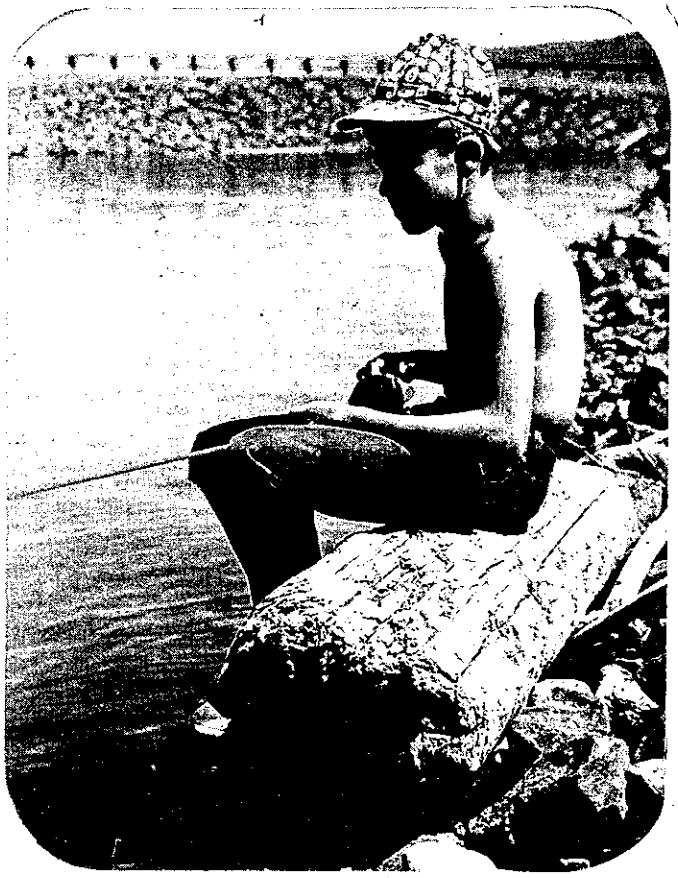
Final Environmental Impact Statement



Lower Snake River Fish and Wildlife Compensation

OFFICE OF THE CHIEF OF ENGINEERS, DEPARTMENT OF THE ARMY
WASHINGTON, D. C. 20314 September 1976

NOTICE

All reference to land condemnation in the statement should be disregarded due to the Compensation Plan's legislative history and because of the current policy of using the willing buyer-willing seller concept.

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ENVIRONMENTAL IMPACT STATEMENT

LOWER SNAKE RIVER REPORT FOR
COMPENSATION FOR FISH AND WILDLIFE LOSSES

( ) Revised Draft (X) Final Environmental Statement

Responsible Office: District Engineer, U. S. Army Engineer District, Walla Walla, Walla Walla, Washington 99362 Telephone: 509-525-5500

1. Name of Action: ( ) Administrative (X) Legislative

2. Description of Action: The construction of the four multiple-purpose water resource development projects on the Lower Snake River created adverse impacts to fish and wildlife resources. Under the provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended), an analysis of the impacts and possible compensative measures has been carried out. To compensate for fish and wildlife losses, the Corps recommends the construction of hatcheries for fall chinook salmon, spring and summer chinook salmon, steelhead trout, and possibly a trout hatchery. It also recommends the acquisition of streambank access on the Snake River or its tributaries for fishing, acquisition of easements for hunters, and the acquisition in fee of lands to be used for wildlife habitat improvement. The Corps also recommends wildlife habitat development of the existing Lower Snake River project lands, installation of bird-watering devices, and the stocking of game birds. The proposed action is the authorization and implementation of these recommendations. The total cost estimate is $45,735,267.

3.a. Environmental Impacts: The major impact will be to increase the populations of certain fish and wildlife in the region to offset those losses resulting from project construction.

b. Adverse Environmental Effects: Construction of hatcheries will require some disturbance to the existing landscape conditions at various sites to be selected. Increase in hunters and fishermen in the wildlife areas may result in an increase in problems such as littering, indiscriminate shooting, or trespass on adjacent lands. There may be some loss to the local tax base. There may be some adverse impact on agricultural production. There will be an impact on landowners who are required to sell their property unwillingly.

4. Alternatives: One alternative is to let the present situation continue without compensation. Another alternative, at least in concept, is the removal of the dams to eventually return the river canyon to a semblance of its former state. In addition, an alternative of implementing only a part of the recommended program also exists. There are also a number of differing and/or alternative compensation development or management variations which exist.

5.a. Comments on Draft Statement Received From:

Federal Agencies

U. S. Fish and Wildlife Service
Bureau of Land Management
Bureau of Reclamation
Bureau of Mines
Bureau of Indian Affairs
U. S. Environmental Protection Agency
Bureau of Outdoor Recreation
U. S. Coast Guard
Soil Conservation Service
Federal Power Commission
National Park Service
U. S. Department of Commerce
U. S. Geological Survey
Bonneville Power Administration

State Agencies

Washington State Agencies (Clearinghouse)
Idaho Department of Water Resources
Idaho Fish and Game Department
State of Oregon, Executive Department (Clearinghouse)

Local Agencies and Organizations

Columbia County Board of Commissioners
Whitman County Park and Recreation Board
Washington State Farm Bureau
ASWSU Environmental Task Force
Whitman County Sportsmen's Association, Inc.
Cheney Environment Center
Washington Public Utility Districts' Association

Private Citizens

Mr. Benton Dickinson, Pomeroy, Washington
Mr. Kennard L. Literal, Dayton, Washington
Mr. Joe Abbey, Waitsburg, Washington
Mr. and Mrs. Wilfred Thorn, Dayton, Washington
Mrs. Esther Eager, Dayton, Washington
Mr. Wesley L. Eager, Dayton, Washington
Mr. Morton R. Brigham, Lewiston, Idaho
Mr. Edward F. Naughton, Richland, Washington
Mr. Charles H. Thronson, Attorney for
Elmer DeRuwe and others, Dayton, Washington

5.b. Comments Requested on Revised Draft From:

Department of the Interior
Department of Agriculture
Department of Commerce
Department of Health, Education, and Welfare
Department of Transportation
Environmental Protection Agency
Federal Power Commission
State of Oregon
State of Washington
State of Idaho

5.c. Comments Received on Revised Draft From:

Pacific Northwest Regional Commission
Environmental Protection Agency
U. S. Coast Guard
Department of the Interior
Department of Commerce
Oregon Department of Fish and Wildlife
Department of Agriculture
Department of Health, Education, and Welfare
Federal Power Commission

6. Draft Statement to Council on Environmental Quality: 5 March 1975.

7. Revised Draft Statement to Council on Environmental Quality: 30 April 1976

8. Final Statement to Council on Environmental Quality: 2 Nov. 1977

GLOSSARY

Acre-foot	A unit of volume one acre in surface and one foot deep. One acre-foot equals 43,560 cubic feet.
Algal	Pertaining to or like algae, a group comprising seaweeds, pond scums, and other related plants.
Anadromous	Fish that hatch from eggs in fresh water streams, migrate to the ocean to grow to adulthood, and then return to their stream of origin to spawn.
Avian	Of or pertaining to birds.
Base Load	Continuous operation of generation units to meet a constant demand for electricity.
Benthic	Of or relating to the bottom of a body of water.
Biological	Of or relating to living things.
BOD	Biochemical oxygen demand: the amount of oxygen needed to support the oxygen-consuming organisms in a body of water. A high BOD may cause depletion of dissolved oxygen.
Cultural	Aspects of the advancement of human civilization, including traditions, and physical objects relative of the civilization, i.e., man-made objects.
Downstream Migrants	Young anadromous fish traveling to the sea. Also called juveniles, smolts, or fingerlings.
Ecosystem	A system composed of a community of animals, plants, and bacteria and the physical and chemical environment with which it is interrelated.
Embayments	Water bodies along the edges of the canyon extending into tributaries or side drainages.
Fetch	The expanse of open water which can be affected by the wind.

GLOSSARY (Continued)

Fluctuation	Changes in flow rates and water levels. In this report the river fluctuations (downstream) are due to daily and weekly changes in power production and turbine discharge rates or to spillway operation. Major reservoir fluctuations are on a seasonal basis due to annual water storage and release.
Forebay	The reservoir immediately upstream of a powerhouse, where the intakes of the turbines (penstocks) obtain water to operate the generator units.
Igneous	Relating to rock formed by heat, usually due to volcanic action.
Lentic	Slowly flowing (water); for instance, a reservoir.
Littoral (noun)	The shoreline between the high and low watermarks.
Littoral (adjective)	Of or related to the edge of a water body, extending downward to the limit of rooted vegetation.
Lower Snake River Project	The construction of four dam and lock projects consisting of Ice Harbor, Lower Monumental, Little Goose, and Lower Granite as authorized by Public Law 14, 79th Congress, First Session, approved 2 March 1945.
Mammalian	Of or relating to the class of mammals.
Mean Sea Level (msl)	The average level of the sea, used for altitude measurements. Sixteen hundred feet msl means 1,600 feet above the average level of the ocean.
Metamorphic	(Rock) formed by high pressures and temperatures over a long period of time, such as slate.

Natural	That which is or would be produced or present without human alteration.
Naturalistic	Simulating or approaching the results of nature.
Peaking	The practice of increasing flows through powerhouse turbines during hours of the day and week when power demands are high. The term "power peaking" is also commonly used.
Penstock	A gate for regulating the flow of water into the outlet system.
Releases	Discharges of water through a control structure or powerhouse. Daily release, annual release, and the like usually refer to averages for the respective periods.
Restoration	In reference to a damsite, alleviation of unnecessary intrusion and making the project blend harmoniously with the existing surroundings.
Riparian	Of or related to the bank of a watercourse.
Salmonid	Fish of the family Salmonidae, which includes salmon, trout, char, and whitefish.
Significant Wave	The average height of the highest one-third of all the waves on a body of water. Used to get an idea of the "average height of a high wave."
Slough	To slip, or cast off a layer or covering.
Socioeconomic	Of or relating to the structure of society and its economic activity.
Tailwater	The water immediately downstream of a dam or hydroelectric powerhouse.
Turbidity	Thickness or opaqueness of water due to suspended sediment.

PREFACE

This final environmental impact statement is written at the survey stage of the planning process. It accompanies the special report that is sent for Congressional review.

Porcupine

I DESCRIPTION OF THE PROPOSED ACTION

INTRODUCTION

The proposed action is based on a report prepared by the Walla Walla District, Corps of Engineers, which was prepared taking full consideration of the recommended 1/ compensation measures reported by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service and concurred in by the state fish and game agencies of Idaho, Oregon, and Washington.

The action is the compensation (or mitigation) of fish and wildlife losses occasioned by the creation of the Lower Snake River project consisting of four locks and dams on the Lower Snake River, Washington and Idaho.

From the data presented in the Special Lower Snake River Compensation Report, and supported by the reports of the Federal fish and wildlife agencies and by letters from the counterpart state agencies, it has been concluded that serious losses have occurred to the fish and wildlife resources of the area through construction of the Lower Snake River Project. It is further concluded that these losses can be compensated for by implementation of a series of proposed actions. The Congressional authorization with subsequent funding and implementation of the following items, constitutes the proposed action.

SUMMARY OF COMPENSATION MEASURES

To compensate for fishery losses, the following features are proposed:

a. Hatchery and associated trapping and holding facilities to rear the progeny of 2,290 adult female fall chinook salmon, produce

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1/ Two independent consultants, Dr. Ernest O. Salo and Dr. W. L. Pengally, generally concurred in the fish and wildlife recommendations. These consultants' views are contained in the Corps report.

101,800 pounds of smolts, and to be capable of returning 18,300 adults to the project area. These facilities would require approximately 40 acres of land to be acquired in fee. The estimated initial construction cost is $6,200,000 with annual operation and maintenance costs of $450,000.

b. Hatchery and associated trapping and holding facilities to rear the progeny of 2,145 adult female spring and summer chinook salmon, produce 450,000 pounds of smolts, and to be capable of returning 58,700 adults above the project. These facilities would require approximately 80 acres of land to be acquired in fee and have an estimated initial construction cost of $11,500,000 and annual operation and maintenance costs of $900,000.

c. Hatchery and associated trapping and holding facilities to rear the progeny of 3,390 adult female steelhead trout, produce 1,377,500 pounds of smolts, and to be capable of returning 55,100 adults above the project. These facilities would require approximately 80 acres of land to be acquired in fee. Estimated initial construction costs of $20,500,000 with annual operation and maintenance costs of $1,500,000.

d. Design and construction of these hatcheries would be funded through future appropriations to the Corps of Engineers. Operation and maintenance would be funded through future appropriations to the U.S. Fish and Wildlife Service or National Marine Fisheries Service. Prior to the actual design of the facilities, the level of hatchery compensation will be reviewed and possibly adjusted depending on the success of bypass, truck and haul, Dworshak hatchery returns, and any adverse effects of expanded powerhouses and increased peaking operations.

e. Hatchery facilities capable of producing 93,000 pounds of trout annually for stocking local streams to replace the lost sport-fishing opportunity or other alternatives of equal or lesser cost. The estimated construction cost of these hatchery facilties is $3 million, and annual operation and maintenance cost is $100,000. These facilities would require approximately 10 acres of land to be acquired in fee. The determination of the actual method of replacing the lost fishing opportunity will be determined by the Corps of Engineers in cooperation with the Washington Department of Game. Construction of the hatchery or other alternate measures will be funded through future appropriations to the Corps of Engineers. Operation and maintenance of the constructed facilities would be funded through future appropriations to the U.S. Fish and Wildlife Service.

f. The Corps of Engineers would, if appropriate, transfer title of the above hatchery and fish cultural facilities to the appropriate Federal or State fishery agency in a manner consistent with desires of the Administration and Congress under authority of the Fish and Wildlife Act of 1956 (16 USC 742) or by mutual agreement with the appropriate agency.

g. Acquisition of 750 acres of land along the Snake River and tributaries of streams adjacent to the lower or middle Snake River in

easement or fee to partially replace loss of stream-type steelhead and salmon sport fishery in the 150 river miles of the project area. Acquisition and development would be accomplished by the Corps of Engineers with ownership vested in the States. The Corps would acquire the land through normal Federal land acquisition procedures including condemnation if necessary. Lands would be purchased from willing sellers to the maximum extent possible consistent with full realization of compensation objectives. Based on the percent of project lands affected in each State, the acquisition would be allocated as 700 acres to the State of Washington and 50 acres to the State of Idaho. Estimated cost of acquisition is $750,000 with initial development cost of $300,000. Funding of land acquisition and development would be by future appropriation to the Corps of Engineers. Future development, if any, and operation and maintenance of these lands would be the responsibility of the State in which they are located.

2. Compensation of Wildlife Losses:

a. Acquisition of approximately 400 acres of riparian habitat in fee and 8,000 acres of farmland in easement surrounding these riparian lands to provide partial compensation for project-caused pheasant and quail hunting losses and additional hunting opportunity as a substitute compensation for nongame species. Acquisition of the land would be by the Corps of Engineers and would undertake the actual acquisition through normal Federal land acquisition procedures including condemnation if necessary. Lands would be purchased from willing sellers to the maximum extent possible consistent with full realization of compensation objectives. Costs for acquisition and initial development of these lands by the State would be reimbursed by the Corps of Engineers. Ownership of estates in the lands would be vested in the States. The initial cost of these lands is estimated at $2,100,000 for acquisition administrative overhead, and initial development. Annual operation and maintenance costs would be a State responsibility.

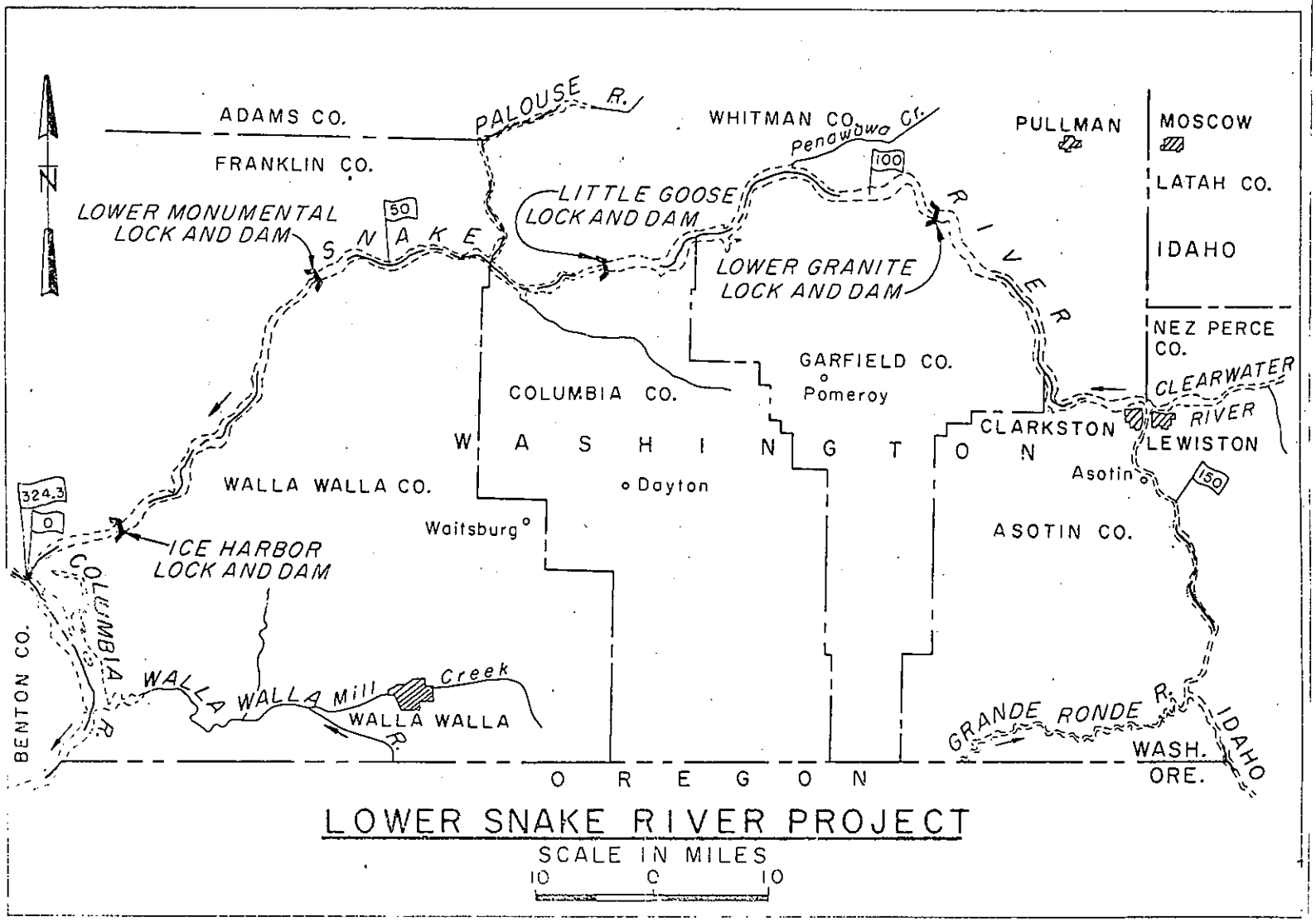
b. Acquisition of approixmately 15,000 acres of land in easement to provide hunter access as partial compensation for project-caused losses to chuckar-partridges. Acquire approximately 50 small select parcels of land (0.1 acre each) in easement or fee and construct bird-watering devices on these lands. The land would be located in the draws along the sides of the Snake River Canyon adjacent to the project area and would provide access to project lands from surrounding private lands. Access to these lands would be acquired by the Corps of Engineers through normal Federal land acquisition procedures including condemnation if necessary. Lands would be purchased from willing sellers to the maximum extent possible consistent with full realization of compensation objectives. The land would be managed by the Corps of Engineers in conjunction with adjacent project lands. Land access acquired by easement would be limited to the hunting seasons and would not be fenced so that normal

rangeland activities could be continued by the owners. Lands around the bird-watering devices would be fenced. Acquisition of these lands and construction of watering devices are estimated to cost $279,000 and the annual operation and maintenance cost $1,000.

c. The Corps of Engineers would enter into an agreement with the Washington Department of Game to provide game birds to stock project and acquired off-project lands for compensation of lost hunter-day use and animals caused by the project construction. The necessary stocking effort to fulfill compensation is estimated to be 20,000 birds per year for a 20-year period by which time habitat and a natural brood stock should be established. The agreement would provide for a lump-sum payment of $1,159,000, estimated capitalized value of the 20-year stocking period, to the Washington Department of Game to provide the birds either by out-right purchase, remodeling an existing bird farm, or constructing a new facility.

DISCUSSION

The Lower Snake River Project consisting of Ice Harbor, Lower Monumental, Little Goose, and Lower Granite Locks and Dams, Snake River, Washington and Idaho, was authorized by Public Law 14, 79th Congress, 1st Session, approved 2 March 1945. The projects have been under construction over about a 15-year period. The reservoir at Ice Harbor (Lake Sacajawea) was formed in 1962; Lower Monumental Reservoir was created in 1969; Little Goose Reservoir (Lake Bryan) was filled in 1970; and Lower Granite was created in February 1975. A map showing the project area is on the next page.



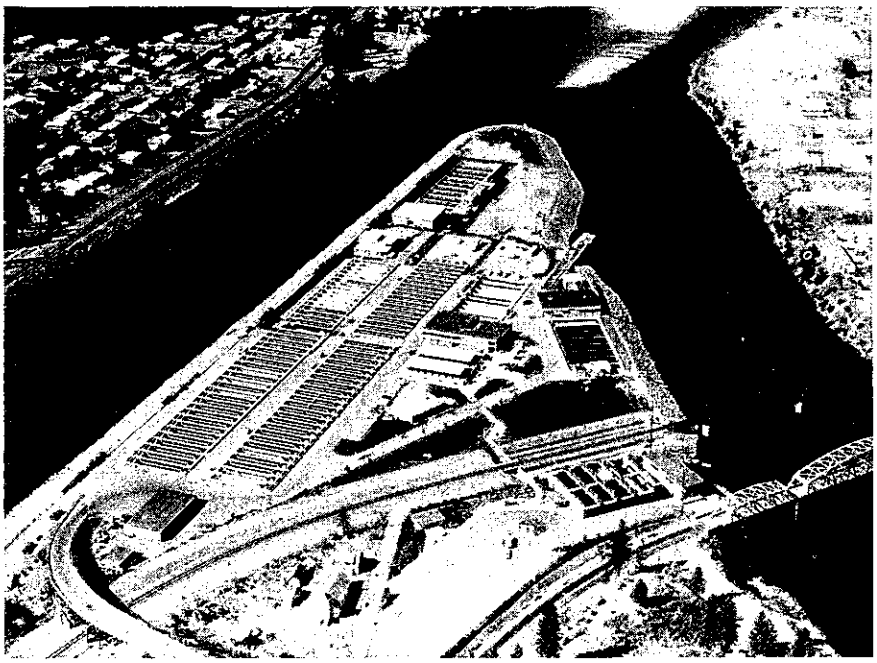
LOWER SNAKE RIVER PROJECT

SCALE IN MILES

10 0 10

The Fish and Wildlife Coordination Act (48 Stat. 401, as amended, 16 U.S.C. 661 et seq., which was approved 12 August 1958) requires[1/] an analysis of impacts on fish and wildlife, as well as compensation for the deleterious effects of dam construction and operation. The Fish and Wildlife Service, within the U.S. Department of the Interior, and the National Marine Fisheries Service, within the U.S. Department of Commerce, conducted the initial investigation, assisted by information from State agencies. To compensate for adverse impacts on the local fishery, the agencies recommended that fish hatcheries be constructed in the region. Such hatcheries would compensate for fish losses which resulted from the elimination of spawning areas and from dam-produced mortalities to migrating smolts in the Lower Snake River.

1/ Section 662 (b): "In furtherance of such purposes, the reports and recommendations of the Secretary of the Interior on the wildlife aspects of such projects, and any report of the head of the State agency exercising administration over the wildlife resources of the State, based on surveys and investigations conducted by the United States Fish and Wildlife Service and such State agency for the purpose of determining the possible damage to wildlife resources and for the purpose of determining means and measures that should be adopted to prevent the loss of or damage to such wildlife resources, as well as to provide concurrently for the development and improvement of such resources, shall be made an integral part of any report prepared or submitted by any agency of the Federal Government responsible for engineering surveys and construction of such projects when such reports are presented to the Congress or to any agency or person having the authority or the power, by administrative action or otherwise, (1) to authorize the construction of water-resource development projects or (2) to approve a report on the modification or supplementation of plans for previously authorized projects, to which sections 661-666c of this title apply. Recommendations of the Secretary of the Interior shall be as specific as is practicable with respect to features recommended for wildlife conservation and development, lands to be utilized or acquired for such purposes, the results expected, and shall describe the damage to wildlife attributable to the project and the measures proposed for mitigating or compensating for these damages. The reporting officers in project reports of the Federal agencies shall give full consideration of the report and recommendations of the Secretary of the Interior and to any report of the State agency on the wildlife aspects of such projects, and the project plan shall include such justifiable means and measures for wildlife purposes as the reporting agency finds should be adopted to obtain maximum overall project benefits."



Dworshak National Fish Hatchery

Hatchery sites and designs have not yet been determined. Detailed studies and design would not be undertaken until after the compensation program is acted on by Congress. There would be variations in the facilities proposed for each hatchery, depending on location. When hatchery designs are completed, it would be possible to present more exacting descriptions of hatchery facilities. 1/

The Columbia Basin Fishery Technical Committee (CBFTC) has recently finished recommendations for possible hatchery sites. (See Appendix I.) The Fish and Wildlife Service, as well as the National Marine Fisheries Service, indicated that five fish races of two species (fall, spring, and summer chinook of one species as well as steelhead and rainbow trout of the other species) would be provided with hatchery facilities to compensate for fish losses. The new hatcheries would be located near streams found in the Snake River area. Some possible streams which could support a hatchery are:

1/ Supplemental environmental impact statements would be prepared later for the individual hatcheries.

River	State
Clearwater	Idaho
Tucannon	Washington
Middle Snake	Idaho, Washington, Oregon
Salmon	Idaho
Columbia	Washington, Oregon
Potlatch	Idaho
Grande Ronde	Washington, Oregon
Imnaha	Oregon
Powder (resident species)	Oregon
Walla Walla	Washington, Oregon
Palouse (resident species)	Washington

Existing hatcheries could also be expanded to meet a portion of the needed productivity. Plate 1 (page 2-2) shows the major impact area covered in this statement, which is over 2,000 square miles. Hatcheries could be located outside this area, but most fish would pass through the lower Snake River to return to their hatchery.

The primary objective of a possible trout hatchery would be to provide rainbow trout for expanded stocking programs. Each year 233,000 rainbow trout (93,000 pounds) could be stocked in lakes and streams in the area. Some of the stocking waters may be Asotin Creek and the Tucannon, Touchet, and Walla Walla Rivers. Other creeks, lakes, or ponds in the project may be included in the hatchery stocking program in the future. The trout hatchery may also be combined with a steelhead hatchery. Since the loss was to a resident fishery, principally warm-water species, a study would be made to determine if feasible means exist to replace the fishery in kind in the project area. This study should be conducted prior to a final commitment to substitute that fishery by supplemental stream stocking of trout.

The steelhead hatcheries would raise 11,020,000 smolt, the offspring from 3,390 adult female steelhead. Salmon hatcheries would raise 9,160,000 smolt, the offspring of 2,290 adult female fall chinook salmon, and 6,750,000 smolt, the offspring of 2,145 adult female spring and summer chinook salmon.

A major component of the proposed compensation plan revolves around acquisition of easements and fee title on certain lands which either are or could be of values to fish, wildlife, or recreation resources. These real estate actions would be taken in a coordinated fashion which would see hunting or fishing easements acquired surrounding areas where intensive upland bird habitat is developed or along streams where fish stocking is accomplished. In this manner, optimum use of the compensation resource would be achieved.

Land acquisition for fishery compensation would be oriented toward replacing lost opportunities for stream fishing. It would consist of acquiring fisherman access easements or fee title to approximately 750 acres of streambanks in the general southeastern Washington, and western Idaho areas. A partial listing of streams which could be included in the program are the Tucannon, Middle Snake, Grande Ronde, and Clearwater Rivers, plus other streams which would meet necessary requirements. Much of this easement acquisition primarily would be oriented toward replacing steelhead fishing opportunities which have been lost as a result of construction of the Lower Snake River Project; however, these same easements would also provide access to resident fishery populations, some of which are native and others which would be supported by proposed compensation stocking programs.

The method of fishery easement or fee acquisition would be for the Corps to acquire the access through normal Federal land acquisition procedures including condemnation if necessary. Lands would be purchased from willing sellers to the maximum extent possible consistent with full realization of compensation objectives. Some of these funds would be used for actual access acquisition and some would be used to provide minimal facilities (small parking areas, restroom facilities, litter barrels, etc.) at some of the access sites.

Land acquisition for wildlife compensation would be accomplished primarily through acquiring hunter access on private land. A minimal amount of fee title acquisition is also envisioned in the program. In the proposed program there is a direct relationship between the easement lands, fee title lands, and project lands. Relations of the wildlife compensation land acquisition program are:

a. Development of wildlife habitat on existing project lands, (see Appendix G).

b. Acquisition of easements on rangeland and selected draws adjacent to project land. Watering devices would be installed on these adjacent lands which would tend to complement habitat development on project lands.

c. Acquisition of fee title to "off-project" lands in one or more parcels which presently have high value for upland birds or have development potential. This land would be located in the southeastern Washington area. This land would be developed through food and cover habitat planting to increase its capacity to support wildlife. Acquisition of hunter easements for use during the hunting season on private land surrounding the land acquired in fee title would allow maximum hunter use of the habitat resources.

The intent of the land acquisition program is basically two-fold.

a. To provide a land base which can be managed for wildlife production, and

b. To provide replacement areas where it would be possible for hunters and non-consumptive users of wildlife to pursue their interests.

Acquisition of both fee title land and easement lands serve these purposes. By acquiring easement lands surrounding areas of intensive wildlife habitat development, the easement lands would benefit from the wildlife production that can occur on the "core" areas. At the same time it is not necessary to alter the existing activities on the easement lands and yet wildlife would still benefit.

Implicit in the land acquisition program is the requirement for development of these lands so they would be able to support wildlife populations. Most habitat development would occur on project lands 1/ or on lands which are acquired in fee. It may be possible that habitat development can be done on some of the easement areas if a suitable agreement can be worked out with the involved landowners; however, present land use patterns on the easement lands would not otherwise be altered.

COST ESTIMATE AND ANTICIPATED BENEFITS

The total estimated cost of the fish and wildlife compensation program as proposed is $5,922,195 annually. The estimated cost of the various subfeatures of the program are given in the project document which is available for review at the District Office. A summary extracted from that report is included as Table 1. Estimated economic benefits resulting from the total program amount to $11,885,815. This results in a benefit to cost ratio of 2.01:1.

1/ Habitat improvement for wildlife on the existing Lower Snake River Project lands will proceed independent of the balance of the actions described.

TABLE 1

SUMMARY OF FACILITIES AND COSTS OF WILDLIFE COMPENSATION FACILITIES
LOWER SNAKE RIVER PROJECT

Facility	Land Requirements	Cost 1/ Initial Cost	Annual O&M
Fish			
Fall Chinook Hatchery	40 Acres	$ 6,200,000	$ 450,000
Spring and Summer Chinook Hatchery	80 Acres	11,500,000	900,000
Steelhead Trout Hatchery	80 Acres	20,500,000	1,500,000
Rainbow Trout Hatchery	10 Acres	3,000,000	100,000
Fisherman Access Lands and Development	750 Acres	1,050,000	
Total		$42,250,000	$2,950,000
Wildlife			
Acquistion and Development of Off-Project Lands	23,400 Acres 2/	$ 2,379,000	$ 1,000
Game Bird Purchase		$ 1,159,000	
Total		$ 3,538,000	$ 1,000
TOTAL COST		$45,788,000	$2,951,000

1/ Includes initial development of lands.
2/ Includes 23,000 acres in easement and 400 acres in fee.

II ENVIRONMENTAL SETTING

The Snake River Basin is one of the most important fish producing systems in the United States. It supports large populations of anadromous and resident fish. Anadromous fish from the Snake River, particularly chinook salmon, contribute substantially to commercial and sport fisheries in the Pacific Ocean from California to Alaska. Steelhead trout support a huge sport fishery throughout the lower Columbia and Snake River and its tributaries. Most of the adult chinook salmon and steelhead trout that migrate upstream in Columbia River past McNary Dam enter Snake River. The sport fishery for anadromous, as well as resident species has developed substantially in the lower Snake River within the past decade.

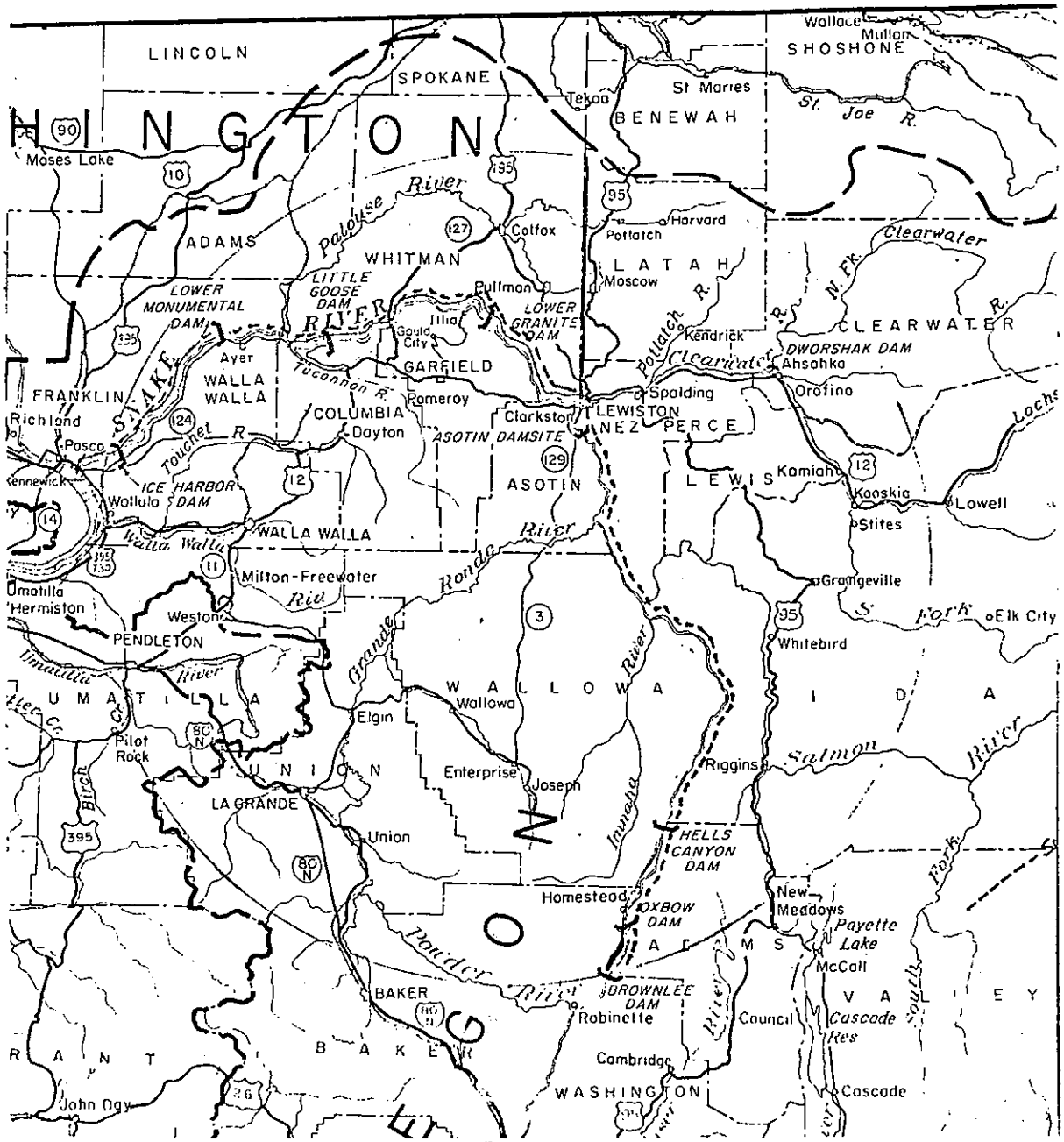
The environmental consideration of the lower Snake River fish and wildlife compensation program involves a wide range of effects which may be regional in nature. Even though the project directly affects events along the lower Snake River canyon in the 140-mile reach from Ice Harbor Dam to Lewiston, the compensation opportunities and requirements indicate that a much larger portion of the region would be influenced by sitings of hatcheries and habitat lands. On this basis then, the discussion of the environmental setting which follows addresses the overall characteristics of the extensive region indicated by the plate on page 2-2.

THE REGION

The region involved is comprised of the southeastern portion of Washington, the northeastern portion of Oregon, and the central part of Idaho. This is basically that portion of the Snake River drainage (including tributaries) which supports anadromous fish. Several other areas in Washington which are not tributary to the Snake River may be considered as part of the region as they may be affected by upland game habitat land programs. The counties of the region are:

Washington	Oregon	Idaho
Walla Walla	Umatilla	Nez Perce
Columbia	Union	Latah
Garfield	Wallowa	Lewis
Asotin	Baker	Idaho
Franklin		Clearwater
Whitman		
Adams		

Plate 1 Project Area



Due to the conceptual nature of the proposed compensation plan, it is not possible to provide a precise description of the lands that will be acquired for compensation purposes. In a general way the characteristics of desirable land parcels are known, and these form the basis for the following discussion.

a. Land Acquisition for Fishery Compensation. The easements to 750 acres of streambanks would be located along perennial streams that provide habitat for fish on a year-round basis. Because loss of the Snake River steelhead fishery is a major adverse impact of the Lower Snake River Project, a preference for streams which currently support a run of steelhead trout (e.g., Middle Snake, Grande Ronde, Clearwater) would be shown. Ready public access via public roads would be a consideration in choosing areas for easement acquisition. Most of the suitable streams have substantial riparian vegetation surrounding them and provide pleasant relief to the generally dry agricultural land. At the present time some of the streams in the area are heavily posted against public access.

b. Land Acquisition for Wildlife Compensation. The 400 acres to be acquired in fee would be lands having some existing wildlife value or potential for wildlife use. This would necessitate acquiring areas with very good soil. Such areas may be in agricultural production. A good source of water, i.e., a well or perennial stream, would be a desirable feature. Because there are so many areas which would fit the general description contained here, many possible locations exist for land acquisition. Consideration must be given to the capability of securing hunter easements on private land surrounding the acquired parcels because it is an integral part of the planned upland game compensation proposal. The factor would weigh heavily in the final selection of lands to be acquired by fee title.

Concerning the proposed easement lands surrounding the fee title lands, only a brief general description is available. Initial estimates show that these lands would likely be farmlands (as opposed to rangelands); however, it may be possible, in some instances, to provide limited habitat development on parts of this land that would not interfere with its primary use, agricultural production. Hopefully, it will be possible to locate the proposed 400 acres of fee title land in an area which is surrounded by land with inherent wildlife values that will make this segment of hunter easement acquisition a more meaningful compensation tool.

More is known about the general nature of the proposed 15,000 acres of hunter easement lands because this land should be adjacent to lands purchased directly for the Lower Snake River Project. In general, the easements would be acquired on rangeland which extends from the project boundary to the upper breaks of the Snake River canyon. The most desirable areas for easement acquisition would be located in and adjacent to major side canyons. These side canyons are heavily vegetated and are known to support good populations of

wildlife species. Side canyons whose upper ends are in close proximity to public roads would be especially valuable as an easement. The primary use of these rangeland areas is seasonal cattle grazing. The acquisition of hunter easements would not be in conflict with this primary use. Inasmuch as these side canyons support substantial populations of upland game birds (primarily chukar partridge with some quail and pheasant) and some deer, acquisition of side canyon easements could do much to replace lost hunting opportunities.

1. Climate

The climate of the area is predominantly dry, but some of the characteristics of both continental and marine situations are evident. The Selkirk and Rocky Mountains effectively protect the large inland basin of southeastern Washington and northeastern Oregon from the more severe winter storms that move southward from Canada. To the west the Cascade Mountains are an effective barrier to moist air moving eastward from the Pacific Ocean. Air from each of these sources, however, reaches the area.

The project area is characterized by wide seasonal variations in temperature and wide geographical variations in precipitation. Average monthly temperatures at Walla Walla range from 32.0 degrees* in January to 76.2 degrees in July, and extremes of recorded temperatures range from -16 degrees to 113 degrees. Plate 2 shows the mean annual temperature for the region. Mean annual precipitation for stations keeping records ranges from 15.07 inches at Walla Walla in the lower portion of the Mill Creek Basin to 40.6 inches 15 miles upstream at the Walla Walla city water intake, approximately 2,400 feet. It is probable that at elevations near 5,000 feet mean annual precipitation exceeds 50 inches. At Walla Walla, approximately 10 percent of the normal annual precipitation falls as snow; at higher elevations this percentage is increased considerably, becoming approximately 40 percent at the 5,000-foot level. Plate 3 shows the region's normal annual precipitation. The higher elevations show a much higher rainfall in the Bitterroot Mountains east of the Snake River in Idaho. Snowfall constitutes a major portion of the mountains' precipitation.

The project area is in the belt of prevailing westerlies and is largely under the influence of air from the Pacific Ocean. Occasionally polar outbreaks of cold air spill over the Rocky Mountain barrier, resulting in short periods of extremely low temperatures. At Walla Walla the average frost-free period extends from late March through early November; the average growing season is considered to be 220 days.

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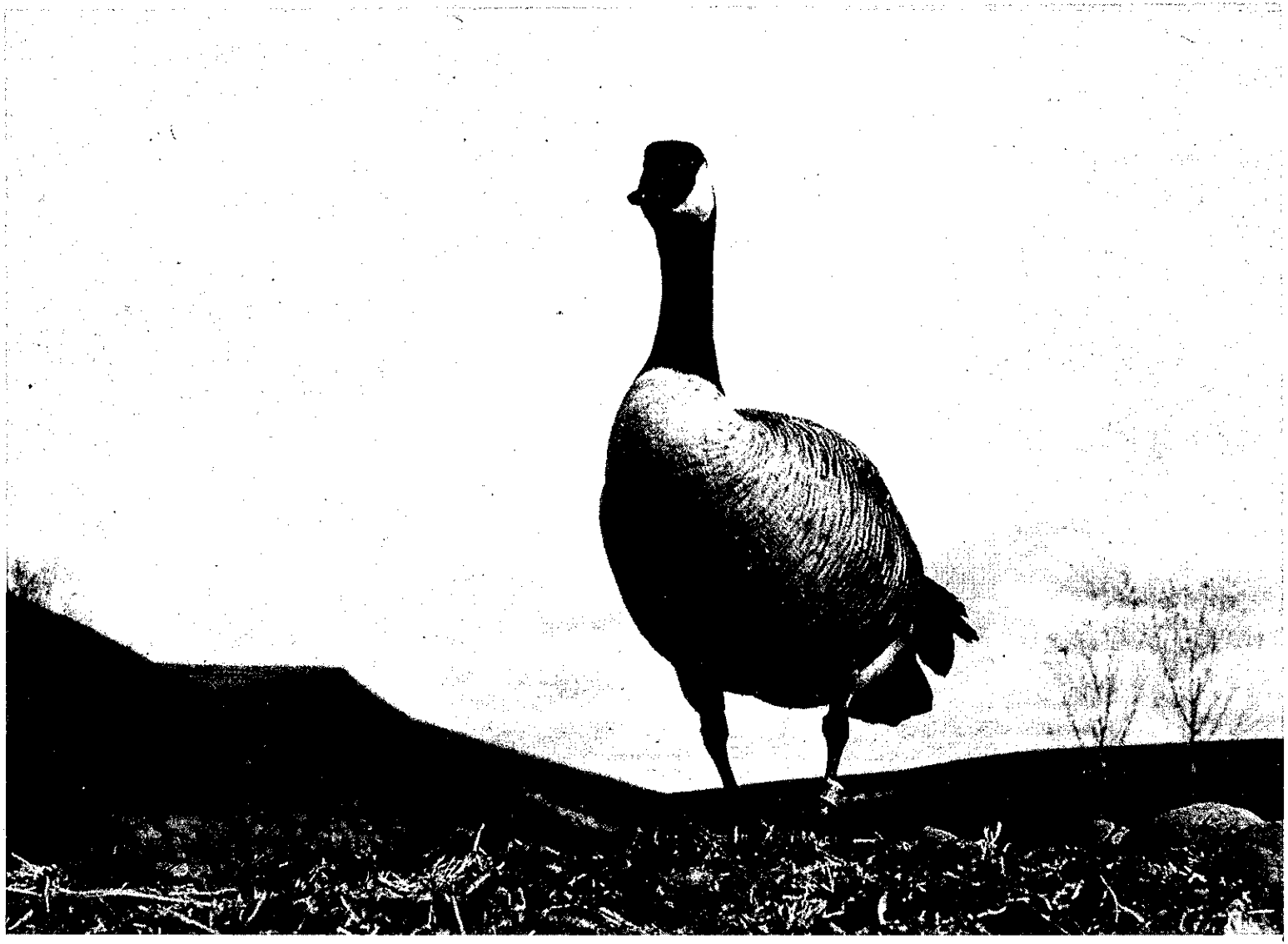
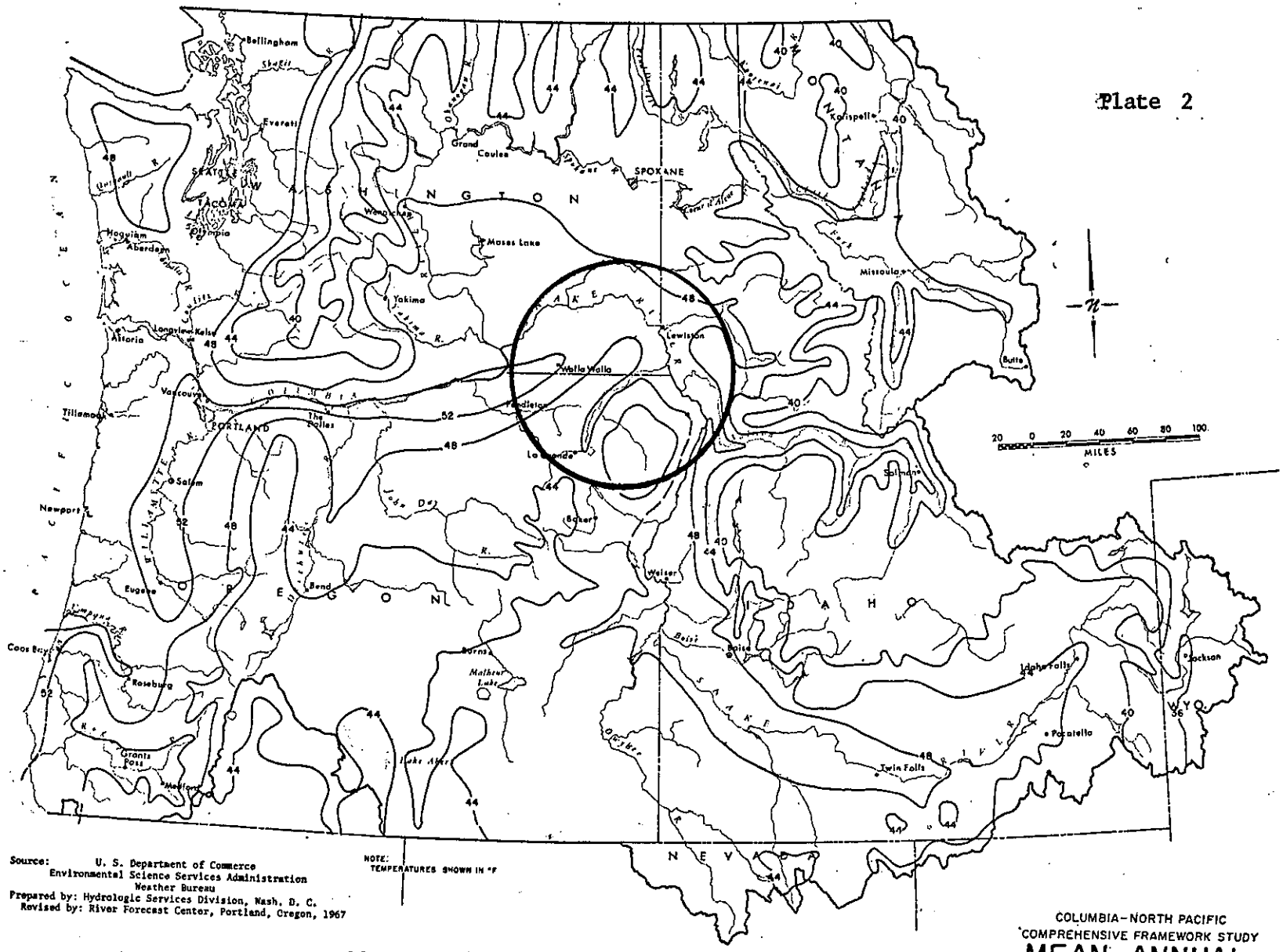
* All temperature measurements are recorded as Fahrenheit degrees.



The familiar V-shaped flight pattern of Canada Geese marks an upcoming seasonal change across this country. This banded goose is a western variety, Branta canadensis moffitti.

Plate 2



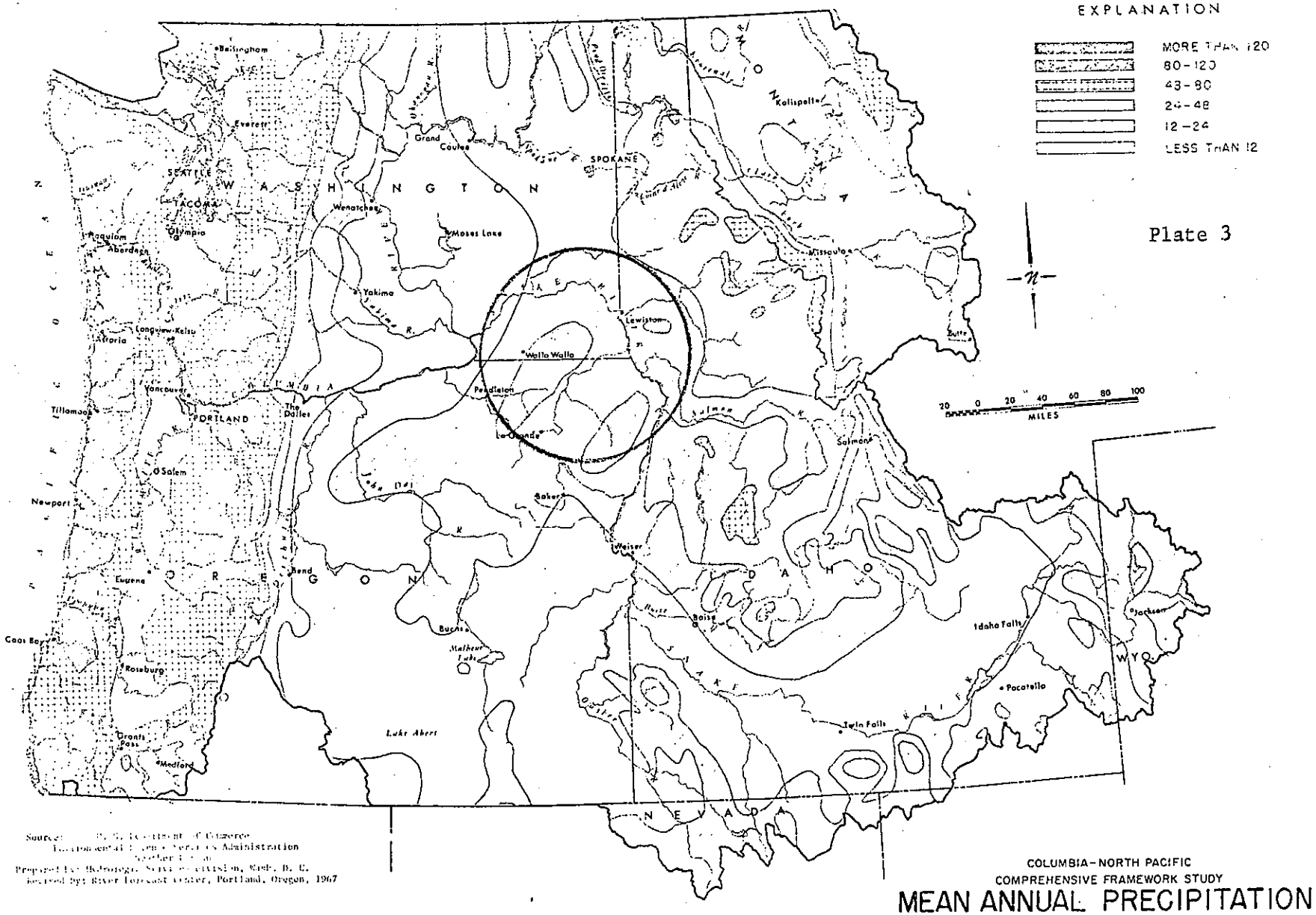
Source: U. S. Department of Commerce
Environmental Science Services Administration
Weather Bureau
Prepared by: Hydrologic Services Division, Wash. D. C.
Revised by: River Forecast Center, Portland, Oregon, 1967

NOTE: TEMPERATURES SHOWN IN °F

COLUMBIA-NORTH PACIFIC
COMPREHENSIVE FRAMEWORK STUDY

MEAN ANNUAL
TEMPERATURES 1931 – 1951

Source: See reference 22.



Source: U. S. Department of Commerce
Environmental Science Services Administration
Weather Bureau
Prepared for Hydrologic Services Division, Weather Bureau, U. S. Department of Commerce, by River Forecast Center, Portland, Oregon, 1967

COLUMBIA-NORTH PACIFIC
COMPREHENSIVE FRAMEWORK STUDY

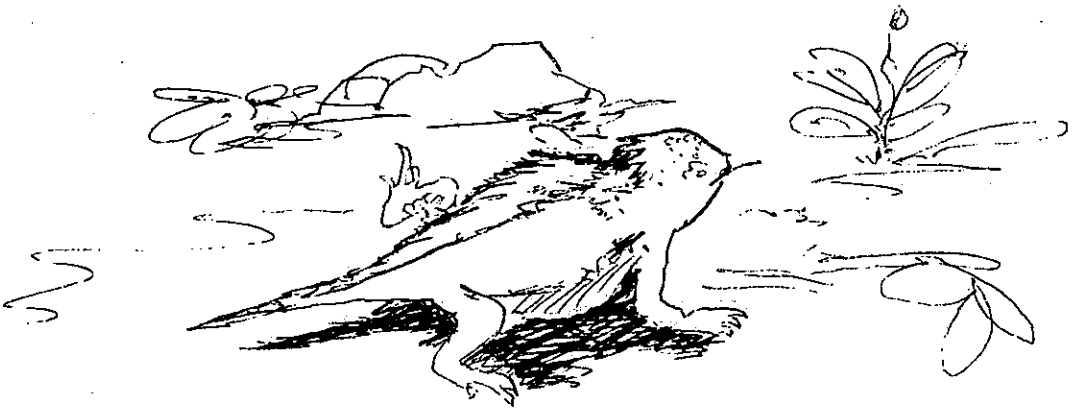
MEAN ANNUAL PRECIPITATION IN INCHES THE REGION

1968

Source: See reference 22.

The project area and the bordering mountains normally have such low rainfall during the summer months that drought conditions are typical of the climate. Although summer convectional storms may locally reduce drought frequency during the growing season, drought periods of at least a month's duration occur every year. Two-month droughts occur about every other year, three-month droughts about three years in ten, and droughts of four months or longer duration occur about two years in ten.

Variation in total annual precipitation, entirely apart from seasonal drought occurrence, also affects water supplies. Dry years with less than two-thirds of normal precipitation occur about once in five years for most of the project area.



2. Air Quality

Within the project area there are nine air quality sampling stations. The majority of these stations measure only total suspended particulates. However, suspended particulates appear to be the only quality parameter of widespread concern. At some stations suspended particulates exceed established Federal and State standards. The State of Washington has an Air Quality Standard which is more restrictive than the Federal standard. Table 2 shows the Federal and Washington State Standards. Monitoring stations usually measure samples as a geometric mean of the micrograms per cubic meter (ug/m3).

Overall air quality in the project area is good. The only parameter of air quality which does not satisfy the Federal primary standards is suspended particulates. However, a reason for high readings may result from dryland or irrigated farmland surrounding the sampling stations. Plowed fields are susceptible

POLLUTANT	MEASUREMENT CLASSIFICATION	NATIONAL AMBIENT AIR QUALITY STANDARDS PRIMARY STANDARDS (µg/m³)*(ppm)**(mg/m³)***			SECONDARY STANDARDS (µg/m³)*(ppm)**(mg/m³)***			DEPARTMENT OF ECOLOGY AMBIENT AIR QUALITY REGULATIONS AIR QUALITY STANDARD (µg/m³)*(ppm)**(mg/m³)***			AIR QUALITY OBJECTIVE (µg/m³)*(ppm)**(mg/m³)***		
Suspended particulates	Annual geometric mean	75	-	-	60	-	-	60	-	-	-	-	-
	Maximum 24-hour average (1/yr)	260	-	-	150	-	-	150	-	-	-	-	-
	Annual median	-	-	-	-	-	-	-	-	-	30	-	-
Sulfur oxides measured as SO_2	Annual arithmetic mean	80	0.03	-	60	0.02	-	60	0.02	-	-	-	-
	Maximum 24-hour average (1/yr)	365	0.14	-	260	0.10	-	260	0.10	-	-	-	-
	Maximum 3-hour average (1/yr)	-	-	-	1300	0.50	-	-	-	-	-	-	-
	Maximum 1-hour concentration	-	-	-	-	-	-	1048	0.40	-	-	-	-
	Maximum 1-hour average (2/7days)	-	-	-	-	-	-	655	0.25	-	-	-	-
	Maximum 5-minute average	-	-	-	-	-	-	-	-	-	786	0.3	-
Carbon monoxide (CO)	Maximum 8-hour average (1/yr)	-	9	10	-	9	10	-	9	10	-	-	-
	Maximum 1-hour average (1/yr)	-	35	40	-	35	40	-	35	40	-	-	-
	Maximum 24-hour average	-	-	-	-	-	-	-	-	-	6	5	-
Photochemical oxidants	Maximum 1-hour average (1/yr)	160	0.08	-	160	0.08	-	160	0.08	-	-	-	-
Hydrocarbons (Less Methane)	Maximum 3-hour average (6-9am,1/yr)	160	0.24	-	160	0.24	-	160	0.24	-	-	-	-
Nitrogen dioxide (NO_2)	Annual arithetic mean	100	0.05	-	100	0.05	-	100	0.05	-	-	-	-

*micrograms per cubic meter
**parts per million
***milligrams per cubic meter

Note: Department of Ecology Standards for Photochemical Oxidants and Hydrocarbons refer to the time period April 1 through October 31, between the hours 1000-1600 PST.

Source: See reference 5.

to wind erosion, and the dust created by high wind is probably responsible for the high suspended particulate measurements. Wind erosion's contribution may be so great that Federal primary standards in some areas are not maintainable, even in a natural state.

Table 2

Population densities are very low within the project area and should not create serious air pollution problems. Cattle and grain are the primary products of Eastern Washington and Oregon. Timber products are dispersed in Washington and Oregon while constituting a major role in the economy of the Idaho section of the project area. These products do not create dense communities. The following listing shows the population density (people per square mile) of major counties within the project area.

Idaho	ppsm	Oregon	ppsm	Washington	ppsm
Adams	2	Baker	5	Asotin	22
Clearwater	4	Umatilla	14	Columbia	5
Idaho	2	Union	10	Garfield	4
Latah	23	Wallowa	2	Walla Walla	33
Lewis	8			Whitman	18
Nez Perce	36				

The average population density is approximately 13 people per square mile for the above counties combined.

The following tabulation displays the basic air quality data of the region:

SITE	ANNUAL AVERAGE			MAXIMUM
State Standard	(60 ug/m3)			(150 ug/m3)
Federal Standard	(75 ug/m3)			(260 ug/m3)
Washington				
Walla Walla	56	ug/m3	(1972)	587 ug/m3
	46	"	(1973)	
Clarkston	108	"	(1971)	269 ug/m3
	95	"	(1972)	
	80	"	(1973) 1/	
Idaho 2/				
Lewiston	119	"	(1972)	
(three stations)	100	"	(1972)	
	85	"	(1972)	
Moscow	67	"	(1972) 3/	
Oregon				
LaGrande	47	"	4/	180 ug/m3
Baker	73	"	4/	286 ug/m3
Pendleton	82	"	4/	504 ug/m3

1/ The record contained only a six month sample in 1973.
2/ Lewiston and Moscow conducted some gross samplings for sulfur dioxide with no violations detected.
3/ The record contained only 17 samples in 1972.
4/ The record contained data from January 1970 until March 1974.

Table 3

3. Geology and Physiography

Straddling the Washington-Oregon line, the Columbia Plateau is the central province east of the Cascades. From elevations of nearly 4,000 feet around the edges, the plateau slopes gently down to about 350 feet along the gorges of the Columbia and lower Snake Rivers. At a distance the plateau appears flat to gently rolling, but it is dissected by present-day streams and in the northern part by deep, vertical-walled couless which were formed as temporary flood-water channels during the time the course of the Columbia River was blocked by an ice sheet. Many small rivers drain the area which extends south from the upper curve of the Columbia to the Blue Mountains, west to the foothills of the Cascades, and east above the Snake just east of the Washington-Idaho line.

Throughout most of the Columbia Plateau the volcanic rocks are overlain by varying thicknesses of surface materials. Almost everywhere upland surfaces are mantled with a few to more than 100 feet of loess or windblown sand. North of the Columbia River glacial outwash, sand and gravel and lacustrine silt fill basins and channels in the basalt. Soils on the outwash range from sandy loams to silt loams and generally are gravelly in the profile. Soils on lake beds are compacted stratified silts. The loess and other windblown deposits range from sand to silt loams. These soils are deep and fertile, and are easily eroded.

The Columbia River Group, the glacial outwash, and the younger alluvium along present streams yield large quantities of water at many places. The alluvium, glacial outwash, and windblown deposits have a high porosity and store large volumes of water where saturated. However, in many places those deposits are above the water table, which is in the underlying basalt having low average porosity. Much of the area is semi-arid to arid. Annual recharge probably does not exceed 3 inches, and in some places may be equivalent to less than 1 inch of water over the area.

In the western and southern parts of the Columbia Plateau, most of the discharge of streams is generated in the Cascade Range and the Blue and Ochoco Mountains. A considerable part of the eastern Columbia Plateau has little or no external drainage.

To the southeast of the Columbia Plateau lie the Blue Mountains, extending from extreme southeastern Washington to central Oregon. Peaks in the Blue Mountains and associated ranges rise from 7,000 to 9,000 feet; but in the separate outlying Wallowa Range on the east they rise to more than 10,000 feet. This area is drained by the John Day and Crooked Rivers flowing west and north, by the Umatilla and Walla Walla Rivers flowing west to the Columbia, and by the Grande Ronde, Malheur, and other smaller tributary streams of the Snake River. Plate 4 displays the major drainage system of the region.

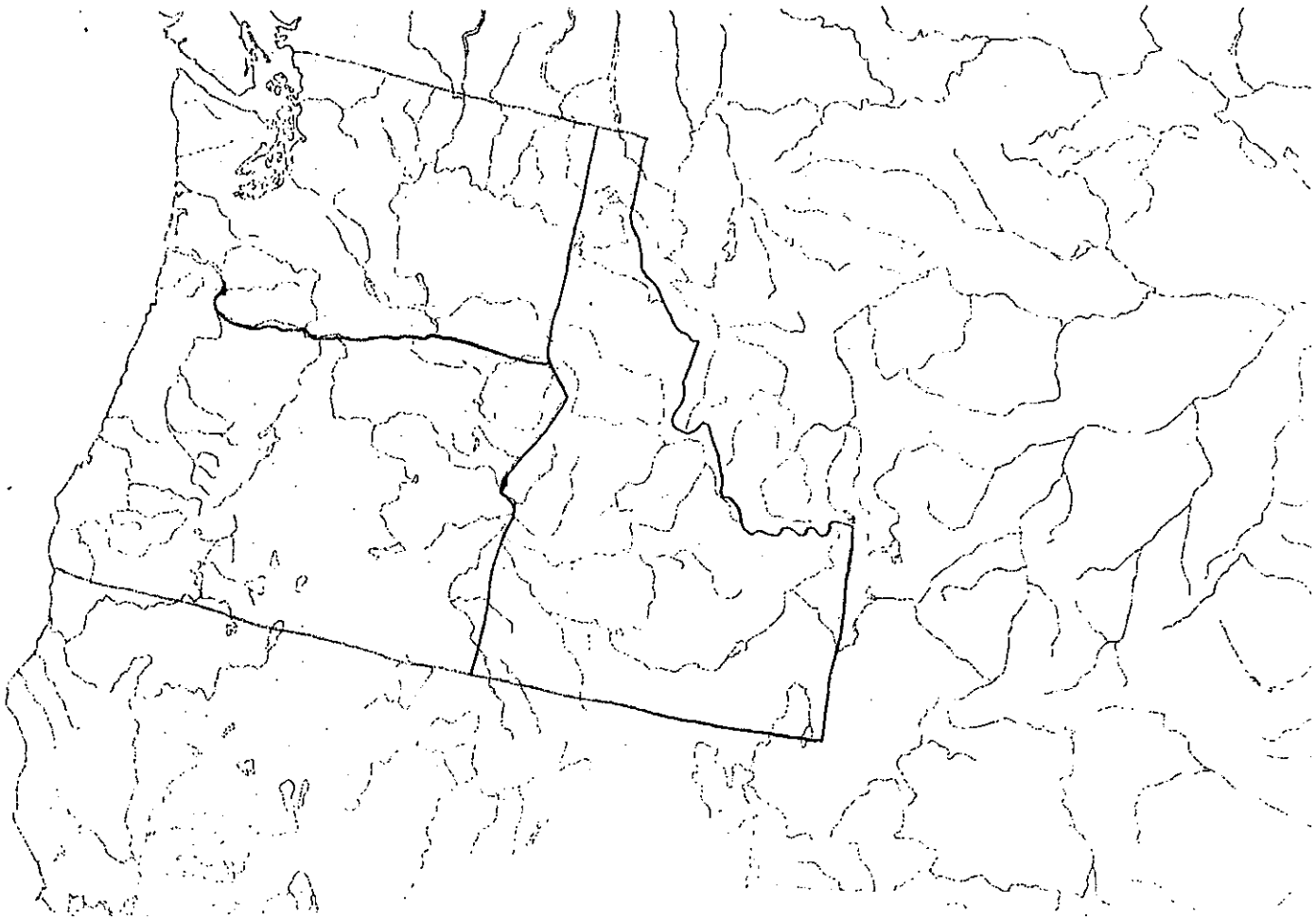


Plate 4 Major Drainage Systems

Source: See referehce 15.

4. Water Quality

Recently the Columbia Basin Fisheries Technical Committee's Lower Snake Hatchery Subcommittee presented their preliminary hatchery site recommendations to the Corps. Appendix I contains the preliminary hatchery site recommendations. The Corps would conduct water quality studies at those selected locations and/or others which may be considered during detailed siting investigations. On the whole, the streams of the region have relatively good water quality, with good opportunity for developing suitable fish hatchery supplies.

5. Vegetation

The Columbia Basin region has several vegetation zones. The drier upland areas are considered big sagebrush-wheatgrass (Artemisia tridentata - Agropyron sp.) and wheatgrass-bluegrass (Agropyron sp. - Poa sp.) associations. Wheatgrass is the dominant grass in both dry and moist soils of the area. A listing of the regional vegetation is located in Appendix B. Not all of the plants listed in Appendix B should be found in any one vicinity. Those plants most likely to be found near lowland streambanks are as follows:

Trees and Shrubs

Douglas maple (mountain)	Acer glabrum
Silver maple	Acer saccharinum
Sagebrush	Artemisia ludoviciana
Netleaf Hackberry	Celtis reticulata (douglasii)
Rubber rabbitbrush	Chrysothamus nauseosus
Black Hawthorn	Crataegus douglasii
Black Walnut	Juglans nagens
Lombardy poplar	Populus nigra
Black Cottonwood	Populus trichocarpa
Chokecherry	Prunus virginiana
Smooth Sumac	Rhus glabra
Black Locust	Robinia pseudoacacia
Wild Rose	Rosa woodsii
Willows	Salix sp.
Blue Elderberry	Sambucus glauca

Perennial Grasses

Crested Wheatgrass	Agropyron cristatum
Basin wildrye	Elymus cinereus
Idaho fescue	Festuca idahoensis
Sandberg bluegrass	Poa secunda

Annual Grasses

Cheatgrass	Bromus tectorum
Bromegrass	Bromus sterilis
Yellow foxtail	Setaria glauca

Perennial Forbs

Plains Prickly pear	Opuntia polyacantha
Yellow dock	Rumex crispus
Elegant goldenrod	Solidage lepida

Biennial Forbs

Flannel Mullein	Verbascum Thapsus

Annual Forbs

Clasping pepperweed	Lepidium perfoliatum
Russian thistle	Salsola pestifer
Cocklebur	Xanthium strumarium

The region contains 315 species of plants. Many plants are restricted to the riparian zone where water is abundant.

There are usually three vegetational zones in the Columbia Basin riparian area. Plate 5 displays the zonation pattern. This pattern is the one representative of lower altitudes.

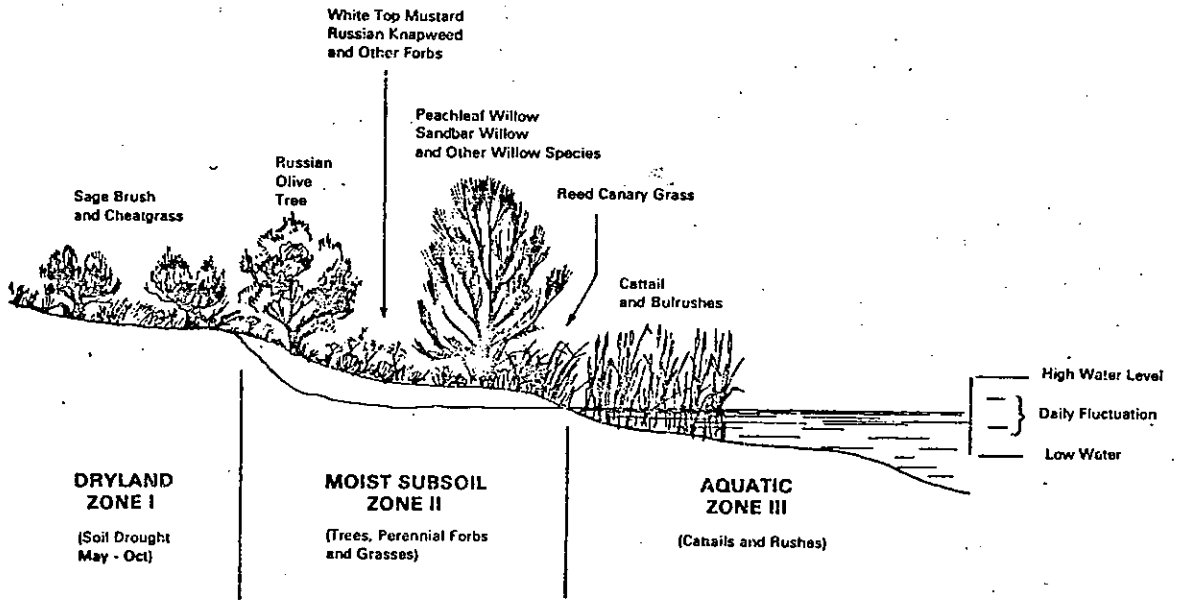
At the higher altitudes of the Blue Mountain and Northern Rocky Mountain subdivision (Plate 6 displays regional vegetation subdivisions) coniferous forests dominate the vegetation. However, it is likely that hatcheries would be located in meadows where the deciduous trees would be present. The vegetation, especially trees listed above, would possibly be found in these meadows.

Detailed vegetation inventories will be prepared as the definite locations of hatchery sites are determined.

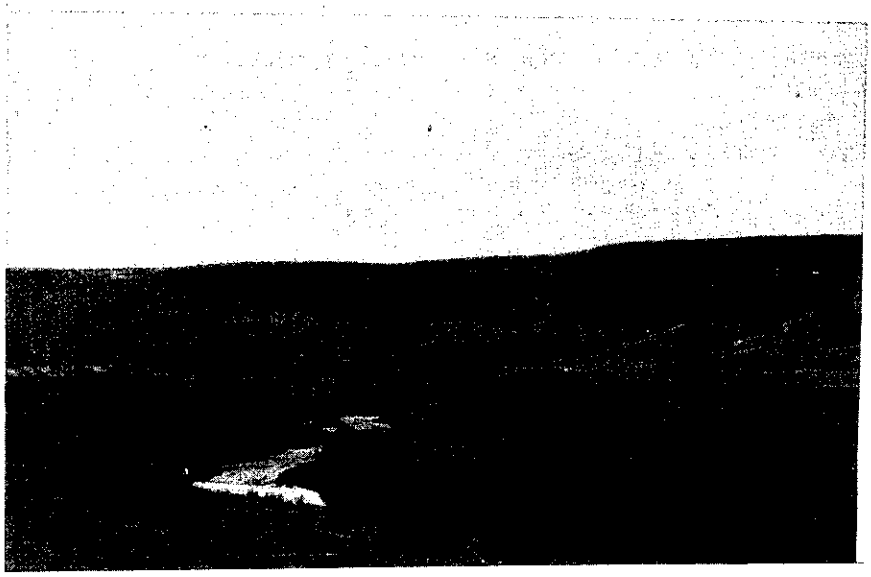
6. Aquatic Organisms

Because agriculture dominates the local land use, runoff water from agricultural lands carries nutrients into the region's streams. These nutrients supply additional impetus to the productivity of receiving waters. Most streams have more than adequate plant growth from which animals draw sustenance. Therefore, a large variety of wildlife inhabits the aquatic environment.

Plate 5 Lake Wallula Vegetation Zones

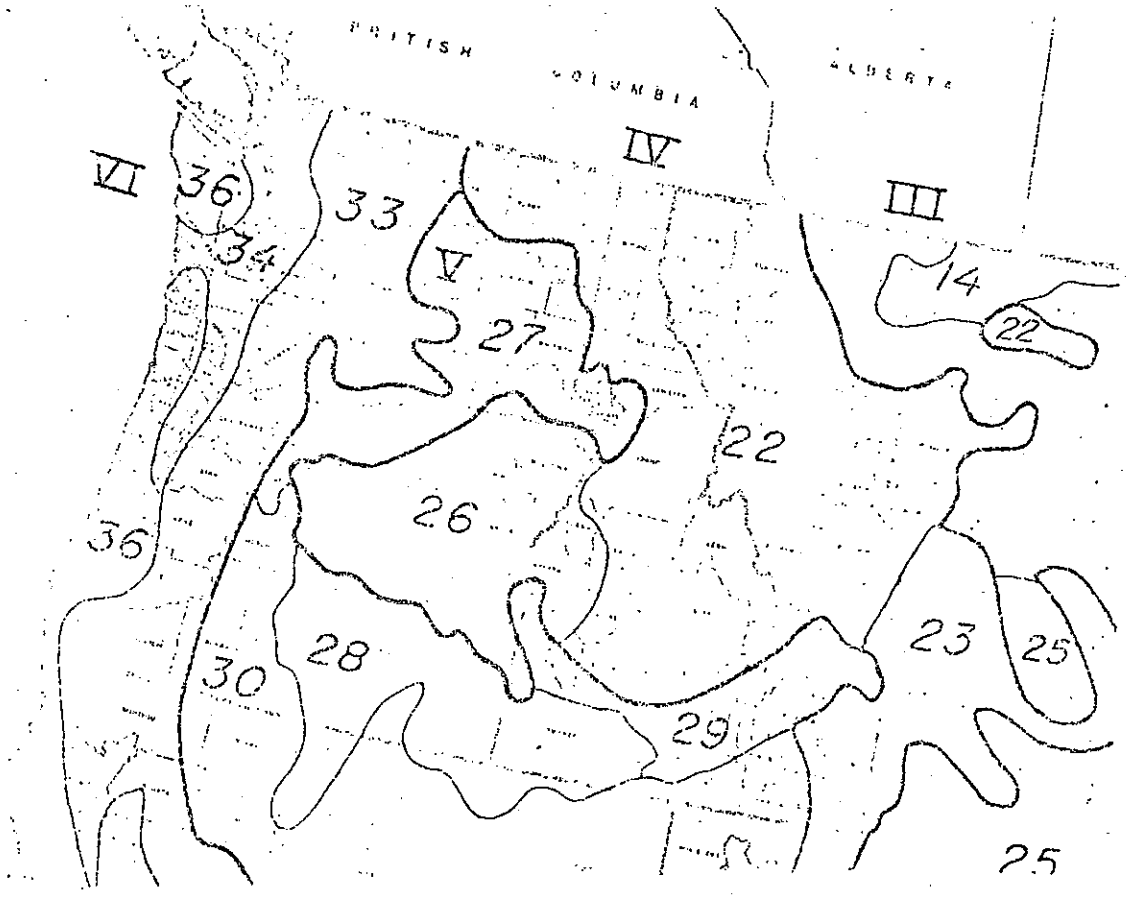


Source: See reference 35.



Walla Walla River

Plate 6 Vegetational Subdivisions



Source: See reference 15.

SUBDIVISIONS:

22 - North Rocky Mountain Subdivision

26 - Blue Mountain Subdivision

27 - Columbia Basin Subdivision

33 - Cascade-Klamath-Sierra Nevada Ranges

A general review of aquatic wildlife shows the streams to contain caddisfly, mayfly, stonefly, damselfly, and dragonfly nymphs. Various water beetles, backswimmers, water scorpions, rat-tailed maggots, mosquito larvae and other aquatic insects; but various worms, leeches, clams, and other invertebrates also inhabit the aquatic environment.

Plant and algae production supports numerous zooplankton as well as aquatic insects which in turn provide forage for small fish such as the redside shiner, speckled dace, leopard dace, and small trout. Small fry as well as some adults provide food for larger gamefish such as large rainbow trout and steelhead.

Fish, especially game fish, are the most familiar form of aquatic wildlife. They provide a valuable food resource as well as a recreational pleasure. There are 44 species of fish within the project area. Some of the better game and/or food fish are as follows:

(1) The chinook salmon, also known as the king, spring, and tyee, is recognized as king of salmon. It is a deep-bodied fish with lengths up to 58 inches and a maximum weight of 126 pounds, though most individuals are much smaller, weighing from 10 to 45 pounds at 24 to 36 inches in length. Chinook are normally four years old at maturity but may range from three to seven years old. Although large runs occur in the Columbia River system, the chinook salmon is found from central California to Alaska and across the Bering Sea to Japan. Chinook salmon are often grouped into three major categories according to the time of adult migration--spring run, summer run, and fall run.

(2) The Coho salmon, also known as the silver, are smaller and shallower in body depth than chinook, attaining lengths to 38 inches and weights to 31 pounds, though most individuals spawn at 6 to 12 pounds at 24 to 30 inches in length. Often confused with chinook, silver salmon are distinguished by the absence of black spotting on the dorsal fin and the lower lobe of the tail. Coho are three years old at maturity. As wide ranging as the chinook, the silver is predominantly seen from southern Oregon to southeastern Alaska. Spawning migrations occur in the fall. Of all the salmon, the silver is probably the most adaptable to changing conditions.

(3) Sockeye salmon, also known as blueback and kokanee (landlocked), are smaller than chinook and coho, attaining a maximum length of 33 inches and weights to 15-1/2 pounds, though most individuals spawn at 4 to 6 pounds at 18 to 24 inches in length. Columbia River sockeye are normally four years old at maturity. Spawning only in streams having lakes at the headwaters, the sockeye is common from the Columbia River north to northern Alaska. It normally migrates up the Columbia in June and July.

(4) Steelhead trout rival coho salmon in size, attaining a maximum length of 45 inches and weights to 43 pounds, although normal adult size is 6 to 20 pounds and lengths from 24 to 36 inches. Generally its head is more rounded in front and shorter than that of the salmon. Spotted like a chinook salmon, the steelhead trout also has a red band extending along its side after it has been in fresh water for some time. The adult steelhead, which is a sea-run rainbow trout, migrates in the lower Snake River most heavily in August, September, and October. It ranges from southern California to southeastern Alaska.

(5) American shad is a member of the herring family which was introduced to the West Coast near San Francisco, California, in 1871. It appeared in the Columbia River around 1876. Native to the Atlantic Coast, the American shad attains lengths to 30 inches, weights to 10 pounds, though usual size is 18 to 24 inches in length and weights from 2 to 6 pounds. It has a single spineless dorsal fine, a forked tail, and a deep, compressed body. An anadromous fish, the shad enters fresh water to spawn, with the largest migration occurring in July. On the Pacific Coast the shad is common from San Diego to Alaska. The Columbia produces 75 percent and more of the west coast shad and shad roe for commercial purposes.

The estimated number of both adult and juvenile salmon, steelhead, and shad, and their seasonal migration patterns, are graphically shown for the Snake River in Chart 1. On the subsequent page, Chart 2, the yearly record of juvenile out-migration for the Snake River (Ice Harbor Dam) is diagrammed. Since the juvenile anadromous fish do not pass the counting stations at the various dams, but instead move through the powerplants or over the spillways, the figures indicated are estimated, based in part on a sampling procedure, upstream spawning area observation, and judgment. Estimates differ, as can be noted from the two charts.

The fish life in the region varies greatly, depending on several conditions. Such things as water temperature and chemistry, habitat, spawning grounds, and food sources are major factors that determine the types of fish found in the still and flowing waters of the tri-state region.

The Snake River, from its mouth at the Columbia River to Brownlee Dam, the base area considered in this statement, is the home for diverse populations of fish. Resident game fish found in the river include smallmouth bass, crappie, sturgeon, and channel catfish, all of which present a sport fishery to anglers at various points along the slackwater system.

Chart 1

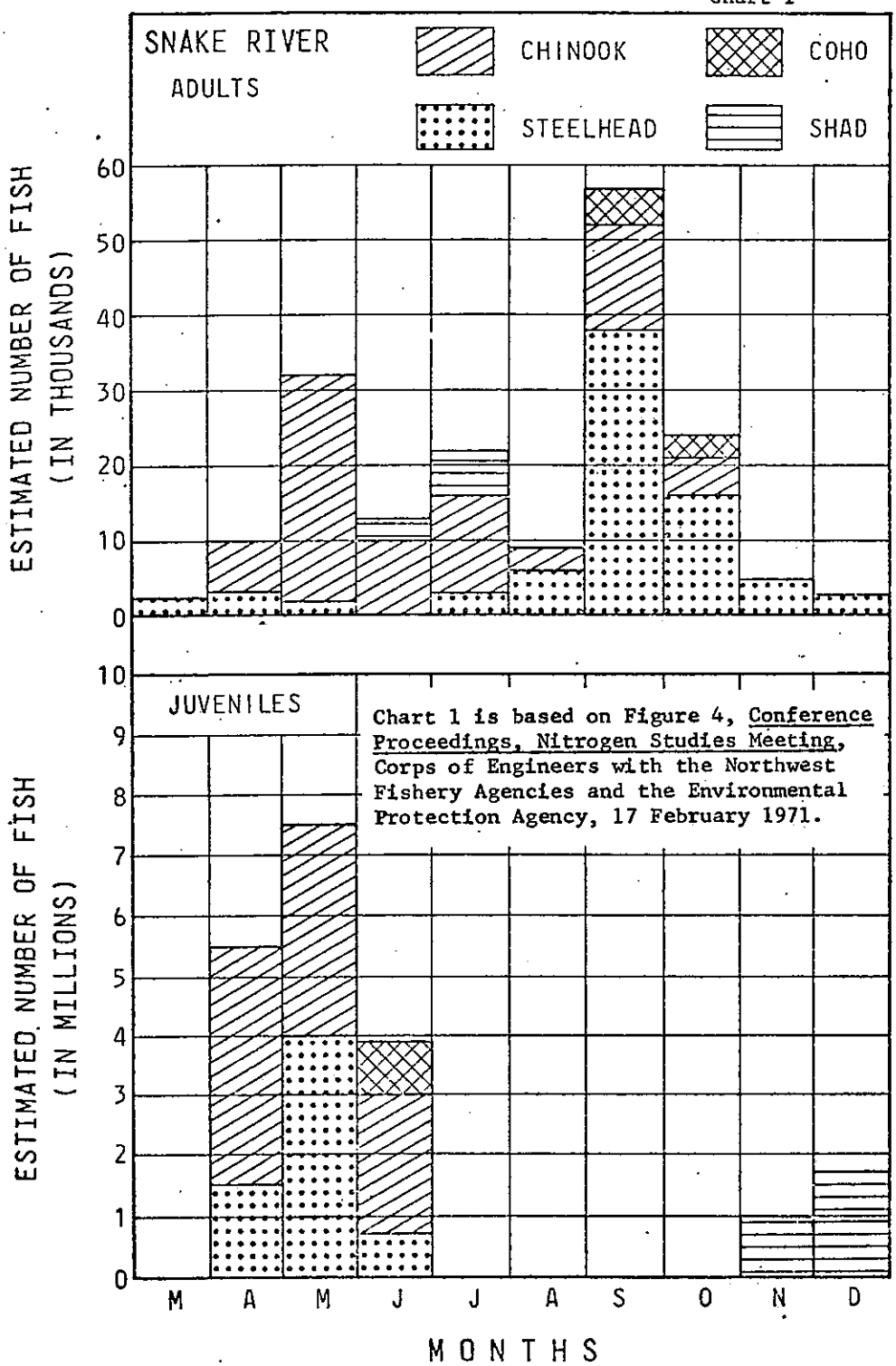
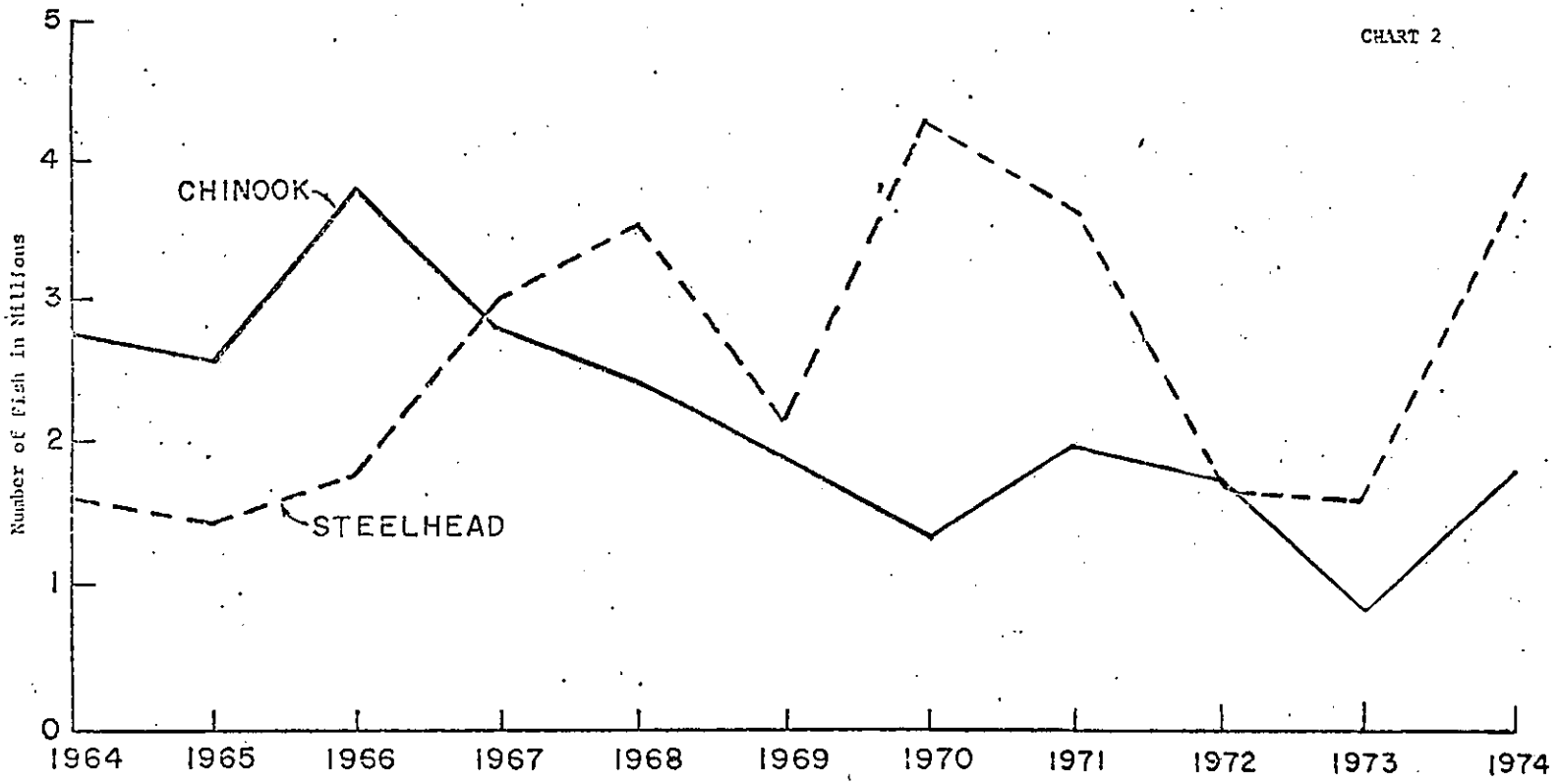


Chart 1 is based on Figure 4, Conference Proceedings, Nitrogen Studies Meeting, Corps of Engineers with the Northwest Fishery Agencies and the Environmental Protection Agency, 17 February 1971.

Seasonal upstream and downstream fish migration in Snake River (March through December). Figures represent a typical average year with both natural and hatchery produced fish.

CHART 2



Record of juvenile chinook salmon and steelhead trout in the Snake River (Ice Harbor Dam), 1964-1974. This chart is based on Figure 2, A Summary of the 1969 and 1970 Out Migration of Juvenile Chinook Salmon and Steelhead Trout from Snake River, H. L. Raymond, September, 1970; and is updated by information in Snake River Runs of Salmon and Steelhead Trout: Trends in Abundance of Adults and Downstream Survival of Juveniles, Seattle: National Marine Fisheries Service, November, 1974 by H. L. Raymond.

Migratory fish using the impounded river in large numbers are steelhead and chinook salmon. American shad enter the mouth of the Snake River in large numbers; 318,377 shad surmounted McNary Dam downstream on the Columbia River in the summer of 1973. Only about 11,000 shad passed over Ice Harbor Dam, however. Although no count is available, a generous portion of the shad spent some time congregated below Ice Harbor and offered an active sport fishery to local anglers.

Smallmouth bass, white crappie, and white sturgeon are also available in portions of the lower Snake River. Large populations of non-game fish reside in the impoundments. These fish include carp, squawfish, suckers, chiselmouth, peamouth, and redside shiners among the species found there.

The tributary streams of the Snake River range from slow rivers such as the Palouse, which carry high sediment loads, to sparkling mountain rivulets such as creeks of the Blue Mountains in Washington and the Bitterroot Mountains along the Montana-Idaho border.

The variety of fish in the high creeks and streams is less than that of the lower Snake River. However, the percentage of game fish is likely to be greater.

Trout (rainbow, cutthroat, Dolly Varden, and brook) are common residents of the feeder streams and brown trout are found in a few locations. The mountain whitefish is another game fish inhabiting these streams, and these sleek fish offer sport to anglers, especially in the winter months. Non-game fish in the higher elevation side streams consist mainly of long nose dace, sculpin, redside shiner, northern squawfish, speckled dace, and chiselmouth. Appendix C lists the fish which inhabit the project area.

7. Terrestrial Wildlife

A great variety of terrestrial wildlife inhabits the project area. During a year the project area may provide habitat for more than 255 bird species. Mammals within the area number approximately 91 species, while reptiles number around 21 and amphibians are estimated at about 13 species. Depending on the availability of suitable habitat for each animal, any particular animal's density varies throughout the project area.

In the appendix section there are lists of animals which could inhabit the project area. Appendices D, E, and F list the species of the reptiles and amphibians, birds, and mammals, respectively. Other animals not on these lists may occur in the project area, but current information is insufficient to establish their range within the project area. When the Corps has selected the hatchery sites, biologists will prepare a detailed wildlife inventory.

8. Threatened Species of Wildlife

Four species of nationally endangered wildlife occur within the three states of Idaho, Oregon, and Washington: The American Peregrine falcon (Falco peregrinus anatum), California brown pelican (Pelecanus occidentalis), Aleutian Canada goose (Branta canadensis leucopareia), and the Columbia White-tailed deer (Odocoileus virginianus leucurus). 1/ The area contains the American peregrine falcon and the Aleutian Canada goose.

The nationally endangered species require protection from any additional impact which may reduce their chances for survival. These animals are threatened with extinction.

The Endangered Species Conservation Act of 1969 indicates that "(C) A species of native fish and wildlife shall be regarded as threatened with extinction whenever...its existence is endangered because its habitat is threatened with destruction, drastic modification, or severe curtailment, or because of overexploitation, disease, predation, or because of other factors, and that its survival requires assistance."

Within the states of Idaho, Oregon, and Washington, other animals are also threatened. Wildlife studies indicate what classification these animals should have; i.e., rare, peripheral, or status-undetermined. A classification of rare (R) means the animal may become endangered if its population decreases further. A classification of peripheral (P) means the animal occurs as a migrant with the main populations residing outside this country. A classification of status-undetermined (SU) means that available information is insufficient to determine the animal's situation.

Threatened fish occurring in the three states are: the arctic grayling (R-Montana form), Thymallus articus; Olympic Mudminnow (R), Novumbra hubbsi; Alvord Basin cutthroat trout (SU), Salmo Clarki subsp.; and the Lost River sucker (SU), Catostomus luxatus. Although these fish inhabit at least one of the three states, none inhabit the project area.

1/ The Fish and Wildlife Service within the Department of the Department of the Interior compiles the endangered species list. The 1973 edition of Threatened Wildlife of the United States indicated that these four animals are the only endangered species within these three states. Additional endangered species may inhabit the project area, but the information available is insufficient to place them on the endangered list.

Concerning threatened bird species, those inhabiting the three states are: The Tule white-fronted goose* (R), Anser albifrons gambelli and Anser albifrons frontalis; the prairie falcon* (R), Falco mexicanus; Cascade boreal chickadee (P), Parus hudsonicus carolinensis; white-faced ibis* (SU) Plegadis chihi; American osprey* (SU), Pandion haliaetus carolinensis; Western snowy plover* (SU), Charadrius alexandrinus nivosus; Ferruginous hawk* (SU), Buteo regalis; Columbian sharp-tailed grouse* (SU), Pediocetes phasianellus columbianus; northern long-billed curlew* (SU), Numenicus americanus parvus; western burrowing owl* (SU), Speotyto cunicularia hypugaea; and the Yakutat fox sparrow* (SU), Passerella iliaca annectens.

Threatened mammals which inhabit at least one of the three states are: The spotted bat (R), Euderma maculatum; northern Rocky Mountain wolf (R), Canis lupus irremotus; grizzly bear (R), Ursus arctos horribilis; sea otter (R), Enhydro lutris nereis; California bighorn* (R), Ovis canadensis californiana; mountain caribou (P), Rangifer tarandus montanus; fisher (SU), Martes pennanti; wolverine (SU), Gulo luscus; Canada lynx* (SU), Lynx canadensis.

The northern Rocky Mountain wolf (R) may inhabit the area, but the record is not clear concerning its range.

The area could contain 14 species of threatened birdlife and three species of threatened mammals. Wildlife surveys at the hatchery sites, when selected, will provide detailed information on wildlife including threatened species. Rare and endangered species will also be considered in selection of fishing and wildlife acquisition areas.

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* This animal occurs in the area under consideration.

9. Archaeology

A most important factor in man's survival has always been water. All life must have adequate supplies of water to survive. Within the Columbia region prehistoric man primarily lived near the rivers. He would spear and trap migrating adult salmon as well as other fish in shallow river areas. There are many known archaeological sites along the streams of the region, as well as many probable unknown sites. The floods and meanderings of the streams and rivers have changed their channels several times over the past millenniums. Also, prehistoric man was believed to be semi-nomadic. When food supplies became scarce or other problems developed, he would move his village to a more promising location. The exact location of ancient villages must be determined on a case-by-case investigation, but the possibility of finding archaeological artifacts and fossils near the rivers is very likely. New sites of archaeological interest may be uncovered prior to or during hatchery construction. The effects of hatchery construction and operation on possible archaeological findings are discussed in Section 4 of this statement.

Petroglyphs

10. National Historical Sites

The area contains sites which are National Historic Places listed in the National Register of Historic Places, 10 February 1976. These historical sites are as follows:

(1) Lolo Trail, Clearwater County, Idaho (also in Idaho County, Idaho, and in Missoula County, Montana), Lolo Hot Springs vicinity, parallel to U.S. 12 on ridges of Bitterroot Mountains, from Lolo Pass to Weippe.

(2) Nez Perce National Historical Park, Clearwater County, Idaho (also in Idaho, Lewis, and Nez Perce counties), Spalding (park headquarters), within an area 90 miles south and 150 miles east of Spalding.

(3) Weippe Prairie, Clearwater County, Weippe vicinity, south of Weippe and Idaho 11.

(4) Whitman Mission National Historic Site, Walla Walla County, Washington, Walla Walla vicinity, 6 miles west of Walla Walla off U.S. 410.

(5) Marmes Rockshelter, Franklin County, Washington, Lyons Ferry vicinity, one mile north of Lyons Ferry on west side of Palouse River.

(6) Wylies Peak Lookout, near Grangeville, Idaho.

(7) White Bird Battlefield, north of White Bird, Idaho off U.S. 95.

(8) White Bird Grade, northeast of White Bird, Idaho.

(9) McConnell, W.J. House 110, S. Adams Street, Moscow, Idaho.

(10) Moscow Post Office and Courthouse, Washington and 3rd Streets, Moscow, Idaho.

(11) Lenore Site, vicinity of Lenore, Idaho.

(12) Lewiston Depot, 13th and Main Streets, Lewiston, Idaho.

(13) Lewiston Historic District, irregular pattern between 1st and 5th Streets and B Street and the Snake River, Lewiston, Idaho.

(14) Ascension Episcopal Church and Rectory, Church Street, Cove, Oregon.

(15) Full Gospel Church (Grace Presbyterian Church), 1st and Monroe Streets, Asotin, Washington.

(16) Van Arsdol, C.C. House, 15th and Chestnut Street, Clarkston, Washington.

(17) Columbia County Courthouse, 341 E. Main, Dayton, Washington.

(18) Dayton Depot, 2nd and Commercial Streets, Dayton, Washington.

(19) Garfield County Courthouse, 8th and Main Streets, Pomeroy Washington.

(20) Lewis and Clark Trail, Travois Road, 5 miles east of Pomeroy, Washington, U.S. 12.

(21) Bruce, William Perry House, 4th and Main Streets, Waitsburg, Washington.

(22) Dacres Hotel, 4th and Main Streets, Walla Walla, Washington.

(23) Fort Walla Walla Historical District, 77 Wainwright Drive, Walla Walla, Washington.

(24) Kirkman House, 214 N. Colville Street, Walla Walla, Washington.

(25) Memorial Building, Whitman College, 345 Boyer Avenue, Walla Walla, Washington.

(26) Walla Walla Public Library, 109 South Palouse Street, Walla Walla, Washington.

11. Socioeconomics

On a general basis, the tri-state region has shown a 14.8-percent population growth over the 1960-1970 decade. However, the average population density of the project area is approximately 13 people per square mile. The economic base is largely agricultural and timber production. High production of wheat, peas, paper, and plywood occurs within the area. Agriculture-related industries such as chemicals, processing, and transportation of agricultures products are also present.

The median family income for 1969 in Washington was $10,407, while in Oregon it was $9,489, and in Idaho $8,381. National median family income for 1969 was $9,590. (Incomes are derived from 1970 census.)

The current estimated values for the commercial catch from the project area's fisheries is $726,000 for fall chinook, $3,205,620 for spring and summer chinook, and $198,000 for steelhead. The estimated value for the anadromous sport fisheries is $7,083,000. The estimated value of the residential sport fisheries is $410,000 @ 2.00/day. The estimated total value of the fishery from the

Table 4

COMMERCIAL LANDINGS AND SPORT FISHING USE, WITH AND WITHOUT COMPENSATION [1/] IN COLUMBIA RIVER SYSTEM AND PACIFIC OCEAN (ANADROMOUS SPECIES) AND IN LOWER SNAKE RIVER PROJECT AREA (RESIDENT SPECIES)

Areas and Species	Commercial Fisheries									Sport Fisheries [4/]		
	With Compensation			Without Compensation			Difference					
		Landings			Landings			Landings		W/Comp.	WO/Comp.	Diff.
	Escapement	Pounds	Value	Escapement	Pounds	Value	Escapement	Pounds	Value	Ang. Days	Ang. Days	Ang. Days
Columbia R. System, Ocean												
Fall Chinook [2/]	32,700	1,668,000	$1,651,320	14,400	734,000	$ 726,660	18,300	934,000	$ 924,660	163,500	72,000	91,500
Spring and Summer Chinook [2/]	122,200	6,232,000	6,169,680	63,500	3,238,000	3,205,620	58,700	2,994,000	2,964,060	611,000	318,000	293,000
Steelhead [3/]	114,800	692,000	380,600	59,700	360,000	198,000	55,100	332,000	182,600	763,000	397,000	366,000
Totals	269,700	8,592,000	$8,201,600	137,600	4,332,000	$4,130,280	132,100	4,260,000	$4,071,320	1,537,500	787,000	750,500
L. Snake Project Area												
Resident										250,000	205,000	45,000

1/ Insofar as possible "with compensation" is intended to reflect the preproject condition.

2/ Calculations based on catch to escapement ratio of 4:1 (commercial catch 3:1 and sport catch 1:1) average weight per fish of 17 lbs.; and commercial value of $0.99 per lb. for Chinook, based on 1973 prices.

3/ Calculations based on catch to escapement ratio of 2:1 (commercial catch 0.67:1 and sport catch 1.33:1); average weight per fish of 9 lbs.; and commercial value of $0.55 per pound, based on 1973 prices.

4/ Angler-days for anadromous fish are based on catch to escapement ratios (footnotes 2 and 3) and an estimated 5 days of effort per fish (the value of an angler-day for anadromous fish is $9.00). Angler-days for resident fish are based on creel studies of Washington Department of Game and the ratio of 3 reservoir angler-days to 2 stream angler-days.

From BSF&W-NMFS Report as revised by correspondence.

Source: See reference 19.

project area is $11,623,280. Table 4 contains an analysis of the fishery value. Based on 1973 harvest figures, wildlife-oriented use in southeast Washington is valued at $27,288,651.

12. Recreation

The region contains 129 known publicly owned recreational sites. Current estimates indicate that 39 private campsites also exist in the project area. The public recreational sites number as follows: 9 state-maintained facilities with campsites; 2 state-maintained facilities without campsites; 79 Federally maintained recreational sites with campsites; 13 Federally maintained recreational sites without campsites; 19 interest points, and 7 areas used for snow skiing.

This region contains a variety of vegetational cover from sagebrush steppe to coniferous forest. This variety provides many diverse forms of recreation to local residents. Various forms of hunting, hiking, skiing, picnicking, fishing, swimming, and bicycling are available within the project area. Table 5 indicates the results

Pheasant Hunting

Summer 1972 Recreation Activities by Percent of National Recreation Survey Respondents Who Participated; Estimated Total U.S. Participation for the Summer Quarter of 1972; Percent of Recreation Occurring on Weekends; and Average Hours of Participation per Activity Day

Activity	Percent of Survey Respondents Who Participated	Estimated Total U.S. Participation for the Summer Quarter of 1972 (Millions of act. days)	Percent of Activity Which Occurred on Weekends	Average Number of Hours of Participation per Activity Day
Picnicking	47	405.1	71	2.7
Sightseeing	37	362.8	62	3.1
Driving for pleasure	34	404.9	[1]	[1]
Walking for pleasure	34	496.3	64	1.9
Other swimming outdoors	34	487.1	69	2.6
Visiting zoos, fairs, amuse. parks	24	122.5	55	4.5
Other activities	24	242.9	[1]	[1]
Fishing	24	278.2	68	4.4
Playing other outdoor games or sports	22	333.8	65	2.6
Outdoor pool swimming	18	257.0	52	2.8
Nature walks	17	148.9	70	2.0
Other boating	15	126.1	74	2.8
Going to outdoor sports events	12	96.9	57	4.2
Camping in developed camp grounds	11	153.3	62	[2]
Bicycling	10	214.2	69	2.0
Going to outdoor concerts, plays, etc.	7	26.5	66	3.6
Horseback riding	5	51.5	51	2.7
Hiking with a pack/mount/rock/climb.	5	45.0	62	3.0
Tennis	5	81.2	79	2.1
Water skiing	5	54.1	69	2.6
Golf	5	63.4	51	4.9
Camping in remote or wilderness areas	5	57.5	80	[2]
Riding motorcycles off the road	5	58.2	62	4.0
Bird watching	4	42.0	75	2.1
Canoeing	3	18.3	72	2.3
Sailing	3	32.5	75	4.4
Hunting	3	17.5	64	4.4
Wildlife and bird photography	2	19.6	56	1.6
Driving 4-wheel vehicles off the road	2	26.6	56	3.1

[1] Was not compiled from NRS.
[2] Defined to be one activity day.

Table 5

Source: Bureau of Outdoor Recreation, Outdoor Recreation A Legacy For America, Washington: U.S. Department of the Interior, 1973.

of a National Recreation Survey on activity participation for the summer of 1972. That table shows how Americans spent their recreation time. Although it is a table for the nation as a whole, the figures given are indicative of the types and popularity of activities. 1/

13. Esthetics

A person may find many features of the region to be esthetically pleasing. However, because esthetics is basically subjective, it is hard to identify what everyone would consider attractive. The area contains many diverse vegetational and topographical perspectives. Streambanks within the project area can contain a variety of vegetation. Sagebrush steppe, hardwood forest, softwood forest, and grasslands are a few vegetational possibilities. The headwaters of the streams in the project area range from high rugged mountains (about 10,000 feet) to flat plateaus (about 340 feet). The area also displays seasonal variations which add to the area's possibilities.

Palouse Canyon

1/ Since the table is for the summer quarter, hunting does not rank as high as might be expected. It should be remembered that much hunting in the region is done in the fall and early winter.

The project area contains some highways which are considered scenic routes. These are: Oregon State Highway 82; Washington State Highways 26, 27, 126, and 127; and Idaho State Highways 8, 11, 13, and 14; almost all of U.S. Highway 12; and all of U.S. Highway 95. The Federal and State roadstops, parkland, or forest land are usually established in esthetically pleasing surroundings.

The region contains part of the wild and scenic Clearwater River in Idaho. Potential wild and scenic rivers within the project are the Grande Ronde, Wallowa, Minam, Wenaha, Snake (middle segment), and Immaha. In addition to these possible scenic rivers, the Eagle Cap Wilderness Area in Oregon is within the region. The wilderness area is considered appealing as a naturalistic setting.

Waterfowl provide a delightful ballet of flight for the non-hunter as well as a recreational outlet for the hunter.