,426

SOURCE: Idaho State Department of Employment.

Employment (Cont.)

The employment gains during the 1970's were not shared equally among the 7 counties of the Lower Snake. While Latah and Nez Perce Counties have enjoyed relatively strong growth and low unemployment, Clearwater, Idaho, and Lewis Counties have not faired as well (Table 23). These counties are heavily dependent upon the timber industry. Below normal lumber demand during most of 1980 and 1981 has caused unemployment projections for 1982 to be above 10 percent. Clearwater County's unemployment rate for 1982 is projected to be 16.3 percent. The poor condition of this County's economy helps explain why its population declined by 4 percent during the decade of the 70's.

Table 23-- 1982 Employment Projections, Lower Snake

	Population	Labor force	Employed	Unemployed	Unemployment rate
					percent
Clearwater	10,583	4,546	3,805	741	16.3
Custer	3,457	1,691	1,611	80	4.7
Idaho	15,008	6,922	6,119	803	11.6
Latah	29,220	16,460	15,790	670	4.1
Lemhi	7,588	3,354	3,024	330	9.8
Lewis	4,163	1,769	1,587	182	10.3
Nez Perce	33,859	19,190	17,944	1,246	6.5
TOTAL	103,878	53,932	49,880	4,052	7.5
Idaho	961,337	464,254	434,542	29,712	6.4

SOURCE: Annual Planning Information Report, Idaho State Department of Employment, March 1981.

Per capita personal income, by county, is listed in Table 24. All counties are below the 1979 State average per capita income of $7,632 except Nez Perce which is well above the average at $9,258. Economic activity spurred by the development of the Port of Lewiston is a significant factor in Nez Perce's high per capita personal income.

Employment (Cont.)

Table 24-- Per Capita Personal Income, Lower Snake, 1975 and 1979

County	1975	1979
	------dollars-------	
Clearwater	4,711	7,593
Custer	4,039	6,768
Idaho	4,736	7,212
Latah	4,931	7,082
Lemhi	4,160	7,297
Lewis	5,579	7,594
Nez Perce	5,954	9,258
Idaho	5,205	7,632

SOURCE: Idaho State Department of Employment.

Agriculture

The rich Palouse Hills of Latah County and the Camas Prairie and rolling hills of the Clearwater Drainage support the production of wheat, peas, and lentils. Only about 14 percent of the cropland in the Lower Snake Region is irrigated as rainfall is adequate to support most grain production.

In terms of land use, only about 6 percent of the total land area of the Lower Snake is in cropland. Land use did not change significantly between 1974 and 1978, although, irrigated acreage did increase from 11.1 to 14.4 percent of total cropland (Tables 25 and 26).

The market value (Table 26) of all products sold declined between 1974 and 1978 ($131 million in 1974 to $118 million in 1978). Wheat is the prime crop of the Lower Snake Region and the average 1978 price of wheat was $3.12/bushel as opposed to a 1974 price of $3.90/bushel. Thus, the low 1978 wheat price was the prime cause in the decrease in value of products sold.

Table 25.--Use of farmland, all farms, Lower Snake River Basin, 1974 and 1978*

Crop	1974	1978
	----1,000 acres----	
TOTAL CROPLAND	1,043	1,011
Harvested cropland	785	734
Field corn	1	0
Wheat	337	305
Other grains	106	207
Hay	168	156
Potatoes	1	2
Vegetables	7	7
Orchards	1	1
Other crops	164	56
Cropland pasture	143	105
All other cropland	114	174
Woodland and woodland pasture	355	395

* Rounding errors may cause some inconsistency.

SOURCE: 1978 Census of Agriculture, Bureau of the Census, U. S. Department of Commerce.

Table 26.--Agricultural Statistics, Lower Snake River Basin, 1974 and 1978

Category	Unit	1974	1978
Farms and land in farms:			
Farms	Number	2,758	2,797
Land in farms	1,000 acres	2,445	2,507
Average size of farm	Acres	887	897
Total cropland	1,000 acres	1,043	1,011
Irrigated farms:			
Farms with irrigation	Number	507	693
Proportion of all farms	Percent	18.3	24.7
Irrigated land	1,000 acres	122	146
Proportion of total cropland	Percent	11.6	14.4
Value of land:			
Average value per farm	$1,000	261	448
Average value per acre	Dollars	309	513
Value of marketings:			
Average value of products sold per farm	Dollars	44,408	41,695
Market value of all products sold	$1,000	131,487	118,550
Crops	"	57,859	76,464
Livestock	"	27,319	20,083

SOURCE: 1978 Census of Agriculture, Bureau of the Census, U. S. Department of Commerce.

Agriculture (Cont.)

Cash receipts by county for 1977 are listed in Table 27. Nez Perce, Latah, and Idaho are the major agricultural counties. Crop production, mostly wheat, accounts for 72 percent of cash receipts in 1977. (The data in Table 27 were compiled by the USDA Statistical Reporting Service, while Tables 25 and 26 are from the Bureau of Census, Department of Commerce. Hence, the tables are not directly comparable.)

Table 27-- Cash Receipts from Farm Marketings, Lower Snake, 1977

County	Total receipts	Total crops	Total livestock
		$1,000	
Clearwater	2,559	1,909	650
Custer	5,714	1,737	3,977
Idaho	17,894	10,788	7,106
Latah	19,225	17,568	1,657
Lemhi	6,260	897	5,363
Lewis	9,054	8,912	742
Nez Perce	19,390	17,012	2,378
TOTAL	80,096	58,823	21,273

SOURCE: 1980 Idaho Agricultural Statistics, U.S. Department of Agriculture.

The Forest Industry

The forest industry is a significant part of the total economic sector. Both primary and secondary wood-using industries are important in terms of output, employment, and income.

Timber harvested has many uses including lumber, plywood, pulp, paper, house logs, posts and poles, and miscellaneous products.

Stumpage value of the annual log production in the Basin was $41 million in 1978. Value added through processing was approximately $164 million for a total of $205 million annually (based upon a stumpage price of $50/thousand board feet and wholesale lumber price of $250/thousand board feet).

Employment

Employment in the wood products industries in the Snake River Basin is significant. Over 3,500 persons are currently employed in the lumber and wood products industries in the Lower Snake Basin. The number of persons employed, by industry group is given in Table 28.

Wood industry employment compared to total county employment is significant in the heavily forested counties. In 1978, the wood industry in Clearwater County employed 49 percent of the total work force. Wood industry employment in Idaho County was 35 percent, and Lewis County accounted for 17 percent of the total county employment. These counties have been impacted by the poor timber economy in 1980 and 1981.

Forest industry and forest management income is significant in the Snake River Basin. Statewide, lumber sector employees earn 31 percent more than the average State wage level. The average annual salary is given in Table 28.

Table 28.--Average annual lumber and wood products employment and wages, by county, Lower Snake River Basin, Idaho, 1978

Subregion & county	Logging	Sawmills	Misc. wood products	Total employment	Total wages	Average salary
	----------Number----------				-----Dollars-----	
LOWER SNAKE RIVER BASIN	1,724.4	1,743.7	48.7	3,516.8	56,421,970	15,681
Clearwater	1,077.2	274.6	48.7	1,400.5	21,682,099	15,487
Custer	--	--	--	--	--	--
Idaho	233.4	849.7	--	1,083.1	17,360,615	16,029
Latah	152.3	547.2	--	699.5	12,214,912	17,462
Lemhi	138.4	--	--	138.4	2,179,519	15,748
Lewis	68.9	72.2	--	141.1	2,262,633	16,036
Nez Perce	54.2	--	--	54.2	722,192	13,325

SOURCE: State of Idaho Department of Employment data.

EFFECTS OF CHANGING ENERGY CONDITIONS ON RECREATION

Effects

Rising prices of gasoline have raised the question of what effect this will have on outdoor recreation participation. As of today, there remain many uncertainties but it seems that recreational purposes will likely remain a high priority use of gasoline, as long as it is available. Even with gasoline at a price of $1.30 per gallon compared to $1.00 the total expenditure for the average family of four on a 1-week, 1,000-mile vacation would increase less than 5 percent.

Activity Changes

It does seem, however, that outdoor recreation activities are changing. Even though overall recreation use increased from 1978 to 1979, mechanized recreation travel dropped. In contrast there was a sharp increase in hiking, swimming and gathering forest products.

Program Changes

Policies and programs should be developed that will offer opportunities for quality, energy efficient recreation. Experience has shown that people alter their leisure time activities in response to kinds of opportunities provided and information about the opportunities. An aggressive program involving improvement of forest recreation facilities of all types, visitor information and coordination with the recreation service industry to develop attractive destination recreation packages could encourage many people to spend their leisure time in outdoor recreation activities rather than traveling long distances in their automobiles. If these programs attracted 2 million visitor-days of use annually consumption of gasoline would be reduced by 7.5 to 10 million gallons per year.

PROCEDURE FOR DEVELOPING LINEAR PROGRAMMING ANALYSIS OF EROSION AND SEDIMENTATION

Purpose

The intent of this section is to describe the procedure used to develop linear programming models for evaluating erosion control alternatives in the Middle and Lower Snake portions of Idaho. The models were designed during the USDA-Cooperative River Basin Study sponsored by the Idaho Department of Water Resources.

The Model

Linear Programming Model

A linear programming tableau was adapted to the specific requirements of the erosion model. Sources of erosion occupy rows in the LP matrix while Alternative methods of controlling erosion occupy the columns in the LP matrix. An example matrix is presented later to illustrate data needs and the relationship between sources of erosion and sediment, and the methods of achieving control. The quantity in acres of each source is essential to the operation of the model. Acreage was used to provide a common denominator for all sources of erosion.

Costs

Costs of applying control measures are identified on a per-acre basis as are all coefficients in the model. Therefore, it was necessary to convert all erosion sources to acres including miles of streams, roads, power corridors, fire trails, etc.

Model Constraints

Right hand side values for each model represent acres of erosion source. Projections of future management scenarios can be incorporated in the system by changing the right hand side values. The model requires several data inputs including those based on physical relationships that reflect the interaction of water and soil, those reflecting the impact of human activities on physical relationships, and those based on the costs associated with controlling sediment and erosion. These will each be discussed in turn.

Table 29.--Erosion and erosion-control practice, Musselshell Creek, 1978

Erosion Source/ Practice	Percent erosion rates (1)	Seed grass (2)	Seed, mulch, and fertilize grass (3)	Seed, fertilize, mulch, and net grass (4)	Plant native shrubs on streamsides (5)	Plant tree seedlings roadway (6)	Plant seedlings-net grass and fertilize ponds (7)	Water bar and vegetate (8)	Gravel road surface (9)	Stabilize and close roads (10)	Gravel seed, fertilize, and hydromulch (11)	Streamside zone management fencing (12)	Streamside zone management vegetative (13)	Rock rip rap (14)	Musselshell Creek
	tons per acre														Acres
Brush & seedlings.....	.07	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Old growth.....	.05	--	--	--	--	--	--	--	--	--	--	--	--	--	4,210
Saplings & poles.....	.07	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Clear cut < 2 years.....	.23	.14	--	--	--	--	--	--	--	--	--	--	--	--	350
Clear cut > 2 years.....	.14	.08	--	--	--	--	--	--	--	--	--	--	--	--	3,150
Seed trees < 5 years.....	.20	--	--	--	--	--	--	--	--	--	--	--	--	--	20
Seed trees > 5 years.....	.10	--	--	--	--	--	--	--	--	--	--	--	--	--	175
Selective cutting.....	.09	--	--	--	--	--	--	--	--	--	--	--	--	--	6,587
Gravel double lane.....	6.30	2.46	1.58	.44	--	3.34	.13	--	--	--	--	--	--	--	7
Gravel 1 1/2 lane w/turn...	5.25	2.05	1.31	.37	--	2.78	.10	--	--	--	--	--	--	--	25
Spur road native surface...	33.25	13.16	8.44	2.36	--	17.89	.68	8.44	18.56	10.12	3.38	--	--	--	198
Skid trail native surface..	45.00	22.50	15.75	9.00	--	23.85	--	9.00	--	18.00	--	--	--	--	33
Single lane dirt road.....	26.25	10.24	6.56	1.84	--	13.91	.52	6.56	16.44	7.88	2.62	--	--	--	109
Pioneer road.....	45.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Stream channels, live.....	93.00	--	--	--	18.59	--	--	--	--	--	--	69.75	46.50	14.25	0
Burns < 2 years.....	.12	.75	--	--	--	--	--	--	--	--	--	--	--	--	929
Fire trails.....	52.50	--	--	--	--	--	--	15.75	--	--	--	--	--	--	--
Commercial selection.....	.11	--	--	--	--	--	--	--	--	--	--	--	--	--	1,665
Meadow.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	122
Rock.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	92
Treatment Costs ($)															
Musselshell.....		100	1,500	2,100	1,000	500	2,600	1,100	7,000	500	8,800	500	700	14,000	

Model Operation

In general, the model takes information concerning the present erosion situation and selects alternative means of controlling that erosion subject to a specified objective function. In the forest land models, the objective function selects the least cost alternatives for a given level of erosion control. In the agricultural models, a least-cost analysis is made to analyze the most cost-effective means of controlling erosion and sediment, and a profit maximizing run is made to select that mix of control alternatives which would maximize net income for each level of erosion control. Later, we will discuss the implications of these two analytical approaches.

Forest Land

Erosion Sources

The first step in developing an erosion-sediment linear programming model (E-S LP) was to identify erosion sources occurring in the forested areas. These sources include roads, streams, vegetative cover types, fire trails, power corridors, and several management conditions such as clear cuts, burned areas, selective cuts, etc.

Erosion Rates

Once the erosion sources were identified, it was necessary to estimate the acreage of each source and its mean erosion rate. By multiplying the acreage of an erosion source by its mean erosion rate, it was possible to obtain an estimate of total current erosion. Sediment estimates were developed in a similar procedure with measurements of sediment loads in streams in the study area being used to estimate the relationship between erosion and sediment on each erosion source.

Erosion Control Alternatives

The next step was to determine the relevant control measures to be applied to each of the several erosion sources. It is important to construct alternatives so that each is unique. If alternatives can be mixed, new alternatives should be set up to combine the mixed alternative as a single action. This increases the number of available alternatives and enhances the interpretation of results by eliminating internal combinations and (transfer) statements. For example, seeding grass on roadways will reduce erosion to a specified level. If the grass seeding is mulched, it is somewhat more expensive and also more effective. Fertilization could be added to again increase the

Erosion Control Alternatives (Cont.)

cost and effectiveness of the alternative. In the Idaho Cooperative E-S LP, alternative control measures were specified for each erosion surface with the erosion-sediment level which would result if the control measure were in place. Estimates of erosion-sediment levels were made for two major soil types in the Lolo Creek drainage -- forest soils and batholith (granitic) soils.

Application Costs

Costs of applying control measures were estimated using engineering cost estimates provided by Forest Service personnel and Forest Service working documents. These costs are necessarily generalized values intended to reflect cost relationships between alternatives in broad applications. A required assumption is that application costs of the several alternatives on specific sites would tend to vary in the same direction from the average prices used in the model, and may each be represented by average relative costs. This may or may not be true in all situations; therefore, application of the procedure to specific sites will require close scrutiny of cost relationships.

Agricultural Lands

Erosion Control Model

The emphasis in the agricultural lands analysis was toward crop rotations and tillage practices to reduce erosion and sedimentation. As with forested lands, the first step in developing the ag lands model was to identify relevant erosion sources. In the Lolo Creek model the SCS technical staff determined that roads and other land (as identified in the CNI), did not contribute a significant portion of the erosion and sediment to the total ag land problem and hence roads should be ignored. The judgment was also made by SCS that streams within the boundaries of the agricultural lands did not have a significant erosion problem relative to the cultivated land. The data base generated for ag lands began with the identification of cropping patterns and associated erosion-sediment levels. Crop rotation and tillage practices were also identified for each erosion source and the present acreage and erosion-sediment levels estimated.

Crop Rotations

Crop rotations by tillage practice are also used as alternative means of controlling erosion and sediment in the evaluation matrix. Erosion/sediment coefficients for each cell in the matrix were estimated by SCS personnel.

Crop Yields and Costs

Crop yields and production costs were also estimated using normalized yields as a guide for crop yields and the ERS adaptation of the Oklahoma Budget Generator to determine production costs. Normal practices were identified for each crop under conventional tillage and a base budget was run to determine a base cost of production. Then each alternative tillage practice production cost was estimated by altering the practices and machinery complements in the production cost relationships between the alternative practices. These costs should not be viewed as production cost estimates for a typical or individual farm.

Flow Chart

Specific requirements for setting up the E-S LP are outlined in Figure 3. There are many steps in this activity. Failure to accomplish each one accurately will result in questionable results.

Model Operations

The model is normally referred to as a Least-Cost Linear Programming System (LC-LP). The most often used objective is to minimize the cost of achieving a predetermined level of erosion or sediment control. One popular method has been to reduce the allowable erosion to some predetermined percentage of the current situation, then find the least-cost solution for achieving the lower level. Many other scenarios can be analyzed with the LP system including, but not limited to, the following:

1. Set an allowable erosion or sedimentation rate for each erosion source. Then find a least-cost solution for lowering present rates to that value.

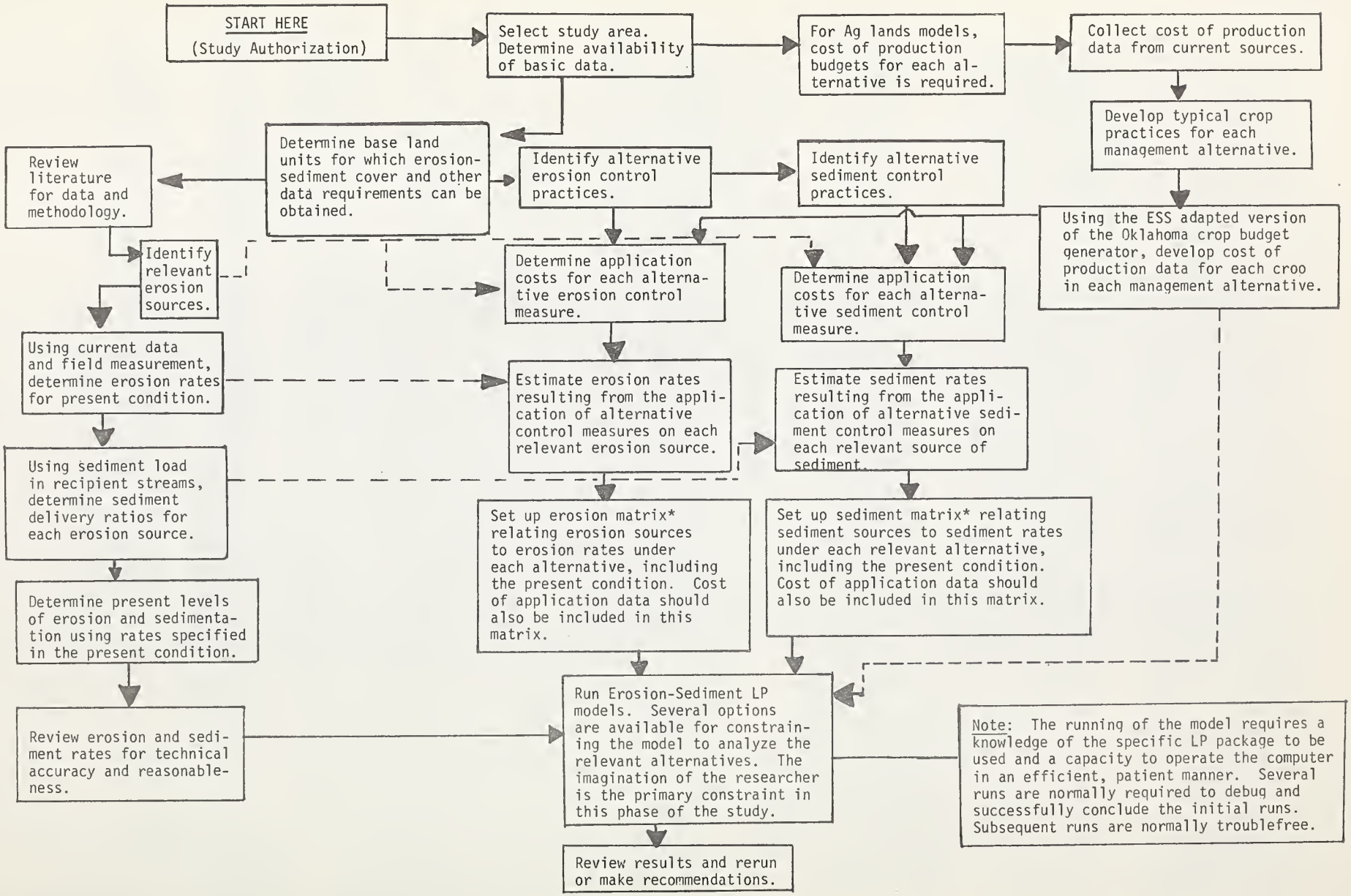
2. Select environmentally sound control measures and constrain the model to utilize those measures. The LP analysis would determine the least cost of achieving an environmental alternative.

3. Use a profit maximizing objective function to determine that set of alternatives which would maximize net returns at various levels of erosion or sediment reduction.

4. Determine the greatest reduction possible in erosion or sediment for given amounts of expenditures on control measures.

Application of the Model

The cooperative study developed a series of linear programming models to evaluate alternative strategies for reducing erosion and sedimentation in the Lower and Middle Snake River Basins.



*Specific details about the matrices depend on the specific requirements of the matrix generator to be used for the LP analysis.

FIGURE 3. Linear programming analysis activity flow diagram.

Application of the Model (Cont.)

Output from these analyses were used to develop alternative plans. The LP model generates erosion levels, sedimentation estimates, cost of treatment, and net income for alternative land treatment scenarios.

An LP model requires detailed data. Steps required to generate a model include:

- Delineation of the study area
- Selection of land units for base data
- Determine data requirements (varies by study depending upon study objectives, major land uses, and type of soil resource)
- Develop erosion rate estimates for each base unit
- Develop sedimentation estimates for each base unit (sediment delivery ratio)
- Determine alternative treatments for each base unit
- Determine effect of alternative treatments on erosion and sedimentation
- Estimate cost of alternative treatments
- Organize input information into a matrix for processing
- Develop report writer to organize LP results
- Interpret result
- Establish criteria for plan selection
- Select plan

Specific Models

A total of six linear programming models were developed to analyze the erosion control alternatives. Each provide insight into the interrelationships of man's activities associated with use of soil resources.

PROCEDURES FOR DEVELOPING THE OUTDOOR RECREATION ENVIRONMENTAL QUALITY ALTERNATIVE PLAN, LOWER SNAKE RIVER BASIN - IDAHO

The intent of this paper is to describe procedures used to determine environmental impact of outdoor recreation facility development in the Lower Snake River Basin in Idaho.

Situation

The Soil Conservation Service, Economic Research Service, USDA-Forest Service, and the Idaho Department of Water Resources are currently engaged in a USDA Cooperative River Basin Study, sponsored by the State of Idaho.

One of the concerns identified and selected for study was the present and projected shortage of outdoor recreation facilities in the Basin. Estimates of environmental impacts from proposed development are required by USDA River Basin Study guidelines. Empirical data were not available for identifying or analyzing environmental impacts of comprehensive program objectives for outdoor recreation facility development. Therefore, an opinion survey was conducted to obtain information needed by the study team to estimate environmental impacts of alternative program levels for outdoor recreation facility development.

Procedures

An opinion survey was designed to identify where environmental impacts from recreation development are likely to occur and to obtain judgmental quantitative values to serve as an indicator of their significance. 1/ See figure 4.

Only State and Federal recreation planners associated with the Basins were surveyed. Their judgments were based on professional experience and knowledge of the area. Their responses were further generalized because comprehensive program development is not site specific.

Over 80 percent of the recreation planners contacted returned the survey forms. Quantitative values, attained from the returned forms, were organized and coded to utilize the statistical capabilities of an electronic computer. 2/

The computer printout displayed the average impact of facility development by each type on all environmental characteristics. See graphs 1 through 8.

1/ Based on Geological Survey Circular 645 - Procedure for Evaluating Environmental Impact, 1971.

2/ Statistical Package for the Social Sciences (SPSS), Nie, Hull, Jenkins, Steinbrenner, and Bent, 1975. Available from McGraw Hill.

INSTRUCTIONS

1 - Based on your knowledge of the local situation, please evaluate which of the proposed actions, listed along the side of the matrix, have the potential to impact one or more of the existing characteristics and conditions of the environment, listed along the top of the matrix. If impacts are possible, place a diagonal slash in the box where the proposed action and the existing characteristics or conditions intersect. (See sample matrix below.)

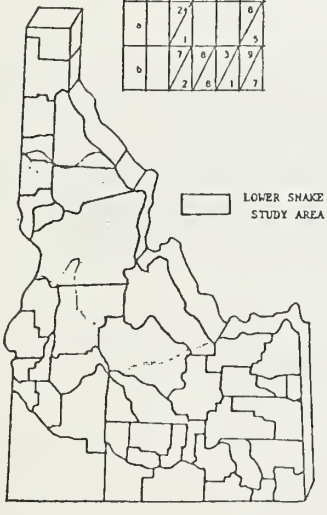
2 - Having completed the matrix, in the upper left-hand corner of each box with a slash, place a number from 1 to 10 which indicates the MAGNITUDE of the possible impact; 10 represents the greatest magnitude of impact, and 1, the least (no zeroes).1/ Before each number, place + if the impact would be beneficial.

3 - In the lower right-hand corner of the box, place a number from 1 to 10 which indicates the IMPORTANCE of the possible impact (e.g., Regional vs. local); 10 represents the greatest importance, and 1, the least (no zeroes).

1/ Actions having a short-term impact (1 year or so) which are ameliorated in a few years, are considered of minor or negligible importance in a long time frame.

SAMPLE MATRIX

	a	b	c	d	e
a	2/1				8/5
b	7/2	8/8		3/1	9/7



DETERMINING THE ENVIRONMENTAL QUALITY ALTERNATIVE
RECREATION FACILITY DEVELOPMENT
Lower Snake River Basin, Idaho, 1980
(Based on Geological Survey Circular 645 - A Procedure for Evaluating Environmental Impact, 1971)

Existing Characteristics and Conditions of the Environment

Proposed actions needed to meet 100% of the recreation facility demand by the year 2000 2/	Wetlands	Historical and Archeological Sites and Objects	Waste Control	Grazing	Forestry	Noise and Vibrations	Habitat Modification	Recreation Participation	Unique and Physical Features	Compaction and Setting	Endangered Animal Species	Endangered Plant Species	Land Use	Sedimentation	Erosion	Visual Esthetics	Water Quality	Air Quality	Treespace	Other
Develop 12,450 camping sites																				
Develop 117 miles of designated cross-country ski trails																				
Develop 498 miles of groomed snowmobile trails																				
Develop picnic sites to provide 3,090 tables																				
Develop 7,341 linear feet of beach for swimming																				
Develop 516 acres of downhill ski area																				
Develop 81 boat ramps																				
Develop 10,035 surface acres for boating and water skiing																				

2/ Demand is based on the Idaho SCORP Report, 1977, minus the projected on-going program.

Figure 4.--Opinion survey form

Survey Findings

The grand average environmental impact from all program developments were low. Summarized survey results averaged 1.43 on a scale of 0 to 10. The standard deviation was 2.85. Development of boating and waterskiing areas followed by camping sites and downhill skiing were indicated as having a greater environmental impact on a larger number of environmental characteristics. Environmental characteristics impacted the most often by the different program elements were waste control, habitat modification, and water quality. See table 30 for the basis of these findings.

Recreation planners, in filling out the form, consistently identified impacts in the column titled "Other" as impacts of development on fish and wildlife.

Recreation participation was the only impact consistently identified on the survey form as a beneficial impact. To avoid confusion, this impact was not included on graphs 1 through 8, which display only adverse impacts. The survey responses indicated that facility development would not greatly affect recreation participation. The average beneficial environmental impact on a scale of 0 to 10 was 2.4.

Returned survey forms indicated an amazing degree of consistency, even though the sample was small. Activities associated with camping development indicated the highest degree of impact, affecting the greatest number of environmental characteristics. Ironically, the demand for camping participation was also greatest of all program elements studied in the Basin.

Survey Results

Survey results were summarized by presenting each program element in graphic form to provide a visual perspective of how each element impacts each environmental characteristic. For comparison, the grand average environmental impact of all program elements on all environmental characteristics and the average impact of all program elements on each environmental characteristic were also displayed on each of the above graphs. See graphs 1 through 8.

Table 1 display those facility developments which had a more significant impact on specific environmental characteristics in the Basin.

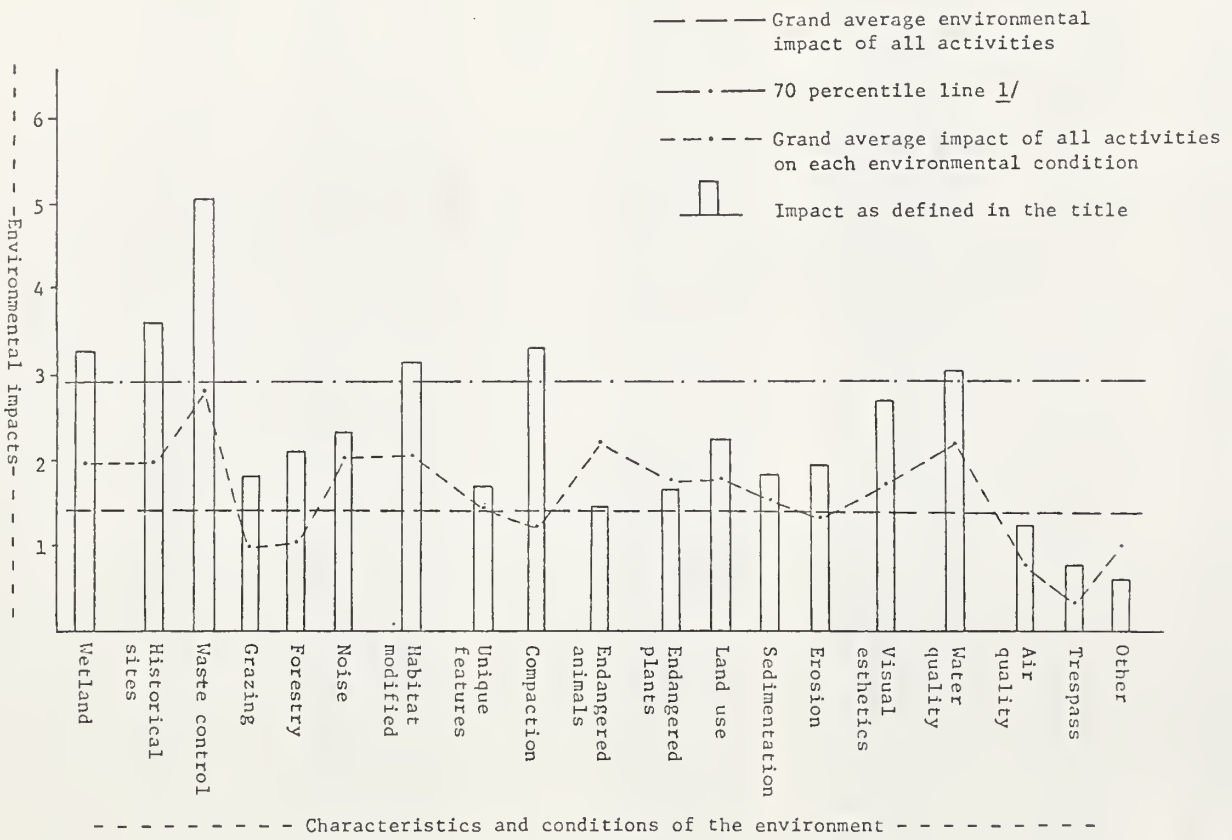
Conclusions

Due to the small number of planners sampled, the resulting information is somewhat limited. However, definite patterns emerge which identiy areas sensitive to recreation development. Although this procedure was used to identify environmentally sensitive areas in a broad planning arena, it could be used as a guide for site specific development.

Survey results indicated facility developments would not significantly affect recreation participation.

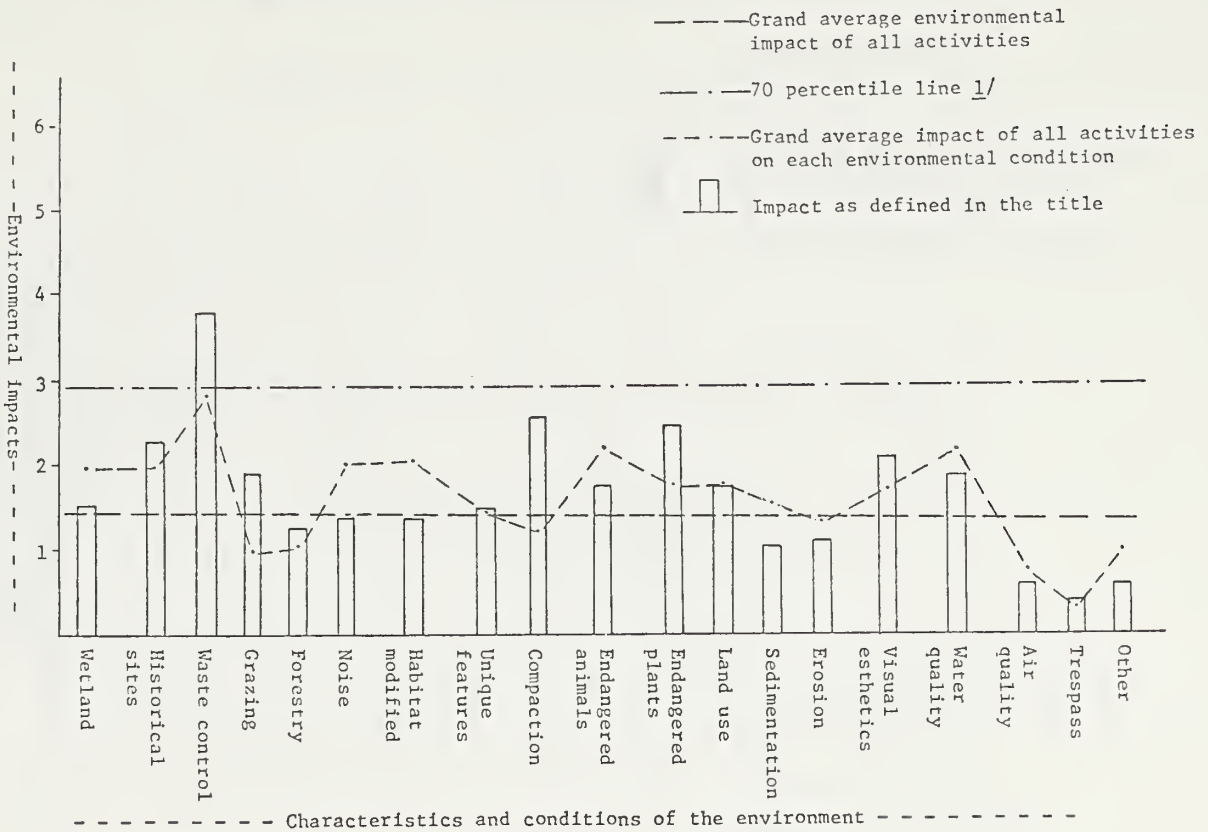
Based on survey results and professional judgments, the study team concluded that (1) increased outdoor recreation participation in the Basin would take place regardless of additional facility development; (2) environmental impacts from unmet outdoor recreation facility demands would be greater than impacts of planned facility development. This would occur from recreational pursuits taking place in areas not designated for recreation use, infringing on fragile environments unprotected by measures and management practices designed to protect and perpetuate the environment. Therefore, recreation planners must also consider environmental impacts which would result from no further planning or development.

Graph 1.--Environmental impacts from action needed to meet demand for 12,454 camping sites by the year 2000, Lower Snake River Basin, Idaho



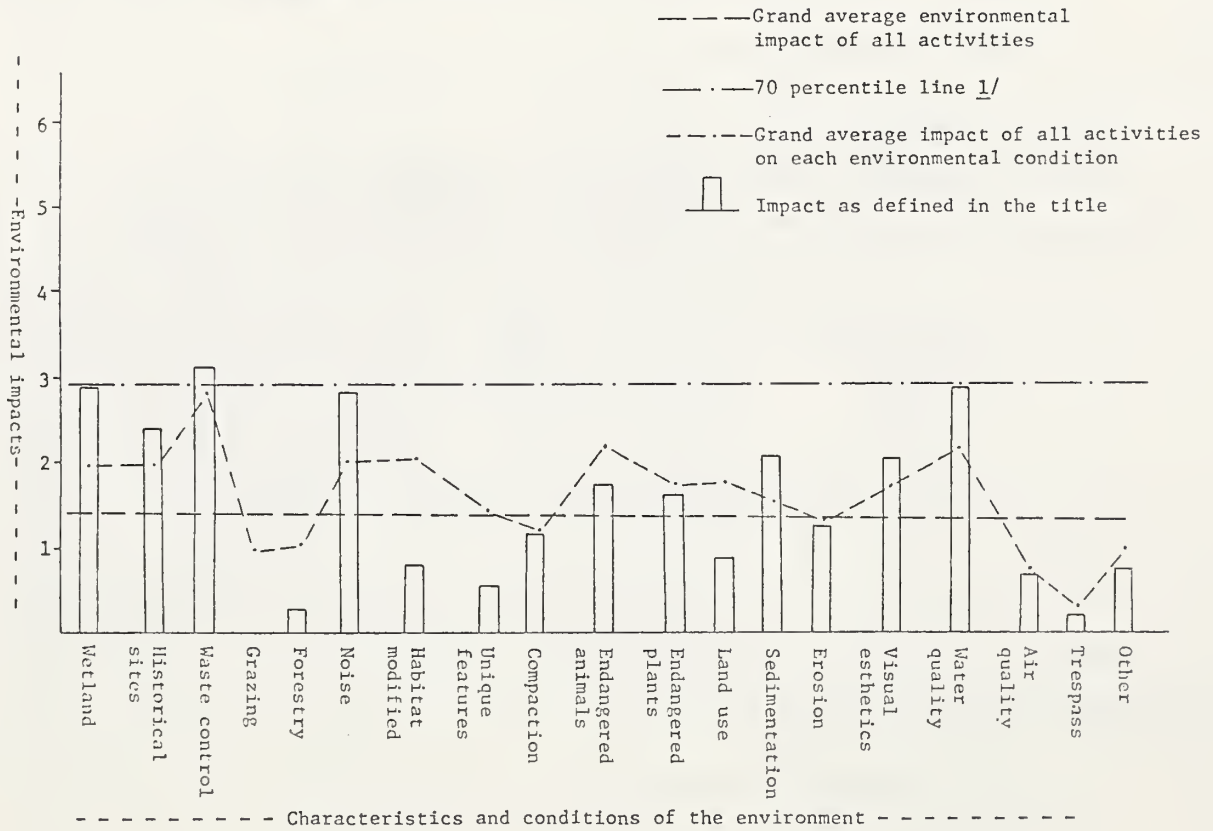
1/ Thirty percent of all impacts from all activities extend above this line.
SOURCE: Results of a recreation survey from Recreation Planners, 1981.
NOTE: All impacts displayed are adverse.

Graph 2.--Environmental impacts from action needed to meet demand for 3,100 picnic sites by the year 2000, Lower Snake River Basin, Idaho



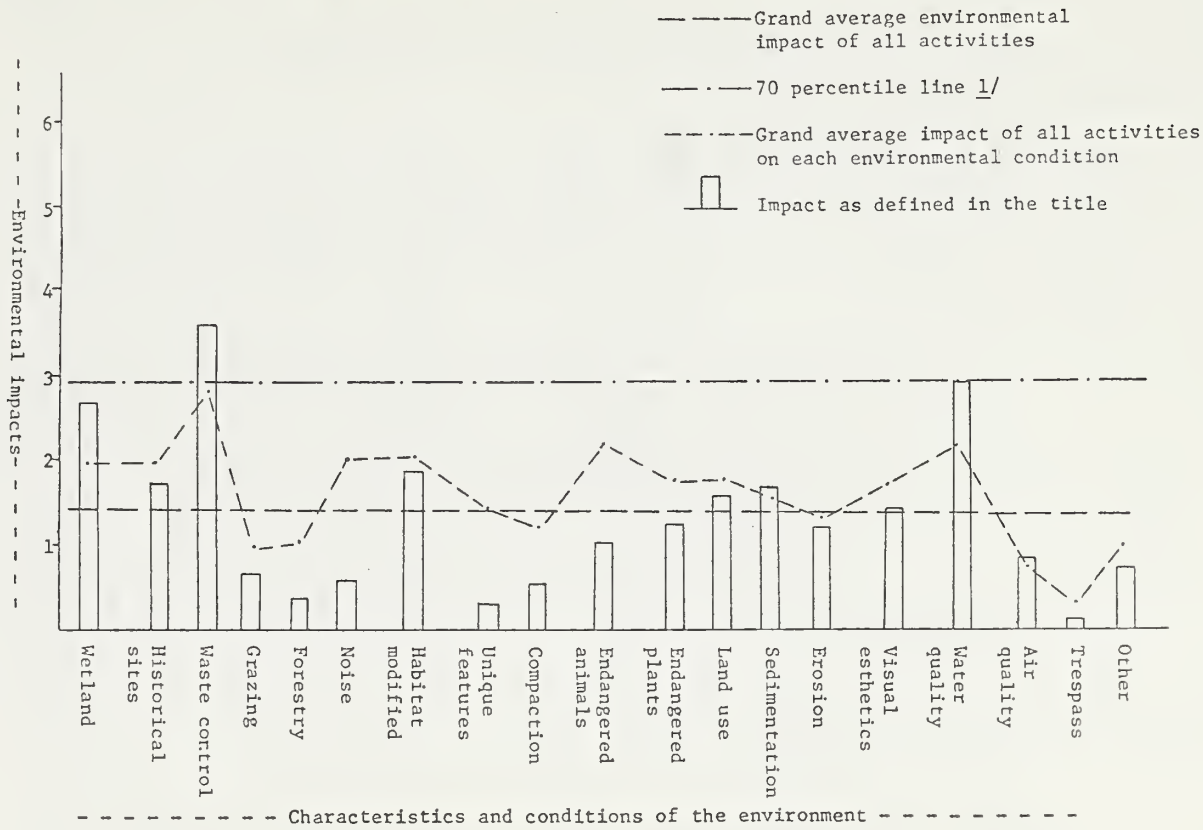
1/ Thirty percent of all impacts from all activities extend above this line.
SOURCE: Results of a recreation survey from Recreation Planners, 1981.
NOTE: All impacts displayed are adverse.

Graph 3.--Environmental impacts from action needed to meet demand for 81 boat ramps by the year 2000, Lower Snake River Basin, Idaho



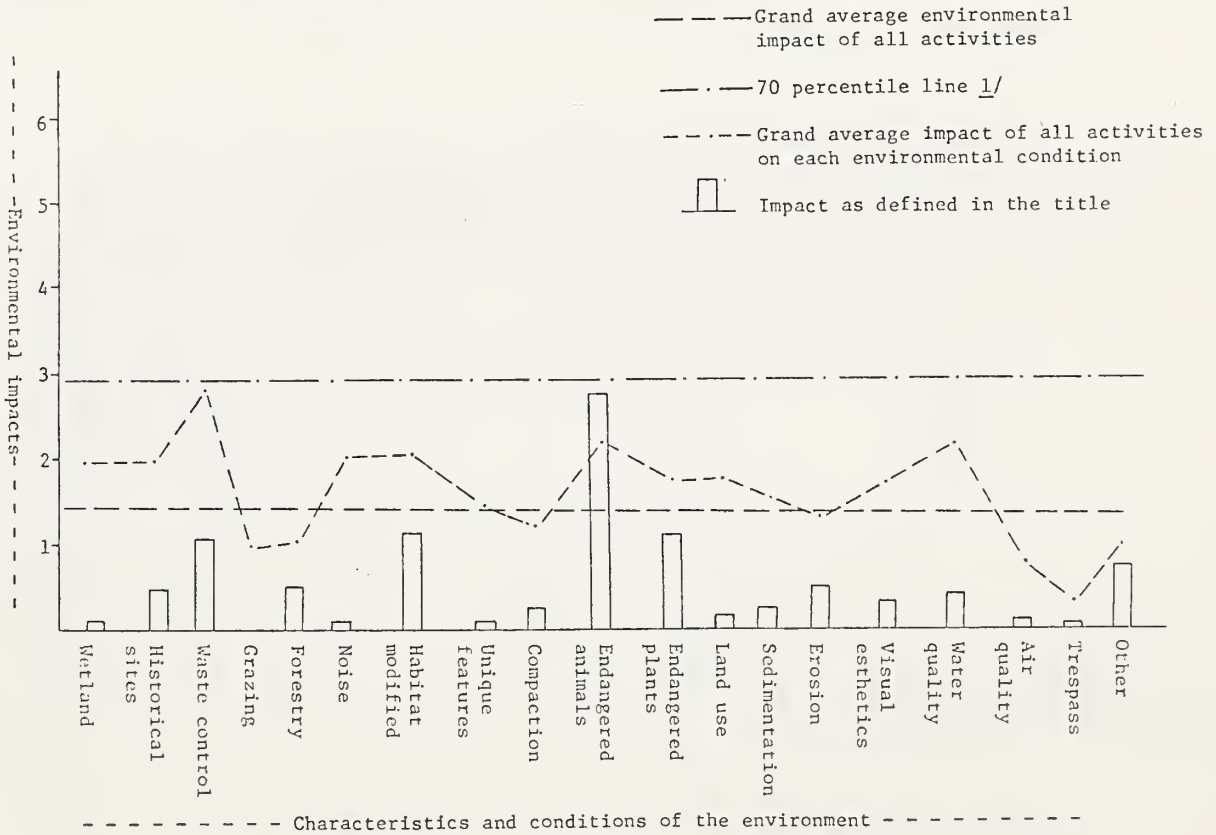
1/ Thirty percent of all impacts from all activities extend above this line.
SOURCE: Results of a recreation survey from Recreation Planners, 1981.
NOTE: All impacts displayed are adverse.

Graph 4.--Environmental impacts from action needed to meet demand for 7,541 linear feet of swimming beach by the year 2000, Lower Snake River Basin, Idaho



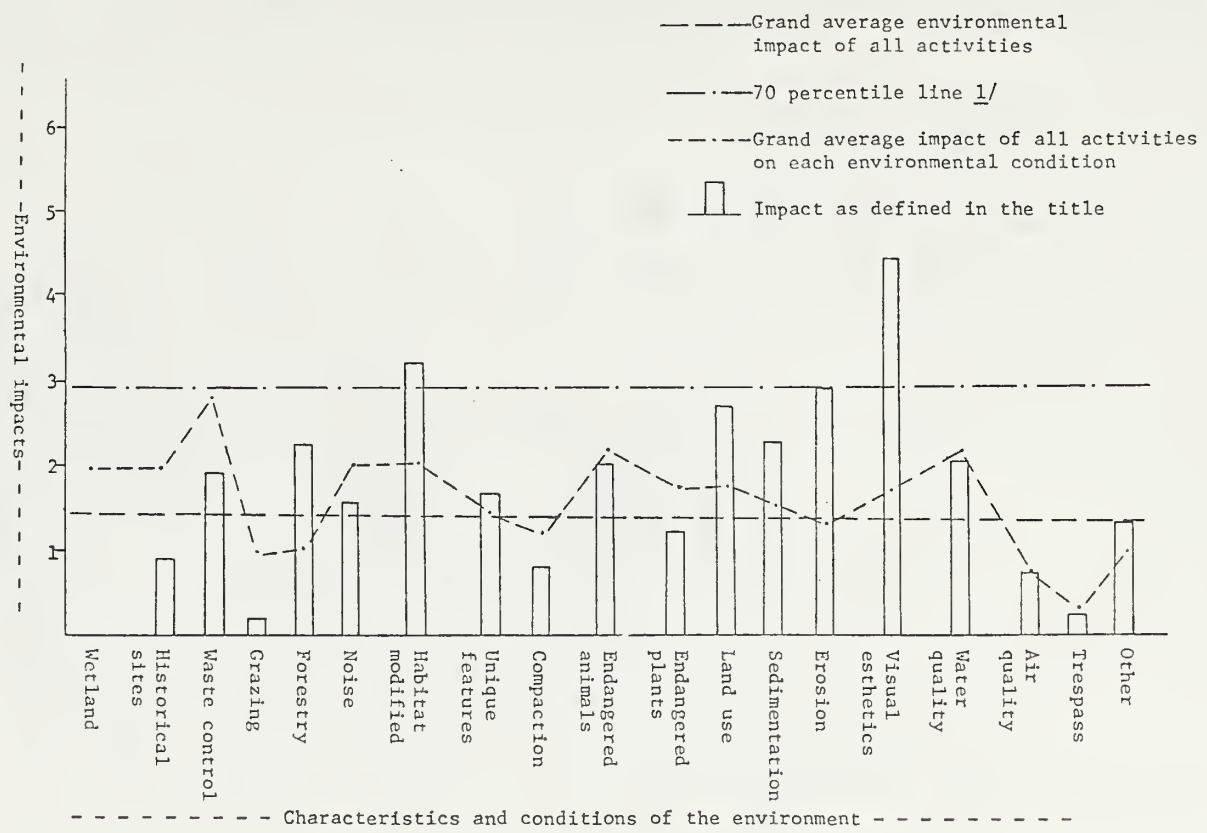
1/ Thirty percent of all impacts from all activities extend above this line.
SOURCE: Results of a recreation survey from Recreation Planners, 1981.
NOTE: All impacts displayed are adverse.

Graph 5.--Environmental impacts from action needed to meet demand for 118 miles of cross-country ski trails by the year 2000, Lower Snake River Basin, Idaho



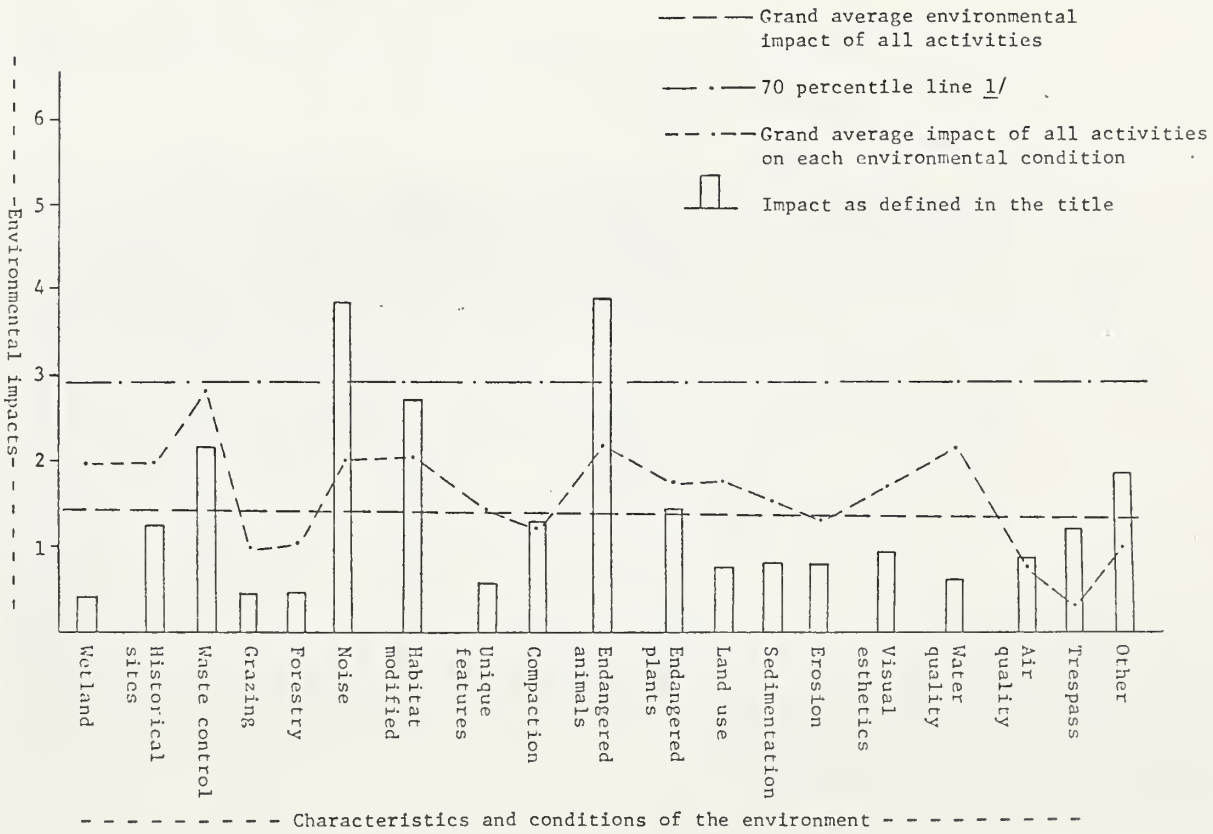
1/ Thirty percent of all impacts from all activities extend above this line.
SOURCE: Results of a recreation survey from Recreation Planners, 1981.
NOTE: All impacts displayed are adverse.

Graph 6.--Environmental impacts from action needed to meet demand for 504 acres of downhill skiing area by the year 2000, Lower Snake River Basin, Idaho



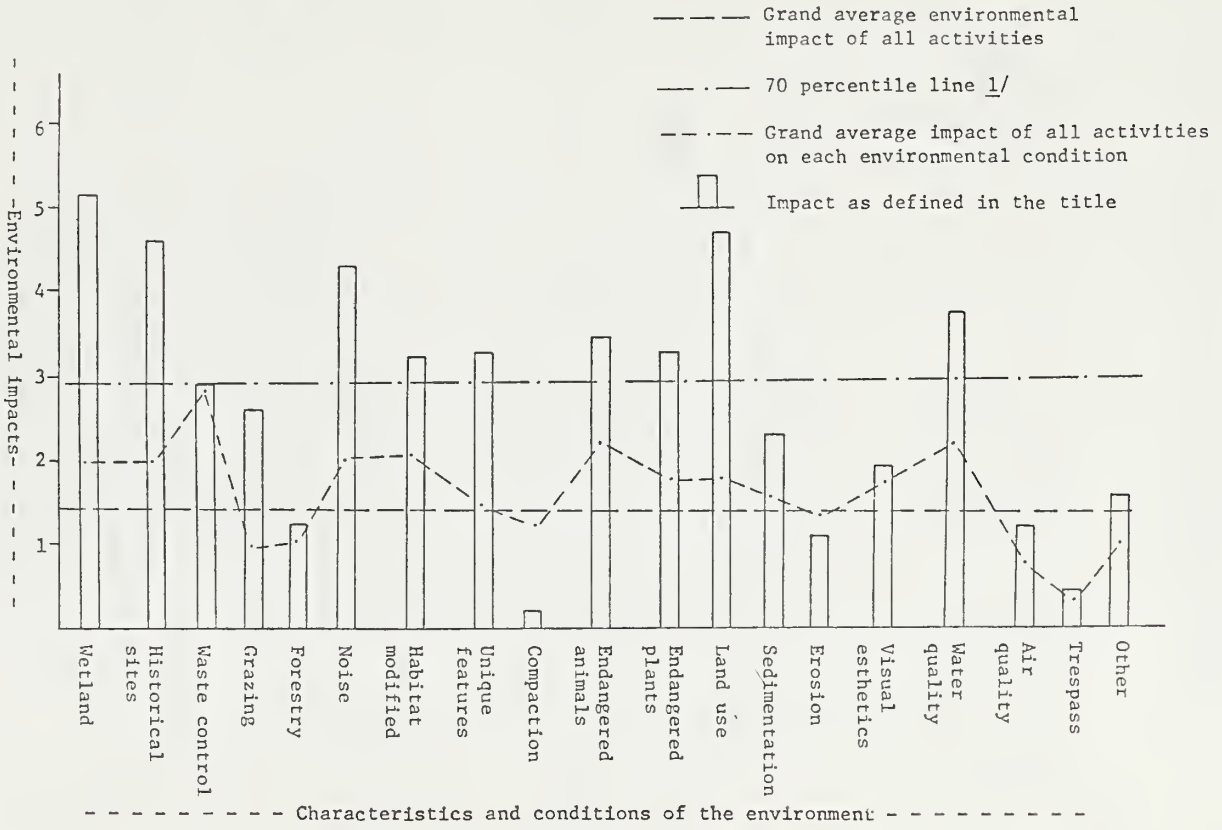
1/ Thirty percent of all impacts from all activities extend above this line.
SOURCE: Results of a recreation survey from Recreation Planners, 1981.
NOTE: All impacts displayed are adverse.

Graph 7.--Environmental impacts from action needed to meet demand for 498 miles of snowmobile trail by the year 2000, Lower Snake River Basin, Idaho



1/ Thirty percent of all impacts from all activities extend above this line.
SOURCE: Results of a recreation survey from Recreation Planners, 1981.
NOTE: All impacts displayed are adverse.

Graph 8. --Environmental impacts from action needed to meet demand for 10,035 surface acres of water for boating and water skiing by the year 2000, Lower Snake River Basin, Idaho



1/ Thirty percent of all impacts from all activities extend above this line.
SOURCE: Results of a recreation survey from Recreation Planners, 1981.
NOTE: All impacts displayed are adverse.

Table 30.—Analysis of the more significant environmental impacts (X) 1/ which would result from providing all outdoor recreation facilities demanded, Lower Snake River Basin, Idaho, 1980

Environmental Characteristics	Facilities							
	Camping Sites	Boat Ramps	Picnic Sites	Swimming Beach	Snowmobile Trails	Downhill Ski Areas	Boating and Water Skiing Area	Totals
Wetlands	X						X	2
Historical Sites	X						X	2
Waste Control	X	X	X	X				4
Noise					X		X	2
Habitat Modification	X					X	X	3
Unique Features							X	1
Compaction	X							1
Endangered Animals					X		X	2
Endangered Plants							X	1
Land Use							X	1
Erosion						X		1
Visual Esthetics						X		1
Water Quality	X			X			X	3
TOTALS	6	1	1	2	2	3	9	

1/ Significance is determined when the impact of any one facility type on an environmental characteristic exceeds 70 percentile.

SOURCE: Results of an opinion survey of Recreation Planners in the Basin, 1981.