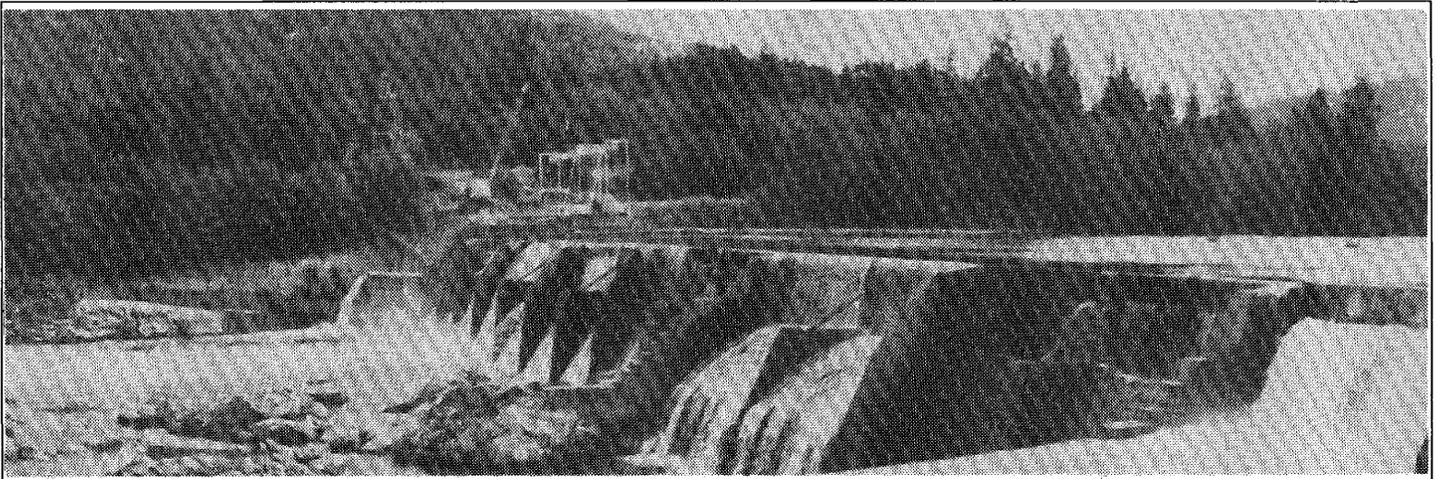


Fish Passage Improvements Savage Rapids Dam



PLANNING REPORT AND FINAL ENVIRONMENTAL STATEMENT



JOSEPHINE COUNTY
WATER MANAGEMENT IMPROVEMENT STUDY, OREGON
Rogue River Basin, Oregon



U.S. DEPARTMENT OF THE INTERIOR
Bruce Babbitt, Secretary



BUREAU OF RECLAMATION
Daniel P. Beard, Commissioner

PRINTING HISTORY

- **The document *Fish Passage Improvements, Savage Rapids Dam, Oregon, Planning Report and Final Environmental Statement* was released in August 1995.**
- **First reprinting — November 1997; 30 copies. This included the same material as the original PR/FES except that the “Record of Decision” (March 1997) and “Amendment to Record of Decision” (April 1997) were added.**
- **Second reprinting — December 2000, 15 copies.**
- **Third reprinting — January 2004; 15 copies.**

AMENDMENT TO THE RECORD OF DECISION

FOR

**BUREAU OF RECLAMATION
FINAL ENVIRONMENTAL IMPACT STATEMENT**

**FISH PASSAGE IMPROVEMENTS
SAVAGE RAPIDS DAM, OREGON**

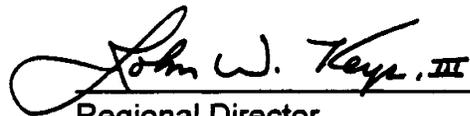
APRIL 1997

The Record of Decision (ROD) signed on March 14, 1997, contains an error pertaining to the Grants Pass Irrigation District's (GPID) position on the Preferred Alternative. The ROD indicates that the GPID appears not to support the Preferred Alternative but instead wishes to pursue other options. GPID has not voted to support any alternative other than the one presented as the Preferred Alternative. In addition, GPID has not requested permission from the Oregon Water Resources Commission to modify its current fish passage plan, which is the same as the Preferred Alternative.

Therefore, on page 4 of the ROD, the last sentence of the first paragraph under VIII. Decision is deleted and replaced with the following sentence: "However, the Preferred Alternative lacks widespread public acceptance."

APPROVED:

Date APRIL 17, 1997



Regional Director
Pacific Northwest Region
Bureau of Reclamation



United States Department of the Interior

BUREAU OF RECLAMATION

Pacific Northwest Region
1150 North Curtis Road
Boise, Idaho 83706-1234

IN REPLY REFER TO:

PN-6519
ENV-6.00

MAR 20 1997

Subject: Record of Decision for Fish Passage Improvements at Savage Rapids Dam, Rogue River Basin, Oregon

Ladies and Gentlemen:

Enclosed for your information is a copy of the Record of Decision (ROD) for the subject project. The ROD finalizes Reclamation's study of alternatives to improve salmon and steelhead passage at Savage Rapids Dam.

The ROD identifies the Preferred Alternative, described in the Planning Report/Final Environmental Statement, as the most efficient and environmentally sound alternative for providing safe salmon and steelhead passage at Savage Rapids Dam. As indicated in the ROD, Reclamation will not be pursuing congressional action to authorize or fund the Preferred Alternative because the Grants Pass Irrigation District wishes to pursue a different course of action.

Thank you for your interest in this project. If you have questions about the ROD, please contact Mr. J. Eric Glover, Lower Columbia Area Manager, at (503) 872-2795.

Sincerely,


ACTING FOR
John W. Keys, III
Regional Director

Enclosure

RECORD OF DECISION

MARCH 1997

BUREAU OF RECLAMATION FINAL ENVIRONMENTAL IMPACT STATEMENT

<p>FISH PASSAGE IMPROVEMENTS SAVAGE RAPIDS DAM, OREGON</p>

I. INTRODUCTION

This document constitutes the Record of Decision (ROD) of the Bureau of Reclamation (Reclamation), Pacific Northwest Region, for fish passage improvements at Savage Rapids Dam. The investigation was conducted under authority of Public Law 92-199, enacted December 15, 1971 (85 Stat. 664). Savage Rapids Dam is an irrigation diversion structure constructed by the Grants Pass Irrigation District (GPID) in 1921. It is located on the Rogue River in southwest Oregon.

In 1971, Reclamation was authorized by the Congress to conduct feasibility studies of anadromous fish passage at the dam and improvements to the GPID irrigation system. The anadromous fish of concern are salmon and steelhead. Detailed studies of salmon and steelhead passage were completed in the 1970's and interim fish passage improvements were made between 1977-1981. Studies of irrigation system improvements were deferred at that time because of lack of local support. Additional anadromous fish passage improvements were deferred because of the uncertainty of potential hydropower development at the dam.

In 1988, Reclamation initiated the Josephine County Water Management Improvement Study in response to requests by Josephine County and the GPID. The main objectives of the study were to (1) identify a permanent solution to salmon and steelhead passage problems at Savage Rapids Dam and (2) help resolve conflicts over water uses in Josephine County. The Planning Report/Final Environmental Statement (PR/FES), filed on August 30, 1995, and this ROD focus only on salmon and steelhead passage concerns at the dam and the associated diversion facilities.

II. ALTERNATIVES CONSIDERED

Two action alternatives (Pumping and Dam Retention) and the No Action Alternative were evaluated in the PR/FES. The description of conditions that would exist with the No Action Alternative serves as the baseline for evaluating the effects of the action alternatives.

The Pumping Alternative was identified as the Preferred Alternative in the PR/FES. The Preferred Alternative consists of three parts: (1) replacement of GPID pumping and diversion facilities at the dam with two new pumping plants, one each on the north and south sides of the river; (2) removal of the dam and appurtenant structures and restoration of the site, and (3) forgiveness of the remaining debt to the Federal government amounting to \$290,525 as of 1994 (remaining debt as of 1997 is \$210,035).

The other action alternative, Dam Retention Alternative, would retain Savage Rapids Dam. Numerous modifications would be made to the dam and control structures to enhance salmon and steelhead passage and protection and operation of the dam and diversion facilities. New fish passage and protective facilities that meet current standards of the National Marine Fisheries Service (NMFS) would be constructed and river channel and dam crest modifications would be made. Existing hydraulic turbines and pumps would be replaced and discharge lines for the irrigation diversion would be replaced or rehabilitated with this alternative.

The No Action Alternative is the best estimate of what would happen in the future if an action alternative is not implemented. For this analysis, Reclamation assumed that GPID would continue to operate the current facilities, making repairs and replacements as needed for up to 20 years. It was further assumed that at some point within this time, the State of Oregon or the Federal government would intervene to mandate fish passage and protective improvements.

III. BASIS FOR FORMULATING AND SELECTING ALTERNATIVES

The action alternatives were formulated on the basis that Reclamation involvement must include (1) improved fish passage for steelhead and salmon and (2) facilities for the GPID diversions. The United States considers anadromous fish to be a national resource and has an interest in the continued operation of the GPID which has remaining debt due to the United States from earlier rehabilitation work by Reclamation.

Under Reclamation policy and Federal rules and regulations, all action alternatives must meet the criteria of completeness, effectiveness, efficiency, and acceptability. In testing whether or not alternatives meet these criteria: (1) monetary benefits to the Nation are compared with monetary costs, (2) economic effects of monetary transfers to the region are compared with transfers out of the region, (3) environmental effects are identified, and (4) other social effects are identified. Two action alternatives—Pumping and Dam Retention—were found to meet the four criteria, but at varying levels of effectiveness, efficiency, and local acceptability.

Reclamation is required to select the action alternative that provides the greatest net economic benefits. Net annual benefits to the Nation with the Pumping Alternative would be about double the net annual benefits with the Dam Retention Alternative. The Pumping Alternative was selected as the Preferred Alternative on the basis that it would be more effective by providing greater fish benefits and would be more efficient by costing less.

IV. ENVIRONMENTALLY PREFERABLE ALTERNATIVE

Reclamation believes that the Preferred Alternative, as presented in the PR/FES, is the environmentally preferable alternative.

V. MAJOR ISSUES

- In 1994, the board of directors for the GPID passed a resolution supporting removal of the dam and construction of pumping plants. The State of Oregon based the extension of a supplemental water permit for GPID in part on implementation of the Preferred Alternative. However, the membership of the board of directors has changed and current members of the board do not actively support removal of Savage Rapids Dam (the Preferred Alternative). The new board members are involved in reassessing the GPID position based on financial and legal considerations.
- During the public review process for the PR/FES, it became clear that some members of the public were highly opposed to removal of the dam. The main opposition was based on maintaining the seasonal lake formed by Savage Rapids Dam. However, there is a widespread misconception that removal of the dam would eliminate irrigation in the area, and there seemed to be widespread skepticism that anadromous fish are killed at the dam.
- After completion of the PR/FES, the Oregon Legislature passed a law directing establishment of a task force to review the findings of the report and to make recommendations. That task force has completed its work and recommends a third action alternative which is similar to the Dam Retention Alternative but would replace the hydraulically powered pumps with electrically driven pumps.

The alternative identified by the task force has not been evaluated under National Environmental Policy Act (NEPA) requirements. That evaluation would be required before Reclamation could fully compare the task force alternative with the Preferred Alternative identified in the PR/FES. The cost of the task force alternative has been identified and is greater than that of the Preferred Alternative. However, the task force proposes to add other sources of financing so that the Federal cost share for the task force alternative would be less than for the Preferred Alternative. At this time, the task force has not offered a specific proposal in that regard.

Although benefits of the task force alternative have not been identified, those benefits would be comparable to those identified for the Dam Retention Alternative identified in the PR/FES. As a result, net benefits would be less with the task force alternative than with the Preferred Alternative identified in the PR/FES.

- In March 1995, the NMFS proposed listing a specific stock of coastal steelhead and, in July 1995, proposed listing three evolutionarily significant units of coho salmon on the Pacific coast as threatened under the Endangered Species Act (ESA). Coho salmon and steelhead that pass Savage Rapids Dam belong to fish stocks included in the proposal. In each case, a final decision was to be made within 12 months. However, the proposal on steelhead has been expanded to their entire geographic range along the West Coast. Conflicting data on coho required additional time for study. As a result, final determinations on coho and steelhead listings are scheduled for mid-1997. A final ESA listing determination for either species would require Section 7 consultations with NMFS before implementation of an action alternative at Savage Rapids Dam.

VI. PUBLIC RESPONSE TO FINAL ENVIRONMENTAL STATEMENT

Following the filing of the FES on August 30, 1995, Reclamation received two letters of comment.

- Randy Hinke commented that removal of the Savage Rapids Dam could have some civil defense implications. Reclamation referred the letter to the Federal Emergency Management Agency (FEMA). FEMA responded to Mr. Hinke that there was no policy on national emergency preparedness policy relative to removal or retention of Savage Rapids Dam.
- Lynn and Della Berntson stated in a letter of comment that they were not pleased with any plan to remove Savage Rapids Dam, disagreed with Reclamation's evaluation of the effect of Savage Rapids Dam on salmon and steelhead, and were skeptical of the costs of the two alternatives. They also urged Reclamation to "simply fix the ladder using local contractors." A response was not considered necessary because the comments merely reflected opinion and preference.

VII. ENVIRONMENTAL COMMITMENTS

The environmental commitments, monitoring, and enforcement programs discussed in the PR/FES are neither meaningful nor applicable to Reclamation's decision and are, therefore, not discussed in this ROD.

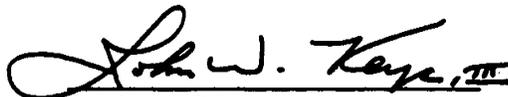
VIII. DECISION

The Preferred Alternative (Pumping Alternative) is the most efficient and environmentally sound alternative for providing safe salmon and steelhead passage at this irrigation diversion. In addition, the Preferred Alternative would reestablish a free flowing reach of river while extending the useful life of the irrigation diversion facilities and protecting the Federal investment. However, it appears that neither the GPID nor the task force appointed by the Governor support the Preferred Alternative; they wish to pursue other options.

Reclamation considers its study of alternatives to improve salmon and steelhead passage at Savage Rapids Dam and the evaluation of those alternatives under NEPA to be complete. Reclamation will not pursue congressional action to authorize or fund implementation of the Preferred Alternative identified in the PR/FES.

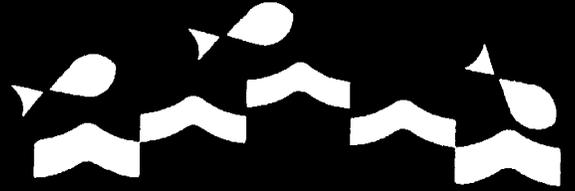
APPROVED:

Date MARCH 14, 1997

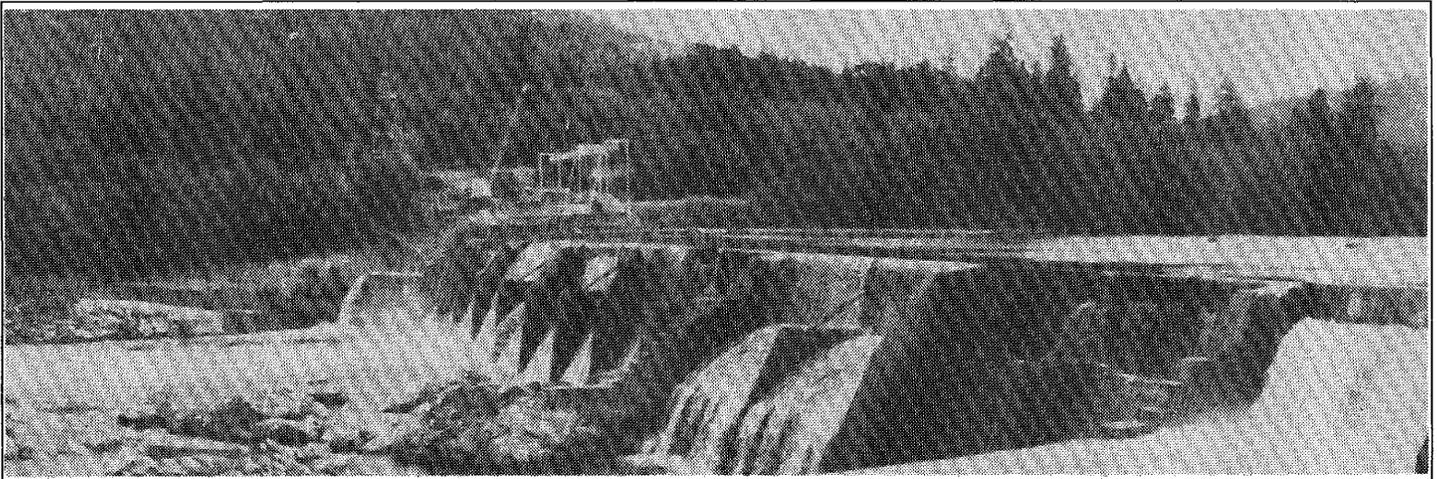


Regional Director
Pacific Northwest Region
Bureau of Reclamation

***Fish Passage Improvements
Savage Rapids Dam***



**PLANNING REPORT
AND
FINAL ENVIRONMENTAL STATEMENT**



**JOSEPHINE COUNTY
WATER MANAGEMENT IMPROVEMENT STUDY, OREGON
Rogue River Basin, Oregon**



**U.S. DEPARTMENT OF THE INTERIOR
Bruce Babbitt, Secretary**



**BUREAU OF RECLAMATION
Daniel P. Beard, Commissioner**

Planning Report/Final Environmental Statement

Fish Passage Improvement Savage Rapids Dam

Prepared by:

Pacific Northwest Region
Bureau of Reclamation
Department of the Interior

This is an integrated Planning Report/Final Environmental Statement (PR/FES) on a proposal for the Bureau of Reclamation to significantly enhance the salmon and steelhead populations of the Rogue River in Oregon. This PR/FES presents the results of agency and public review of the Planning Report/Draft Environmental Statement (PR/DES). Revisions were made to correct errors in the PR/DES and to accommodate other comments; however, no changes were made in the facilities of either action alternative or the evaluation of those alternatives.

Development objectives of significantly improving anadromous fish passage and maintaining a water diversion for the Grants Pass Irrigation District located in Jackson and Josephine Counties severely limited the possible alternatives. The federally preferred alternative and the preferred alternative of fish and wildlife agencies is the pumping alternative. Major plan elements include (1) construction of two electric powered pumping plants, one on each side of the river near the site of the existing dam, with a total capacity of 150 cubic feet per second and (2) demolition of the existing dam and related facilities and disposal of the waste. It is also proposed that the existing debt to the Federal government for rehabilitation work on the dam be forgiven as the dam would no longer exist. The other viable alternative is to leave the dam in place and provide new fish passage and protective facilities that would meet current standards of the National Marine Fisheries Service. New hydraulic turbines, pumps, and discharge lines for the irrigation diversion would be installed with this alternative.

The PR/DES was released to the public on December 15, 1994, and a public hearing on the PR/DES was held on February 16, 1995, in Grants Pass, Oregon. A Federal decision on the proposed project will not be made until at least 30 days after the PR/FES is filed with the Environmental Protection Agency and a Notice of Availability” appears in the *Federal Register*.

For further information, please contact Robert J. Hamilton, Bureau of Reclamation, 1150 North Curtis Road, Boise, Idaho 83706-1234, or call (208) 378-5087.

Statement number: **95-34**

Filing date: **August 30, 1995**

MISSION STATEMENTS

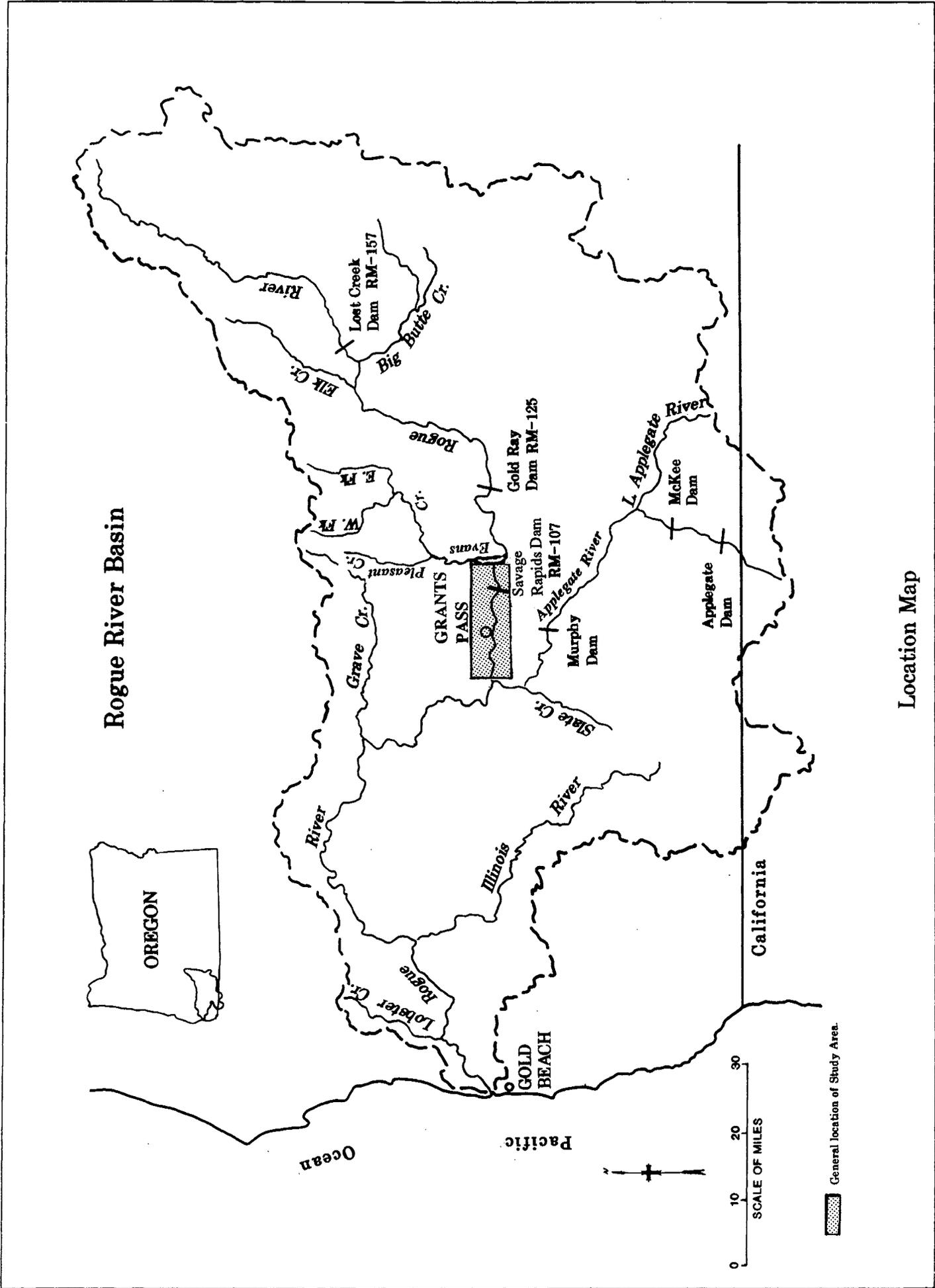
As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. Administration.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

THIS REPORT WAS PREPARED UNDER THE AUTHORITY OF THE FEASIBILITY STUDIES ACT OF DECEMBER 15, 1971 (P.L. 92-199), AND THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (P.L. 91-190, AS AMENDED). PUBLICATION OF THE FINDINGS OF THIS REPORT SHOULD NOT BE CONSTRUED AS REPRESENTING EITHER THE APPROVAL OR DISAPPROVAL OF THE COMMISSIONER OF THE BUREAU OF RECLAMATION OR THE SECRETARY OF THE INTERIOR. THE PURPOSE OF THIS REPORT IS TO PROVIDE INFORMATION AND ALTERNATIVES FOR FURTHER CONSIDERATION BY THE PUBLIC, BUREAU OF RECLAMATION, AND DEPARTMENT OF THE INTERIOR.

Abbreviations and Acronyms

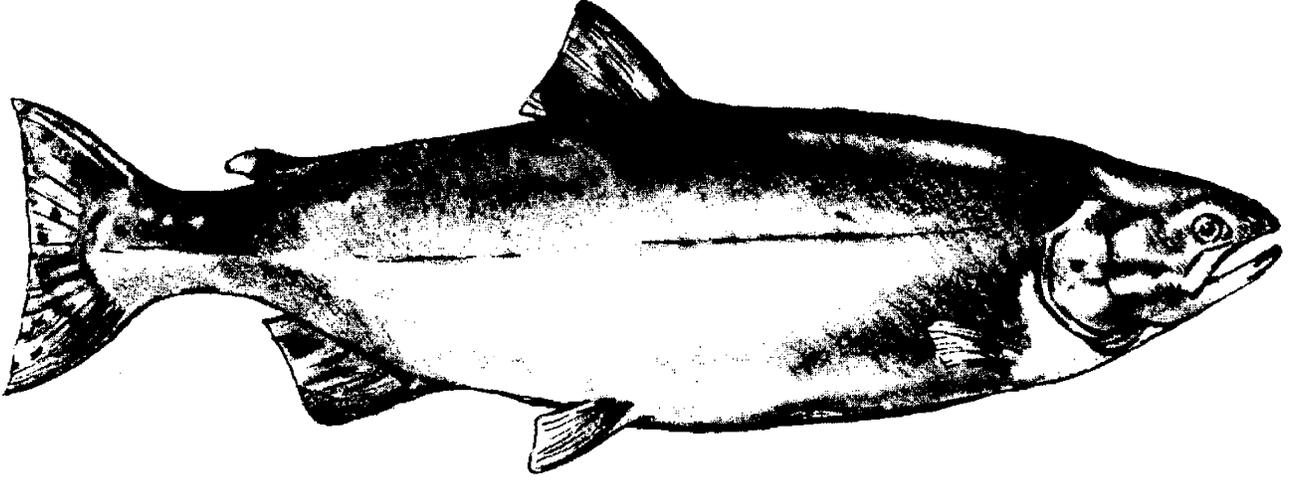
BLM	Bureau of Land Management
cfs	Cubic feet per second
Corps	U.S. Army Corps of Engineers
DNA	David J. Newton Associates, Inc.
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
GPID	Grants Pass Irrigation District
gpm	Gallons per minute
ITA	Indian Trust Asset
JCWMISS	Josephine County Water Management Improvement Study
kW	Kilowatt
kWh	Kilowatt-hours
NED	National Economic Development
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NRCS	Natural Resources Conservation Service
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
OMR&P	Operation, management, replacement, and power
OWRD	Oregon Water Resources Department
P.L.	Public Law
P&G	Economic and Environmental Principles and Guidelines for Water and Related Land Resource Implementation Studies
POC	Permit Oversight Committee
PR/ES	Planning report/environmental statement
Reclamation	Bureau of Reclamation
RED	Regional Economic Development
RM	River mile
RV	Recreational vehicle
SHPO	State Historical Preservation Officer
T&E	Threatened and endangered (species)
USFWS	U.S. Fish and Wildlife Service
°F	Degrees Fahrenheit



Rogue River Basin

Location Map

General location of Study Area.



Purpose, Scope, and Authority

Savage Rapids Dam is located on the Rogue River where the river crosses the Josephine/Jackson County line in southwestern Oregon State. The dam is the primary irrigation diversion facility of the Grants Pass Irrigation District (GPID).

The Bureau of Reclamation (Reclamation) initiated the Josephine County Water Management Improvement study in 1988 in response to requests of Josephine County and the GPID. The main objective of the study was to (1) identify a permanent solution to fish passage problems at Savage Rapids Dam and (2) help resolve conflicts over water uses in Josephine County.

The scope of this report is limited to fish passage concerns at the dam and the associated irrigation diversion facilities. Water management concerns, including improved management of irrigation and other water supplies through facilities improvement and water conservation, are addressed in a separate document prepared by a private consultant for the GPID. That document has been reviewed by the Oregon Water Resources Commission and any implementation of development options will be privately financed and funded. Implementation of those development options would constitute non-Federal cost share as defined by Federal policy.

In 1971, Reclamation was authorized by the Congress to conduct feasibility studies of fish passage and irrigation system improvements. Detailed studies of fish passage were completed in the 1970's, and interim fish passage improvements were made between 1977-1981. Studies of irrigation system improvements were deferred at that time because of costs and lack of interest. Additional fish passage improvements were deferred because of the uncertainty of potential hydropower development at the dam.

Authority to conduct this investigation is provided in Public Law 92-199, enacted December 15, 1971 (85 Stat. 664):

Need for Action

The Rogue River salmon and steelhead trout fisheries in southwest Oregon are nationally renowned for diversity and productivity, and the Rogue River supports the largest wild population of these anadromous salmonids in

SUMMARY

Oregon. Nonetheless, Pacific Northwest salmon and steelhead fisheries, including those of coastal streams, are severely depressed from historic levels. Some runs of salmon in the Pacific Northwest and California have been listed as threatened or endangered under the Endangered Species Act.

At the time of this writing, none of the anadromous fish in the Rogue River system were listed under the Endangered Species Act (ESA). However, on March 16, 1995, the National Marine Fisheries Service (NMFS) proposed the "Klamath Mountains Province Steelhead" (all steelhead stocks between Cape Blanco, Oregon and Cape Mendocino, California) for listing as threatened under the ESA. This includes the steelhead runs of the Rogue River. On July 19, 1995, NMFS proposed three distinct populations of Coho salmon (from the San Lorenzo River in California to the Columbia River) for listing as threatened under the ESA; this includes the coho run of the Rogue River. In addition, all other anadromous trout species of Oregon, Idaho, Washington, California, and Montana and Pacific salmon (sea-run cutthroat trout and pink, chum, sockeye, and chinook salmon) are currently the subject of comprehensive status reviews which are expected to be completed in 1995 and 1996. Depleted stocks of salmon, especially coho, prompted the Pacific Fishery Management Council to prohibit all ocean fishing for salmon in 1994 along the Washington and northern Oregon coasts and banned all fishing for coho. For 1995, coho fishing is again banned and ocean fishing for other salmon is open but the allowable catch is severely restricted compared to historic levels.

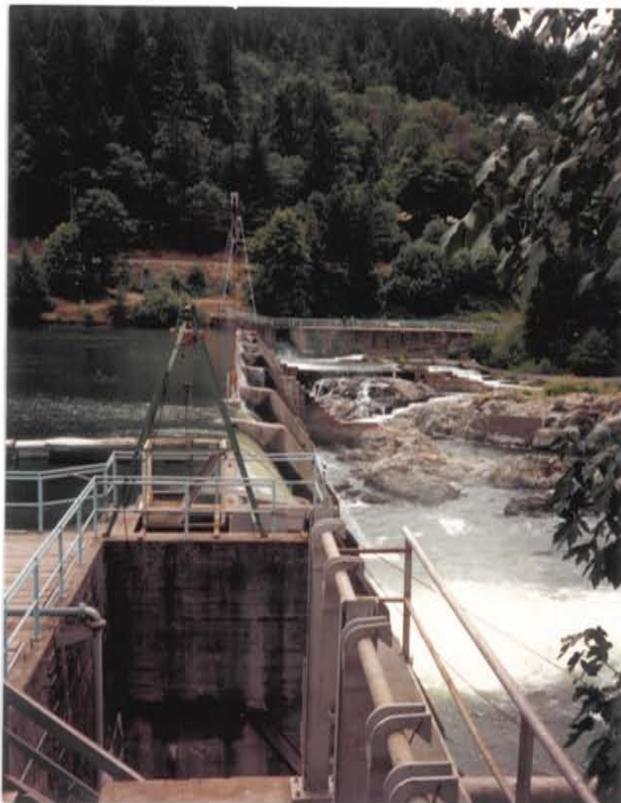
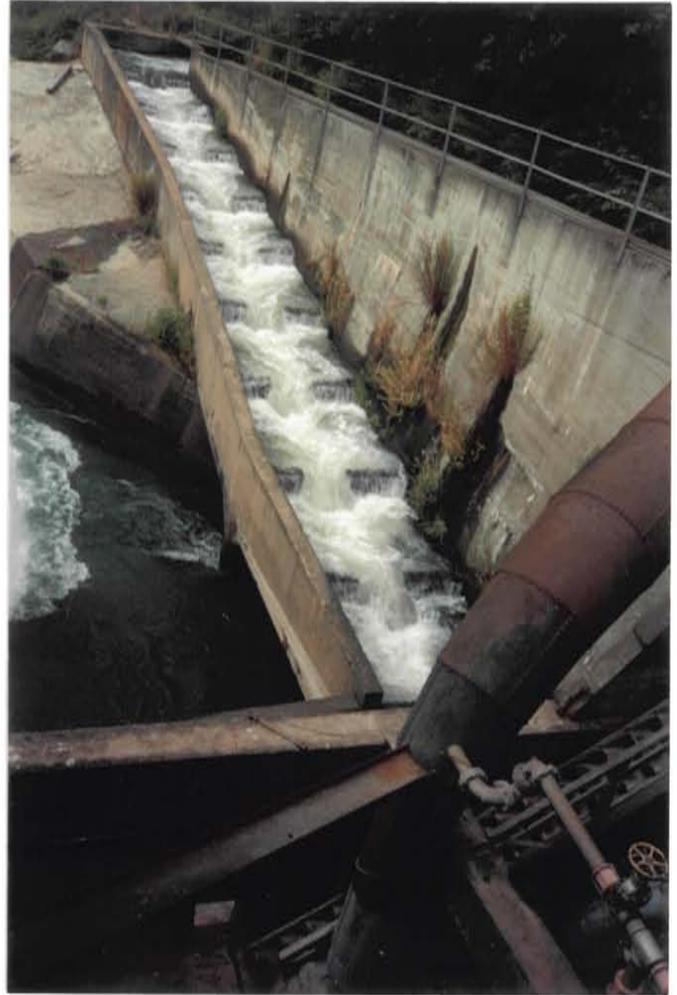
Fish passage at Savage Rapids Dam has been an issue since the dam was constructed in 1921 by the GPID. The concrete structure has a structural height of 39 feet, and a fish ladder was constructed on the north side at the time the dam was completed. A ladder on the south side was completed in 1934. Rotating fish screens were an initial part of the gravity diversion. Early attempts to screen the pumping diversion were unsuccessful, and this diversion remained essentially unscreened until 1958. Fish passage improvements made in the late 1970's have helped reduce losses, but fish passage problems continue. The existing fish screens do not meet current criteria of the NMFS.

Irrigation diversion and fish passage facilities are intimately related, and any change in facilities must consider both fish passage and irrigation diversions. The existing diversion facilities, including the hydraulically driven pumps, are old and nearing the end of their useful lives. These facilities are not capable of operating at the reduced rates expected to be required in the near future and need to be upgraded.



View of Savage Rapids Dam looking north from the left abutment (left).

The north fish ladder (below).



View of Savage Rapids Dam looking south from the right abutment (left).

Alternatives

Two permanent action alternatives were identified in the 1970's studies, and these were reviewed. Public involvement activities and consultation with Federal and State fish and wildlife and other agencies confirm that only two general concepts are viable. These concepts are: (1) construct electric pumping facilities and remove Savage Rapids Dam, and (2) retain Savage Rapids Dam and construct new fish passage and protective facilities to current standards and improve or replace irrigation diversion facilities for the long term. The concerns of most fishery, irrigation, recreation, and other interests are met by one of these alternatives.

Most of the fish and wildlife agencies and interests want the dam removed, and most GPID patrons appear to prefer the least cost alternative (Pumping Alternative). Some recreation and other interests and most residents that own land or businesses located along the shoreline of the seasonal reservoir formed by Savage Rapids Dam want to retain the dam and favor the Dam Retention Alternative.

Preferred Alternative (Pumping Alternative)

Environmental groups, the NMFS, the U.S. Fish and Wildlife Service (USFWS), and the Oregon Department of Fish and Wildlife support removal of Savage Rapids Dam. In January 1994, the GPID Board passed a motion to remove Savage Rapids Dam and replace it with pumping plants¹. Economic analysis indicates that the pumping alternative has greater net benefits and is, therefore, the federally Preferred Alternative².

On October 28, 1994, the Oregon Water Resources Commission, completed a review of the water conservation and fish passage plans recommended by GPID and accepted those plans. The Commission granted an extension of the temporary water permit until October 15, 1999. This permit is necessary to continue full service to GPID lands and the

¹The motion included several conditions, many relating to funding and financing the project (see Attachment E).

²The Water Resource Council's *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* requires Federal water agencies to select the plan with the ". . . greatest net economic benefits compatible with protecting the Nation's environment . . ." as the preferred alternative.

SUMMARY

extension is contingent on implementing the plan to resolve fish passage including removal of Savage Rapids Dam.

The Preferred Alternative would eliminate all salmon and steelhead fish passage problems at Savage Rapids Dam and would increase salmon and steelhead escapement at the site by about 22 percent. (Escapement is the number of adults that return to spawn.) This 22 percent increase amounts to 26,700 spawners¹ which would result in a harvest increase estimated at 87,900 fish (sport and commercial fisheries) with an annual monetary value of \$4,998,600. New electric pumping facilities would extend the life of GPID diversion facilities; however, a monetary irrigation benefit was not identified.

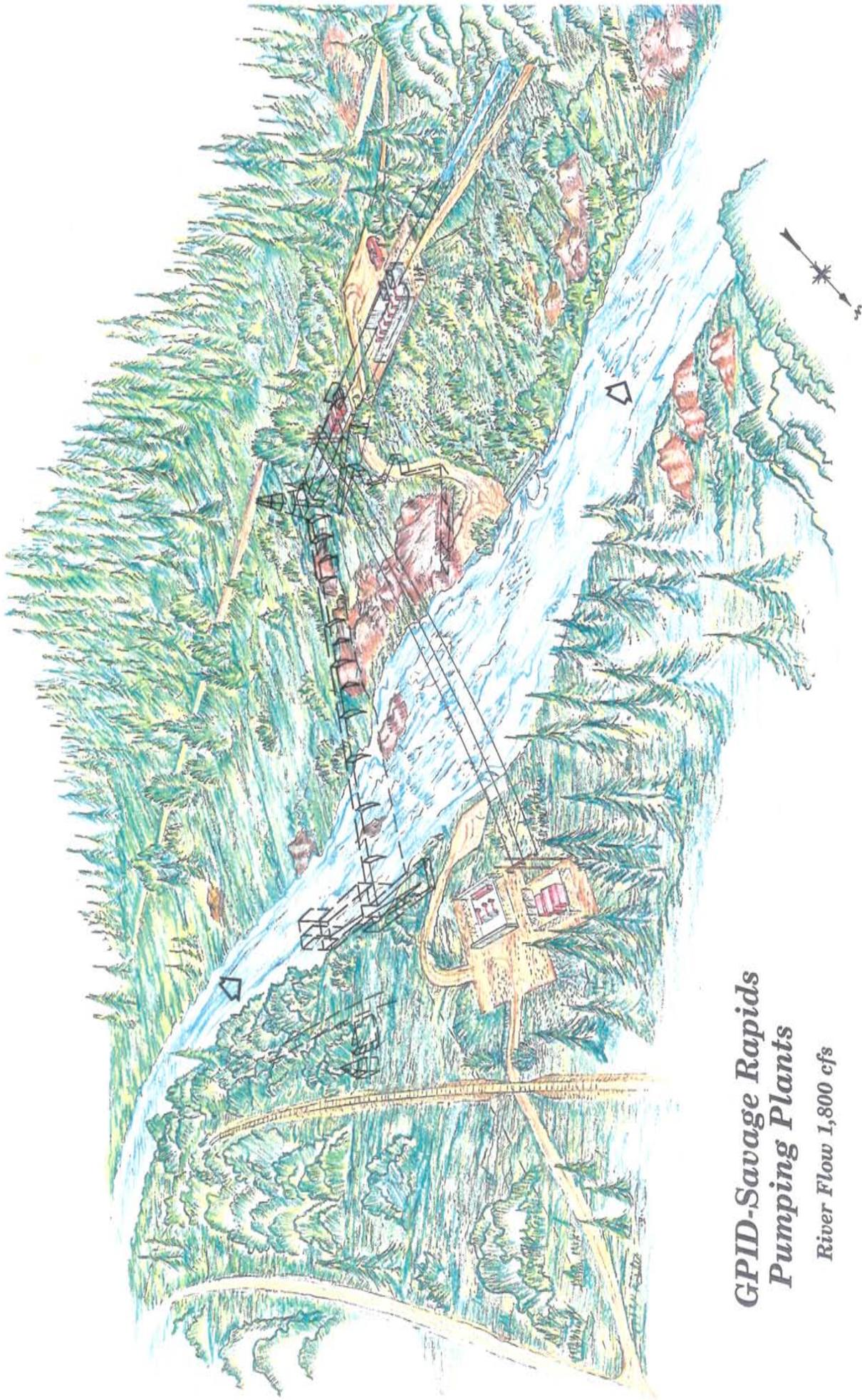
An electric powered pumping plant would be constructed on each bank just downstream from Savage Rapids Dam. Savage Rapids Dam and associated instream facilities would be removed (see artists conception - GPID Savage Rapids Pumping Plants). In addition, the remaining debt owed to the Federal Government for past construction on Savage Rapids Dam would be forgiven.

The north pumping plant would have a capacity of 32 cubic feet per second (cfs) and pump water to the existing Tokay Canal and Evans Creek Lateral. The south pumping plant would have a capacity of 118 cfs and pump water to the existing Savage Lateral, South Highline Canal, and Gravity Canal. Total diversion capacity of the pumping plants would be 150 cfs.

The outdoor type pumping plants would have vertical turbine pumps which operate in a wet sump. Noise abatement walls would surround the units and focus noise upward to reduce the noise level at the site and to help obscure the pumping plants from view. Electric power would be supplied to the plants from an existing 12-kilovolt distribution line on the south side of the river; an overhead powerline would extend from the south plant across the river to the north plant. Annual consumption of power is estimated at 5,675,800 kilowatt-hours (kWh).

Concrete box culverts that extend horizontally from the pumping plants to the river would carry water from the river to the pumping plant sumps. The box culverts at the river openings would be covered by vertical fish screens that meet current criteria; the screens would be protected by

¹The Oregon Department of Fish and Wildlife has recently estimated the escapement increase at 7,600-29,400 fish.



GPID-Savage Rapids Pumping Plants

River Flow 1,800 cfs

— Facilities to be removed

Artist concept does not show nearby residences.

trashracks. The vertical screens, which would be oriented essentially parallel to the riverflow, would be 4 feet high and 22 feet long for the north plant and 75 feet long for the south plant.

New discharge pipelines from the pumping plants to existing facilities would be buried and follow the alignment of existing pipelines to the extent possible.

Construction of the Preferred Alternative would take about 5 years. Actual construction would begin with the pumping plants and end with removal of Savage Rapids Dam. Instream construction would be timed and coordinated with Federal and State fish and wildlife agencies to have the minimum effect on salmon and steelhead migration.

Construction of the Preferred Alternative is estimated at \$11,205,000 based on January 1993 prices. The estimated project cost, which includes interest during construction (8 percent interest over a 5-year construction period) is estimated at \$13,255,000. Annual operating costs are estimated at \$233,700 and include \$192,600 for electric power. In addition, the debt associated with earlier modifications to Savage Rapids Dam (amounting to \$290,525 in 1994) would be forgiven.

The Preferred Alternative would eliminate the existing seasonal reservoir and change the environment of the river from the site of Savage Rapids Dam to the upper end of the reservoir (about 3.5 miles upstream). This reach would become a free-flowing river with the loss of 110 acres of seasonal flatwater and associated flatwater recreation. Landowners along the reservoir reach (essentially all of the land is privately owned) could be expected to extend their developments further toward the new high waterline. The seasonal view of a reservoir and recreation associated with the seasonal reservoir would be eliminated. Lost recreation opportunities associated with flatwater would be offset by increased opportunities associated with a stable riverine environment. It is not expected that the Preferred Alternative would have significant or measurable effects on the quantity of long-term recreation opportunities, land values, land use, or water quality.

For this analysis, all costs of the Preferred Alternative were assigned to an anadromous fishery function since (1) all of the identified monetary benefits¹ are associated with the anadromous fishery function and (2)

¹Although replacing old irrigation facilities with new facilities would have benefits, monetary irrigation benefits accruing with a 20-year period of analysis would be difficult to identify and would be minor.

SUMMARY

removal of the dam would require replacement of irrigation diversion facilities lost due to removal of the dam. It was assumed that, in accordance with past practices, all costs for the anadromous fishery function would be nonreimbursable (to be borne by the Federal Government).

Dam Retention Alternative

With the Dam Retention Alternative, Savage Rapids Dam would be retained but modifications would be made to the structure, equipment, and the river channel. Existing pumping facilities would be replaced with new facilities, including discharge lines, new fish ladders would replace the current north and south side facilities, and new fish screens would be provided at the pumping plant intake and at Gravity Canal.

This alternative was formulated because landowners along the seasonal reservoir and some long-time residents, business interests, and other interests prefer to retain, rather than remove, Savage Rapids Dam. This alternative was also formulated to test the relative economic and environmental impacts of retaining Savage Rapids Dam while improving fish passage. The Dam Retention Alternative, however, has higher construction costs than the Preferred Alternative, and GPID patrons appear unwilling to pay the additional cost of the Dam Retention Alternative.

The Dam Retention Alternative would eliminate most of the salmon and steelhead passage problems and increase salmon and steelhead fish escapement at the site by about 17 percent. The increased escapement of 20,700 spawners¹ would result in an increased sport and commercial fishery harvest of 69,100 fish with an annual monetary value of \$3,870,900. New pumping facilities would extend the life of GPID diversion facilities, but provide no monetary irrigation benefits.

The Dam Retention Alternative includes numerous modifications to Savage Rapids Dam, replacement of associated facilities and equipment, and changes to the river channel. The north and south fish ladders, fish screens, diversion turbines and pumps, discharge lines, and the radial gates and gate controls would be replaced. Bays 8 and 9 at the center of the dam would be modified to direct flows to a new plunge pool, and the river channel on the south side below the dam would be reshaped. A juvenile

¹The Oregon Department of Fish and Wildlife have recently provided new estimates that range from 5,400 to 29,400. They indicate that the 29,400 estimate is highly optimistic.

fish counting facility would be constructed and public access to the south fish ladder would be improved. In addition, numerous operation and maintenance deficiencies would be corrected.

The new fish ladders would be fully functional over the anticipated range of riverflows at full pool elevation and at the lowered pool elevation that is maintained between irrigation seasons. Fish ladder designs provide for improved attraction flows which, along with improvements to the river channel, would attract adult fish through the range of anticipated flows.

Vertical fish screens for the pumping diversion would consist of four units 8 feet wide by 32 feet high. Fish screens for the gravity diversion would consist of five rotary drum screens. New fish screens would have 1/8-inch clear openings and would be angled to provide an approach flow (right angle to screen) velocity of less than 0.4 feet per second. Sweeping flow (parallel to the screen surface) velocity would be twice that of the approach flow velocity.

Single-runner turbine units and single stage double-suction pumps would replace existing units and would supply a maximum of 32 cfs to the Tokay Canal and 59 cfs to the Highline Canal. New discharge pipelines, with the exception of the pipeline embedded in the dam, would be buried; the embedded pipeline would be rehabilitated.

Construction of the Dam Retention Alternative would take about 6 years. Actual construction would begin with the staged removal and replacement of the existing fish ladders so that one ladder would always be operational. Instream construction would be timed and coordinated with Federal and State fish and wildlife agencies to have the minimum effect on salmon and steelhead migration.

Construction of the Dam Retention Alternative is estimated at \$17,634,000 based on January 1993 prices. The project cost, assuming 8 percent interest over a 6-year construction period, is estimated at \$21,343,000. Annual operating costs are estimated at \$104,800.

For this analysis, all of the costs associated with fish passage, protection facilities, counting, and viewing were assigned to the anadromous fishery function and the remaining costs were assigned to the irrigation function. Capital costs assigned to the fishery function are \$14,786,000, and costs assigned to irrigation are \$2,848,000. It was assumed that all anadromous

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fishery costs would be nonreimbursable, to be borne by the Federal Government. It was further assumed that irrigation costs would be privately financed by GPID without cost to the Federal government.

No Action Alternative

The No Action Alternative is the best estimate of what would happen in the future if an action alternative is not implemented. The description of conditions that would exist with the No Action Alternative serves as the baseline for evaluating the effects of the action alternatives.

Due to uncertainties, several reasonable scenarios could be constructed. For this analysis, Reclamation assumed that GPID would continue to operate the current facilities, making repairs and replacements as needed and that salmon and steelhead losses at Savage Rapids Dam would continue at current or near current levels for up to 20 years. It is unlikely that these conditions would continue beyond a period of 20 years. At some time, the State or Federal government would intervene to mandate fish passage and protective improvements. The effect at that time on GPID and the community could be dramatic depending on the solution implemented. Because of these uncertainties, Reclamation's analysis of effects is based on a 20-year period instead of the 100-year project life normally used in Reclamation analyses.

Evaluation

Features, accomplishments, and monetary and other effects are summarized in the Summary Table. There are major differences in costs and monetary benefits between the two action alternatives:

- **Costs:** The construction cost of the Preferred Alternative is significantly less (about two-thirds) than that of the Dam Retention Alternative; \$11,205,000 compared to \$17,634,000. Comparisons of project costs and annual equivalent costs for the two alternatives are similar in that those for the Preferred Alternative are significantly less than those for the Dam Retention Alternative.

- **Fishery Benefits:** The annual benefits (after a 5-year period of build up) of the Preferred Alternative are significantly greater (1.29 times) than that of the Dam Retention Alternative; \$4,998,600 compared to \$3,870,900.

The benefit/cost ratio (annual equivalent benefits and costs using a discount rate of 8 percent over a 20-year period) of the Preferred Alternative is significantly greater than that of the Dam Retention Alternative; 3.2 to 1 compared to 1.7 to 1.

There is a significant difference between the two alternatives in financing and funding of the construction costs:

- **Preferred Alternative:** All construction costs would be nonreimbursable, i.e., financed and funded by the Federal Government.
- **Dam Retention Alternative:** In addition to construction costs financed and funded by the Federal Government, there would be \$2,848,000 of construction costs to be financed and funded by the GPID.

The action alternatives have significant environmental effects and differences in only two areas:

- **Fish:** The estimated increase in salmon and steelhead escapement is significantly greater for the Preferred Alternative; a 22 percent increase compared to a 17 percent increase for the Dam Retention Alternative.
- **Seasonal Reservoir:** The existing seasonal reservoir of 110 acres and associated flatwater recreation would be eliminated with the Preferred Alternative. This river reach would revert to a free flowing status with that visual aspect, and the area between the old high waterline and the new high waterline would slowly revegetate. It is anticipated that increased stream recreation would offset losses of flatwater recreation. With the Dam Retention Alternative, the seasonal operation of the reservoir would remain unchanged.

Based on the analysis of environmental impacts, there do not appear to be any other significant long-term environmental effects of either action alternative. Short-term environmental effects would be associated with the

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construction period but are not considered significant. The lack of significant environmental impacts is in part due to the fact that Savage Rapids Dam and the seasonal reservoir are located in an urban/suburban setting with highways along each side and a railroad along one side. All of the shoreline lands are privately owned, with many ownerships highly developed. As a result, human disturbance in the area is common at all times.

There are no Indian Trust Assets that would be affected by either action alternative. Neither of the action alternatives would have any effect on any river reach within the national Wild and Scenic River system. Neither of the action alternatives would have an adverse impact on minorities or low-income populations and communities.

Neither of the action alternatives are likely to adversely affect currently listed endangered or threatened species. However, there is potential for the listing of one or more Rogue River salmon or steelhead runs in the future. Both of the action alternatives would have a beneficial effect on salmon and steelhead through improved fish passage as described above and in the Summary Table.

The only irreversible and irretrievable commitment of resources is loss of 110 acres of seasonal flatwater and an annual electric power consumption of 5,675,800 kWh with the Preferred Alternative.

Features, accomplishments, costs and benefits, environmental effects, and other evaluations are summarized in the Summary Table on the following pages.

Summary Table

Item	Preferred Alternative	Dam Retention Alternative
Features		
Fishery	Remove Savage Rapids Dam.	Replace existing fish ladders and screens and radial gates. Modify dam crest, excavate new plunge pool, and reshape portions of the river channel. Construct fish counting facility and improve public access for viewing fish and improve safety.
Irrigation	Construct two electric pumping plants to replace those removed with the dam. Construct new supply lines from the pumping plants to the existing canals. ¹	Replace existing turbines and pumps. Replace existing pipelines from pumps to canals; rehabilitate line through the dam. Correct existing operation and maintenance deficiencies.
Accomplishments		
Fishery	22 percent increase in salmon and steelhead escapement (26,700 fish) with increased harvest of 87,900 fish.	17 percent increase in salmon and steelhead escapement (20,700 fish) with increased harvest of 69,100 fish.
Irrigation	Increased life of diversion facilities	Increased life of diversion facilities
Costs and Benefits		
Construction cost (January 1993 price level)	\$11,205,000	\$17,634,000
Federal investment (project cost) ²	\$13,255,000	\$21,343,000
Annual equivalent project cost ³	\$1,350,000	\$2,173,800
Annual operating costs	\$233,700	\$104,800
Total annual equivalent costs	\$1,583,700	\$2,278,600
Annual equivalent benefits ⁴	\$4,998,600	\$3,870,900
National economic development effects		
Benefit/cost ratio	3.2 to 1	1.7 to 1
Net annual benefits	\$3,414,900	\$1,592,300
Regional development effects		
Net short-term regional benefits	\$15,200,000	\$23,900,000
Net short-term employment	120 jobs	190 jobs
GPID construction cost	\$0	\$2,848,000

¹Irrigation is not considered a function of this alternative as the pumping plants are a replacement for facilities removed for fish passage. ²Includes construction cost and interest during construction at 8 percent. ³Based on a discount rate of 8 percent over a 20-year period. ⁴ Fishery benefits only; based on a discount rate of 8 percent, a 20-year period, and a 5-year build-up of benefits.

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Summary Table

Item	Preferred Alternative	Dam Retention Alternative
Environmental effects		
Ecological components	Major positive effect on salmon and steelhead. Loss of 110 acres of flatwater, replaced by a stable riverine aspect. Positive effect on aquatic insects and overall productivity and riparian vegetation of 3.5-mile reach of Rogue River upstream of Savage Rapids Dam. No measurable effect on wildlife.	Major positive effect on salmon and steelhead.
Physical components	Slight negative effect on air quality and water quality during construction. Increased noise levels during construction and small increase during operation.	Slight negative effect on air quality and water quality during construction. Increased noise level during construction.
Cultural components	No effect	No effect
Recreational components	Loss of 110 acres of flatwater recreation. Replaced with free flowing river recreation.	No effect.
Social well-being effects		
Community	Short term employment increase. Major improvement in salmon and steelhead sport fishery. Riverside landowners will lose a seasonal lake and gain a stable river environment.	Short term employment increase. Major improvement in salmon and steelhead sport fishery.
Health and safety	Eliminates flatwater boating hazards, increases whitewater boating hazards. Traffic hazards increased during construction.	Traffic hazards increased during construction.
Displacements	Changes in recreation and some businesses. Riverside property owners would lose seasonal lake recreation.	None
Energy	Increased energy usage (equivalent to needs of 380 households); not considered significant	None
Indian Trust Assets	None	None
Wild and Scenic Rivers	None	None

Conclusions

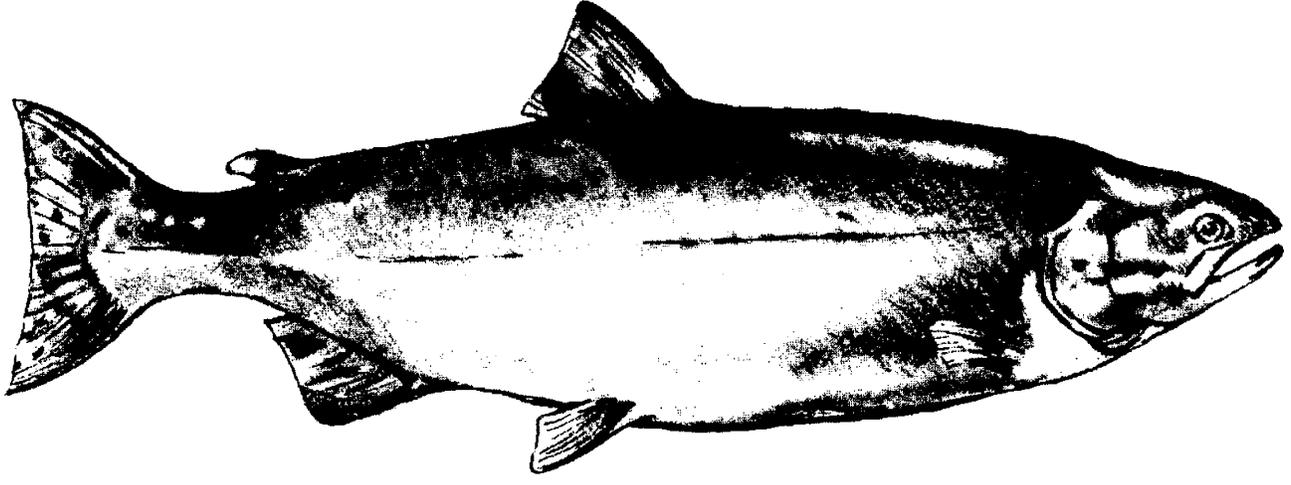
It is concluded that:

1. Fish passage and protective facilities at Savage Rapids Dam are inadequate and cause a large loss of salmon and steelhead production.
2. A Preferred Alternative (Pumping Alternative) which includes removal of the existing dam has been developed. In accordance with the Water Resource Council's Principles and Guidelines, this alternative provides the greatest net economic benefits consistent with protecting the Nation's environment. This alternative would eliminate all fish passage problems and provide optimum salmon and steelhead passage at the site.
3. The Preferred Alternative is fully compatible with the recommendations of the U.S. Fish and Wildlife Service and the Oregon Department of Fish and Wildlife.
4. A Dam Retention Alternative has been developed. This alternative would provide substantial improvement in fish passage and eliminate most loss of salmon and steelhead at the site.
5. The Preferred Alternative and the Dam Retention Alternative would have no adverse long-term effects. Neither of these alternatives would adversely affect Indian Trust Assets or affect any river reach included in the national system of Wild and Scenic Rivers.

Recommendations

Pending completion of ongoing State initiatives concerning Savage Rapids Dam, it is recommended that:

1. The Preferred Alternative be authorized under the provisions of the Federal Reclamation laws for construction by the Secretary of the Interior substantially in accordance with the plans of this report, with such modifications or additions as the Secretary may find necessary and desirable to carry out the purposes of the plan.
2. Construction costs of the Preferred Alternative be nonreimbursable; the purpose of the alternative is to benefit anadromous fish and irrigation facilities included in the plan are merely replacement for facilities lost through removal of the dam.
3. The Federal Government forgive the remaining debt owed to the United States by the Grants Pass Irrigation District for rehabilitation of facilities, recognizing that removal of the dam also removes the facilities associated with that debt.



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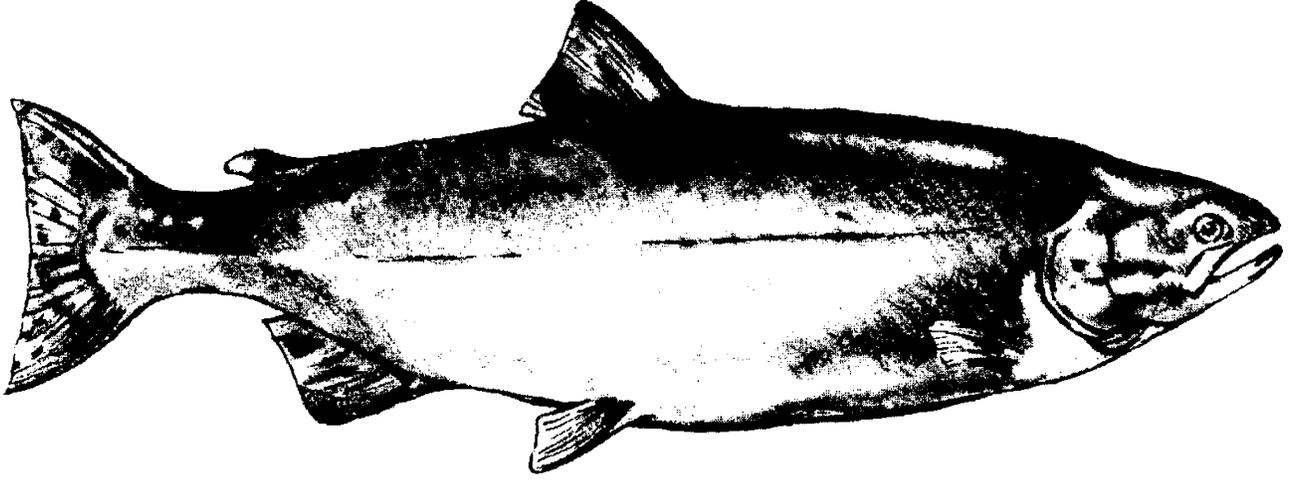
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Chapter I— Introduction

LOCATION

This planning report/environmental statement focuses on Savage Rapids Dam, located at river mile (RM) 107 on the Rogue River where it crosses the Josephine/Jackson County line about 5 miles east of the city of Grants Pass in southwest Oregon (see Location Map).

PURPOSE, SCOPE, AND OBJECTIVE

The Bureau of Reclamation (Reclamation) initiated the Josephine County Water Management Improvement Study (JCWMIS) in 1989 to (1) identify a permanent solution to fish passage problems at Savage Rapids Dam and (2) help resolve conflicting water issues in Josephine County, of which Grants Pass Irrigation District (GPID) is a major water user. These two issues are intimately related, especially where Savage Rapids Dam is concerned. However, it has been the intent throughout this study, to maintain a two pronged approach so that study delays in one area would not hold up study and report findings in the other area. This report addresses fish passage concerns only; irrigation diversion facilities are addressed to the extent that those facilities are related to fish passage facilities.

The JCWMIS developed and evaluated data at an appropriate level of detail to support a decision on future actions. This document summarizes the findings by presenting a description and analysis of alternatives which could permanently correct fish passage problems at Savage Rapids Dam and by evaluating the environmental impacts of those alternatives in accordance with the requirements of the National Environmental Policy Act (NEPA). This document may serve as the vehicle to request congressional authorization to implement a preferred fish passage plan.

AUTHORITY

Authority to conduct this investigation is provided in Public Law (P.L.) 92-199, 85 Statute 664 enacted December 15, 1971.

PREVIOUS INVESTIGATIONS

Prior to 1971, Reclamation's involvement with Savage Rapids Dam and the GPID was limited to congressionally authorized emergency repairs and various modifications to the dam in 1953-54 and in 1957-58.

In December 1971, Congress passed P.L. 92-199 which authorized the Secretary of the Interior to conduct a feasibility study of the Grants Pass Division, Rogue River Basin Project, Oregon. The Senate Committee report indicated that the study should include (1) a study of the fish passage at Savage Rapids Dam and (2) a study of the need to replace the existing distribution system of GPID.

Reclamation and the Bureau of Sport Fisheries and Wildlife (now the U.S. Fish and Wildlife Service (USFWS)) undertook the first phase of the study. Because of the immediate need to improve fish passage, the intent was to develop an interim solution to fish passage in the first phase and to consider all water related problems and integrate solutions with a permanent solution to fish passage problems in the second phase. The results of the first phase of the study were published in a special report in 1974. Congress authorized the measures proposed in the report and appropriated funds for construction in P.L. 93-493. The *Final Environmental Statement, Anadromous Fish Passage Improvements, Savage Rapids Dam, Rogue River Basin Project, Grants Pass Division-Oregon (INT-FES 76-26)* (Reclamation 1976) was completed and made available to the public on May 18, 1976.

Not all of the interim measures identified in the report were implemented. Some work was done on the south fish ladder, but a solicitation for bids to replace the north fish ladder received only one response and that bid exceeded available funds. In November 1979, it was decided to use the remaining funds to replace the north side fish screens, deferring further work on the fish ladders until a permanent resolution of the fish passage issue could be achieved.

A formulation working document (Reclamation 1979) provided some information on the second phase of the study. Following public review, it was concluded that prospects were poor for a Federal project to improve irrigation and that part of the study should be dropped. The fisheries part of the study, however, was continued until 1984 when further work was deferred because of uncertainty regarding potential development of hydropower at the dam. The State had passed a law in 1967 that did not

allow further diversion of water for hydropower generation on the Rogue River from river mile (RM) 157 to the mouth. However, there were efforts to amend the law to allow hydropower development at Savage Rapids Dam. A pending Federal Energy Regulatory Commission (FERC) application to develop a hydroelectric generating plant at the dam led fish passage planners to assume that the applicant would have to correct the fish passage problems within the requirements of the FERC license. Eventually it became clear that the State of Oregon would not amend existing legislation to allow hydropower development at the dam. This stopped the FERC application and provided impetus to proceed with finding a permanent solution to fish passage problems.

In early March and April of 1987, Josephine County, GPID, and the city of Grants Pass solicited the Commissioner of Reclamation and the Oregon congressional delegation to provide funds for Reclamation to reopen investigations authorized by P.L. 92-199. The Congress provided funding in fiscal year 1989 for the current investigation which was initiated at that time.

JOSEPHINE COUNTY WATER MANAGEMENT IMPROVEMENT STUDY (JCWMIS)

Two purposes were identified for the JCWMIS (1) resolution of fish passage problems at Savage Rapids Dam and (2) provide assistance in the development of a master water plan for Josephine County including GPID. Two events shifted the focus of the water management activities primarily to GPID facilities and water use. After a final proof survey reduced GPID water rights by about half and after a period of negotiation, the State of Oregon granted a temporary supplemental water right permit to GPID in 1990 (see attachment B). This permit required GPID to study and report on a wide range of water management options that nearly duplicated the water management focus of the JCWMIS. At the same time, budget problems caused Josephine County to limit participation in the study. A decision was made to report separately on the water management activities and the fish passage activities. Reclamation prepared and distributed a progress report on the fishery portion in May 1992 and a report on the water management portion in December 1992.

Early in the study GPID hired a consultant, David J. Newton Associates, Inc. (DNA), to help with the water management aspects of the study. As the JCWMIS progressed, the separation of the fish passage and water

management portions of the study became more distinct. Although Reclamation has provided technical help in both fish passage and water management efforts, GPID and DNA eventually became the focus for directing and reporting on the water management activities.

On January 5, 1994, the GPID Board voted to remove Savage Rapids Dam if certain conditions, mainly funding, could be met (see Attachment E). In March 1994, GPID and its consultant, DNA, submitted a water management plan (Newton 1994) to the Oregon Water Resources Commission which addresses each of the stipulations of its temporary permit, including proposed implementation of conservation measures. That report has been reviewed by the Oregon Water Resources Commission. It is anticipated that any water conservation/management options would be privately financed. Accordingly, Reclamation does not intend to prepare a report on water management options for consideration by Congress.

As a result, this document focuses exclusively on fish passage and the required facilities to maintain irrigation diversions and those study activities related to formulation and evaluation of the fish passage alternatives.

RELATED ACTIVITIES

There are serious concerns regarding the declining numbers of salmon and steelhead along the Pacific coast. Some runs of salmon are now listed as threatened or endangered under the Endangered Species Act (ESA). Most notable are the salmon runs in the Snake and Sacramento River systems. The potential exists for similar listings in the Rogue and other coastal rivers and for listing steelhead throughout its range.

Increasing concerns are being expressed by government agencies and environmental interests for preserving wild stocks in the Rogue River system. This has led to more stringent management of fishing opportunities including reductions and limitations on ocean harvest. As these activities increase and as concerns mount, the issue of fish passage at Savage Rapids Dam becomes more intense.

Federal

The U.S. Army Corps of Engineers (Corps) completed two dams and reservoirs on the Rogue River system, Lost Creek Dam (1977) and Applegate Dam (1980). A third structure, Elk Creek Dam, is

approximately 50 percent complete and underwent a court-ordered review to determine its future. This review was accomplished through a formal environmental impact analysis (Corps 1991). In a February 6, 1992, Record of Decision (Corps 1992), the Corps declared its decision to complete the dam and operate it strictly for flood control purposes under the "no conservation pool alternative," described in the supplemental Environmental Impact Statement (EIS). Court actions are still in progress and construction to complete the structure has not proceeded.

The completed Corps dams provide significant flood control in the Rogue River system, and Lost Creek Dam provides significant flow control of the Rogue River past Savage Rapids Dam.

State

State actions have a significant bearing on all future water management activities in the Rogue River basin.

Diack v. City of Portland

A 1988 State court ruling in *Diack v. City of Portland* proclaimed that no actions can be taken which affect the instream flow of those sections of Oregon's waterways which have been designated as wild and scenic. The Rogue River from its confluence with the Applegate River, just west of the city of Grants Pass, to Lobster Creek Bridge, 88 miles downstream, was included as a component of the national wild and scenic rivers system in 1968. In addition, the State has placed this reach within the State system of wild and scenic rivers. In response to the *Diack* decision, the State set standards of acceptable instream flows for the lower Rogue River (OWRD 1991b).

GPID Proof Survey

In 1982, the State completed a final proof survey of the water right permit issued to GPID. This is a process in perfecting a water right and is preparatory to issuing a water right certificate. Because GPID is now irrigating less than half the land claimed in its water right permit, the State issued a water right certificate for about 50 percent of GPID's historic diversion. GPID appealed, and in response, a temporary supplemental

water right permit was granted in April 1990 which allows additional diversion diversions until October 1, 1994. This permit was extended to October 15, 1999 (see attachment G).

This temporary permit carried several stipulations (see Attachment B). One of the stipulations was the formation of an oversight committee to advise and help the district comply with the other terms of the permit. The permit oversight committee (POC) consisted of representatives of GPID's board, non-voting GPID members, the city of Grants Pass, Josephine County, Oregon Water Resources Department (OWRD), the Oregon Department of Fish and Wildlife (ODFW), the Oregon Water Resources Commission, Natural Resources Conservation Service (NRCS)¹, Reclamation, and WaterWatch of Oregon.

Reclamation was asked by both GPID and the State to provide technical assistance in evaluating options for complying with the water permit requirement for improving fish passage at Savage Rapids Dam. Through this permit, Oregon has officially recognized Reclamation as a major participant in the effort to resolve fish passage problems at Savage Rapids Dam.

Flow Measurement

Effective December 31, 1991, OWRD no longer jointly funds the U.S. Geological Survey to measure riverflows and levels at 92 stations. This amounts to more than one-third of the approximately 250 measuring stations throughout the State. Responsibility for collecting data from these stations has now shifted to local water user entities including GPID.

Ballot Measure 5

On November 6, 1990, Oregon voters passed a property tax cutting plan known as "Ballot Measure 5." The effects of the measure are widespread as it effectively limits funding of State and local taxing entities. The measure has seriously affected irrigation districts by changing the rules and costs for "buy outs." Maintaining the financial integrity of such districts was previously accomplished by granting the districts the legal authority to prevent water users who had access to district water from buying out, or withdrawing, from the district. Under Measure 5, anyone can buy out of

¹Renamed from the former Soil Conservation Service

an irrigation district, and this introduces uncertainty into district management and budget processes. Since passage of the measure, over 200 patrons of GPID have bought out of the district.

County

The Josephine County Water Master's Office and GPID are cooperating in a surface water measurement study. Reclamation has supplied flow meters, measuring flumes, and water level recorders, while the district provides measurement flumes and has provided the staff for installation and monitoring within the general GPID service area. The Watermaster has helped with calibration of flow measurement devices.

Specific goals and policies of the county, which include zoning regulations to preserve agricultural land and the rural character of the county are outlined in the Josephine County Comprehensive Plan.

The Josephine County Water Resources Department sponsored a jointly funded study with the city of Grants Pass and Reclamation to ". . . clarify groundwater resources in the Grants Pass area . . ." Findings of a review were reported in 1991 (Haskett 1991), and on December 18, 1992, a contractor for the city and the county published the results of the investigation (Newton 1992).

Local

The city of Grants Pass is studying ways to rehabilitate streams passing through the city. The primary focus of its efforts has been Gilbert Creek, which receives supplemental flows from the GPID irrigation system. Restrictive zoning within the stream corridor and restoration of the streambank are activities now underway.

Grants Pass contracted with Brown & Caldwell, a consulting engineering firm, to provide a facilities plan for the city. Current emphasis is on the city's sewer treatment facilities with plans to upgrade and enlarge them within the next few years.

The city of Grants Pass and Josephine County have developed flood control plans which use GPID's distribution system to intercept and carry storm runoff. Most storms with the potential to cause flooding occur between irrigation seasons.

To enhance fish habitat, GPID and local interests have constructed flumes where the South Highline Canal crosses Fruitdale Creek, Allens Creek, and Sand Creek. The flumes were constructed over the creeks to separate canal flows from creek flows while providing an opportunity to release canal water into the creeks to enhance instream flow.

STUDY CONDUCT

Initial scoping for the JCWMIS began in 1988 and continued into 1989. A multidisciplinary planning team, appointed by Reclamation, met throughout 1989 with State, County, GPID and others in scoping activities and helping to identify tasks and roles. Because of changes in study participation and direction, the study was rescoped and some study roles changed in 1990.

Public involvement activities have been largely a local responsibility overseen by Reclamation. Initially, Josephine County developed an overall community involvement process in 1989 for use in developing the County master water plan. This formed the basis for public involvement, but most activities after 1990 were managed by GPID and its contractor, DNA.

The following, listed in alphabetical order, made significant contributions to the JCWMIS:

- City of Grants Pass
- Grants Pass Irrigation District
- Jackson County (Parks Department)
- Josephine County (Planning, Water Resources, and Parks Departments)
- National Marine Fisheries Service
- Oregon Department of Fish and Wildlife
- Oregon Water Resources Department
- Natural Resources Conservation Service
- U.S. Fish and Wildlife Service
- WaterWatch of Oregon

In addition to the entities listed above, environmental interests, citizens, and businesses of Josephine and Jackson Counties provided valuable assistance in the study. Additional information on public involvement is in Chapter VIII.

GPID OVERVIEW

Area

Savage Rapids Dam and the GPID service area are within the lower part of the middle Rogue River basin which includes most of Josephine County and a large part of Jackson County. The middle Rogue is surrounded by mountains, and more than three-fourths of the basin is forest or timberland. The Rogue River is a designated wild and scenic waterway from its junction with the Applegate River just west of Grants Pass downstream to Lobster Creek Bridge about 10 miles upstream from the mouth at the Pacific Ocean.

Nearly one-half of the total basin area and most of the basin population is contained in the central valley region. Medford, Oregon, the largest city in the region, is located about 30 miles southeast of Grants Pass. Because of this population concentration, most of the basin's economic development has also taken place within the central valley and is based on the lumber and wood products industries, agriculture, and recreation. Most of the usable land within the valley is well developed and fully utilized within the limits imposed by climatic conditions, soils, topographic features, and availability of water. Urban growth has significantly encroached on commercial agricultural land.

Climate

The area has generally mild, wet winters and hot, dry summers. The city of Grants Pass, located in the central valley, receives about 30 inches of precipitation annually, most of which falls during October through May. On the average only 2 inches of precipitation fall during June through September.

GPID Facilities¹

The GPID, organized in 1916, serves lands in Josephine and Jackson Counties (see Grants Pass Irrigation District map). The original projected service area included about 18,400 acres along Evans Creek and both sides of the Rogue River from the town of Rogue River to west of the city of Grants Pass. In the 1930's, the service area was cut to about 12,600 acres because the higher elevation lands were not economical to serve. Since that time, the service area has gradually declined to about 7,400 acres, largely because of residential and commercial encroachment. Under Reclamation's current land classification criteria, most of the service area, although arable, would now be classed as nonagricultural due to increased per unit service costs associated with many smaller land parcels.

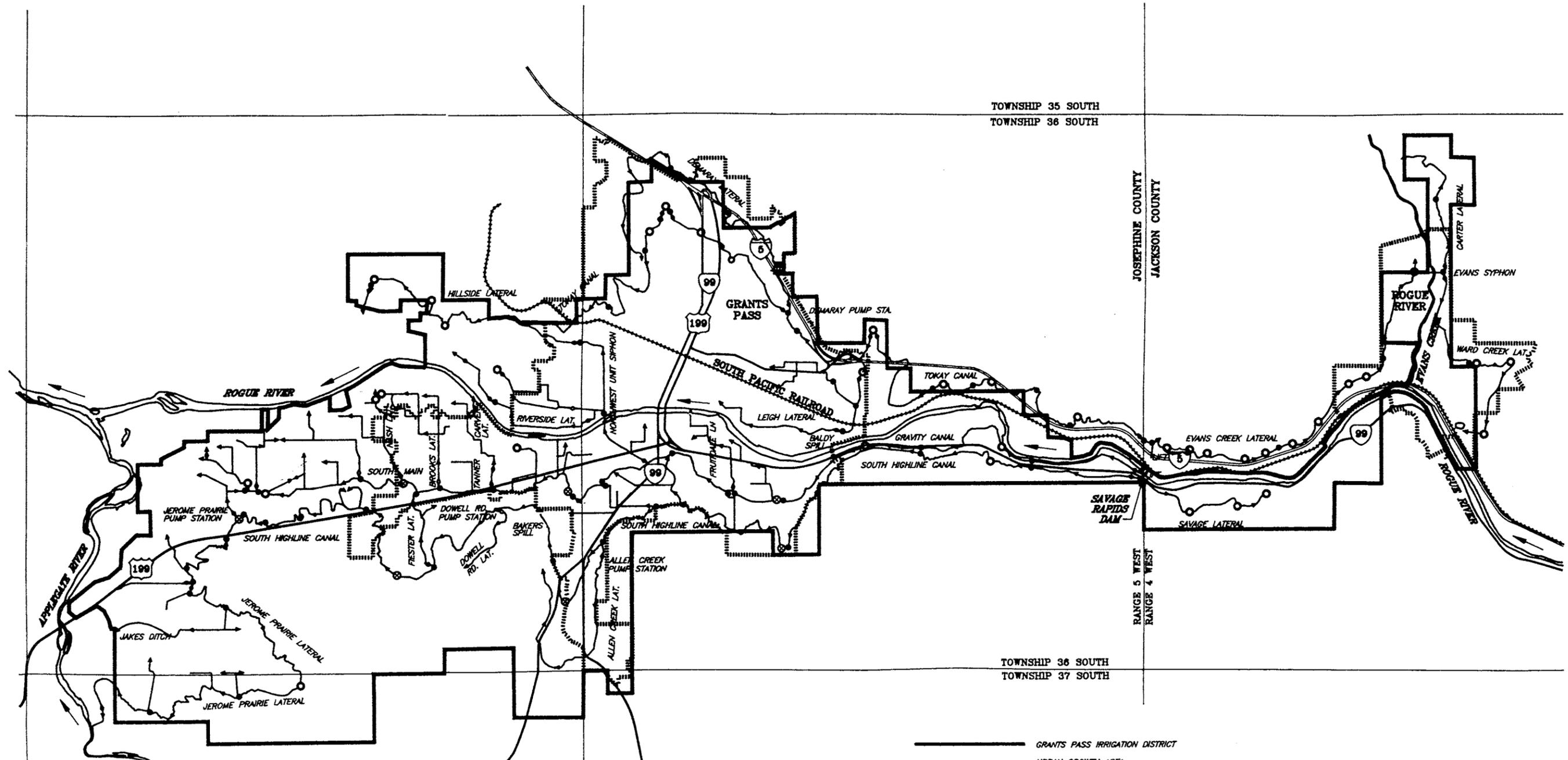
All of GPID's original facilities were privately constructed. Major facilities consist of Savage Rapids Dam, a main pumping plant consisting of three hydraulically-driven pumps located on the right abutment, nearly 160 miles of canals and four relift pumping plants. The district diverts about 180 cubic feet per second (cfs) of water from the forebay formed by the Savage Rapids Dam. About two-thirds of GPID's water supply is pumped from the Rogue River at Savage Rapids Dam into gravity canals using hydraulically powered pumps (GPID has a nonconsumptive right for about 800 cfs to power its turbine pumps). The remaining water supply is diverted to the Gravity Canal through headworks located on the left abutment of the dam.

In 1949, GPID enlisted Federal assistance for modifications to the dam and existing fish screens and for constructing a siphon under the Rogue River. The siphon was completed in 1950 and repair and rehabilitation work on the dam was completed in 1955. Fish passage improvements were made in the late 1970's. In 1990, GPID spent \$50,000 to repair the cableway. More repairs are likely in the near future.

Savage Rapids Dam

Savage Rapids Dam, completed in 1921, is a concrete structure 464 feet long, with a maximum height of 39 feet (see photo I-1). Features consist of the north fish ladder, a pumping plant, a 16-bay overflow spillway

¹Several conventions are used in describing facilities. Left and right always assume the observer is looking downstream. The downstream end of a fishway (fish ladder) is the entrance (where adult fish enter) and the upstream end is the exit (where adult fish exit).



TOWNSHIP 35 SOUTH
TOWNSHIP 36 SOUTH

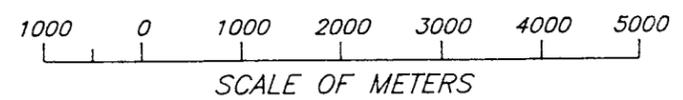
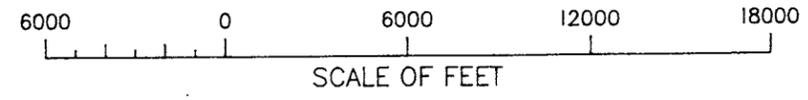
JOSEPHINE COUNTY
JACKSON COUNTY

TOWNSHIP 36 SOUTH
TOWNSHIP 37 SOUTH

RANGE 7 WEST
RANGE 6 WEST

RANGE 6 WEST
RANGE 5 WEST

RANGE 5 WEST
RANGE 4 WEST



- GRANTS PASS IRRIGATION DISTRICT
- ▬▬▬▬▬▬ URBAN GROWTH AREA
- ⊗ GAGED SPILLWAY - RETURN FLOW TO ROGUE RIVER
- UNGAGED SPILLWAY - RETURN FLOW TO ROGUE RIVER
- END OF CANAL SEGMENT
- ◆ MEASURING STATION
- ◆ MEASURING STATION NOT INSTALLED

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
JOSEPHINE COUNTY WATER MANAGEMENT IMPROVEMENT - OREGON
GRANTS PASS IRRIGATION DISTRICT

Used with permission of David J. Newton Associates Inc.

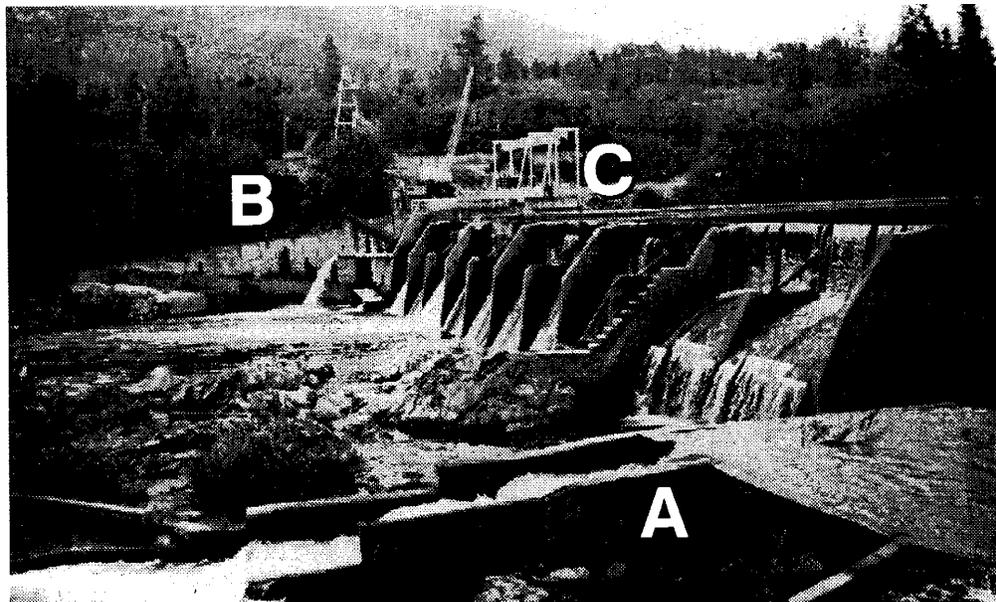
BOISE, IDAHO MAY 1992

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section, two radial gates at bays 10 and 11, the south fish ladder, and the Gravity Canal headworks.

The two existing 16-foot by 7-foot radial gates have a combined capacity of about 6,000 cfs. The radial gates are operated by hydraulic cylinders controlled remotely from the hoist house of the cableway. The radial gate bay structures have concrete flow shields over them to protect the gates from debris that might flow over the dam. These gates were rehabilitated in the 1950's and designed to last about 30 years. The radial gates are normally closed but are opened to lower the reservoir surface level.

At the beginning of the irrigation season, usually in late April, the radial gates are opened to lower the reservoir pool, allowing installation of the stoplogs. Three metal stoplogs are placed in each of the 16 bays to raise the reservoir water surface elevation 11 feet above the concrete crest of the dam to an elevation of 964 feet above mean sea level. Once this is done, the radial gates are partially closed to fill the reservoir without completely interrupting riverflow. Approximately 1,000 cfs are allowed to pass until the filling is completed and the fish ladders are functioning.



A - South fish ladder
 B - North fish ladder
 C - Support structure for bulkhead gates and fish screens of the pumping plant

Photo I-1--Savage Rapids Dam

The radial gates generally remain closed during the irrigation season and are opened in the fall to remove the stoplogs. After the stoplogs are removed, the radial gates are closed to maintain the reservoir level at the dam crest. This allows the south fish ladder to function during the winter months.

The reservoir is fully emptied or dewatered only when work is required on the radial gates, or when excessive sediment accumulation in front of the turbine-pump inlet must be removed mechanically.

Canals

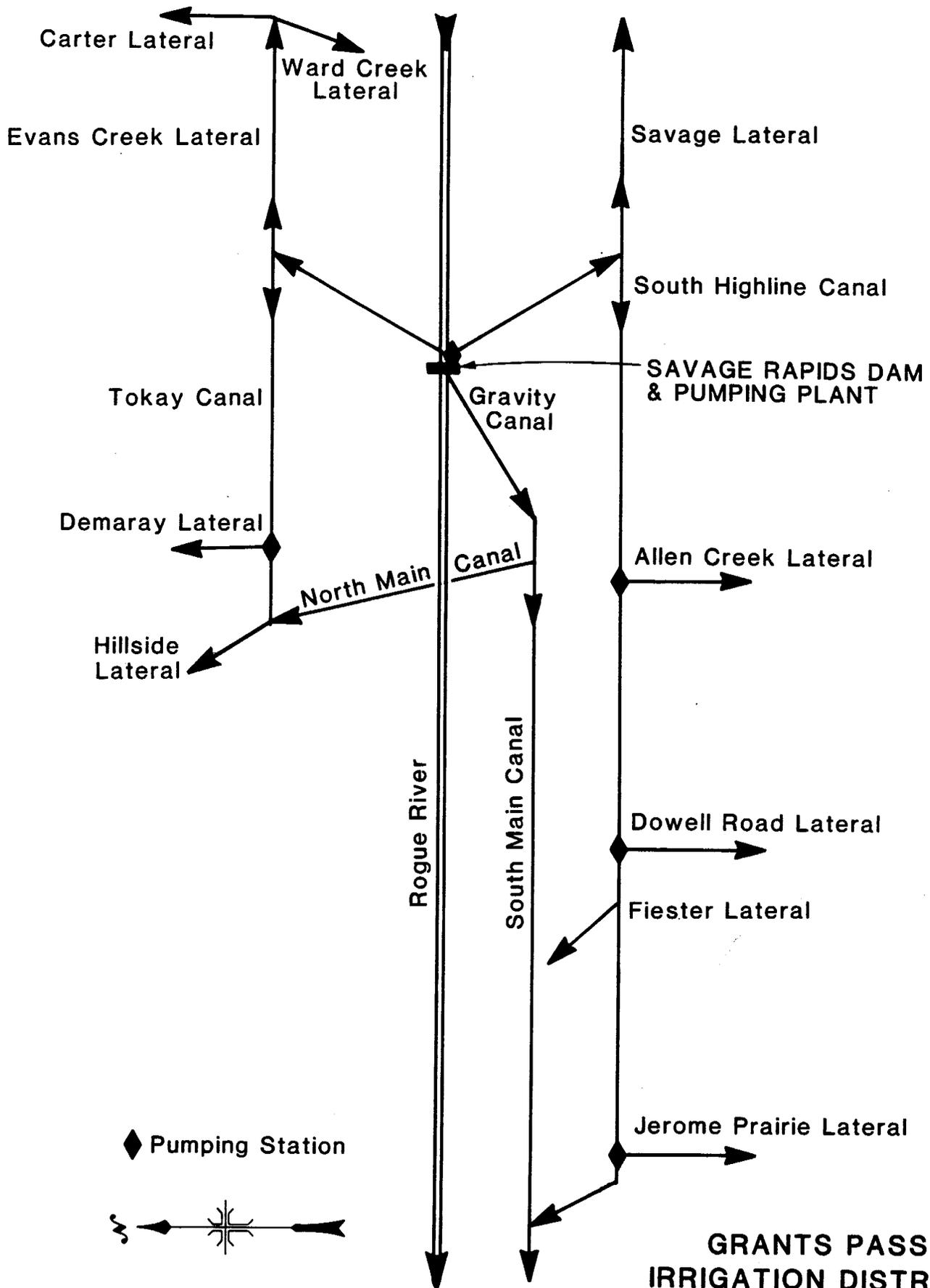
The main canals and laterals are South Highline Canal, Savage Lateral, Gravity Canal, Tokay Canal, and Evans Creek Lateral (see Grants Pass Irrigation District Schematic). Savage Lateral and Evans Creek Lateral carry water generally east into Jackson County, and the other canals carry water generally west into Josephine County. Gravity Canal serves the lowlands along the river on the south side of the river. Service to higher elevation lands on both sides of the river is provided by the other canals.

Gravity Diversion

The largest diversion (73 cfs) is through the headworks on the south side of the dam to Gravity Canal. Two slide gates control flows into the head of the canal.

Rotary Drum Screens

Two rotary-drum screens are located on Gravity Canal about 130 feet downstream from the headworks. Each screen is 5 feet in diameter by 8 feet long. A single paddle wheel provides the power to operate the two screen (see photo I-2).



**GRANTS PASS
IRRIGATION DISTRICT
SCHEMATIC**

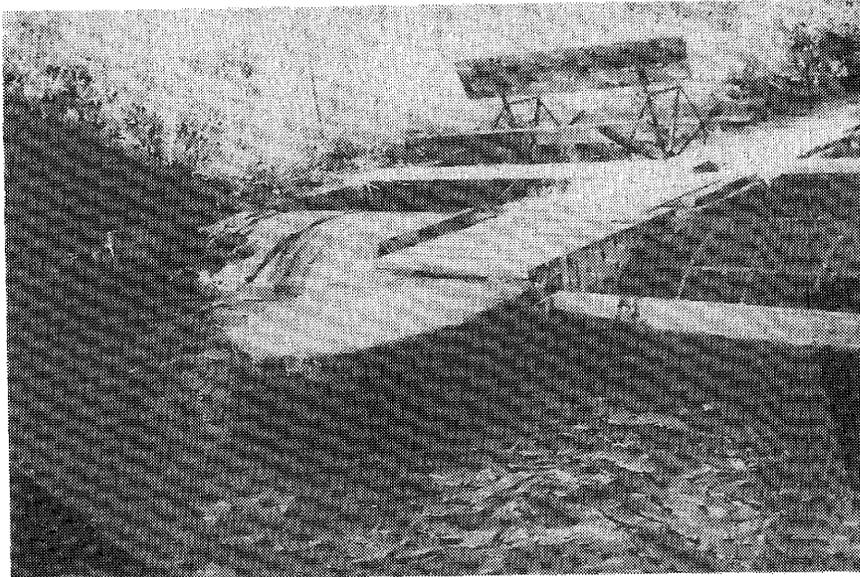


Photo I-2.—Gravity Canal rotary fish screen, partially closed for flow control by wooden stoplogs on the right side of the screen. The paddle wheel used to drive the rotating screens is also visible in the photo.

Pumping Operation

Pumping facilities, located at the right abutment (north side) of the dam, consist of two hydracone turbines and three centrifugal pumps. The turbines operate at a hydraulic head of 29 feet. The left turbine drives a centrifugal pump with a capacity of 67 cfs which lifts water 90 feet to a distribution box on the south side of the river (South Highline Canal). The right turbine drives two pumps, connected in series, which provides a capacity of 40 cfs to lift water 150 feet to the distribution box on the north side of the river (Tokay Canal).

The hydraulic turbines and pumps operate at full or nearly full capacity throughout the irrigation season. Curtain gates operated by an electric hoist provide some control of flow to the turbines and pumps.

Sediment Control

Four sluice gates at the turbine structure are used to flush sediment deposits which build up in front of the screen structure. The combined capacity of the sluice gates is 2,000 cfs.

Pumping Plant Fish Screens

Designed to prevent small fish from entering the turbines and pumps, the fish screen structure consists of two vertical traveling screens, 8 feet wide and 32 feet high. They do not meet current National Marine Fisheries Service (NMFS) criteria. These screens operate when the pumps and turbines are running during the irrigation season. In the past few years, the screens have been damaged twice, resulting in stoppage of irrigation deliveries for significant periods of time.

North Fish Ladder

Approximately 150 feet long, the north fish ladder is a concrete structure with rectangular pools 8 feet long and 9 feet wide. The entrance is located near the base of the dam next to the exit of the discharge flow of the turbines. The exit of the fish ladder is located adjacent to the intake of the pumping plant.

South Fish Ladder

Approximately 100 feet long, the south fish ladder is a concrete structure containing 10 pools (see photo I-3.) Several fish resting pools and attraction channels extend from the Rogue River to the fish ladder entrance at the base of the dam (see photo I-4.). The ladder is somewhat unusual in that the ladder exits to Gravity Canal rather than directly to the reservoir. Fish moving upstream in the fish ladder exit the ladder into Gravity Canal just upstream of the rotary fish screens and must continue upstream through the headgates of the canal to exit to the river.

The south fish ladder also serves as the conveyance for downstream migrants which enter the headworks of the Gravity Canal. At the rotary screens, the downstream migrants move to a bypass which empties into the fish ladder which passes the migrants on downstream.

Photo I-3.—Downstream view of south fish ladder.

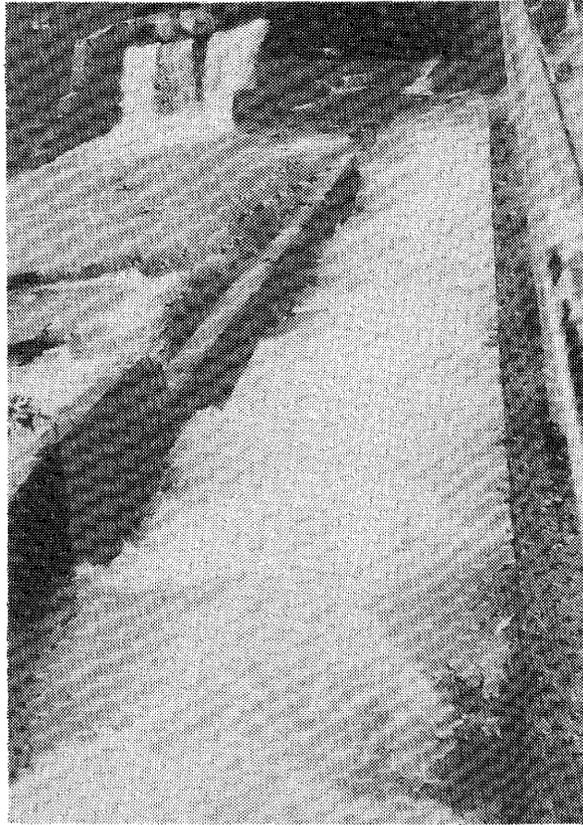
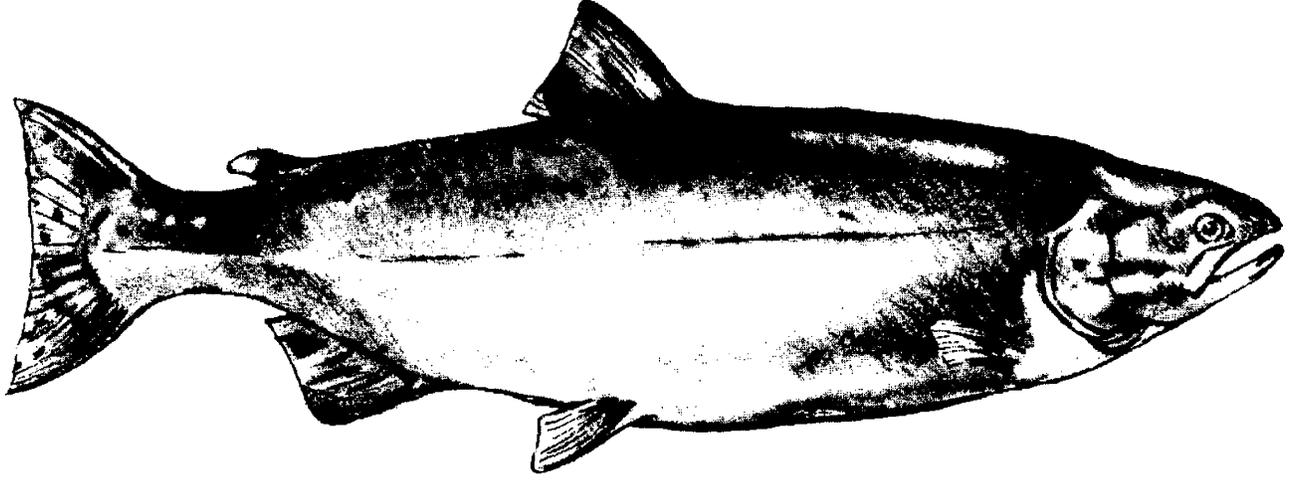


Photo I-4.—Fish resting pools at the downstream end of the south fish ladder.



Chapter II—Need for Action

INTRODUCTION

This document addresses and focuses on only one need—reduction of salmon and steelhead loss at Savage Rapids Dam.

There has been a longstanding recognition of fish passage problems at Savage Rapids Dam. Little was known about the specific needs of the various species migrating in the Rogue River at the time the dam and the first fish ladder were built. Consequently, fish passage was far from adequate. Mortality of upstream migrating adult fish and downstream migrating smolts was high. Smolts were especially vulnerable as they were swept through the operating turbines, swept over the top of the dam onto rocks and concrete below, or diverted into irrigation canals and open fields.

Concern for fish has resulted in a notable spirit of cooperation among Federal, State and local entities, organized fishing groups, and private citizens. Volunteers have spent many hours working with biologists, engineers, and construction workers to improve the fish passage facilities. All of these efforts have helped to reduce mortalities. But, there are still significant opportunities to further improve fish passage. Under ideal circumstances, state-of-the-art facilities are capable of passing almost 99 percent of the migrating fish and smolts.

FISH AS A NATIONAL RESOURCE

Water Resources Development Act

The Water Resources Development Act of 1986 (P. L. 99-662) provides a framework for interpreting the intent of Congress regarding national resources that might be associated with Federal water resource projects. Title 9, section 906e defines two categories of national resources:

- Those resources addressed by treaties of the United States, and
- Anadromous fish.

Anadromous fish found in the Pacific Ocean off the west coast of North America can travel great distances north and south from their streams of

origin. Because of the proximity of Canada and the United States, Canadian fish are often found in U.S. water and U.S. fish are often found in Canadian waters. Management of the Canadian harvest can be crucial to U.S. anadromous fish and vice versa. As a result, the anadromous fish found in these waters are the subject of a United States/Canadian fishing treaty.

The anadromous fish of the Rogue River fit both categories of national resources defined in P.L. 99-662. As a national resource, the anadromous fish of the Rogue River are worthy of every consideration to preserve and enhance their viability and to prevent them from becoming threatened or endangered.

Other Considerations

Poor fish passage at Savage Rapids Dam is only one of many factors that affect fish populations in the Rogue River. Most of the complex factors that affect salmon and steelhead populations are not within the purview of this study but should be recognized in any planning effort. These include fresh water habitat loss, forest management practices that may affect sedimentation or water temperatures, gravel mining, boating, passage at Gold Ray Dam and other upstream dams, harvest rates in fresh water and in the ocean, hybridization of wild and hatchery fish, predation, and general ocean conditions.

Considering the problems confronting salmon and steelhead in the Rogue River, a united front is needed to help protect and maintain the diversity and genetic integrity of the individual stocks of wild fish. Efforts to improve passage at Savage Rapids Dam will complement several region-wide conservation efforts to restore fish populations to sustainable levels. For example, on the Federal level, the President's Forest Plan of ecosystems management of forests within the range of the northern spotted owl will contribute to improved habitat conditions for fish as will the Fish and Wildlife Program of the Columbia River Basin under the Pacific Northwest Electric Power Planning and Conservation Act (P.L. 96-501). On the State level, Oregon has adopted model watershed restoration efforts for the Grande Ronde basin and the southern Oregon coast.

FISH PASSAGE

A detailed description of needs associated with fish passage at Savage Rapids Dam is presented in several documents (Reclamation 1974, 1976, and 1979 and USFWS 1990, 1994). That information is summarized here.

Fish Passage Construction History

The north fish ladder was completed was in 1921 at the same time as the dam was completed. The Oregon State Game Commission built the south fish ladder in 1934.

As early as 1928, recommendations for screening the turbines were submitted. Early attempts were not only expensive but failed to protect fish. Downstream migrating salmonids passed through turbines and pumps until 1958.

In 1941, State Game Commission field agents stressed the high priority of fish protection screens. Six years later, the commission began intensive investigations of fish losses. These investigations showed 14 to 38 percent mortality rates, depending on the size of the fish. The commission claimed a conservative estimate of 210,000 fish lost annually in the Tokay and South Highline Canals along with additional losses from injured fish passing through the hydraulic turbines.

Plans for a link-belt screen were completed in 1950 and incorporated in a 1951 Reclamation report (Reclamation 1951). However, the 82d Congress did not provide funds for fish screens. Construction of radial gates in 1954 required cofferdams to block and divert riverflow. This action blocked the spring chinook salmon run at the time. In addition, the base of the cofferdam remains in the river below the tailrace on the north side of the dam and maintains a pool level in the tailrace that is 24 inches too high for the entrance to the northside ladder. This combined with the 800-cfs discharge from the turbines which masks the north ladder entrance, results in an inadequate entrance attraction flow.

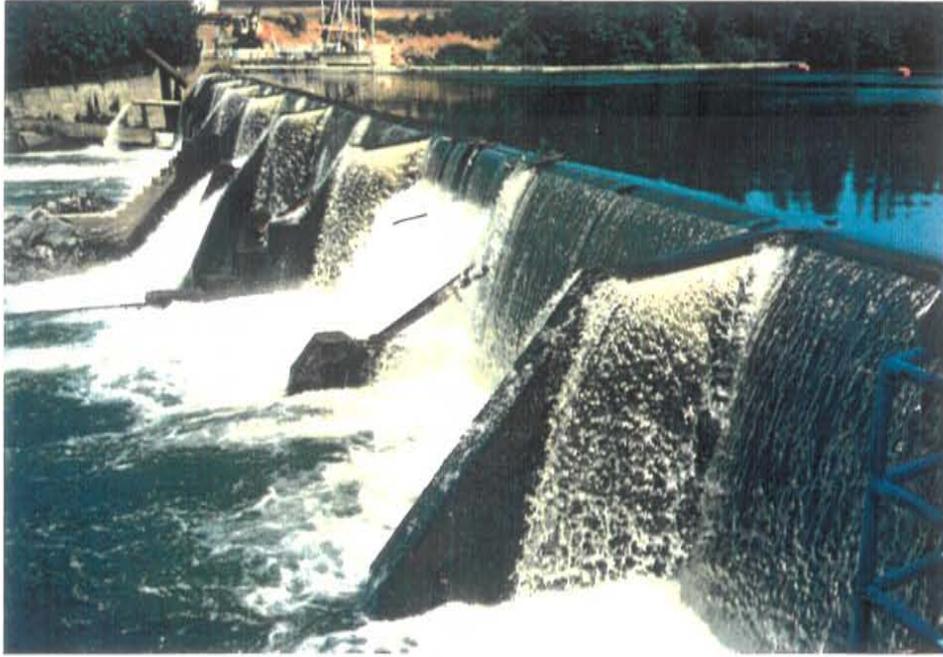
The 85th Congress appropriated \$208,000 (P.L. 85-641) on a nonreimbursable basis to construct and install vertical traveling screens on the previously unscreened hydraulic turbines. Reclamation completed this project in April 1958. Thus, the 1958 irrigation season marked the first time since 1921 that downstream migrants were protected from losses in the turbine and pumping system. Some gaps in the screen structure were discovered and filled late in 1958. However, fish passage problems still remained. The velocity of flows moving through the screens and into the turbine bays was too great for many of the smaller fish to resist. These migrants were impinged (pushed) against the upstream face of the screen and injured or killed. A 1960 investigation further revealed that numerous gaps in screen side seals caused turbulence and backflows in front of the side seals and next to the bypass ports, which attracted fish away from the bypass ports and through the side seal gaps where they were then flushed through the turbines, suffering high mortality rates.

In 1971-73, Reclamation studied interim fish passage improvements. Congress authorized these interim improvements in 1974. In 1976, the final environmental statement (Reclamation 1976) for these interim improvements was filed with the Environmental Protection Agency (EPA). Some of these improvements, including new bulkhead gates, modifications on the south fishway, and new fish screens, were completed in 1981. In 1984, the fisheries study was deferred due to uncertain hydropower development on the Rogue River.

In 1986, minor modifications were made to the south fish ladder by local fishery groups under the overview of ODFW.

Migration Losses

By the mid-1960's, and after 19 years of investigation, ODFW became convinced that Savage Rapids Dam caused more fish passage damage than any other single factor on the Rogue River. Fish counting data resulted in the determination that runs using the river above Savage Rapids Dam declined, while runs below the dam increased. In 1981, the USFWS estimated that elimination of all fish passage losses at Savage Rapids Dam would result in a 22 percent increase in fish escapement at the site. The USFWS considers that estimate to be still valid today.



View of Savage Rapids Dam looking north at full pool elevation with flow over the crest.



View of Gravity Canal showing rotary drum fish screens.

Upstream Migration

Other than removing the dam, fish ladders are the only practical solution to provide a way for anadromous fish to continue their upstream migration. However, at present, the fish ladders do not function through a wide enough range of flows and conditions to adequately accommodate the year-round migration of several anadromous fish species.

North Fish Ladder.—The north fish ladder operates only during the irrigation season and is generally inadequate. Few fish use it due to insufficient attraction flows, improper entrance location, inability to control flows in the ladder, sediment and debris in the ladder, and shallow pool depth. Turbulence caused by discharge flows of about 800 cfs from the turbines occurs next to and under the ladder entrance and masks the ladder attraction flows.

South Fish Ladder.—The south fish ladder is a combination of pools and a fish ladder. This fishway is the primary anadromous fish path over the dam. Regulation of flows in the ladder is difficult, which causes passage conditions to vary greatly with fluctuating water levels in the river. Flows which exceed the capacity of the fishway overtop the walls and pour into an area of irregular rock outcropping containing willows and debris. Fish entering the fishway at high flows may become stranded in this area when flows decrease. Fish entering at low flows may have to jump as much as 3 feet vertically to enter some sections of the ladder. Constant attention is required to assure fish passage over the dam. Given the available personnel and operating practices at the dam, this level of close monitoring is not always feasible.

The reservoir is drawn down in the spring and fall to accommodate installing and removing stoplogs, flushing sediment from the turbine/pump intake area, and general maintenance activities. These operations tend to delay upstream migration for varying lengths of time because the south fish ladder is dewatered when the reservoir is lowered.

Radial Gates.—The radial gates in the dam are normally raised for a few days in April and again in October to install and remove the stop logs (raise or lower the reservoir surface level). GPID works with ODFW to time these events to the extent possible to minimize adverse fishery impacts. Salmon cannot swim against a velocity greater than 10 feet per second which is exceeded at the radial gates whenever the riverflow exceeds 2,000 cfs. Since the completion of Lost Creek Dam by the Corps, the flow in the river drops below 2,000 cfs only during the driest months

of the year, July-October, or during droughts. Thus, salmon cannot swim upstream through the open radial gates during the April maintenance period. A flow duration analysis indicates that riverflow exceeds 2,000 cfs about 25 percent of the time in October when the gates are opened to remove the stoplogs. Thus, the upstream passage through the radial gates is minor.

Downstream Migration

Loss of juvenile fish is a major concern at Savage Rapids Dam, aggravated by the fact that downstream migration peaks in the middle of the irrigation season. Earlier investigations by ODFW found that the highest mortality rates were associated with fish ranging from 4 to 8 inches long. Sample counts showed 38,000 fish lost in July 1959 alone, and that up to 10 percent of juvenile salmon and steelhead were impinged. Attempts to reduce losses by plugging some bypass ports to generate a stronger current toward the remaining bypass ports generally failed; fish impingement losses remained unchanged. New traveling screens in the 1970's helped reduce losses due to poor screens but the impingement problems remain uncorrected and these losses continue. Current downstream losses at the site are due to the following:

- Impingement on the traveling screens when the turbines are operating. There are annual losses of significant numbers of fingerlings and smolts, primarily spring chinook. This occurs because the large volume of water required by the turbines and pumps creates a flow velocity through the screens that is too great for small fish to overcome.
- Impingement on the rotary screens of the Gravity Canal. The flow velocities in the Gravity Canal system often cause juvenile fish to impinge on the rotary fish screens.
- Fish screens malfunctioning or are damaged. Although not a frequent occurrence, the loss of fingerlings and smolts can be quite high before the diversion can be stopped, and losses are reminiscent of the losses that occurred before screens were installed and:

- Fish were pumped or diverted into irrigation canals and diverted out to fields or trapped at the end of the canal. When fish are diverted into the canal system, it is nearly impossible for them to escape back to the Rogue River.
- Fish were damaged by the turbines.
- Rapid release of pressure in the turbine and pumping systems cause internal hemorrhages. (Fish losses stemming from pressure hemorrhaging cannot be estimated, and these fish are not counted in total fish losses.)
- Juvenile fish pass over the dam and strike the sill at the bottom of the spillway.
- Predation. Juvenile fish, especially the smaller fry, are particularly vulnerable to predation when their downstream migration is slowed while passing through the slower moving water of the reservoir.

ENDANGERED SPECIES

At the time of this writing, none of the anadromous fish in the Rogue River system were listed as threatened or endangered under the ESA. However, on March 16, 1995, NMFS proposed the “Klamath Mountains Province Steelhead” (all steelhead stocks between Cape Blanco, Oregon and Cape Mendocino, California) for listing as threatened under the ESA. This proposal to list includes all steelhead runs in the Rogue River. On July 19, 1995, NMFS proposed three distinct populations of Coho salmon (from the San Lorenzo River in California to the Columbia River) for listing as threatened under the ESA; this includes the coho run of the Rogue River. In addition, all other anadromous trout species and Pacific salmon of Oregon, Idaho, Washington, California, and Montana (sea-run cutthroat trout and pink, chum, sockeye, and chinook salmon) are currently the subject of comprehensive status reviews. These are expected to be completed in 1995 and 1996.

The seriousness of depleted stocks of salmon, especially coho, prompted the Pacific Fishery Management Council to prohibit all ocean fishing for salmon in 1994 along the Washington and northern Oregon coasts and banned all fishing for coho. For 1995, coho fishing is again banned and ocean fishing for other salmon is open but the allowable catch is severely restricted compared to historic levels. Under these circumstances, any action available to enhance salmon and steelhead populations should be given serious consideration.

SUMMARY

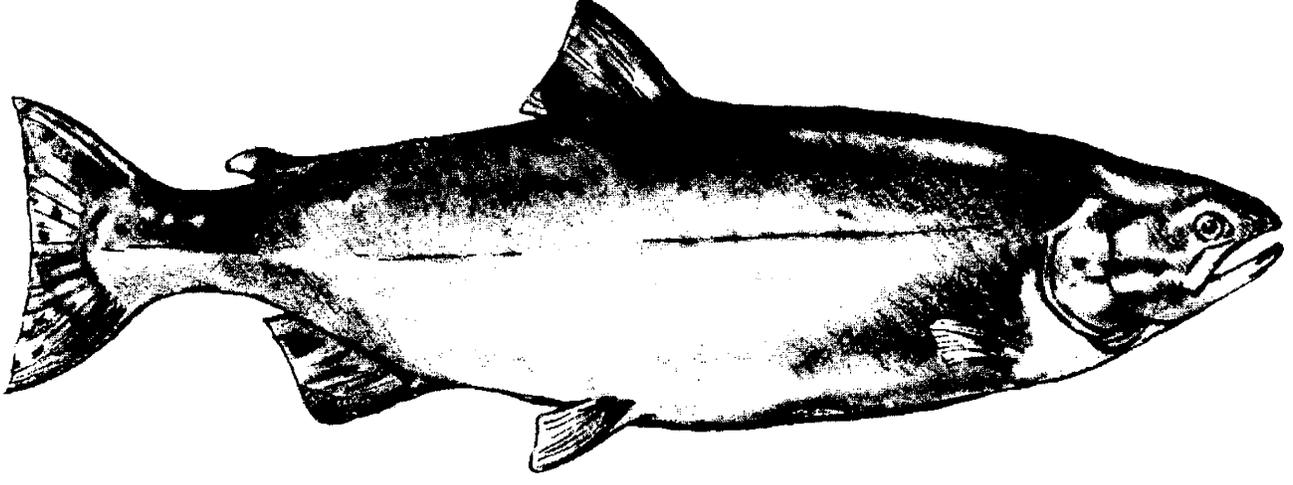
Savage Rapids Dam continues to be a major impediment to salmon and steelhead in the Rogue River basin. The significant fish losses mean that the full potential of basin production is not being realized. The existing fish passage facilities are inadequate, especially considering the dam's location on a major migration route. Table II-1 summarizes the continuing problems at Savage Rapids Dam.

The need for improving fish passage and reducing fish losses at Savage Rapids Dam is recognized by essentially all sectors of the public.

Table II-1.—Fish passage problems at Savage Rapids Dam
[Source: USFWS Planning Aid Memorandum, April 1990]

Item	Problem
1.	Poor regulation of flows in the south ladder.
2.	Unfavorable entrance to and exit conditions from the south ladder under all flows, i.e., ladder now exits through canal headworks; at high flows fish approach through channel behind ladder towards shore, and at low flows, fish may have to jump to enter some sections of ladder, etc.
3.	Poor attraction flows result in marginal use of the north ladder during operation.
4.	North ladder does not operate between irrigation seasons.
5.	Drawdown of the reservoir (after irrigation the season) dewateres the south ladder delaying upstream migration.
6.	Reservoir dewatering for removal or addition of stoplogs causes increased turbidity during fall and spring.
7.	Impingement of juvenile fish on screens.
8.	Increased trash and vegetation buildup because of flow regulation with Lost Creek Project or people dumping debris into Savage Rapids reservoir.
9.	Loss of juvenile fish and steelhead kelt ¹ that pass over the dam and strike the sill or rocks below.
10.	Smolt losses due to pressure changes when the sluice gates are opened and the reservoir is at full pool.

¹A kelt is an adult steelhead that returns to the ocean after spawning.



DESCRIPTION

This chapter discusses the Preferred Alternative (Pumping Alternative) to resolve fish passage problems at Savage Rapids Dam.

The Pumping Alternative maximizes net national economic benefits as defined by Federal water project guidelines (Water Resources Council 1983). These guidelines generally require that Federal agencies recommend the alternative plan with the greatest net economic benefits; therefore, the Pumping Alternative is the Federally preferred alternative. State and Federal fish and wildlife agencies have indicated that the Pumping Alternative is their choice (see Attachments C and D). In January 1994, the GPID announced that it concurred and selected the Pumping Alternative as their preferred alternative (see Attachment E).

The Preferred Alternative consists of three parts: (1) replacement of GPID pumping and diversion facilities at the dam with two new pumping plants, one each on the north and south sides of the river; (2) removal of the dam and appurtenant structures and restoration of the site, and (3) forgiveness of the remaining debt to the Federal Government amounting to \$290,525 as of 1994. (See Summary for an artist's conception of the pumping plants and associated facilities including service road access to the river inlets.)

ACCOMPLISHMENTS

The Preferred Alternative focuses on the area just downstream from Savage Rapids Dam upstream to the city of Rogue River (about 3.5 miles upstream). The accomplishments are confined to (1) fish passage improvement, (2) reestablishment of a free-flowing reach of river, and (3) extension of the useful life of irrigation diversion facilities. In addition, there would be minor changes in wildlife habitat, vegetation, recreation, and social and economic activities associated with that river reach, and there would be temporary adverse effects associated with construction.

With the Preferred Alternative, salmon and steelhead escapement¹ past Savage Rapids Dam would increase by about 22 percent. For this analysis, Reclamation is using the USFWS estimate that the increased escapement would be 26,700 salmon and steelhead and the accompanying increase in

¹Fish escapement is the number of adult fish successfully returning to spawn.

harvest would be about 87,900 fish. A 1981 study by the USFWS (USFWS 1981) estimated that if all fish passage problems at Savage Rapids Dam were eliminated, salmon and steelhead escapement past the dam would increase by 26,700 fish, about 22 percent of the estimated total escapement at that time of 120,500 adult salmon and steelhead.

Because of criticism that the 1981 estimates were outdated, the ODFW recently undertook an analysis of potential anadromous fish escapement with the Preferred Alternative. This analysis is based on more recent efforts to model fish mortality associated with the dam and uses updated information on life cycle and abundance of the fish species. The ODFW analysis includes high, medium, and low estimates of increased anadromous fish escapement; the results range from a low of 7,624 fish to a high of 29,407 fish (see attachment D). Since the 1981 estimate falls within this range, Reclamation did not recalculate monetary benefits which are based on the 1981 estimate in this report. (See chapter VI for detailed discussion of fish passage and losses.)

The Rogue River from the site of the existing Savage Rapids Dam to the upper reach of the impoundment would be restored to a natural free-flowing, unobstructed river. This would provide additional spawning habitat for fall chinook salmon, eliminate impediment to fish movement, eliminate the current loss of anadromous fish due to passage problems, and benefit resident fish which would be free to move up and down the river to find suitable habitat as flow conditions change.

Removal of the dam and associated facilities eliminates the physical capability for gravity diversion and hydraulic power to drive pumps for irrigation diversions. Existing irrigation diversion facilities are replaced by construction of new electric pumping facilities which will provide a useful life of more than 50 years.

This alternative does not affect water rights, amount and timing of water diversions, annual river flow, ground water, or other natural resources and uses other than those identified above.

FACILITIES

Designs for the Preferred Alternative were made during the course of this study which was initiated in 1989. These designs are adequate for authorization but not for specifications or construction. Final designs would be completed in consultation with NMFS, USFWS, and ODFW during preconstruction.

Pumping Plants

Two pumping plants, one on the right or north bank and one on the left or south bank, would be constructed to provide a total pumping capacity of 150 cfs. Except for the intake, all facilities would be constructed above the 100-year flood level. Drawings 1313-D-1 and 1313-D-2 show the facilities.

The north pumping plant would have three equal-capacity pumps to serve the Tokay/Evans Canal system. The south pumping plant would have two sets of three equal-capacity pumps; three to serve the Highline/Savage Canal system and three to serve the Gravity Canal system. Serving each canal system with three equal-capacity pumps allows greater flexibility in operation.

Table III-1 summarizes pumping plant data.

Table III-1.—Pumping plant data

Item	North plant		South plant
	Tokay/Evans	Highline/Savage	Gravity
Number of pumps	3	3	3
Pumping capacity (cfs)	32	59	59
Each pump			
Flow (cfs)	10.67	19.67	19.67
Flow (gallons per minute)	4,788	8,827	8,827
Total dynamic head (feet)	190	122	34
Motor size (horsepower)	300	350	100

Vertical turbine pumping units operating in a wet sump would be used and represent the simplest and possibly the quietest arrangement for ease of maintenance and operation. Each sump, the river inlet, and the connecting box culvert would be located at an elevation that would have the hydraulic capability to realize the pumping capacities shown in table III-1 under all reasonable conditions. The size of the inlet requirements are dictated by incoming flow velocities which must be no more than 0.4 feet per second in order to prevent the impingement of small fish. The inlet for the north pumping plant would be 4 feet high and 22 feet long while the inlet for the south pumping plant would be 4 feet high by 75 feet long. Each inlet would be equipped with 1/8-inch mesh fishscreen and trashracks to protect the screens.

Power for the pumps would be provided from an existing 12-kilovolt distribution line located next to State Highway 99 on the south side of the river. A pad mounted transformer would provide the needed voltage adjustment for the pumps. Simple "H" frame poles would support the powerline as it spans about 550 feet over the river from the south to the north pumping plant. No center support would be needed, and clearance would exceed the overhead minimum of 25 feet.

Since the pump motors would be located outside, noise abatement walls which reflect sound directly upward would be provided to reduce the overall noise level in the immediate vicinity. Careful attention to landscaping would also help attenuate pump noise as well as obscure the pumping plants from river or road view.

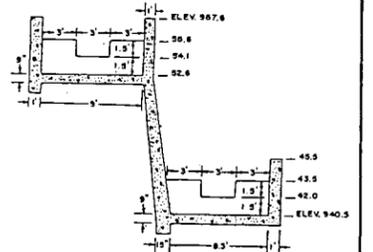
Discharge pipelines from the new pumping plants would be buried and would follow the general alignment of pipelines from the existing pumping plant. The north pipeline would terminate at the freeway where it would connect with the existing steel pipe under the freeway. The two south pipelines would terminate at new outlet structures at the heads of the Gravity and Highline Canals. The lengths and diameters of the pipelines are shown in table III-2.

Table III-2.—Pipe dimensions

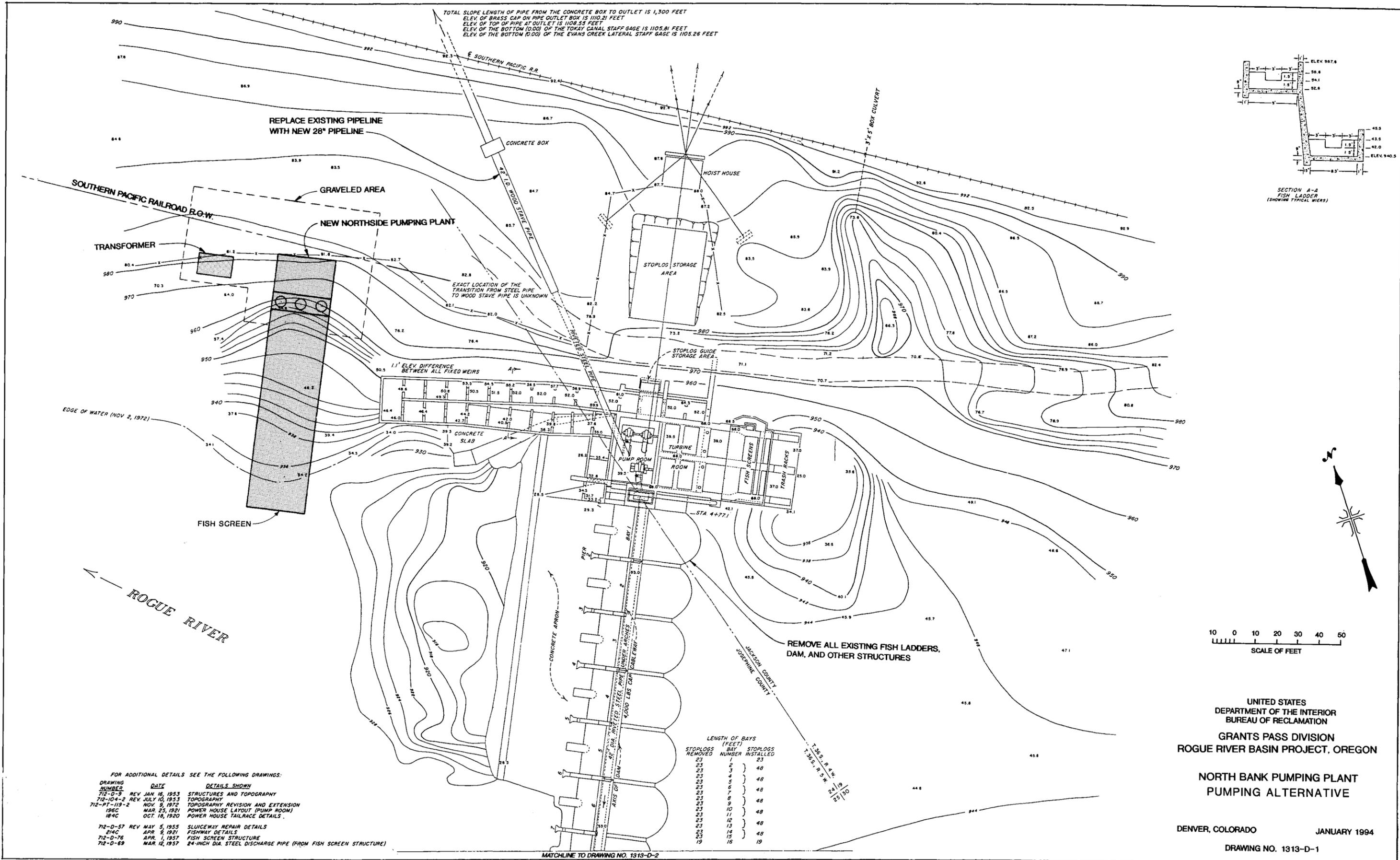
Location	Diameter (inches)	Length (feet)
North plant to Tokay Canal ¹	28	1,450
South plant to South Highline Canal	38	478
South plant to Gravity Canal	38	30

¹Connects to existing pipeline at freeway

TOTAL SLOPE LENGTH OF PIPE FROM THE CONCRETE BOX TO OUTLET IS 1,300 FEET
 ELEV. OF BRASS CAP ON PIPE OUTLET BOX IS 110.21 FEET
 ELEV. OF TOP OF PIPE AT OUTLET IS 110.55 FEET
 ELEV. OF THE BOTTOM (O.D.) OF THE TOKAY CANAL STAFF GAGE IS 110.51 FEET
 ELEV. OF THE BOTTOM (O.D.) OF THE EVANS CREEK LATERAL STAFF GAGE IS 110.26 FEET



SECTION A-A
FISH LADDER
(SHOWING TYPICAL WEIRS)



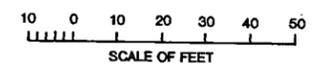
SOUTHERN PACIFIC RAILROAD R.O.W.

TRANSFORMER

FISH SCREEN

ROGUE RIVER

REMOVE ALL EXISTING FISH LADDERS, DAM, AND OTHER STRUCTURES



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
GRANTS PASS DIVISION
ROGUE RIVER BASIN PROJECT, OREGON

NORTH BANK PUMPING PLANT
PUMPING ALTERNATIVE

DENVER, COLORADO JANUARY 1994

DRAWING NO. 1313-D-1

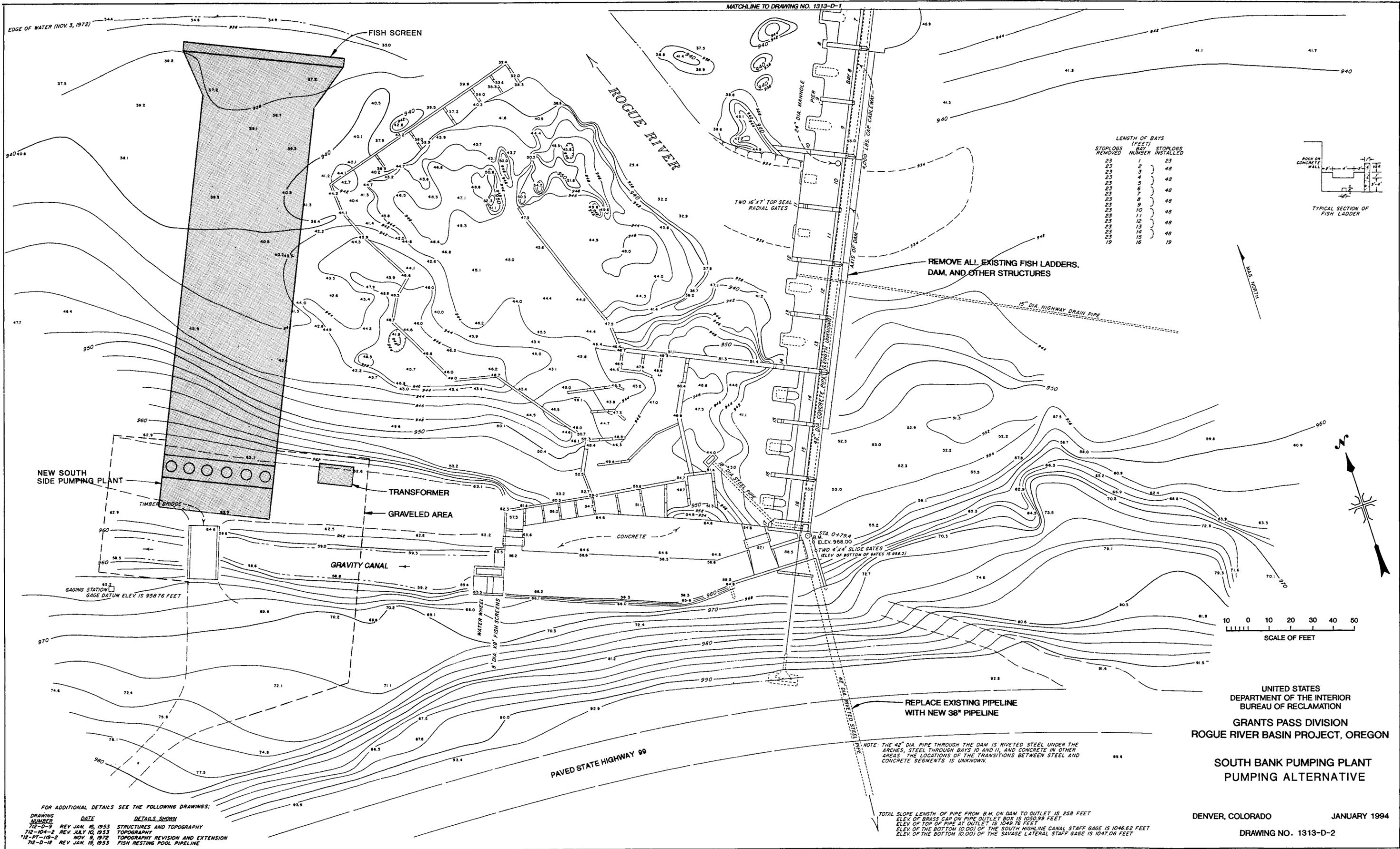
FOR ADDITIONAL DETAILS SEE THE FOLLOWING DRAWINGS:

DRAWING NUMBER	DATE	DETAILS SHOWN
712-D-3	REV JAN 16, 1953	STRUCTURES AND TOPOGRAPHY
712-D-2	REV JULY 10, 1953	TOPOGRAPHY
712-PT-119-2	NOV 9, 1972	TOPOGRAPHY REVISION AND EXTENSION
196C	MAR 23, 1921	POWER HOUSE LAYOUT (PUMP ROOM)
184C	OCT 18, 1920	POWER HOUSE TAILRACE DETAILS
712-D-57	REV MAY 5, 1955	SLUICeway REPAIR DETAILS
214C	APR 9, 1921	FISHWAY DETAILS
712-D-76	APR 1, 1957	FISH SCREEN STRUCTURE
712-D-69	MAR 12, 1957	24-INCH DIA. STEEL DISCHARGE PIPE (FROM FISH SCREEN STRUCTURE)

LENGTH OF BAYS (FEET)

STOPLOGS REMOVED	BAY NUMBER	STOPLOGS INSTALLED
23	1	23
23	2	48
23	3	48
23	4	48
23	5	48
23	6	48
23	7	48
23	8	48
23	9	48
23	10	48
23	11	48
23	12	48
23	13	48
23	14	48
23	15	48
19	16	19

MATCHLINE TO DRAWING NO. 1313-D-2



FOR ADDITIONAL DETAILS SEE THE FOLLOWING DRAWINGS:

DRAWING NUMBER	DATE	DETAILS SHOWN
712-D-9	REV JAN. 16, 1953	STRUCTURES AND TOPOGRAPHY
712-D-4-2	REV. JULY 10, 1953	TOPOGRAPHY
712-PT-108-2	NOV 9, 1952	TOPOGRAPHY REVISION AND EXTENSION
712-D-12	REV JAN. 19, 1953	FISH RESTING POOL PIPELINE

NOTE: THE 42" DIA PIPE THROUGH THE DAM IS RIVETED STEEL UNDER THE ARCHES, STEEL THROUGH BAYS 10 AND 11, AND CONCRETE IN OTHER AREAS. THE LOCATIONS OF THE TRANSITIONS BETWEEN STEEL AND CONCRETE SEGMENTS IS UNKNOWN.

TOTAL SLOPE LENGTH OF PIPE FROM B.M. ON DAM TO OUTLET IS 258 FEET
 ELEV OF BRASS CAP ON PIPE OUTLET BOX IS 1020.99 FEET
 ELEV OF TOP OF PIPE AT OUTLET IS 1049.76 FEET
 ELEV OF THE BOTTOM (0.00) OF THE SOUTH HIGHLINE CANAL STAFF GAGE IS 1046.62 FEET
 ELEV OF THE BOTTOM (0.00) OF THE SAVAGE LATERAL STAFF GAGE IS 1047.06 FEET

Access Roads

Access to all construction sites, including the pumping plants, pipelines, and electric transmission lines, would be from existing county roads or State highways. Access to the north pumping plant site, just downstream from the dam on GPID-owned land, would be across the existing railroad right-of-way. Access to the south pumping plant site would be by the existing access road and across the uppermost reach of the Gravity Canal. The portion of Gravity Canal from the existing headworks to the outlet structure of the discharge pipelines would be filled in for parking and access. Access to these sites would be limited to operating personnel and not open to the public.

SAVAGE RAPIDS DAM REMOVAL

All existing structures would be demolished and removed from the site, including the dam, powerhouse and related facilities, hoist house and cable works, north and south fish ladders, and a portion of the Gravity Canal. The existing structures would be demolished primarily by mechanical means (jackhammer, bulldozer, and crane with wrecking ball) with minimal blasting. Blasting may prove faster and less obtrusive to humans and wildlife than the more prolonged demolition by mechanical means and may warrant further consideration at the time final designs are prepared. (See also "Construction Schedule.")

Disposal of Excavated and Other Materials

Excavated rock, concrete, and other waste materials would be removed and disposed of in a landfill within 10 miles of the construction site. The potential for salvaging has not been evaluated.

Any materials that are categorized as hazardous would be handled in accordance with Federal, State, and local laws.

Damsite and River Channel Restoration

The damsite and area immediately adjacent to GPID-owned land would be rehabilitated by revegetation and minimal landscaping to retain the approximate configuration and condition of a free-flowing river.

Portions of the river channel through the damsite area may need restoration. Shaping, stabilizing, revegetation, and landscaping that may be required would be carried out in consultation with the Jackson County Parks Department, ODFW, NMFS, and USFWS.

River Recreation Option

An option identified is to develop a challenging river course for rafts, drift boats, and kayaks in the vicinity of Savage Rapids. The design would depend on the as-yet-unknown configuration of Savage Rapids. If properly developed, visitors would be attracted to the area. The reach could be designed to allow jet boat passage or to act as a jet boat barrier. Conceptual plans would require considerable public involvement and interagency coordination to determine feasibility.

Costs have not been developed for this option. Cost sharing responsibilities would need to be in accordance with P.L. 89-72 as amended by Section 16 of P.L. 102-575.

CONSTRUCTION

The Preferred Alternative assumes a total construction period of 5 years including 2 years preconstruction activities and 3 years of actual construction.

Construction Cost

Construction costs for the Preferred Alternative are summarized in Table III-3. These costs include standard cost factors of 10 percent for unlisted items, 25 percent for contingencies, and 30 percent for noncontract (indirect) costs. Removal and disposal costs are included in the unit costs based on a haul distance of 10 miles. No values are included for salvaging existing materials or equipment.

Table III-3.—Construction cost of the Preferred Alternative¹
(January 1993 Price Level)

Item	Cost
Remove Savage Rapids Dam	\$4,967,000
North Pumping Plant	
Pumping plant (3 pumps), screens, T-lines, etc.	1,891,000
Tokay/Evans Canal discharge line	301,000
North total	\$2,192,000
South Pumping Plant	
Pumping plant, (6 pumps) screens, etc.	\$3,662,000
Gravity Canal discharge line	37,000
South Highline/Savage Canal discharge line	347,000
South total	\$4,046,000
Total construction cost	\$11,205,000

¹Includes allowances for unlisted items, contingencies, and indirect costs

Materials

Sand, gravel, rock and other raw materials for construction are readily available from commercial sources in the area.

Construction Schedule

Three primary considerations affect scheduling construction activities:

- Safety of contractors performing the work.
- Effect of construction activity on migrating fish.
- Effect on the capability to deliver irrigation water.

Much of the construction activity would require work within the river channel but also requires a dry-site condition. To achieve dry-site conditions, temporary earth cofferdams would be needed at construction sites to divert the riverflow. The safest time of year for such work is during times of low flow. However, fish considerations may require that the in-river construction period take place during higher flow periods, and, as a result, increased safety features may be necessary.

Scheduling of actual construction and demolition activities would be determined in consultation with the Corps, Oregon Department of Environmental Quality (ODEQ), GPID, and the three agencies who have a major interest in fish (NMFS, ODFW, and USFWS). The State has determined that the period from June through about mid-September would be the least disruptive for migrating fish. In-river work and removal of the dam and appurtenant structures would be accomplished on schedules where the least potential damage to fish would occur.

The pumping plants would be constructed and operational before any part of the dam is removed to assure GPID's ability to maintain water delivery.

Three parameters would control all construction activities:

1. Construction within the riverbed itself would be limited to the period from June to September. Lengthy construction activities that must take place within the riverbed require the construction of cofferdams which would be placed (and removed) only during the time allowed for in-river work. Construction work within the confines of the cofferdam would not be considered in-river and could continue past the in-river construction period.
2. Construction would be scheduled to prevent jeopardizing the ability of GPID to deliver irrigation water to its patrons. The new pumping plants would be constructed first so they would be in place and ready to deliver water when demolition of the dam begins.
3. Construction activity would not be allowed to block the migration of anadromous fish. Contractors must be flexible so as to work on one side of the river at a time.

A conservative estimate of a 5-year construction period was assumed. This includes 2 years of preconstruction activities and 3 years of actual construction. The new pumping plants would be constructed during the first year of actual construction, and the dam and other facilities would be removed during the following 2 years.

OPERATION, MAINTENANCE, REPLACEMENT, AND POWER

Power

The average annual energy consumption is estimated at 5,675,800 kilowatt-hours (kWh) over the 6-month irrigation season; the maximum demand¹ is 1,600 kilowatts (kW). Table III-4 summarizes the power requirement.

Table III-4.—Electric power requirement

Month	Days of irrigation	Average pumping (cfs)	Average demand (kW)	Energy consumption (kWh)	
				Daily average	Total
May	28	130	1,390	33,300	932,400
June	30	140	1,490	35,800	1,074,000
July	31	145	1,550	37,100	1,150,100
August	31	150	1,600	38,300	1,187,300
September	30	130	1,390	33,300	999,000
October	10	130	1,390	33,300	333,000
Total	160				5,675,800

Costs

Estimated operation, maintenance, replacement, and power (OMR&P) costs for the Preferred Alternative are based on operating the plant as a semi-attended facility at full or nearly full capacity during a 23-week operating season; pumping rates would be adjusted as needed to avoid waste of water. Estimates were modeled using computer programs and procedures as well as historical data, based on the pump sizes described earlier in this section. The OMR&P costs identified in this document are for the new facilities described (pumping plants and associated facilities) and do not include costs associated with the operation of other GPID facilities. It is

¹Demand is the instantaneous power requirement

assumed that power would be obtained from Pacific Power and Light Company. Costs are based on Agricultural Pumping Service Schedule 41, dated 16 December 1992. These charges include the energy charge of \$0.03266 per kWh and a load charge of \$800 plus \$4 per kilowatt based on the average demand for the 2 highest months. Table III-5 summarizes project OMR&P costs.

Table III-5.—Annual OMR&P costs for the Preferred Alternative
(January 1993 Price Level)

Item	OM&R	Power	OMR&P
North pumping plant			
Pump plant, screens, T-line, etc.	\$13,200	\$82,400	\$95,600
Tokay/Evans discharge line	300	0	300
North side subtotal	\$13,500	\$82,400	\$95,900
South pumping plant			
Pumping plants, screens, etc.	\$27,100	\$110,200	\$137,300
South Main Canal discharge line	200	0	200
Highline/Savage discharge line	300	0	300
South side subtotal	\$27,600	\$110,200	\$137,800
Total	\$41,100	\$192,600	\$233,700

ECONOMIC AND FINANCIAL ANALYSIS

Benefits

This alternative would produce non-consumptive use benefits related to anadromous and resident fish increases and indirect or secondary benefits. Because these monetary benefits are difficult to calculate and minor compared to direct consumptive use benefits, they were not fully identified and not included in the economic analysis.

Monetary benefits of the Preferred Alternative in this analysis are limited to salmon and steelhead and are based on an estimated increase in the annual escapement at the site of 26,700 salmon and steelhead. This would

increase the annual commercial and sport harvest by 87,900 salmon and steelhead and provide annual equivalent monetary benefits of \$4,998,600. Table III-6 summarizes the relationship between escapement and anticipated increase in fish harvest by species, and table III-7 summarizes estimated harvest by species and type of harvest.

Table III-6.—Increased escapement and harvest with the Preferred Alternative
[Source: USFWS Planning Aid Memorandum, 1990]

Species	Escapement at Savage Rapids Dam	Catch/escapement ratio	Harvest increase
Fall chinook	8,200	5:1	41,000
Spring chinook	9,100	3:1	27,300
Coho	400	4:1	1,600
Winter steelhead	4,600	2:1	9,200
Summer steelhead	4,400	2:1	8,800
Total	26,700		87,900

Table III-7.—Distribution of increased salmon and steelhead harvest
[Source: USFWS Planning Aid Memorandum, 1990]

Species	Commercial harvest		Sport harvest		Total harvest
	Ocean	Freshwater	Ocean	Freshwater	
Fall chinook	30,750	—	5,125	5,125	41,000
Spring chinook	20,475	—	3,413	3,412	27,300
Coho	1,056	—	462	82	1,600
Winter steelhead	—	—	—	9,200	9,200
Summer steelhead	—	—	—	8,800	8,800
Total	52,281	—	9,000	26,619	87,900

Monetary benefits for commercial fishing values are based on average fish weight and value per pound. Sport fishing values are based on an average value per angler-day and the number of angler-days to catch one fish.

Commercially caught fall and spring chinook average 9.33 pounds and have a value of \$2.30 per pound; a value of \$22.30 per fish. Coho caught commercially average 4.73 pounds and have a value of \$1.09 per pound; a value of \$5.16 per fish. Ocean sport fishery for all of the species listed in table III-7 is valued at \$60 per angler-day with an average effort of 1.08 angler-days per fish; a value of \$64 per fish.

Fresh water sport fishing is valued at \$51 per angler-day. Fall and spring chinook salmon, coho salmon, and summer steelhead require an average effort of 3.3 angler-days per fish; a value of \$168.30 per fish. Winter steelhead require an average effort of 2.9 angler-days; value of \$147.90 per fish.

Annual equivalent fishery benefits of \$4,998,600 accruing to the Preferred Alternative are based on a 20-year period of analysis, a 5-year build up period, and an 8 percent discount rate. Table III-8 summarizes the annual monetary benefit by species and type of harvest.

Table III-8.—Estimated annual equivalent value of increased harvest¹

Species	Commercial ³	Sport ²		Total
		Ocean	Freshwater	
Fall chinook	\$568,800	\$275,500	\$715,500	\$1,559,800
Spring chinook	378,700	183,500	476,400	1,038,600
Coho	4,500	24,800	13,500	42,800
Winter steelhead	0	0	1,228,600	1,228,600
Summer steelhead	0	0	1,128,800	1,128,800
Total	\$952,000	\$483,800	\$3,562,800	\$4,998,600

¹The annual equivalent value is based on a discount rate of 8 percent over a 20-year period with a 5-year buildup.

²Benefits for sport fishing are based on an angler-day value of \$60 for ocean fishing and an angler-day value of \$51 for freshwater fishing. Ocean sport fishing values are based on a 1970 report by Mathews and Brown, *Economic Evaluation of the 1967 Sport Salmon Fisheries of Washington*, and the Pacific Fishery Management Council's March 1978 *Final Environmental Statement and Fishery Management Plan for Commercial and Recreational Salmon Fisheries off the Coasts of Washington, Oregon, and California Commencing in 1978*. Values for freshwater fishing were derived from a 1978 NMFS report, *Economic Benefits from Recreational Steelhead Fishing*, and a 1978 paper by Charbonneau and Hay *Determinants and Economic Values of Hunting and Fishing*. More recent values are not available for this analysis.

³All commercial harvest is assumed to be ocean. The methodology for quantification of economic benefits for commercially harvested salmon and steelhead is based on National Oceanographic and Atmospheric Administration Technical Memorandum NMFS F/NWR3, *Net Economic Values for Salmon and Steelhead from the Columbia River System*, P.A. Meyer, June 1982.

Costs

Project cost, consisting of construction costs plus interest during construction, totals \$13,255,000. Construction costs based on a January 1993 price level are shown in table III-3. Interest during construction was calculated on the basis of a total 5-year construction period at the applicable Federal discount rate of 8 percent for 1994.

The annual equivalent cost of the Preferred Alternative, which includes the annual equivalent of the project cost and the annual OMR&P cost, is estimated at \$1,583,700. Calculation of the annual equivalent of the project cost assumes a 20-year period of analysis and the 1994 Federal discount rate of 8 percent. Table III-9 summarizes project and annual costs.

Table III-9.—Project and annual costs of the Preferred Alternative

Item	Cost
Project cost	
Construction	\$11,205,000
Interest during construction (8 percent over a 5-year construction period)	2,050,000
Total project cost	<u>\$13,255,000</u>
Annual cost	
Annual equivalent of project cost ¹	1,350,000
Annual operation, maintenance, replacement, and power	233,700
Total annual cost	<u>\$1,583,700</u>

¹Total project cost annualized at 8 percent for a 20-year period

Benefit/Cost Analysis

A true benefit/cost analysis which compares annualized values for all of the costs to all of the benefits over the life of the project was not made for this analysis. Instead, costs and benefits were annualized over a 20-year period instead of the 100-year period that is normally used for a project life, and the only monetary benefits identified are those associated with salmon and steelhead. Although not identified, the project may produce some monetary benefits associated with recreation. The effect of using a short period for the analysis is that annualized benefits are slightly less than with

a longer period, and annualized costs are much higher than with a longer period. As a result, the comparison of benefits and costs using a shorter period is that the benefit/cost ratio is very conservative, i.e., much less than would be obtained using a longer period of analysis.

For this analysis, benefits and costs were annualized over a 20-year period using the 1994 Federal discount rate of 8 percent. Annual equivalent benefits of \$4,998,600 compare with annual equivalent costs of \$1,583,700 to provide a benefit/cost ratio of 3.2 to 1.

COST ALLOCATION AND REPAYMENT

A cost allocation was not made for this analysis. All of the benefits of the project are assumed to be associated with the salmon and steelhead; therefore, all of the costs were assigned to the anadromous fish function.

Costs of fish protection facilities at Savage Rapids Dam have in the past been nonreimbursable. It is assumed for this analysis that all of the costs associated with the anadromous fish function would be Federal costs and nonreimbursable. (Costs associated with the non-Federal portion of this study--the irrigation conservation function--would be paid by non-Federal entities and constitute cost share for this initiative.)

FUNDING

It was assumed for this analysis, that the capital costs of the Preferred Alternative would be 100-percent federally financed and funded and that funds would be expended as needed during the construction period. A total of \$11,205,000 in actual funds would be expended over a 5-year period. About \$1,345,000 would be required during the 2-year preconstruction period, and the remainder would be required during the 3 years of actual construction. Table III-10 summarizes the funding requirement by year (interest during construction is not shown).

Table III-10.—Construction funding schedule for the Preferred Alternative
(January 1993 price level)

Item	Preconstruction		Construction			Total
	Year 1	Year 2	Year 3	Year 4	Year 5	
Pumping plants	\$249,000	\$500,000	\$5,489,000	\$0	\$0	\$6,238,000
Dam removal	196,000	400,000	0	2,914,000	1,457,000	4,967,000
Total	\$445,000	\$900,000	\$5,489,000	\$2,914,000	\$1,457,000	\$11,205,000

Funding of all OMR&P costs would continue to be the responsibility of the GPID.

PERMITS AND REGULATORY COMPLIANCE

Prior to the initiation of construction activities, certain permits and other compliance issues must be addressed. Among these is the Clean Water Act. The Corps and the ODEQ would be contacted for compliance with the permitting requirements of sections 402 and 404 of the Clean Water Act. (See Consultation and Coordination chapter for additional discussion.)

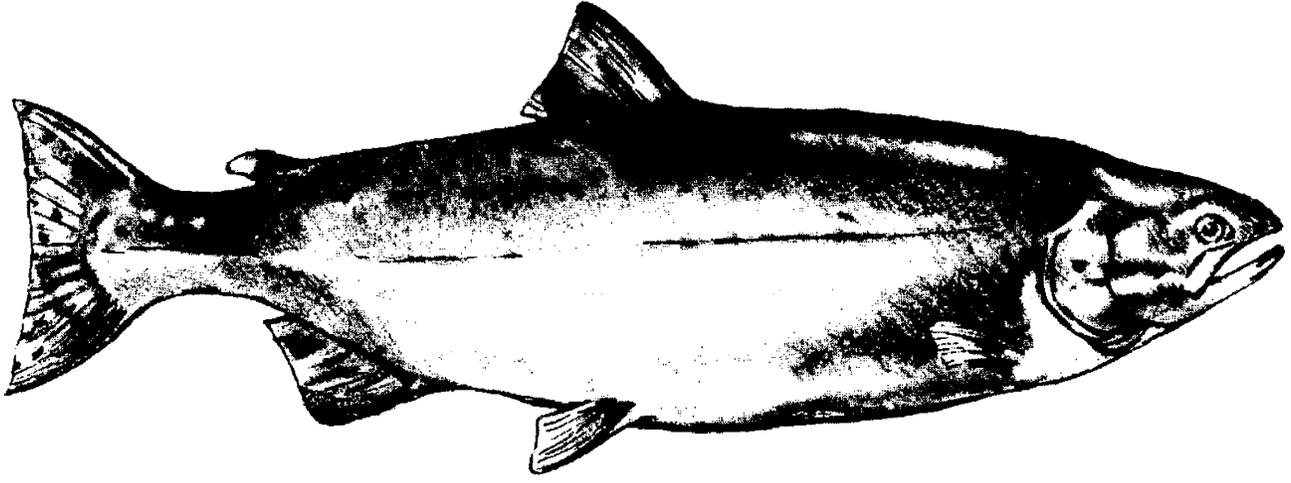
VIABILITY

The Preferred Alternative was found to meet the four criteria of viability--completeness, effectiveness, efficiency, and acceptability. (See "Formulation and Evaluation" chapter.)

The Preferred Alternative includes all investment needed to provide for safe fish passage and continued irrigation diversion and would eliminate all salmon and steelhead loss due to irrigation diversion at this site. It has a large benefit/cost ratio and is the most efficient alternative identified. This alternative is supported and preferred by Federal and State fish and wildlife agencies, environmental and fishery interest groups, and the GPID Board

Chapter III—Preferred Alternative

and is compatible with existing laws, regulations, and public policies. Some opposition to any action alternative is expected, and there is a portion of the public that would prefer another action alternative or no action.



DESCRIPTION

This chapter discusses the Dam Retention alternative to resolve fish passage problems at Savage Rapids Dam.

The Dam Retention Alternative includes two parts (1) modification of Savage Rapids Dam, improvement of the headworks of Gravity Canal, and replacement or rehabilitation of the aging hydraulic turbines, pumps, and associated facilities; and (2) removal of the existing fish ladders and screens and replacement with facilities that meet current NMFS criteria.

ACCOMPLISHMENTS

The Dam Retention Alternative focuses on the river area from just downstream to just upstream from Savage Rapids Dam. The accomplishments are confined to (1) fish passage improvement and accompanying harvest potential of salmon and steelhead and (2) extension of the useful life of irrigation diversion facilities. In addition there would be temporary effects associated with construction.

With the Dam Retention Alternative, annual salmon and steelhead escapement past Savage Rapids Dam would increase about 17 percent. For this analysis, Reclamation estimates that the increased escapement would be 20,700 fish and the associated increase in harvest would be about 68,100 fish. The ODFW recently undertook an analysis of potential anadromous fish escapement with the Dam Retention Alternative. Their analysis is based on more recent effort to model fish mortality associated with the dam and uses updated information on life cycle and abundance of the fish species. The results of high and low estimates of increased anadromous fish escapement range from 5,500 fish to 29,400 fish (see attachment D) Since the earlier estimate falls within this range, Reclamation did not recalculate the monetary benefits based on the new ODFW numbers.

Improved fish passage would also benefit resident fish which could more easily move up and downstream to find suitable habitat as flow conditions change.

The useful life of the irrigation diversion facilities that pump water to the Tokay Canal/Evans Creek Lateral system and to the South Highline Canal/Savage Lateral system would be extended for at least 50 years.

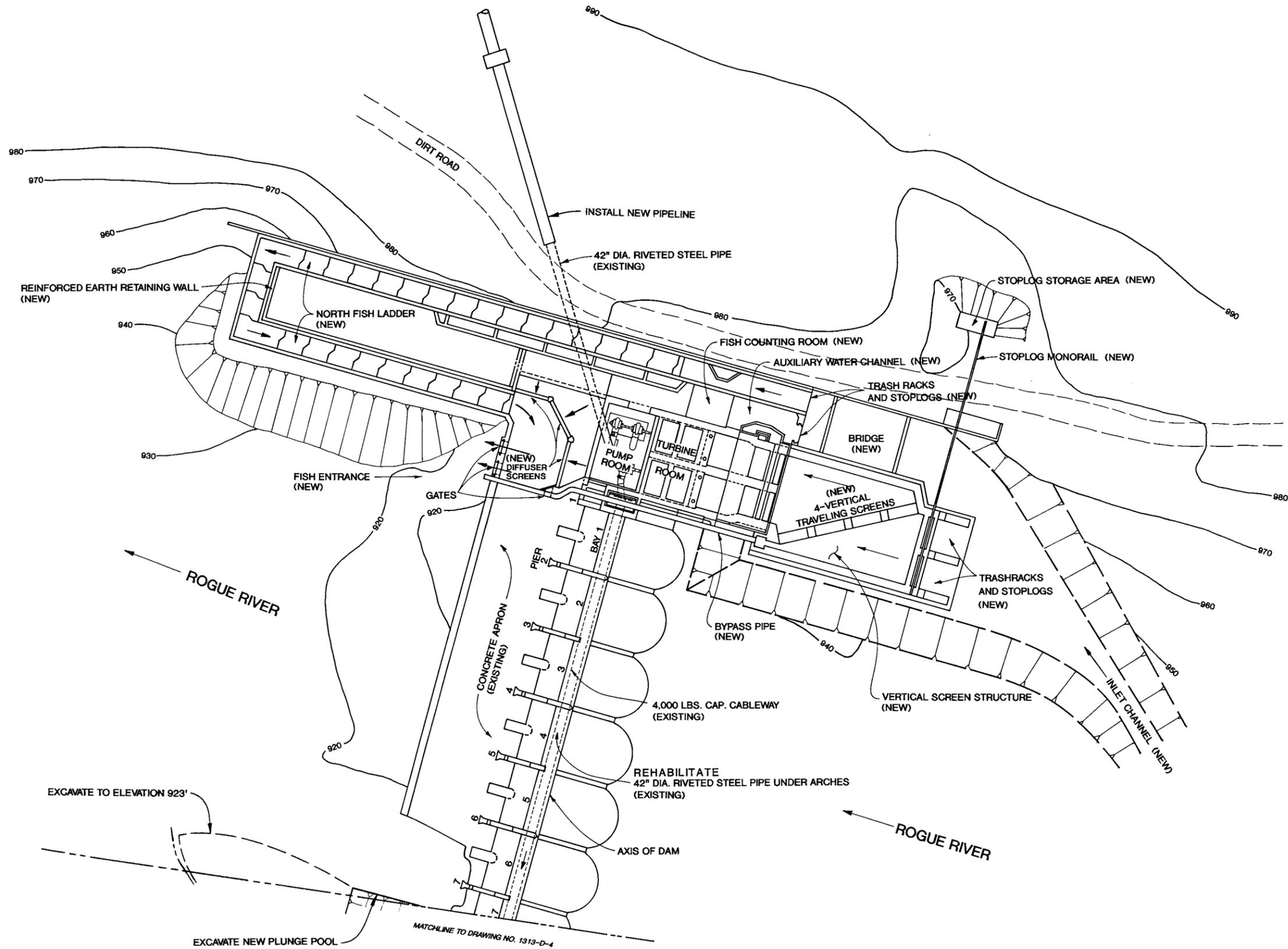
This alternative does not affect water rights, amount and timing of water diversions, annual river flow, operation of the pool formed by Savage Rapids Dam, ground water, current recreation activities, or other natural resources and uses other than those identified above.

FACILITIES

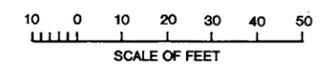
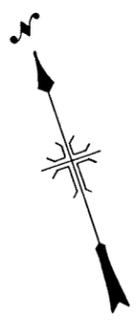
Savage Rapids Dam would be modified, fish passage and protective facilities and the pumps and turbines would be replaced (see drawing numbers 1313-D-3 and 1313-D-4). Overall designs for the Dam Retention Alternative were made during the course of this study which was initiated in 1989; however, some specific features are based on older designs. These designs are adequate for authorization but not for specifications or construction. Final designs would be completed in consultation with NMFS, USFWS, and ODFW during preconstruction.

Basic features include the following:

- Replace north and south fish ladders.
- Replace fish screens.
- Construct a juvenile fish counting facility.
- Excavate a plunge pool immediately downstream from the center of the dam and reshape portions of the south side of the river channel below the dam.
- Modify bays 8 and 9 at the center of the dam to direct overflows into the plunge pool.
- Replace existing turbines and pumps.
- Replace existing radial gates and gate controls.
- Improve public access to the south fish ladder for viewing migrating fish including:
 - Construct a safe intersection between the access road and State Highway 99.
 - Pave the existing parking lot.
 - Construct a viewing platform with handicap access to replace the existing viewing platform.

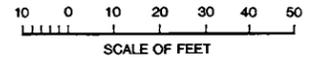
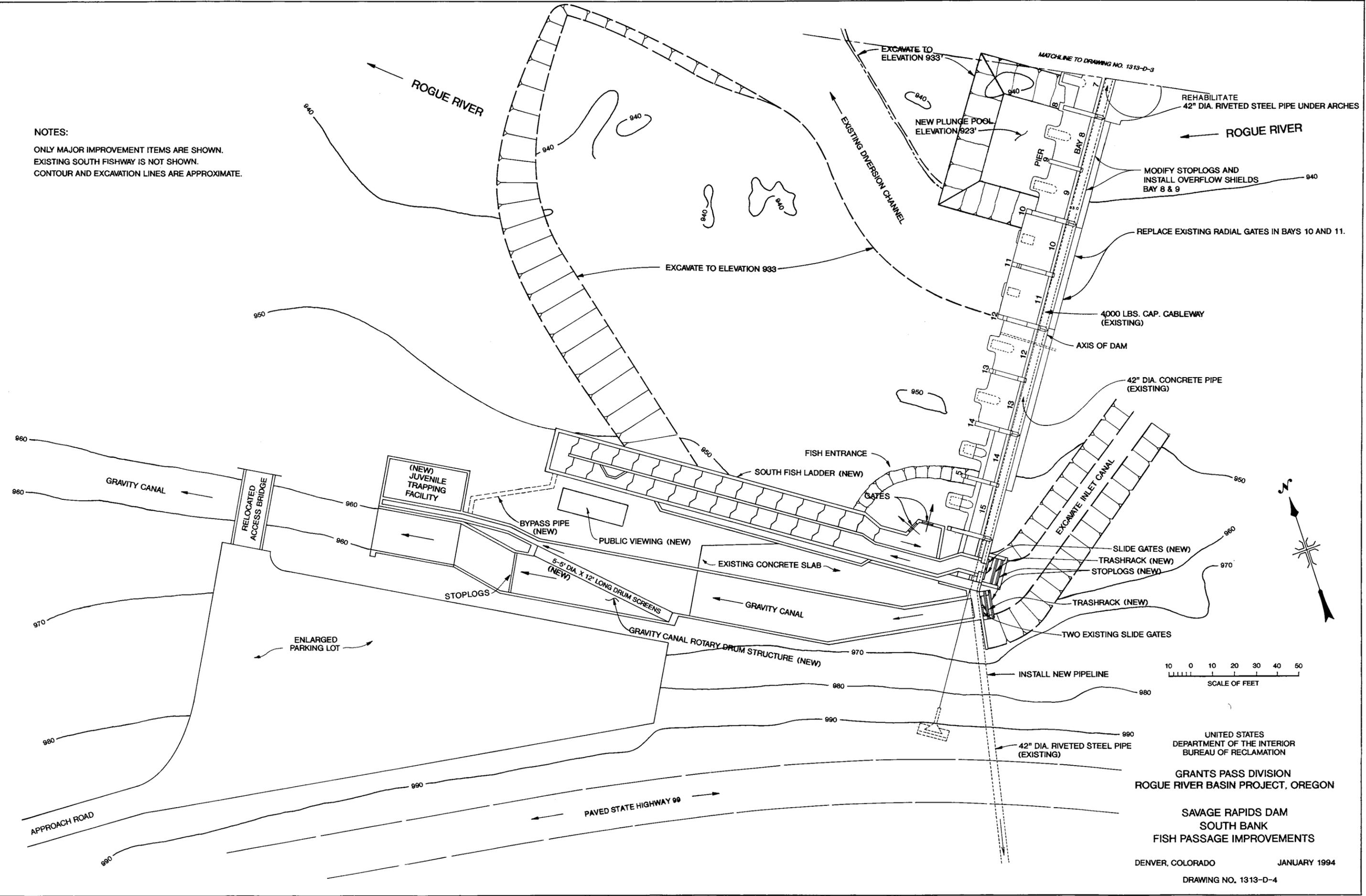


NOTES:
 ONLY MAJOR IMPROVEMENT ITEMS ARE SHOWN.
 EXISTING NORTH FISH LADDER IS NOT SHOWN.
 EXISTING STOPLOG MONORAIL IS NOT SHOWN.
 CONTOUR AND EXCAVATION LINES ARE APPROXIMATE.
 ① EXISTING FISH SCREENS WILL BE REMOVED AND
 REPLACED WITH DIAGONAL SCREENS.



UNITED STATES
 DEPARTMENT OF THE INTERIOR
 BUREAU OF RECLAMATION
 GRANTS PASS DIVISION
 ROGUE RIVER BASIN PROJECT, OREGON
 SAVAGE RAPIDS DAM
 NORTH BANK
 FISH PASSAGE IMPROVEMENTS
 DENVER, COLORADO JANUARY 1994
 DRAWING NO. 1313-D-3

NOTES:
 ONLY MAJOR IMPROVEMENT ITEMS ARE SHOWN.
 EXISTING SOUTH FISHWAY IS NOT SHOWN.
 CONTOUR AND EXCAVATION LINES ARE APPROXIMATE.



UNITED STATES
 DEPARTMENT OF THE INTERIOR
 BUREAU OF RECLAMATION
 GRANTS PASS DIVISION
 ROGUE RIVER BASIN PROJECT, OREGON

SAVAGE RAPIDS DAM
 SOUTH BANK
 FISH PASSAGE IMPROVEMENTS

DENVER, COLORADO JANUARY 1994
 DRAWING NO. 1313-D-4

Fish Ladders

Structures

Design of the new fish ladders at Savage Rapids Dam is based on drawings and specifications provided by USFWS and approved by NMFS. Although this design work was completed in the 1970's, USFWS and NMFS agree that the designs are adequate for cost estimating purposes.

The new ladders would be a vertical slotted-wall design that allows for self-regulation of flows, adequate resting areas for fish, and operation with nearly any flow. The design consists of 28 pools or cells that would be 8 feet wide by at least 10 feet long and up to 17 feet deep plus an entrance pool at the downstream end and an exit pool at the upstream end of the ladder. The entrance and exit of each ladder cell consist of a full-height vertical slot that is 15 inches wide (see Vertical Slot Fishways schematic). Although the vertical slots would not maintain a constant discharge, the ladders would provide fish passage over the range of riverflows. Under most operating conditions, there would be about 41 cfs of water passing through each fish ladder. Minimum water depth in each cell (measured at the vertical slot) would be about 6.8 feet. A level channel would lead from the last pool directly into the reservoir.

The ladder design (mirrored for the south and north banks) accommodates the lower pool elevation that is held between irrigation seasons. A level, 2-foot-wide channel with a floor elevation of 949.0 feet would extend from the reservoir along the side of the upper nine pools. This channel would enter the ninth pool from the upstream end via a slide gate.

The floor of each ladder would have a slope of 10:1 from the entrance pool at elevation 930.0 feet to the exit pool at elevation 958.0 feet. When the reservoir pool elevation is at maximum, the head loss between ladder pools would be approximately 1 foot (within NMFS criteria). Head losses between ladder pools would be proportionately less (and more desirable) with lower reservoir elevations.

Two slide gates, stoplogs, and trashracks to facilitate operation and maintenance would be located at the exit of the fish ladders (upstream end). These would be serviced by the existing monorail crane cableway.

Channels would be excavated from each fish ladder entrance and exit to the main channel of the river. These channels would allow fish to enter and exit the fish ladders during low river flows.

Dam bay No. 16 would be modified as part of the south fish ladder and would no longer function as a part of the dam spillway.

Attraction Flows

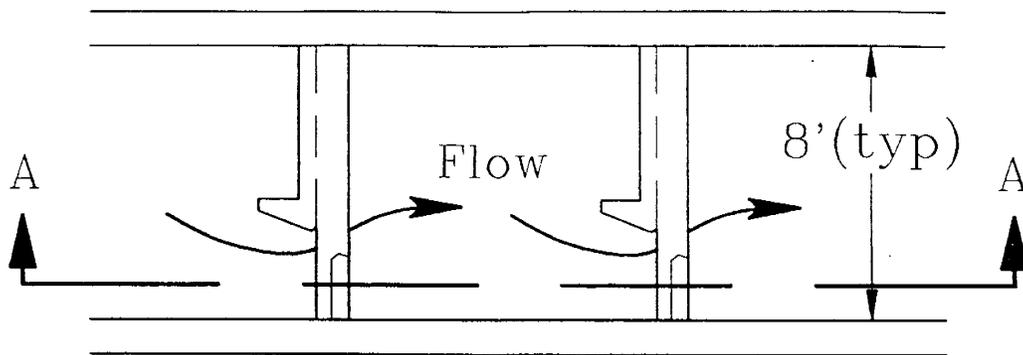
The hydraulic turbine discharge (approximately 800 cfs) would be routed to provide attraction flow for the north fish ladder during the irrigation season. These flows would discharge directly into the entrance pool through a diffuser screen which would smooth out turbulence and decrease velocities. Between irrigation seasons, flow would be released through the turbine sluice gates to the entrance pool to provide attraction flows. A slide gate on the south side of the entrance pool would be opened to help direct fish toward the fishway during periods when high riverflows passing over the spillway attract fish to the base of the dam. The entrance pool of the north ladder would have a floor elevation of 922.0 feet to accommodate and help reduce the turbulence of the turbine discharge flows.

Auxiliary attraction water for the entrance pool of the south fish ladder would be diverted through a baffle structure and diffuser screens before entering the downstream entrance pool. A semicircular pool with a 20-foot radius would be excavated to a minimum depth of 5 feet in front of the entrance pool to facilitate fish access. The entrance pool would be equipped with slide gates to provide control over the full range of expected riverflow conditions.

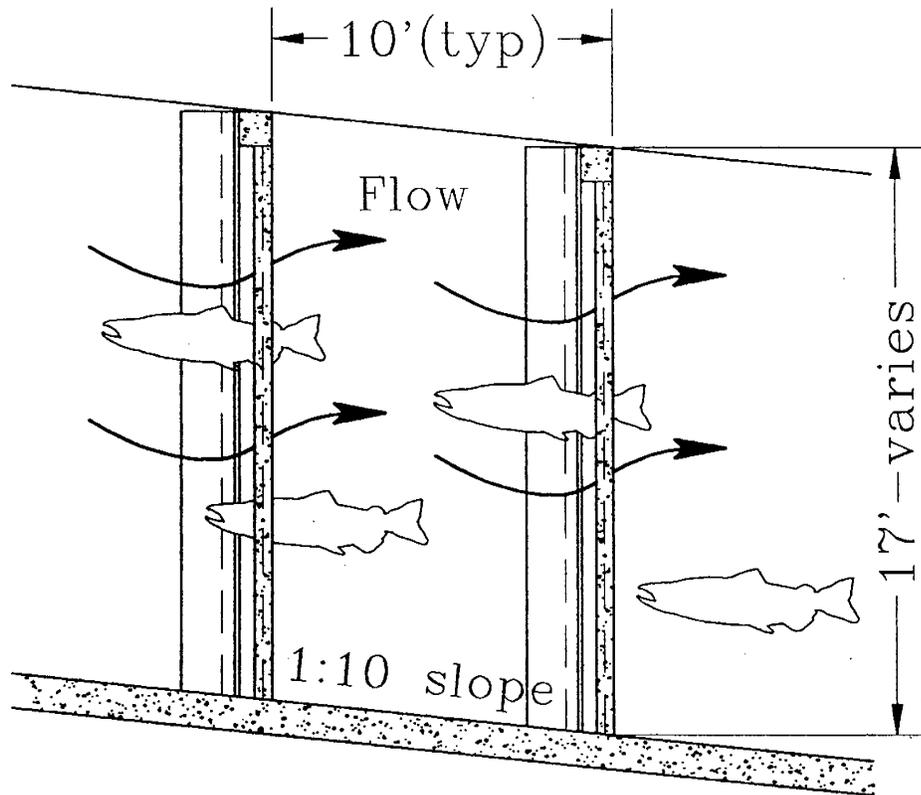
North Diversion

Vertical Fish Screens

The two existing vertical traveling fish screens on the north side of the dam would be removed, and the existing concrete support structure would be extended upstream approximately 75 feet and modified to accommodate the new screens. To help direct riverflows toward the structure, a short channel would be excavated toward the center of the river. Four new traveling fish screens would be installed at an angle of 30 degrees to riverflow (see Drawing No. 1313-D-3).



PLAN VIEW



SECTION A-A

VERTICAL SLOT FISHWAYS

Each screen unit would be 8 feet wide by 32 feet high (the same size as the present screen units) and would have a mesh with 1/8-inch clear openings. Velocity of the screen movement would be 10 feet per minute. Cleaning of screens would be accomplished in part by the sweeping flow across the screens and in part by a washing system that sprays water from behind and through the screens. The approach flow velocity (perpendicular to the screen face) would be a maximum of 0.4 feet per second. Sweeping flow (flow parallel to the screen face) would be approximately twice the approach velocity to help fish move along the screen surface to the inlet of the bypass. Fish would enter a 24-inch-diameter bypass pipe and exit next to the entrance of the fish ladder. Supporting piers for the screens would be flush with the face of the screen to optimize fish travel along the screen face and into the bypass inlet.

A new engine and electrical generator combination is included to operate the four screens in the event of power failure.

Turbines and Pumps

The existing turbine units along with the concrete/steel intake structures would be removed from the turbine room, and would be replaced with single-runner turbine units of conventional steel draft tube elbow intake and discharge cone configuration. These units are an inherently simpler design and present a relatively obstruction-free location in the turbine room. Each turbine would be equipped with a gear drive transmission to drive the horizontal, single stage, double-suction pumps which would pump the water into the Tokay and South Highline Canals. Pumps and hydraulic turbines are designed to provide a maximum pumping capacity of 32 cfs at 167 feet of dynamic head (Tokay Canal) and 59 cfs at 99 feet of dynamic head (South Highline Canal).

A new 28-inch-diameter steel pipe would be installed in the existing right-of-way to service the Tokay Canal, and a new 38-inch-diameter pipe would be installed to service the Highline Canal. Various gates, valves, hydraulic dampers, controls, and instrumentation would allow slow closing and throttling capabilities to meet varying diversion requirements.

Trashracks

New trashracks would be constructed at the entrance to the northside diversion to protect the vertical screens from large debris. Clear openings in the trashracks would be 10 inches wide by 24 inches high. Automatic trash rakes are not included in the design as initial investigation indicates that they would not be cost effective. Automatic trash rakes would be reevaluated during final design.

Stoplogs

Ten new, metal stoplogs would be provided to block off and dewater the north diversion facilities for routine maintenance and repair of the screens and hydraulic turbines. The stoplogs would fit into the slotted concrete piers of the two entrance bays. Each bay would hold five stoplogs which would be installed or removed separately by a traveling trolley hoist on an overhead monorail crane runway extending to the north bank. The stoplogs would be stored on the north bank.

Access Bridge

At present, vehicle access to the north side of the dam is through a locked gate and a private maintenance road that crosses the railroad right of way. This road would remain closed to the public for safety reasons.

A concrete bridge would be constructed to provide access for a mobile crane to lift the vertical screens for major repairs. Since use of a crane would be for short periods, a mobile crane would be rented as necessary and is not included as a capital expense. The 30-foot-wide bridge would be approximately 21 inches thick and span approximately 25 feet from the north bank to the vertical screen structure.

South Diversion

Gravity Canal

The headworks structure of the Gravity Canal would be modified for trashracks and stoplogs, and approximately 130 feet of the Gravity Canal between the headworks and the existing rotary drum screens would be lined with concrete. Existing openings in the canal to the fish ladder would be sealed, and the existing fish screen assembly would be removed and replaced.

Rotary Drum Screens

A bank of five rotary drum screens would be installed in the canal at an angle of approximately 15 degrees to canal flows. A new concrete structure would house the rotary drum screens. Each of the five rotary drum screens would be 5 feet in diameter and 12 feet long. Screen fabric would be a 4-mesh, 12-gauge stainless steel woven fabric with clear openings of 1/8 inch. The screens would be designed to operate within a submerged range of 70 to 80 percent of the screen diameter. Proper depth of flow would be maintained at the screens by use of the slide gates at the Gravity Canal headworks structure and by stoplogs downstream from the screens.

A 2-foot-wide bypass channel would lead from the screens to the south fish ladder; bypass flows could also be directed to the fish counting facility (see below). Sweeping flow velocity along the drum screen face would be about double the 0.4 feet per second flow velocity against the screen face. Maximum travel time for fish across the screen face is estimated at 2 minutes.

Included with the supporting structure for the screens is an overhead lifting frame, 3-ton hoist, motor, and drive mechanism to remove the screens during winter months and to do required maintenance work during the irrigation season. A 5-kW engine/generator combination would provide backup power to maintain drum operation in case of electric power failure.

Juvenile Fish Counting Facility

A juvenile fish counting facility similar to the design used at the Umatilla Project (Three Mile Falls Diversion Dam) would be constructed downstream from the fish screen. ODFW would operate the facility. During periods when juvenile fish are being counted, flows carrying juvenile fish would be directed to the counting facility before exiting to the fish ladder.

Bridge

The intent was to relocate an existing bridge that crossed Gravity Canal. To accomplish this, new concrete abutments would be constructed about 50 feet downstream from the old site. This bridge has since been removed from the site. A decision would be made during preconstruction on how to proceed.

Plunge Pool and Rock Excavation

A concrete-lined, plunge pool approximately 40 feet long by 70 feet wide and 10 feet deep would be constructed downstream from bays 8 and 9 of the dam. The plunge pool would provide a deep basin for fish to safely fall into if swept over the spillway portion of the dam. Irregular rock outcroppings below the plunge pool would be removed for more efficient and less turbulent flow.

Most of the rock area in the river channel in the vicinity of the existing south fishway would be excavated to elevation 933. This elevation is about 10 feet lower than the elevation of the middle of the rock area and would be below any tailwater elevation. Removing the rock would reduce turbulent flows below the dam and make it easier for the fish that come upstream along the south riverbank to find the attraction flow from the south fish ladder. Rock removal would also eliminate the stranding of fish in pools caused by rapid changes in water levels downstream from the dam.

Bay 8 and 9 Modifications

Spillway/Stoplogs

Replacement stoplogs for spillway bays 8 and 9 would be constructed with less depth than the four existing stoplogs to allow spills over the dam to be concentrated and directed into the new plunge pool. The most appropriate depth for the stoplogs would be determined during final designs. The stoplogs would be placed and removed by means of the existing electrically operated hoist and cableway located above the dam crest.

Crest Modification

Overflow shields constructed of steel plate would direct flow over the dam. The shields would be attached with pins to allow removal of the plates and stoplogs. These overflow shields would help pass fish gently over spillway section into the plunge pool. Final design of these structures would be coordinated with the USFWS and NMFS.

Radial Gates

The existing radial gates, which are nearing the end of their useful life, would be replaced. New seals, guides, gate hoists, control equipment, piping, and appurtenant facilities would be installed.

Access Road and Parking

The existing operation and maintenance access road on the right side (south) of the dam was never intended for public access and is unsafe. Parking is inadequate for the general public use that has developed at the south side of the dam. Features to improve the safety of the public using this access (to view migrating fish) would include a new paved access road from State Highway 99, culvert drain pipe, paved parking area, entry and walkway areas, and repairs and improvements to the existing bridge. Entry and walkway areas would be paved, have handrails, and meet handicap access requirements. The parking area would require a 2-inch asphalt layer over a 4-inch subbase. The access road would intersect State Highway 99 at a 90-degree angle, providing both improved and safer

access. The access road would conform to State highway specifications and include some grade improvements and surface paving. Data for the access road were provided by the Oregon Department of Transportation, Roseburg District Office.

Fish Viewing Platform

An educational fish viewing platform for public use would be located downstream on the left side of the south fish ladder and would be designed to accommodate handicapped persons. This platform would replace the existing fish viewing platform.

Interpretive signs would be developed for this site to explain fish passage and the opportunity to view fish. Signs would be constructed of durable material resistant to vandalism and extreme weather conditions. Specific sign size, type, design, text, and artwork would be developed during final designs.

Correction of Existing O&M Deficiencies

A 1990 Review of Operation and Maintenance report prepared by Reclamation identified many problems and inadequacies resulting from deferred maintenance over the years. By the end of 1992, 25-35 percent of the recommendations had been implemented. There remained 22 items that vary from highly specific actions to evaluation or establishment of general maintenance programs. These remaining items are included in the Dam Retention Alternative.

Three program items account for over 70 percent of the estimated total cost of corrections. These are: (1) replacement of four 4- by 6-foot slide gates, (2) establishment of a program to coat the stoplogs and replace the deteriorated seals, and (3) installation of a permanent lighting systems and permanent metal floor grates with fixed handrails within the dam gallery.

Many of the items relate to safety, e.g., removal of grease from floors and walls, replacement of existing wooden walkways and handrails with metal structures, adding handrails, providing signs, locking accessways, and fencing some areas.

Some of the items include establishing programs for training and preventive maintenance, inspection and annual maintenance of specific systems, and evaluation of current maintenance practices.

REMOVAL OF EXISTING FACILITIES

Removal of the existing fish ladders and other facilities to be replaced would be accomplished in the same manner as discussed for the Preferred Alternative. Waste materials such as concrete, wood, and steel, and excavated rock would be moved to a nearby landfill, and hazardous materials would be handled in accordance with existing Federal, State, and local laws.

CONSTRUCTION

A 6-year construction period was assumed for this alternative including 2 years of preconstruction activity and 4 years of actual construction. Facilities associated with irrigation would be completed during the first 2 years of actual construction, but fish passage facilities would not be completed until the final year. Delivery of irrigation water and passage of fish would not be interrupted during this period.

Construction Cost

January 1993 price levels were used in estimating construction costs. Construction cost factors include 10 percent for unlisted items, 25 percent for contingencies, and 30 percent for noncontract (indirect) costs. An allowance is included for contractor mobilization, preparatory work, and demobilization.

Since all construction activity would take place on existing GPID land or right-of-way, there would be no costs for land purchases or easements, with the exception of a small parcel of land needed to upgrade the intersection between State Highway 99 and the parking lot south of the dam. Estimated construction costs are shown in table IV-1.

Table IV-1.—Construction costs for the Dam Retention Alternative
(January 1993 price level)

Item	Cost
Fish enhancement	
River control—north side construction	\$106,000
North fish ladder	3,410,000
Vertical fish screens	3,881,000
River control—south side construction	91,000
South fish ladder	2,070,000
Replace radial gates	1,856,000
Spillway/stoplogs	48,000
Removable dam crest overflow sections	560,000
Plunge pool	450,000
Downstream rock excavation	751,000
Gravity canal drum screens	792,000
Fish viewing platform	50,000
Access road/parking lot	110,000
Juvenile fish trap facility	611,000
Fish passage subtotal	\$14,786,000
Irrigation	
North pipeline	344,000
South pipeline	465,000
Turbines and gearing	1,189,000
Pumps and remaining items	700,000
Correction of O&M existing deficiencies	150,000
Irrigation subtotal	\$2,848,000
Total construction cost	\$17,634,000

Materials

Sand, gravel, rock, and other raw materials for construction are readily available from commercial sources in the area.

Construction Schedule

To minimize construction effects on migrating fish, replacement and rehabilitation work performed on the dam, the fish ladders, and fish screens would be divided into two segments: (1) work on the north side of the dam which would be accomplished first and (2) improvements on the south side of the dam which would follow. This would assure that at least one fish ladder would be operational at all times.

To assure GPID's ability to maintain water deliveries, work that would affect GPID delivery of water would be performed between irrigation seasons.

Construction concerns including timing and in-river construction work are generally the same as for the Preferred Alternative (see Chapter III).

OPERATION, MAINTENANCE, REPLACEMENT, AND POWER

OMR&P Costs

Appraisal level cost estimates for annual OMR&P costs are based on Reclamation's experience with a similar facility (Three Mile Falls Diversion Dam, Umatilla River, Oregon). Adjustments were made to reflect conditions at Savage Rapids Dam. Actual power consumption to operate the facilities would not be significantly different from current usage. The operating season for irrigation facilities at Savage Rapids Dam is approximately 23 weeks per year and the fish ladders would be operated year round. Operation costs are based on an assumed amount of staff hours required to operate the facilities. Maintenance costs are based on assumed staff hours required to maintain the facilities in a reasonable manner. Replacement costs are based on the field cost of principal items multiplied by a replacement factor derived from Reclamation experience.

Power costs are based on the electric motor sizes appropriate for operation of dam maintenance equipment and the fish screens and an assumed number of hours of operation per day. These are the total power costs for dam and fish screen operation and are not incremental to current power costs. The long-term power rate for general energy consumption (as

Chapter IV—Dam Retention Alternative

opposed to the rate used for irrigation pumping) assumed for this estimate is \$0.065 per kilowatt-hour. Table IV-2 summarizes OMR&P costs for the Dam Retention Alternative.

Table IV-2.—Annual OMR&P costs for the Dam Retention Alternative
(January 1993 price level)

Item	OM&R	Power	OMR&P
Irrigation and fish passage			
North fish ladder	\$10,000	\$0	\$10,000
Vertical fish screens	14,000	400	14,400
South fish ladder	10,000	0	10,000
Gravity canal drum screens	8,100	200	8,300
Access road/parking lot	200	0	200
North pipeline	300	0	300
South pipeline	200	0	200
Turbines and gearing	16,000	0	16,000
Pumps	10,000	0	10,000
Maintenance of dam facilities	25,000	200	25,200
Total irrigation and fish passage	\$93,800	\$800	\$94,600
Juvenile fish trap facility	\$10,000	\$200	\$10,200
Total	\$103,800	\$1,000	\$104,800

Operation Schedule

Operation of facilities would generally remain unchanged, with the exception that both fish ladders would be operated year round. Irrigation diversion amounts and schedules would be the same as shown in table III-4, and the pool behind Savage Rapids Dam would continue to be raised at the beginning of the irrigation season and lowered at the end of the season.

ECONOMIC AND FINANCIAL ANALYSIS

Benefits

This alternative would produce nonconsumptive use benefits related to anadromous and resident fish increases and indirect or secondary benefits. Because these monetary benefits are difficult to calculate and minor compared to direct consumptive use benefits, they were not fully identified and not included in the economic analysis.

Monetary benefits of the Dam Retention Alternative in this analysis are limited to salmon and steelhead; monetary recreation and irrigation benefits were not identified. The fishery benefit is based on the concept that elimination of all loss would increase salmon and steelhead escapement by about 22 percent and that with the Dam Retention Alternative losses of about 5 percent would continue. That is, the Dam Retention Alternative would increase escapement by about 17 percent. A simple mathematical factor ($17/22$) was applied to all of fishery values derived for the Preferred Alternative (Table III-8).

Annual equivalent fishery benefit accruing to the Dam Retention Alternative would be \$3,870,900. The annual equivalent benefit is based on a 20-year period, a 5-year build up, and a discount rate of 8 percent.

Costs

Project costs consisting of construction plus interest during construction total \$21,343,000. Construction costs are based on a January 1993 price level and are shown in table IV-1. Interest during construction was calculated on the basis of a total 6-year construction period at the applicable Federal discount rate of 8 percent.

Annual costs including the annual equivalent of the project cost and the annual OMR&P accruing to the Dam Retention Alternative total \$2,278,600. The annual equivalent of the project cost is based on a 1994 Federal discount rate of 8 percent over a 20-year period. Table IV-3 summarizes project and annual costs.

Table IV-3.—Project and annual costs for the Dam Retention Alternative

Item	Cost
Project cost	
Construction	\$17,634,000
Interest during construction (8 percent over a 6-year period)	3,709,000
Total project cost	\$21,343,000
Annual costs	
Annual equivalent of project cost ¹	\$2,173,800
Annual operation, maintenance, replacement, and power	104,800
Total annual cost	\$2,278,600

¹Total capital costs annualized at 8 percent for a 20-year period

Benefit/Cost Analysis

A true benefit/cost analysis which compares annualized values for all of the costs to all of the benefits over the lifetime of the project was not made for this analysis. As with the Preferred Alternative, benefits and costs were annualized over a 20-year period instead of a 100-year period that is normally used for a project life. Other monetary benefits may be produced by the Dam Retention Alternative but were not identified for this analysis. The effects of this type of analysis on the benefit/cost ratio are the same as discussed for the Preferred Alternative.

For this analysis, benefits and costs were annualized over a 20-year period using the 1994 Federal discount rate of 8 percent. Annual equivalent benefits of \$3,870,900 compare with annualized equivalent costs of \$2,278,600 to produce a benefit/cost ratio of 1.7 to 1.

COST ALLOCATION AND REPAYMENT

A true cost allocation was not prepared. For this analysis all of the facilities and construction activities associated with fish passage, protection, counting, and viewing were assigned to an anadromous fish function. Remaining costs were assigned to the irrigation function. This results in capital costs of \$14,786,000 assigned to an anadromous fish function and \$2,848,000 assigned to the irrigation function.

Costs of fish protection facilities at Savage Rapids Dam have in the past been nonreimbursable. It is assumed for this analysis that all of the costs associated with the anadromous fish function would be Federal costs and nonreimbursable. Further it is assumed that all of the irrigation function costs would be privately financed, and no Federal funds would be involved.

FUNDING

For this analysis, it was assumed that capital costs assigned to the anadromous fish function would be federally funded and that those funds would be expended as needed. If federally funded, capital costs associated with the irrigation function would be reimbursable without interest under current Federal requirements. However, for this analysis, it was assumed that the irrigation function would be privately financed over a 30-year period at 6 percent interest. OMR&P costs associated with the juvenile fish trap facility would be assumed by the ODFW, and all other OMR&P costs would be paid by GPID.

Table IV-4 summarizes capital costs and the annual financial requirements of GPID and ODFW with the Dam Retention Alternative. GPID would continue to be responsible for existing debt to the United States. In mid-1994, this amounted to \$290,525 (10 annual payments of \$26,830 and a final payment of \$22,225).

Table IV-4.—Annual payments

Item	Capital Cost	Annual Cost
GPID--Irrigation		
Irrigation capital costs	\$2,848,000	¹ \$207,000
All OMR&P (except fish trap facility)	--	94,610
Total of Dam Retention Alternative		\$301,610
ODFW --Annual OMR&P (fish trap facility)	² \$611,000	\$10,200

¹Assumes private financing at 6 percent interest over a 30-year period.

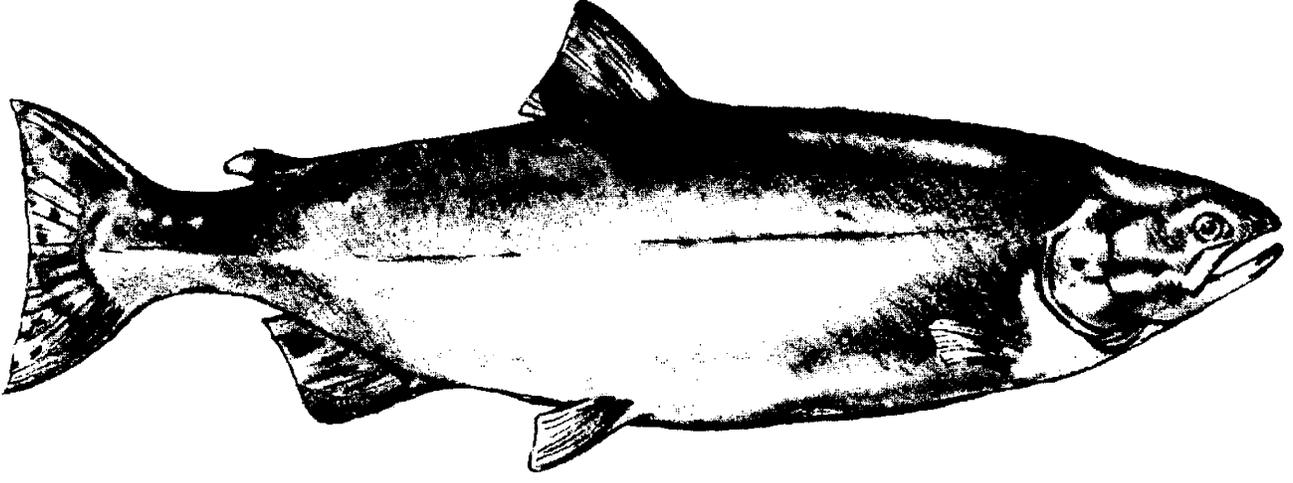
²Included in Federal anadromous fish function cost.

PERMITS AND REGULATORY COMPLIANCE

Permit and regulatory compliance for the Dam Retention Alternative would be essentially the same as for the Preferred Alternative (see chapter III).

VIABILITY

The Dam Retention Alternative was found to meet the four criteria of viability--completeness, effectiveness, efficiency, and acceptability. (See "Formulation" chapter.) The Dam Retention Alternative includes all of the investment necessary to provide effective fish passage and protection with continued diversion of irrigation water. This alternative has a benefit cost ratio of 1.7 to 1 and is therefore cost effective. Although the Dam Retention Alternative is not as effective or as efficient as the Preferred Alternative, it is acceptable to most Federal, State, and local agencies. Some opposition is expected for any alternative, and this alternative is opposed by some fishery and environmental interests.



DESCRIPTION

The No Action Alternative is formulated (1) to establish anticipated future conditions including the needs expected to exist in the future and (2) to serve as a base for evaluation of action alternatives. Conditions that can be expected to exist in the future without implementation of any of the identified action alternatives are identified. These conditions are compared with the conditions expected with an action alternative to determine the potential net effects of an action alternative. Identification and evaluation of the No Action Alternative are required by NEPA.

For this study, the No Action Alternative assumes that the Bureau of Reclamation would neither act nor participate in an action to resolve fish passage problems at Savage Rapids Dam. However, the No Action Alternative does not assume that there would be an absence of all action. Continued loss of anadromous fish at Savage Rapids Dam is unacceptable to Federal, State, and local entities; private organizations; and many individuals. In addition, GPID is accountable for all the legal parameters specified by the State in GPID's temporary water permit. Two of those parameters are specifically directed at resolving the fish passage problems at Savage Rapids Dam. Without the current study and Federal funding, it is uncertain how these issues would be resolved.

Therefore, the No Action Alternative assumes that sometime in the future, fish passage problems would be resolved by some means. In the interim, anadromous fish losses would continue at the current or near the current level. The length of delay in implementing a solution would depend on the extent of legal intervention and the willingness of various entities to cost share in implementing a solution. It is possible that GPID's share of costs to implement a solution would exceed its income. If that happened, GPID would have to reorganize, combine with other entities, or cease to exist. Such action, or the threat of such action could result if there are further delays to implement a fish passage solution. If a species of Rogue River anadromous fish is listed under the ESA, it is likely that a passage solution would be implemented somewhat earlier under the direction of NMFS.

Several reasonable scenarios could be constructed to describe the future under the No Action Alternative. For this analysis, it has been assumed that anadromous fish losses at Savage Rapids Dam would continue at current or near current levels for up to 20 years.

ACCOMPLISHMENTS

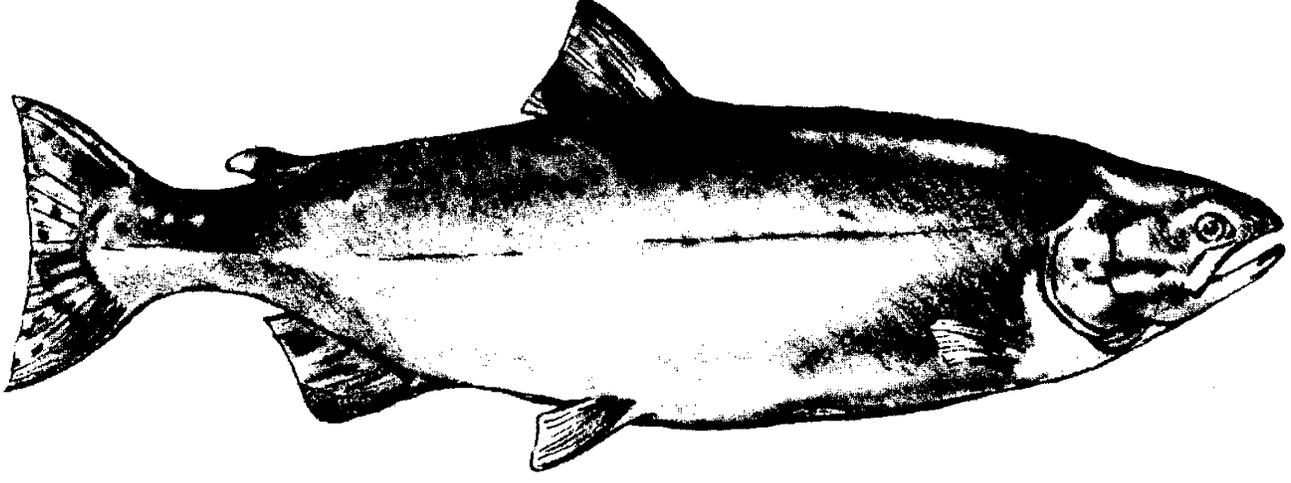
Under the No Action Alternative, fish passage problems would remain essentially unchanged. There would be no significant change in salmon and steelhead escapement. From time to time malfunctions in fish passage and protective facilities would result in large losses of salmon and steelhead.

Irrigation diversion would remain essentially unchanged. Over time, malfunctions in equipment would cause more frequent interruptions in service while repairs are made.

FACILITIES

The existing fish passage and protective facilities and GPID diversion facilities would remain essentially unchanged (see description in Chapter 1). As facilities continue to deteriorate, more frequent and more extensive repairs and replacements would be needed. The costs to maintain these facilities would increase over time.

Facilities operation would remain unchanged (see chapter 1). However, increases in irrigation district assessments would be needed to fund increased costs of repairs and replacements. No attempt was made to determine possible cost increases.



Chapter VI—Affected Environment and Environmental Consequences

PURPOSE

This chapter discusses the affected environment and environmental consequences of the alternatives and provides background material on current conditions. The major effect of the action alternatives is to enhance salmon and steelhead in varying amounts above current populations. This improvement would affect the fishery and related activities over a wide area from far upstream to the mouth of the Rogue River and into the ocean. Other effects of the alternatives would be limited primarily to the area of the seasonal reservoir formed by Savage Rapids Dam—from Savage Rapids Dam to the confluence of Evans Creek about 3.5 miles upstream. Effects on social well-being (except those related to increased salmon and steelhead) would be confined to the local area including, the cities of Grants Pass and Rogue River, the GPID service area, and the residents along the seasonal impoundment.

Background material on climate, physiography, economic conditions, and other aspects are provided in this chapter as an aid to reader understanding. The following categories of affected environment are discussed:

Economics	Hydrology
Water quality	Wild and Scenic Rivers
Land Use	Fish and wildlife
Vegetation	Endangered and threatened species
Recreation	Cultural resources
Air quality	Noise
Esthetics	Social well-being
Energy requirements	Indian Trust Assets

CLIMATE

The climate of the Rogue River basin is dominated by maritime influences which contribute to relatively mild, wet winters and warm, dry summers. The frost-free period is about 172 days at Grants Pass. Temperatures at Grants Pass vary from an average of 39 degrees Fahrenheit (°F) in January to 71 °F in July, although highs of 90 °F and even 100 °F are not uncommon. About 50 percent of the average annual precipitation of 32 inches falls from November through January, and less than 2 percent falls during July and August. Snow accumulates at high elevations during

winter and early spring and is the principal source of streamflow during late spring and summer.

Precipitation records for Grants Pass show a significant trend likely to affect area stream runoff. These records show a relatively wet period with average to above average rainfall beginning in 1950 and continuing through 1974 with only a few minor breaks. Beginning in 1975, there was an abrupt change to a dry trend. With the exception of a few years in the early 1980's, rainfall has continued well below average. The net loss to the area over the past 15 years has been approximately 50 inches of rain or the equivalent of going without rain for 1-1/2 years (Haskett 1991).

PHYSIOGRAPHY

The Rogue River basin consists of a narrow valley cut into the western slope of the Cascade Range, a broader central valley area, and another narrow section downstream where the Rogue River breaches the Klamath Mountains before entering the Pacific Ocean. The basin is bordered on the north by the Umpqua Mountains and on the south by the Siskiyou Range.

The Klamath Mountain region is rugged with narrow winding valleys and sharp divides, although local differences in elevation between valley bottoms and nearby ridges are usually less than 3,500 feet. Slopes of 30 degrees are common in the mountains. Low relief and subdued topography of the Grants Pass-Merlin area contrast sharply with the rugged hills and steep canyons along the western and northern basin boundaries.

Nearly all the valley lands lie below 1300 feet elevation. Lands along Evans Creek range from 950 to 1300 feet while those near Grants Pass range from about 920 to 1000 feet.

Stream gradients vary widely. Evans Creek drops 270 feet per mile in its headwaters and then levels off to about 30 feet per mile below RM 28. The Rogue River between the cities of Rogue River and Grants Pass drops an average of 9 feet per mile.

SEISMICITY

Savage Rapids Dam is located in the Klamath Mountains geomorphic division of southwestern Oregon. Some of the oldest rocks in Oregon,

estimated at 200 million years old, are exposed in this mountainous terrain. Although severe tectonic activity has folded and faulted most of these rocks into a complex assemblage, there are no known active faults in the area. The last major crustal disturbance occurred more than 60 million years ago.

The dam is in Zone 1 of the 1969 seismic risk map of Oregon. Zone 1 is classified as an area that can expect minor damage, corresponding to intensity V-VI on the Modified Mercalli Scale. The major earthquake on record, in 1873, had an intensity of VII. This earthquake was believed to be centered near the Oregon-California border between Crescent City, California, and Port Orford, Oregon, about 60 to 70 miles southwest from Savage Rapids Dam. The closest recorded earthquake to the dam was near Talent, Oregon, about 25 miles southeast, where an intensity V event was recorded on August 16, 1931. On April 14, 1920, an intensity V earthquake was recorded in the Crater Lake area, about 65 miles northeast of the dam. An intensity VI event on August 23, 1962, centered in northern California about 80 miles southwest of the dam, had an intensity V rating at Grants Pass, Oregon.

The foundation for the dam is partly on firm rock and partly on compacted, cemented gravel which forms a stable foundation. Given this foundation and the dam's design and construction, historic earthquakes would not have caused any significant damage to Savage Rapids Dam.

ECONOMIC AND DEMOGRAPHIC SETTING

The local economy of Jackson and Josephine Counties, which extend southward to the Oregon-California border, is based on agriculture and related agri-business, lumber, wood products, and tourism.

The lumber and wood products sector consists mainly of logging, lumber mills, and plywood manufacturing. Douglas fir is the major commercial tree species and accounts for about 50 percent of the commercial growing stock in Jackson County and two-thirds in Josephine County. Douglas fir is the primary species used in the production of softwood plywood and lumber.

The mountains, lakes, and the Rogue River in particular provide abundant recreation opportunities. Many people come to fish for salmon and steelhead or to float or jetboat on the river. A significant industry has

developed to provide the services necessary to support the recreation and tourist economy.

Population

Population changes of the two counties have followed the Oregon State trend of the 1980's with most of the increase due to in-migration. A total of 53 percent of Jackson County and 73 percent of Josephine County population growth in the 1980's resulted from migration. The 1990 Census population in the two counties totaled approximately 209,000 persons—about 146,000 in Jackson County and 63,000 in Josephine County.

Grants Pass is the largest city in Josephine County with about 18,000 residents. If the surrounding urban area is included, the population swells to about 40,000. The city of Rogue River in Jackson County has a population of about 1,800 residents.

Employment

Employment in Jackson and Josephine Counties encountered wide swings during the 1980's. All sectors of the economy faced increases and decreases in employment. After reaching the bottom of an economic slump in 1982, the area economy began a strong upward climb. By 1988, substantial recovery had been generated in manufacturing and construction. Agricultural employment averages about 2,000 in Jackson County and 400 in Josephine County and has remained somewhat stable.

Since 1988, there has been a downward turn in the manufacturing industries of lumber and wood, but construction, trade, and services continue to grow. Jackson County's manufacturing has decreased by 12 percent, losing nearly 1,400 jobs in the lumber and wood industry. Non-manufacturing employment increased by 17 percent during the same period with increases in construction (18 percent), trade (17 percent), and services (33 percent). Jackson County's projected unemployment rate for 1993 is 8.5 percent.

In the same time period, Josephine County's manufacturing decreased by 23 percent, losing nearly 800 jobs in the lumber and wood industry. Non-manufacturing employment increased by 10 percent with increases in construction (24 percent), trade (4 percent), and services (19 percent). However, the projected 1993 unemployment rate for Josephine County was

11.5 percent. With unemployment running that high, Josephine County is classified as a "labor surplus area." Employers in areas receiving this designation are eligible for preference in obtaining Federal procurement contracts.

Income

Per capita income is one of the better measures of economic well-being and can also provide an indication of the level of economic activity within a local economy. County personal income is divided by total county population to arrive at the county per capita income. Personal income is made up of net earnings, dividends, interest, rent, and transfer payments.

In 1991, per capita income in Jackson County was \$15,953, a increase of 4.9 percent over the previous year. Jackson County ranked 16th out of 36 Oregon counties in terms of per capita income in 1991 and was at 91 percent of Oregon State per capita income of \$17,495.

Josephine County per capita income in 1991 was \$14,004, a 1 percent increase over the 1990 figure. Josephine County ranked 34th out of 36 Oregon counties in terms of per capita income in 1991 and at just 80 percent of the Oregon State per capita income.

Analysis of the components of personal income indicates that a much smaller portion of personal income is derived from net earnings and much more is derived from other components than is average for the State and the Nation (see table VI-1). This indicates the population of the two counties is older and includes a higher percentage of retired persons. As more retired people enter the county, the percent of personal income derived from dividends, interest, rents, and transfer payments will continue to increase.

Table VI-1.—Percent of personal income by major component (1991)
[Source: State of Oregon Employment Department]

Area	Net earnings	Dividends, interest, and rent	Transfer payments
Nation	66.7	17.2	16.1
Oregon State	65.1	18.0	16.9
Jackson County	58.4	21.3	20.3
Josephine County	48.0	24.2	27.8

Effects of the Alternatives on Economic Conditions

Implementation of the action alternatives would have long term effects on the national economy due to an increase in salmon and steelhead production and the increased commercial and sport fishing harvest. Effects on the regional economy would be short-term only and would stem from construction.

Preferred Alternative

National Economic Development.—The Preferred Alternative would provide annual equivalent benefits of \$4,998,600 due to increased annual harvest of salmon and steelhead. Derivation of NED benefits is shown in tables III-7 and III-8 in chapter III.

Regional Economic Development.—RED effects would be short term, limited to the 5-year construction period. The direct effect from construction on the economic output of the region is estimated at \$15,200,000. Construction expenditures of \$11 million would create approximately 120 jobs during a 5-year construction period. Personal income would increase by \$2,205,000 with a total income increase of about \$4,266,000.

Very little statistical data is available upon which to measure the economic value of recreation impacts. Use has not been monitored or user-day numbers collected on this stretch of the Rogue River. However, after consultation with experts knowledgeable about the local area, Reclamation does not foresee any significant increase or decrease in the use of the affected stretch of the river, but rather a change in the type of use (i.e., changing from a water skiing, jet skiing, motor boating area to a float trip, fishing [both float and bank], and jet boating area).

Scenic qualities would be reduced for some time and would change over the long term but that is not expected to affect local motel and recreational vehicle campsite use.

Property owners who have made improvements (boat docks or ramps) to take advantage of the seasonal lake would have individual losses and real estate values may drop temporarily. However, riverfront property would be expected to maintain its high value.

Dam Retention Alternative

National Economic Development.—The Dam Retention Alternative would provide annual equivalent benefits of \$3,870,900 due to the increased annual harvest of salmon and steelhead.

Regional Economic Development.—RED effects would be short term, limited to the 6-year construction period. The direct effect from construction on the economic output of the region is estimated at \$23,900,000. Construction expenditures of \$17 million would create approximately 190 jobs during a 6-year construction period. Personal income would increase by \$3,950,000 with a total income increase of about \$6,713,000.

The GPID would be responsible for financing and funding \$2,848,000 of the construction costs. Assuming a repayment period of 30 years and an interest rate of 6 percent, the increased costs to the GPID due to construction of the Dam Retention Alternative would be \$207,000 annually throughout the repayment period.

No Action Alternative

The No Action Alternative would have no effect on national or regional economic development.

WATER

Water supply, water rights, and water use are important components of the JCWMIS study which was initiated in part to provide help to the GPID in addressing these issues and identifying potential conservation measures. These issues are fully addressed in a separate report on facilities improvements (DNA 1994).

Resolution of the water rights issues will have an effect on the sizing of irrigation diversion facilities and, therefore, on the cost of alternatives. The future amount of irrigation diversion, which will be settled through resolution of the water right issues with the State of Oregon, is the only factor related to water supply. The annual irrigation diversion in the future is expected to be less than that of the past. The best estimate and the rate of diversion assumed for this study is 150 cfs, the current estimated requirement, which compares with the historical diversion of 180 cfs.

Since the amount of diversion will be the same for all alternatives including the no action alternative, selection of a fish passage alternative will have no effect on water supply. Discussion of water supply, water rights, and water use in this report is limited and provided only for background information.

Rogue River

The average annual runoff of the Rogue River is over 2.5 million acre-feet at Grants Pass and 8 million acre-feet at the mouth. Flows at Grants Pass have ranged from 500 cfs to as high as 152,000 cfs. During late winters and early spring, flows at Grants Pass have reached 35,000 cfs (bankfull capacity) about every other year.



Photo VI-1.—Rogue River near Greens Creek, below Savage Rapids Dam.

Completion of Lost Creek Dam in 1977 provided significant regulation of flows in the middle reach of the Rogue River. About 10 to 20 percent of the total Rogue River flow originates upstream of Lost Creek Dam. Under current operation, 70 to 75 percent of the riverflow in July and August is from Lost Creek Dam releases. Flow duration analyses show that with the Lost Creek Dam operation, the State minimum flow requirement of 1,200 cfs at Savage Rapids Dam (OWRD 1985) can be met 92 percent of the time.

Chapter VI—Affected Environment and Environmental Consequences

Figures VI-1 and VI-2 show the runoff patterns of the Rogue River at Grants Pass (OWRD 1985).

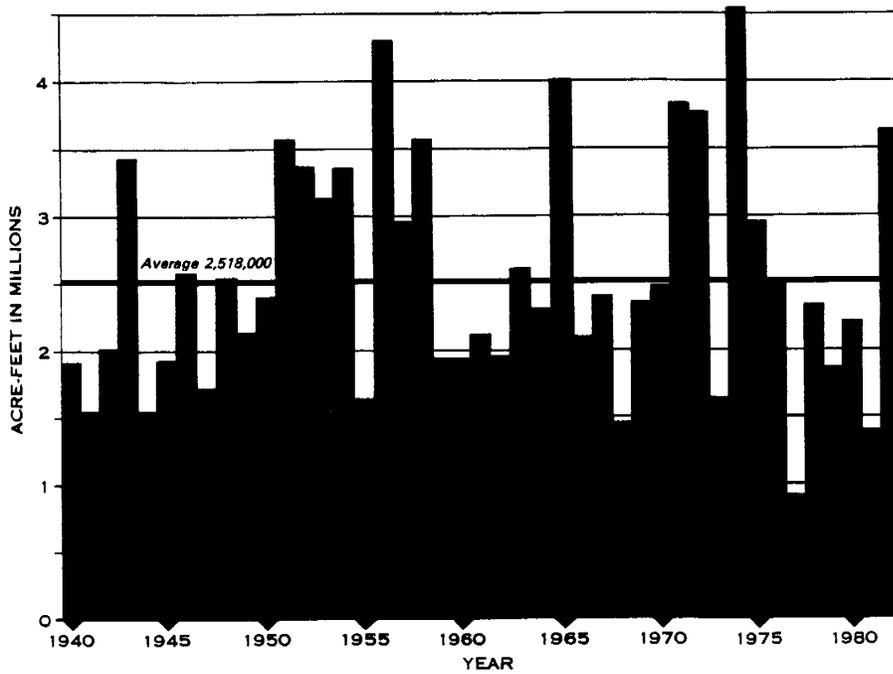


Figure VI-1.—Annual runoff of the Rogue River at Grants Pass.

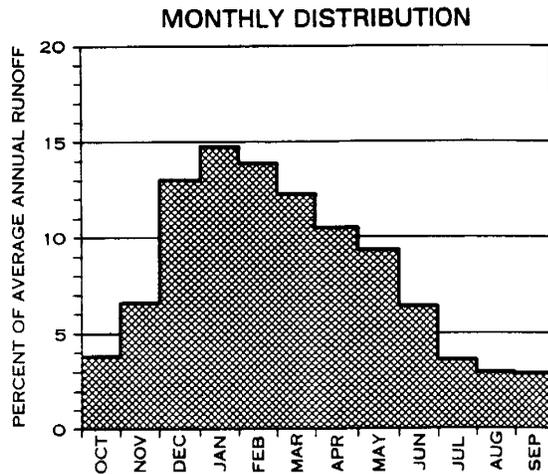


Figure VI-2.—Monthly distribution of Rogue River runoff at Grants Pass.

Water Use

The Rogue River is the principal source for municipal, industrial, and irrigation water and for water-based recreation in the Grants Pass area. Oregon Statute 538.270 prohibits the use of main stem Rogue River for industrial use and for hydroelectric power development below RM 157 (50 miles upstream from Savage Rapids Dam) to avoid potential conflicts with anadromous fish runs. Moreover, the potential for further out-of-stream use of the Rogue River is severely restricted.

A 1988 Oregon Court ruling in *Diack v. City of Portland* proclaimed that no actions can be taken which affect the instream flow of those sections of Oregon's waterways that have been designated as wild and scenic (see "Wild and Scenic Waterways"). In response to the *Diack* decision, the State set standards of acceptable instream flows for the lower Rogue River, as shown in table VI-2.

Table VI-2.—Minimum, maximum, and recommended flows for the Rogue River State Scenic Waterway (Applegate River to Lobster Creek)
[Source: Oregon Water Resources Department]

Month	Flow (cubic feet per second) near Agness (gauge 14372300) ¹					
	Minimum ²	Maximum ²	Average ³	Recommended		
				Fish ⁴	Recreation	Scenic waterway
January	3,104	13,340	6,933	1,600	3,500	3,500
February	3,071	30,282	8,598	1,600	3,500	3,500
March	2,207	17,750	7,572	1,600/3,200	3,500	3,500
April	2,455	15,086	5,609	3,200	3,500	3,500
May	2,577	8,158	4,315	3,000	2,000	3,000
June	2,140	5,363	3,250	2,700	2,000	2,700
July	1,829	3,446	2,383	1,800	2,000	2,000
August	1,858	3,370	2,321	1,800/2,400	2,000	2,000/2,400
September	1,630	3,187	2,249	2,400/1,500	2,000/1,600	2,400/1,600
October	1,421	3,497	2,281	1,300	1,600	1,600
November	1,386	16,652	4,857	1,600	1,600/3,500	1,600/3,500
December	2,124	29,250	7,038	1,600	3,500	3,500

¹ A "/" indicates that flow changes in mid-month.

² Minimum and maximum flows are the lowest and highest mean monthly flows measured during 1981-1990.

³ Average flow is the 50-percent exceedance mean monthly flow value as estimated by the Oregon Department of Water Resources for period of record 1981-1990.

⁴ Fish flows are recommended through analysis of research by McPherson and Satterthwaite (ODFW).

Under currently defined water rights and instream flow requirements, the Rogue River at Grants Pass has no additional streamflow available for diversion during most of the year (OWRD 1991a). Some storage water may be available between June 1 and October 15 from existing Corps reservoirs. Applegate Lake has about 45 acre-feet of storage available and Lost Creek Reservoir has about 3,000 acre-feet of storage available.

The major water user in the area is GPID which has rights to divert water for irrigation and an instream nonconsumptive water right for operation of its hydraulic turbines. GPID facilities are used to divert water from the Rogue to smaller streams under an ODFW water right. Historically, the out-of-stream diversion at Savage Rapids Dam has average about 180 cfs, (recently 170 cfs) although the total water right was much higher. The nonconsumptive instream use to power the pump turbines is 800 cfs.

Future out-of-stream diversions by the GPID are expected to range from about 117 to 145 cfs as GPID implements its conservation plan (Newton 1994).

In addition, the Fort Vannoy Irrigation District and the Apple-Rogue District Improvement Company have minor irrigation water rights. The ODFW has a water right to divert water from the Rogue River to enhance flows in tributaries, and this water, when requested, is carried by GPID facilities.

The cities of Grants Pass and Rogue River divert water for municipal and industrial purposes.

Water Quality

The Rogue River is generally clear and the chemical, physical, and biological qualities are excellent. During flood periods brought on by intense fall and winter storms, the river is turbid and sediment-laden but still well below problem limits. Recorded maximum turbidity levels are about ten times lower than levels that adversely affect salmon. Hot, dry periods in the summer can produce undesirable high water temperatures; however, this effect has been moderated by storage releases from Lost Creek Reservoir.

Because of the relatively small size of the impoundment of Savage Rapids Dam, water rapidly flows through this reach. As a result, all water quality parameters of the reservoir are the same as for the Rogue River.

Ground Water

Several separate actions have recently taken place to develop a better understanding of the ground-water systems in the study area. The primary concern for this interest is facility service planning by both the city of Grants Pass and Josephine County. Ground-water resources were reviewed recently (Haskett 1991). Under a jointly funded contract, DNA recently completed a ground-water management program (Newton 1992). DNA has brought together several other studies and has attempted to fill some of the gaps with additional work. The study ends at the Josephine-Jackson county line. However, the geologic conditions within the Evans Creek drainage and between the county line and the city of Rogue River are similar, and it can be assumed that the following summary from Newton's report would also apply to this part of the study area:

“Operation of the reservoir does not significantly affect ground-water levels except in the close vicinity of the river. Under current operations the surface of the reservoir is lowered at the time that ground-water levels could be expected to be near their lowest.”

Effects of the Alternatives on Water

Preferred Alternative

The current instream right to power the hydraulic turbines would be forfeited as pumping power would be provided by electric motors. Other water rights would be unaffected. Elimination of the reservoir is not expected to have a significant effect on ground-water levels. Shallow wells near the reservoir edge, that in effect pump directly from the river, would be affected over the entire year to much the same extent as they are now affected for 9 months when the reservoir is lowered.

Water quality would be reduced slightly during construction due to increased turbidity. Contractors will be required to use methods to reduce turbidity during construction. Compliance with the various State, local, and Federal permit processes, especially as required under sections 402 and 404 of the Clean Water Act, will provide adequate mitigation of normal construction impacts. Increased turbidity would continue at intervals during flood periods until the accumulated sediments behind Savage Rapids

Dam are moved downstream. None of these are considered to be significant.

About 320 acre-feet (516,000 cubic yards) of sediment have accumulated behind the dam and consists of 32 percent sand, 52 percent silt, and 16 percent clay. Chemical analyses of sediment samples show that trace elements trapped within the sediments are below or within the baseline range for soils of the Western United States.

Given the slope of the Rogue River from the dam to the ocean as well as the frequency and magnitude of flood events, nearly all of the accumulated sediment would be transported downstream. Finer silt and clay materials should remain in suspension throughout the lower river until reaching the ocean. Due to the volume of the Rogue River, no significant increase in measurable turbidity would be expected. Sand-sized materials would move more slowly, partially filling the pools in the pool-riffle environment downstream and filling the interstitial space among the gravel and cobble in slower moving channel areas in much the same manner as normal erosional processes. Virtually all sediment would be transported out of the existing reservoir area within 5 to 10 years. Because movement will primarily occur during flood events, which are normally turbid, any increase in turbidity resulting from the accumulated sediment would be insignificant.

The temperature of river water at the site may decrease slightly with the swifter flow of water in the natural channel, and dissolved oxygen content would be higher. No quantification of these values is available.

Dam Retention Alternative

Water rights would not be affected. Turbidity would increase slightly during construction but the increase would be temporary and would have no significant effect on the quality of riverflows. Contractors would be required to minimize adverse water quality changes during construction. Compliance with the various State, local, and Federal permit processes, especially as required under sections 402 and 404 of the Clean Water Act, will provide adequate mitigation of normal construction impacts.

No Action Alternative

This alternative would have no effect on water use or water quality.

WILD AND SCENIC RIVERS

Under The Wild and Scenic Rivers Act of 1968, a reach of the Rogue River was included as a component of the national wild and scenic rivers system. This reach extends from its confluence with the Applegate River (about RM 95), just west of the city of Grants Pass, to Lobster Creek Bridge (about RM 11), 88 miles downstream. The State of Oregon system of scenic rivers includes the same river reach and two more reaches in the Rogue River basin. The additional reaches are: (1) the main stem Rogue River from the headwaters to RM 173 and (2) the Illinois River from the Deer Creek confluence (RM 47) downstream to the mouth at the confluence with the Rogue River (Rogue River RM 47). These river reaches are shown in figure VI-3.

The action alternatives (Preferred Alternative and the Dam Retention Alternative) do not invade any river reach in the national system of wild and scenic rivers or the state system of scenic rivers and would not diminish the scenic, recreation, or fish and wildlife values or have any effect on streamflows. The greatest concern is potential effects on water quality. Temporary, but insignificant increases in turbidity could be expected during construction as summarized under "Effects of the Alternatives on Water." Sediment would be transported downstream over a period of years under the Preferred Alternative, but would be moved during high flow and flood events. During these events turbidity due to the Preferred Alternative would be insignificant compared with the background turbidity. Salmon and steelhead fish production of the Rogue River would be significantly increased as discussed under "Effects of the Alternatives on Fish."

In summary, the action alternatives would have no significant or measurable adverse effect on any wild and scenic river, but would have a large positive effect due to increased populations of salmon and steelhead. A Section 7(a) Determination by the U.S. Forest Service and the BLM concurs with this assessment (see attachment J).

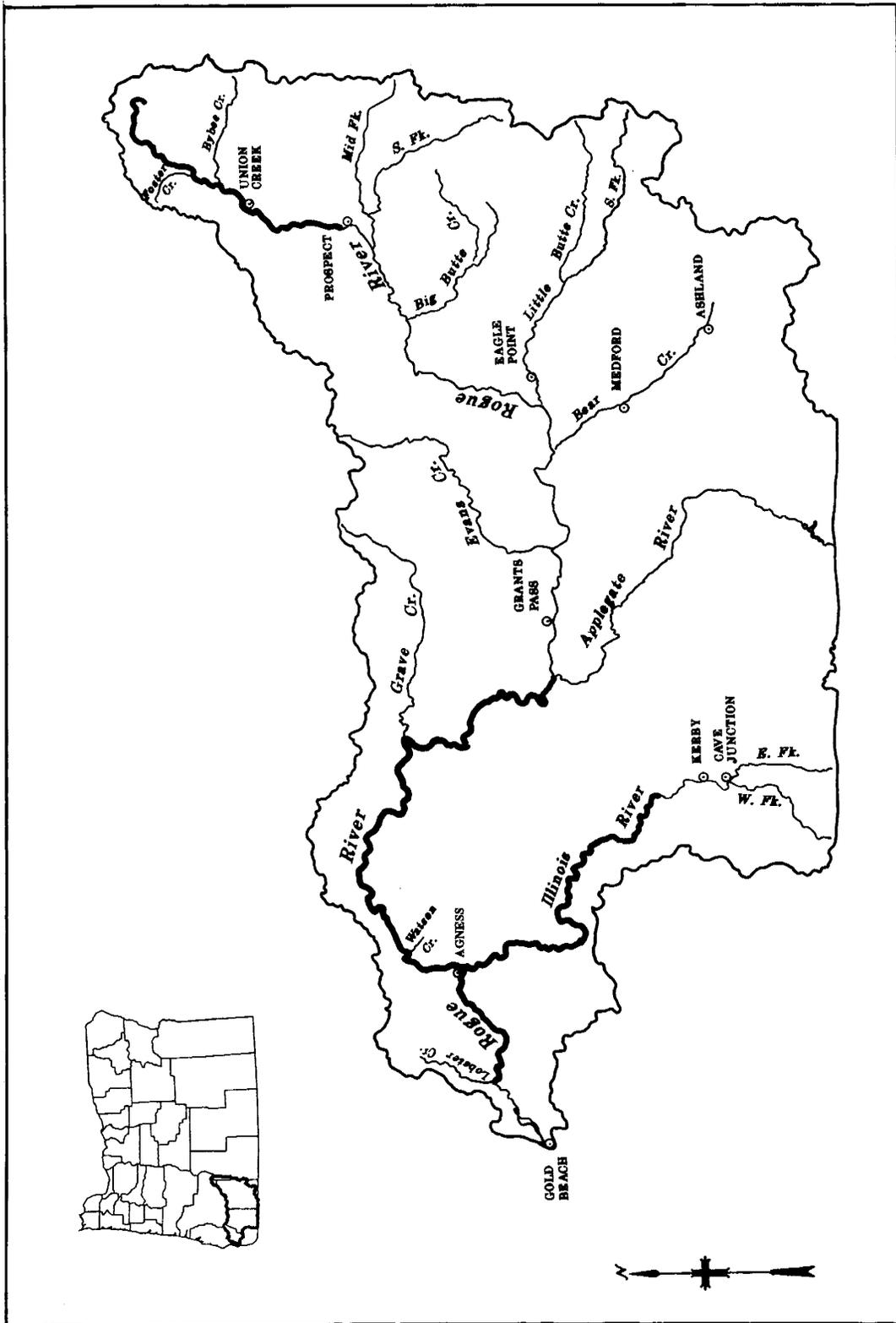


Figure VI-3.—Rogue River basin scenic waterways.

LAND USE

Most agricultural land consists of pasture, range, and woodland. Approximately 298,000 acres of land (17 percent) is in farms in Jackson County and about 37,000 acres (4 percent) in Josephine County. Lands served by the GPID are mostly in small tracts (3 acres or less), with few full-time commercial agricultural operations.

Urban growth and agriculture compete for suitable flat lands. Irrigated lands within GPID have decreased from about 12,000 acres in the 1930's to about 7,760 acres at present. Irrigated lands consist mainly of pasture, alfalfa, gardens, and lawns. Hillsides surrounding the valley areas are covered with forested growth. Land adjacent to the Rogue River has been developed for both residential and commercial use.

Local zoning regulations have been developed in accordance with the policies of the Oregon Land Conservation and Development Commission. Much of the land originally classified as arable and which once represented potential expansion of irrigated agriculture, is now zoned as forest or woodland reserve. Stringent use restrictions apply to these lands and they are no longer available for irrigation.

Lands around the reservoir above Savage Rapids Dam are zoned for a variety of uses that include woodland resources, exclusive farm use, rural residential, suburban residential, and open space reserve. Between the dam and the bridge that crosses the river at Rogue River, there are about 263 tax lots that could be classified as lakeside. Of these, 214 lots access directly on the river and the remaining 49 lots are close with a view of the river but do not access directly on the river. Included are 16 businesses that include motels, campgrounds, and other small enterprises. As of June 1990, approximately 184 homes/cabins had been built along the shores of the reservoir and there were approximately 122 vacant lots. Some of these vacant lots are used by their owners on a temporary basis for camping or day-use activities.

Effects of the Preferred Alternative on Land Use

Approximately 1 to 1.5 acres of land would be required for the pumping plants and appurtenant facilities.

A total of 110 acres of seasonal flatwater would be eliminated and the area would revert to a riverine environment. It is assumed that the GPID flood easement on these lands would be abandoned and landowners would extend their current property uses and permanent fixtures toward the new high waterline. There may be some short term shifts or disruptions in land values but the Preferred Alternative is not expected to affect land values in the long term.

Whether additional development will be made at Savage Rapids Park is unclear as Jackson County has returned control of the land to GPID. However, other public parks at the upper end of the reservoir and private camping sites located around the seasonal reservoir would likely extend development to the new high waterline.

This alternative would have no effect on prime and unique farmlands.

This alternative would affect the flood plain only in the 3.5-mile reach of river upstream from the pumping plants. The high waterline would be closer to the river center with elimination of the seasonal reservoir. Since floods are controlled primarily by Lost Creek Dam upstream, this alternative would not be expected to significantly affect the potential for flooding. However, development on private lands toward the new high waterline and into the flood plain could be expected with some increased potential for flood damage.

Elimination of the seasonal reservoir would allow development of some wetland vegetation in the area. It is unlikely that any increase would be significant.

Effects of the Dam Retention Alternative on Land Use

This alternative would have no effect on land use.

Effects of the No Action Alternative on Land Use

This alternative would have no effect on land use.

FISH

The Rogue River supports a large population of anadromous salmonids including spring and fall chinook salmon, coho salmon, summer and winter steelhead trout, and sea-run cutthroat trout. Of these, steelhead trout and chinook salmon are the most abundant and the most widely distributed. The ODFW has indicated that the Rogue River basin supports the largest population of wild anadromous salmonids in Oregon.

There are also four species of resident trout, six species of warm-water game fish, two species of sturgeon, and shad which have overlapping or coinciding distributions; the latter two are anadromous. The Rogue River fisheries are nationally known for diversity and productivity.

Coastal stocks of salmon and steelhead are at very depressed levels. Coho stocks have been especially hard hit by poor ocean survival conditions. These, as well as adverse conditions locally, are reflected in depressed fish counts at Gold Ray Dam.

At the time of this writing, none of the resident or anadromous fish found in the Rouge River were listed under the Endangered Species Act, however the status of most salmon and anadromous trout species are being reviewed by the NMFS (see also "Endangered and Threatened Species" section).

Aquatic Habitat

The historic diversity and productivity of the Rogue River indicate that the river is healthy. Although logging, urban, and agricultural development have likely had a detrimental effect in some areas, the overall quality of the aquatic system is considered excellent by fish biologists.

Habitat within the confines of the reservoir created by Savage Rapids Dam is poor for salmon and steelhead because flow is slowed and bottom sediments do not contain gravelly conditions favorable for spawning beds. As a result, adults do not generally spawn in the reservoir reach. Juvenile salmonids, which rely on the river current to carry them downstream to the ocean, may be exposed to higher levels of predation from fish and birds as they migrate downstream through the slower moving waters of the reservoir.

Seasonal raising and lowering of the impoundment limits the establishment of an aquatic substrate to support a significant resident fish population of trout or other resident fish.

Anadromous Fish

Anadromous refers to species that spend a portion of their life cycle in salt water but spawn in fresh water. Salmon, steelhead trout, sturgeon, shad, and lamprey are the most common anadromous species. Salmon and some other anadromous species die shortly after spawning. Steelhead trout, in contrast, may survive to spawn more than once, returning to the sea after each spawning period.

Salmonid Species

Two distinct races of steelhead exist in the Rogue River—summer run and winter run. Adult summer steelhead enter the river from June to September, moving slowly upstream, occasionally holding near the mouth of cooler tributaries. Generally, the first winter freshets cause these fish to move into smaller tributaries of the middle and upper Rogue River system; spawning commences in mid-January.

The run of winter steelhead is larger and more widely distributed. This race enters the system primarily in mid-October and are found in most streams of the drainage where spawning is not precluded by a lack of water flow, lack of spawning habitat, or the presence of natural or man-made passage barriers.

A fish run unique to some coastal streams including the Rogue River is a run of "half-pounders." These are immature steelhead that have been in the ocean for about 2 months and swim upstream with the summer run of adult spawners. They appear to be too immature to spawn and those that successfully avoid capture and other dangers probably return to the ocean.

There are also two runs of chinook salmon—spring and fall. Adult spring chinook enter the Rogue River in the spring, remain in the main stem above Gold Ray Dam through the summer, and spawn in the fall. Fall chinook enter the system early in the fall and spawn through December, tending to use the river and tributary systems below Gold Ray Dam.

Coho salmon ascend the system as mature adults in the fall and spawn through January in smaller tributaries below Gold Ray Dam.

Sea-run cutthroat trout enter the Rogue River primarily in summer and early fall, migrating as far up as the Illinois River at RM 27.1. These fish normally do not spawn until the fall freshets are adequate to permit entry into the tributary streams.

About 375,000 anadromous salmonids with an estimated value of \$31.5 million are produced annually (ODFW 1985). Included in this total is an annual sport and commercial harvest of 162,000 chinook salmon and an annual sport harvest of 95,000 steelhead (ODFW 1988). The ODFW has a management policy giving first and highest consideration to the protection and enhancement of wild (as opposed to hatchery bred) anadromous fish stocks.

Fish Passage

Detailed study of fish passage issues at Savage Rapids Dam were completed in the 1970's. Since then, numerous studies of Rogue River fisheries have been completed or are ongoing by ODFW in conjunction with the Corps Rogue River Basin Project.

Facilities in the basin that affect the salmon and steelhead or actual passage conditions at Savage Rapids Dam include Lost Creek Dam at RM 157 on the main stem Rogue River, Elk Creek Dam on Elk Creek (a tributary at RM 152), and Cole M. Rivers Fish Hatchery (located just downstream from Lost Creek Dam and operated by ODFW). The Corps recently published an environmental document (Corps 1991) which contains an abundance of information regarding the life cycles of the various salmonids in the Rogue system, effects of temperature, turbidity, and the flow regulation provided by Lost Creek Dam.

The last estimate of salmon and steelhead passage at Savage Rapids Dam was prepared by USFWS in 1981 (USFWS 1981) and was based on averages of escapement upstream at that time. Counts at Gold Ray Dam, 18 miles upstream from Savage Rapids Dam, are only partially indicative of the numbers passing Savage Rapids Dam. Fall chinook spawn in two main stem areas between the two dams. Chinook and steelhead also spawn in the Evans Creek drainage; summer steelhead spawn mostly in the tributaries and winter steelhead spawn mostly in the main stem of Evans Creek.

Table VI-3 shows that the 1981 estimate of average passage of salmon and steelhead at Savage Rapids Dam was 120,500 fish. Passage estimated at Gold Ray for the high year, low year, recent 10-year average, and the entire 52-year record are shown. Counts at Gold Ray Dam have been highly variable in recent years. The highest count at Gold Ray Dam was over 140,000 fish in 1987 and the lowest count in recent years was about 23,600 fish in 1992. The average for the period 1984-1993 is 76,081 fish passing Gold Ray Dam.

Table VI-3.—Estimated salmon and steelhead passage

Year	Spring Chinook	Fall Chinook	Coho	Steelhead		Total
				Summer	Winter	
1981 USFWS estimate of average passage at Savage Rapids Dam						
Average	49,700	8,500	1,000	37,300	24,000	120,500
Counts at Gold Ray Dam						
Average 1984-1993	43,584	7,532	2,934	11,117	10,914	76,081
Average (52 years)	31,126	3,148	1,981	6,016	9,317	51,598
High year (1987)	81,581	10,699	5,395	24,955	17,587	140,217
Low year (1959)	13,972	735	371	865	4,550	20,493

A major concern in estimating current fish passage is that operation of Lost Creek Dam and Cole M. Rivers Fish Hatchery have changed salmon and steelhead passage at Savage Rapids Dam. Annual releases of spring chinook smolts from the hatchery have averaged about 1.6 million beginning in 1986. Summer and winter releases have varied over time, but an annual release of 150,000 smolts per stock is intended.

Fall chinook spawning has shifted further upstream because of (1) flow changes due to Lost Creek Dam and (2) hatchery production and release of spring chinook. Chinook salmon have also increased because ocean harvests have been reduced to protect Klamath River stocks which mix with Rogue River stocks in the ocean off northern California and southern Oregon. Coho salmon increases are connected with higher releases from

the hatchery, making the coho run in the Rogue River essentially a hatchery run.

Because of the many changes in the last 20 years and the variability in runs in recent years, the 52-year average and counts made more than 30 years ago at Gold Ray Dam probably don't have much validity in estimating current passage. In addition, the ratio of escapement past Savage Rapids Dam compared to escapement past Gold Ray Dam appears to have changed but the magnitude of change is not known.

Reclamation chose to use the 1981 USFWS estimate of salmon and steelhead escapement past Savage Rapids Dam for the analysis in this report. All fish population and fishery effects are based on the 1981 estimate including the estimate that elimination of all passage problems at the site would increase escapement at the site by 22 percent. USFWS has recently indicated that this estimate of 22 percent remains valid (see attachment C).

Migration Periods

Counts of upstream migrants at Gold Ray Dam and of juvenile fish caught in a downstream migrant trap at Savage Rapids Dam indicate that salmon and steelhead migrate upstream or downstream in all months. Figure VI-4 summarizes the timing of adult and juvenile migrations.

Species	Month											
	J	F	M	A	M	J	J	A	S	O	N	D
Adults												
Fall chinook									☒	☒	■	■
Spring chinook				☒	☒	■	■	■				
Coho										☒	☒	■
Summer steelhead					☒	☒	☒	☒	☒	■	■	■
Winter steelhead	☒	☒	☒	■	■							
Juveniles												
Chinook					■	■	■	■	■	■		
Coho				■	■	■						
Steelhead			■	■	■	■	■	■	■			

☒ = period of first one-half of adult migration

Figure VI-4. Migration of salmon and steelhead past Savage Rapids Dam.

Resident Fish

Resident trout are native to most streams. Rainbow trout are common in the middle and upper Rogue River system. Coastal cutthroat trout are found in the headwater sections of most high elevation tributaries. Brook trout and brown trout, introduced species, are found primarily in the North Fork Rogue River between Prospect and Union Creek.

Warm-water game fish are most abundant in various lakes, reservoirs, and ponds; however, harvestable populations are found in some sections of the main stem Rogue River. The most prevalent species are black crappie, largemouth bass, bluegill, brown bullheads, and green sunfish.

The most abundant nongame fish include suckers, carp, roach, sculpins, dace, and red-sided shiners. Not all species are found throughout the basin, but overlapping ranges of the various species encompass nearly all fresh waters of the Rogue system.

Effects of the Alternatives on Fish

Preferred Alternative

The use of cofferdams during construction and staging of construction activities on one side of the river at a time would allow upstream and downstream fish movement to continue during construction.

The Preferred Alternative would improve fish habitat in the 3.5-mile reach as the seasonal impoundment changes to a riverine environment. Restoration of this reach would provide additional habitat for fall chinook spawning. Full realization of this potential may require the State Marine Board to prohibit or carefully control jet boat use in this reach. Release of accumulated sediment from the reservoir reach is not expected to have a significant effect on water quality (see "Effects of the Alternatives on Water") or fish.

Man-made fish passage problems at Savage Rapids Dam would be eliminated resulting in an increase in the escapement of salmon and steelhead at the site. Salmon and steelhead escapement at Savage Rapids Dam would be increased about 22 percent. This escapement assumes the catch-to-escapement ratios and the harvest increases of 87,900 salmon and steelhead shown in table III-6 in Chapter III. Recently, the ODFW made

high, medium, and low estimates of potential escapement increases with the Preferred Alternative (see attachment D). Table VI-4 summarizes the earlier estimate and the recent ODFW estimates of increased escapement by species.

Table VI-4.—Increased salmon and steelhead escapement with the Preferred Alternative

Species	1981 Estimate	ODFW Estimates		
		Low	Medium	High
Spring chinook	9,100	3,458	5,493	13,340
Fall chinook	8,200	1,389	2,205	5,356
Coho	400	220	350	849
Summer steelhead	4,400	1,071	1,701	4,131
Winter steelhead	4,600	1,486	2,360	5,731
Total	26,700	7,624	12,109	29,407

Improved escapement at Savage Rapids Dam under this alternative would help in the recovery of any anadromous species that may be listed under the ESA

In addition to anadromous fish benefits, the Preferred Alternative would benefit resident fish which could more easily move up and down the river to find a suitable habitat as flow conditions change. No estimate of increased resident fish populations has been made.

Dam Retention Alternative

The use of cofferdams and staging of construction activities to one side of the river at a time would allow one fish ladder to function at all times so that fish movement would not be impeded during construction.

There would be no change in a fish habitat of the 3.5 mile reservoir reach with the Dam Retention Alternative.

Manmade fish passage problems at Savage Rapids Dam would be reduced resulting in an estimated increase in a salmon and steelhead escapement of about 17 percent. Total harvest increases would be about 68,100 salmon and steelhead based on earlier estimates. Recently, ODFW made high and low estimates of an increased escapement for the Dam Retention Alternative. The ODFW cautions that their high estimate is very optimistic and is based on maintaining fish passage facilities in peak conditions and does not account for any possible acute incidents such as screen failure. Table VI-5 summarizes increased escapement using the earlier estimate that assumes a 5 percent loss due to passage and the recent high and low estimates of the ODFW.

Table VI-5.—Increased salmon and steelhead escapement with the Dam Retention Alternative

Species	1981 Estimate	ODFW Estimates	
		Low	High
Fall chinook	6,400	1002	5,356
Spring chinook	7,000	2,495	13,340
Coho	300	159	849
Summer steelhead	3,400	773	4,131
Winter steelhead	3,600	1,072	5,731
Total escapement	20,700	5,442	29,407

Improved escapement at Savage Rapids Dam under this alternative would help in the recovery of any anadromous species that may be listed under the ESA

In addition to anadromous fish benefits, the Dam Retention Alternative would benefit resident fish which could more easily move up and down the river to find a suitable habitat as flow conditions change. No estimates of resident fish populations have been made.

No Action Alternative

The No Action Alternative would have not change fish habitat or fish passage. Fish passage losses would continue at the same rate as in the past.

WILDLIFE

The area surrounding the reservoir formed by Savage Rapids Dam can be classified as urban and suburban. Interstate Highway 5 borders the reservoir on the north and State Highway 99 borders the reservoir on the south. As a result, wildlife found in the area is composed mostly of those species associated with water/riparian areas and high levels of human disturbance. Waterfowl species are the most common with the greatest numbers occurring in the spring and fall migration periods. However, some species are present year-round. Diving ducks (mergansers, scaup, redheads, and goldeneye) are common in the pool immediately upstream from the dam because of the numbers of small fish in the area. Migratory song birds are also common users of wooded forest or shrub areas. Wading or shore birds use the area mostly during drawdown when floats, bars, and shoreline are available and human disturbance is limited. Fur-bearing mammals (mink, beaver, river otter, muskrat, nutria, raccoon) may use the area intermittently but are not likely to be permanent residents.

Other species that may use the area include upland game species that are found in the agricultural areas of the basin—ring-necked pheasant, California quail, mourning dove, and bandtailed pigeon. Resident brush rabbits and western gray squirrels are present but limited.

Effects of the Preferred Alternative

Construction would disturb wildlife which would temporarily move out of the area. This disturbance would be short term and would not be significant, especially as the site is within an urban setting.

Some waterfowl species that currently use the seasonal reservoir would be displaced by other wildlife associated with more riverine conditions. Because the existing shoreline area is highly developed as private homes or businesses, human disturbances would continue to be high. Changes in wildlife populations would not be significant.

Effects of the Dam Retention Alternative

Construction would disturb wildlife which would temporarily move out of the area. This disturbance would be short term and would not be significant, especially as the site is within an urban setting.

Effects of the No Action Alternative

The No Action Alternative would have no effect on wildlife.

VEGETATION

Natural vegetation in the Grants Pass area consists of oak/madrone deciduous woods and pine/Douglas fir mixed conifer forest. The general land cover is a natural woody forest with a mixed shrub/herbaceous understory.

The shoreline along the seasonal reservoir is highly developed consisting of scattered houses, lawns, gardens, small pastures, parks, and recreation vehicle campgrounds. In some areas, deciduous trees and shrubs form dense riparian vegetation. Alder, ash, cottonwood, willow, snowberry, sumac and blackberry are common along the shoreline.

When the reservoir is lowered at the end of the irrigation season, some persistent grasses are revealed but most of the land between the reservoir high waterline and the natural high waterline of the river is rocky or gravelly and bare of vegetation.

Effect of the Preferred Alternative

An area of about 3 acres would be affected by construction. Most if not all of this area has been highly disturbed by past construction activities and during the construction period this area would be denuded of vegetation. At the completion of construction, the area where the dam was removed, the area around the pumping plants and the staging areas for construction would be reshaped to blend with the natural contours and reseeded. In the long term, these areas would assume a more natural aspect and probably support more wildlife than currently.

The area between the natural high waterline of the Rogue River and the high waterline of the seasonal impoundment would fill in with natural vegetation appropriate to a riverine environment. Vegetation along the old high waterline could be expected to gradually change in character. Since all of this area is privately owned, landscaping, planting, and maintenance will vary by ownership.

Because of the seasonal nature of the reservoir, raised during the irrigation season and lowered the remainder of the year, permanent wetlands have not developed as a result of reservoir operation. Elimination of the seasonal reservoir would have no effect on wetlands.

Effect of the Dam Retention Alternative

An area of about 2 acres would be affected by construction. During the construction period, most if not all of this area would be denuded of vegetation. At the completion of construction, the disturbed area would be reshaped to blend with the natural contours and reseeded. In the long term, this area would assume the current aspect.

Effect of the No Action Alternative

The No Action Alternative would have no effect on vegetation compared to the current and historical operation of the dam.

ENDANGERED AND THREATENED SPECIES

Some species of plants and animals in the general area are listed as endangered or threatened under the ESA. Endangered species are defined as any species which is in danger of extinction throughout all or a significant portion of its range. Threatened species are defined as species which are likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Although candidate species have no technical protection under the ESA, Reclamation's policy is to avoid adverse effects to these species to the extent possible and provide mitigation if needed. These species are included here for general information as it is possible some candidates could be listed prior to project completion.



View immediately upstream of Savage Rapids Dam at full pool elevation.



View further upstream with the seasonal lake at full pool elevation showing development and typical vegetation along the shoreline.

Fish

Currently there are no ESA listed fish species within the Rogue River system, but steelhead trout and coho salmon have recently been proposed for listing. In addition, all other anadromous trout species of Oregon, Idaho, Washington, California, and Montana and all other Pacific salmon are currently the subject of comprehensive status reviews. These species include sea-run cutthroat trout and chum, sockeye and chinook salmon. The reviews are to be completed throughout 1995 and 1996.

Coho Salmon (*Oncorhynchus kisutch*)

On July 19, 1995, NMFS proposed three distinct populations of Coho (Central California Coast, Southern Oregon/Northern California Coasts, and Oregon Coast) for listing as threatened under the ESA. This includes the coho run of the Rogue River.

Steelhead (*Oncorhynchus mykiss*)

On March 16, 1995, NMFS proposed the “Klamath Mountains Province Steelhead” (all steelhead stocks between Cape Blanco, Oregon and Cape Mendocino, California) for listing as threatened under the ESA. This includes all steelhead runs of the Rogue River.

Wildlife

Listed Species

Bald Eagle (*Haliaeetus leucocephalus*).—The bald eagle is listed as threatened. Bald eagles are known to migrate through the area and spend some time foraging on the Rogue River during migration. No active nests are located along or near the reservoir area.

Northern Spotted Owl (*Strix occidentalis*).—This owl is listed as a threatened species. Although it may be found in the general area, habitat along the Rogue River in the vicinity of the reservoir area is not suitable for the species.

Candidate Species

Pacific Western Big-Eared Bat (Plecotus townsendii townsendii).—This bat is a candidate category 2 species. Category 2 indicates a species for which existing information indicates listing may be warranted, but biological information to support a proposed rule is lacking. Occurrence of the bat within 2 miles of the Rogue River has been documented. Preferred habitat includes caves and sometimes buildings.

Northwest Pond Turtle (Clemmys marmorata marmorata).—This turtle is a candidate category 2 species. Preferred habitat consists of ponds and small lakes with abundant vegetation, but the turtle is also found in marshes, slow moving streams, reservoirs, and occasionally in brackish water. The reservoir formed by Savage Rapids is not preferred habitat because of the seasonal transition between the lake and swift flowing stream.

Northern Red-Legged Frog (Rana aurora aurora).—This frog is a candidate category 2 species. Preferred habitat is in and near ponds or other permanent water with extensive vegetation. The frog is also found in damp woods.

Plants

No species of threatened or endangered plants are known to be in the area. However, one Federal candidate category 2 species has been found in the general area. The coral seeded allocarya (*Plagiobothrys figuratus var. corrallicarpus*) has been found in three locations west of Grants Pass. All three locations are about 1 mile from the river. Habitat along the reservoir does not appear suitable for the plant.

Effect of the Alternatives on Threatened and Endangered Species

Available data were examined, and a survey of the area that would be affected by the project was made with representatives of fish and wildlife agencies. The habitat of the affected area is not suitable for any listed species except the bald eagle. Effects on wintering bald eagles would be insignificant and limited to temporary disturbance during construction. Elimination of the seasonal reservoir would have no effect on wintering

bald eagles. The affected area is unsuitable to all candidate species except fish and, possibly, the Pacific western big-eared bat which would not be affected.

Reclamation has determined that none of the alternatives would likely have any measurable effect on any ESA-listed or candidate species. There would be positive effects on the salmon undergoing status review and steelhead trout recently proposed for listing as threatened under ESA. (See “Effects of the Alternatives on Fish” for discussion of the positive effects of the Preferred and Dam Retention Alternatives.) The No Action Alternative would have no effect on listed or candidate wildlife species but would continue to cause losses in steelhead and salmon populations.

RECREATION

General

Throughout the Rogue River basin, recreation and tourism are considered to be the fastest growing economic activities (OWRD 1985). The Rogue River is nationally and internationally recognized for its diverse recreation opportunities. Visitors as well as residents use the river and adjacent land for fishing, hunting, camping, backpacking, hiking, boating (including whitewater), jet skiing, picnicking, photography, nature study/viewing, and sightseeing. Water skiing is limited to reservoirs. Federal, State, county, and city governments and private industry have been instrumental in providing numerous parks, recreation facilities, and opportunities to accommodate users.

With the exception of hunting, backpacking, and hiking, these recreational activities are present in the Grants Pass/Savage Rapids Dam area.

Boating is becoming increasingly popular. Between 1987 and 1989, boat registration in Jackson County increased 6.1 percent and in Josephine County increased 7.1 percent to respective totals of 9,293 and 3,840 boats. Although no figures are available, the use of drift boats, rafts, and other floating devices probably increased at an even greater rate. River running and touring on the Rogue River have become so popular that permits are now required for many downstream reaches in order to regulate the number of trips and people in an effort to limit adverse effects on the river system. Boating activity for area rivers and lakes is shown in table VI-6.

Table VI-6.—Boating activity (boating-days)
 [Source: 1990 Statewide Boating Survey, Oregon]

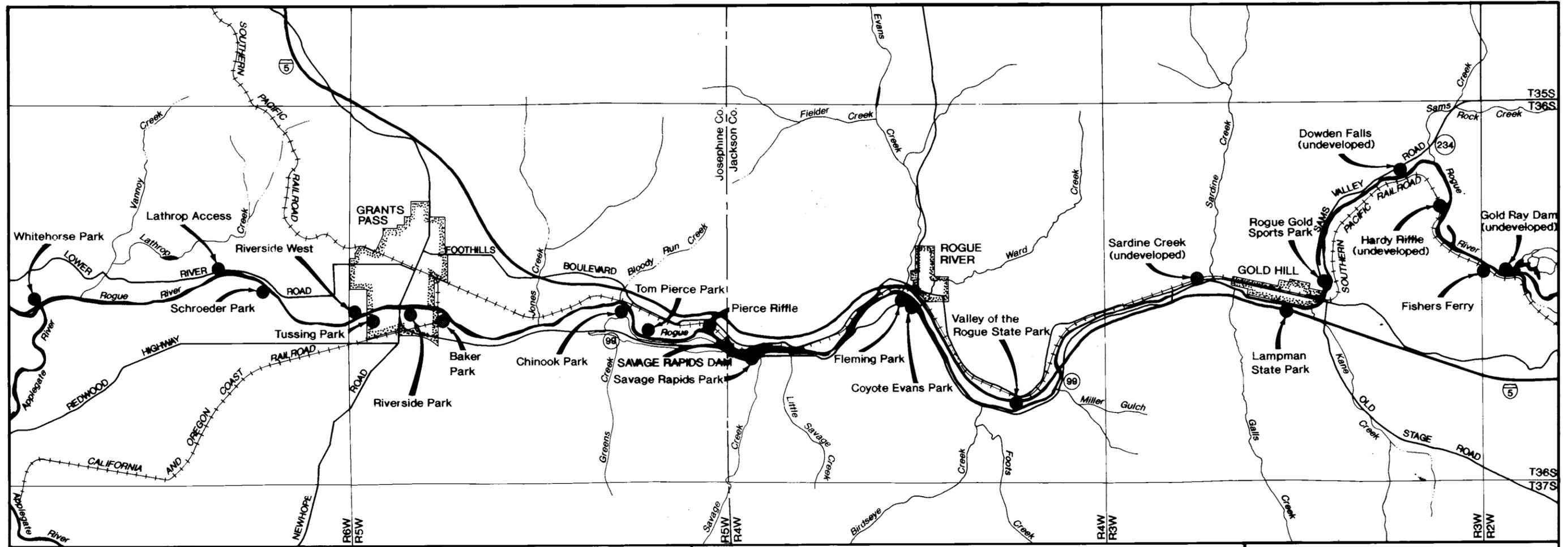
Body of water	Fishing	Cruising	Skiing	Sailing
Jackson County				
Emigrant Lake	5,681	110	6,459	1,227
Fish Lake	7,071	705	-	-
Howard Prairie Reservoir	16,294	1,465	1,721	3,624
Hyatt Reservoir	727	-	-	-
Lost Creek Reservoir	36,359	3,752	13,301	468
Rogue River	13,146	914	-	-
Savage Rapids Reservoir	-	¹ 520	-	-
Willow Creek Reservoir	2,506	376	734	-
Applegate Reservoir	5,020	26	-	-
Subtotal	86,804	7,348	22,735	5,348
Josephine County				
Illinois River	129	-	-	-
Rogue River	18,642	1,830	1,335	129
Selmac Lake	1,005	26	-	-
Subtotals	19,758	1,856	1,335	129
Total	106,562	9,204	1,335	5,477

¹All boating-days, including water skiing but not other activities such as jet skiing, and floating using durtbags or tahitis.

Savage Rapids Reservoir

For this study, the affected environment with regard to recreation is limited to the Rogue River corridor from Coyote Evans Park near the city of Rogue River to Savage Rapids Dam, adjacent lands, and the area just downstream from the dam. Coyote Evans park is located at the upper end of the Savage Rapids Dam impoundment.

Except as noted below, Federal, State, and local agencies have not counted the actual number of visitors nor enumerated the types of activities along this reach of the Rogue River. However, Reclamation has consulted a number of recreation professionals and obtained local opinions. Recreation areas and facilities for all locations in and near the general area are shown on the Public Recreation Areas map.



SITE NAME	JOSEPHINE COUNTY													JACKSON COUNTY								
	WHITEHORSE (COUNTY)	LATHROP ACCESS (COUNTY)	SCHROEDER (COUNTY)	RIVERSIDE WEST (CITY)	TUSSING (COUNTY)	RIVERSIDE (CITY)	BAKER (CITY)	CHINOOK (COUNTY)	TOM PIERCE (COUNTY)	PIERCE RIFFLE (COUNTY)	SARGE RAPIDS (COUNTY)	FLEMING (CITY)	COYOTE EVANS (CITY)	VALLEY OF THE ROGUE (STATE)	SARDINE CREEK (COUNTY) (future boat ramp)	LAMPMAN (STATE)	ROGUE GOLD (CITY & COUNTY)	DOWDEN FALLS (COUNTY) (future boat ramp)	HARDY RIFFLE (COUNTY) (undeveloped)	FISHERS FERRY (COUNTY)	GOLD RAY DAM (COUNTY) (future boat ramp)	
FACILITIES																						
BEACH			X				X			X												
POTABLE WATER	X		X	X		X		X			X	X	X	X			X					
BOAT RAMP	X	X	X				X	X		X	X		X	X			X			X		
TOILETS	X		X	X		X		X	X	X	X	X	X	X			X			X		
CAMPGROUND	X		X											X								
DAYUSE/ PICNIC AREA	X	X	X	X	X	X		X	X	X	X	X	X	X		X	X					
OTHER	trail, nature viewing area, shelter		ball field, tennis & basketball courts	tennis courts & ball fields		shelters, ball field, lawn bowling		handicap fishing pier	trail, playground ballfields, shelters	trail, nature viewing area				freeway rest area	fishing access	tennis courts	fishing access	fishing access	fishing access	fish viewing ladder, old power plant		

EXPLANATION

● Recreation Area

SCALE OF MILES

UNITED STATES
DEPARTMENT of the INTERIOR
BUREAU of RECLAMATION
GRANTS PASS DIVISION,
ROGUE RIVER BASIN PROJECT, OREGON

JOSEPHINE COUNTY WATER
MANAGEMENT IMPROVEMENT STUDY
PUBLIC RECREATION AREAS

Denver, Colorado January 1991

Recreation activities on the reservoir include the use of motor boats for water skiing and riding for pleasure, jet skiing, swimming, and limited fishing. These activities are limited somewhat since the reservoir is narrow. Drift boat, canoe, and raft use on the reservoir are extremely low. The State estimated approximately 520 motorized boating-days on the reservoir in 1990 (Oregon State Marine Board 1990).

Jackson County Parks Department has surveyed auto license plates at Savage Rapids Park and concluded that the primary users of the reservoir are people who live in the area, mostly from the city of Grants Pass. The area is close and easily accessible for short duration visits.

Although tourists use the area, the use is probably secondary to fishing and whitewater boating/rafting on the Rogue River. The reservoir is not a primary or secondary destination site for any significant number of non-local visitors. As noted above, even local use is limited because of the narrow surface area of the reservoir which contributes to crowding and creates safety problems, limited public access, and limited facilities.

Fishing and Fish Viewing

Josephine County Parks Department and Jackson County Parks Department have indicated that the quality of fishing in the reservoir is considered poor and is an incidental activity.

The State formerly stocked the reach from Gold Ray Dam to the upper end of Savage Rapids impoundment with catchable-size trout, but stocking was stopped in 1994 to avoid conflict with wild fish. The current policy is that no planting will be made in the main stem Rogue River below Lost Creek Dam, about 32 miles upstream from Gold Ray Dam.

Although the area on the left (south) abutment of the dam is not designed or developed for public access, the location is well known and used by local people for fish viewing during spawning runs. Local groups have installed a bench here. No estimate of this use is available.

Most of the fishing in this general area takes place in the 2,000-foot reach downstream from Savage Rapids Dam to Pierce Riffle because this reach has a higher than average concentration of fish.

Public Facilities

At the upstream end of the reservoir and within the city of Rogue River, a 4-acre parcel of land has been developed into two day-use parks—Coyote Evans and Fleming Parks. These parks are operated and maintained by the city of Rogue River. Savage Rapids Park, located a short distance upstream from Savage Rapids Dam, is operated and maintained by a private entity under contract to the GPID. Jackson County ordinances allow camping on sites for up to 30 days. All of these campgrounds stay very busy during the high use season from May to September.¹

Coyote Evans Park.—Leased to the city of Rogue River by the ODFW, this park caters mainly to river users and serves as a primary launch and takeout location for floatboaters and jet boaters who use the river upstream from the reservoir. Some people using canoes and drift boats travel downstream and takeout at Savage Rapids Park; but, according to the Jackson County Parks Department, the number is very low. Facilities at Coyote Evans Park include a picnic area, barbecue grills, and vehicle parking. The Jackson County Parks Department estimates that over 50,000 people visit the park each year.

Fleming Park.—Adjacent to Coyote Evans Park and owned and operated by the city of Rogue River, this park serves as a local picnic and fishing area, as a rest stop for travelers because of its proximity to Interstate 5, and accommodates one commercial concession which provides jet boat rides on the Rogue River upstream from the reservoir. Facilities include restrooms, barbecue grills, picnic tables, and open-space areas. Jackson County Parks Department estimated that this park had 100,000 visitors during 1989.

Savage Rapids Park.—Savage Rapids Park is the only public access adjacent to the reservoir. In 1975, Jackson County leased 10 acres of land from GPID and developed this recreation site, one-quarter mile upstream from the dam. Currently, 5 acres have been developed to provide a boat launching facility, picnic area, restrooms, vehicle parking, and a beach. In 1989, one county official estimated visitation at about 50,000 people.

The county deferred development of the remaining 5 acres of land until funds were available and has now returned the development to GPID. The park is now operated as a fee park under a year to year contract. Future development and operation of the park is uncertain.

¹Jackson County Parks Department, personal communication.

Private Facilities

The State has declared much of the Rogue River above Savage Rapids Dam as navigable. In Oregon, this designation means private ownership of adjacent land extends only to the mean high waterline of the river. The river and the lands below the high waterline are public.

Where a reach of river has not been declared navigable, the State defines adjacent land ownership as extending to the middle of the watercourse. The Rogue River in the vicinity of Savage Rapids Dam and its impoundment has not been declared navigable. Public access to these waters is very limited and has caused considerable tension—"no trespassing" signs are common throughout this area.

Commercial.—Four areas on the south side of the reservoir have been privately developed for commercial recreation, as shown in table VI-7. These operations provide overnight and long-term camping.

Table VI-7.—Commercial campgrounds

Campground	Number of sites
Rogue River RV Park	21
Have A Nice Day	15
Circle RV Park	25
Unnamed new site	12

Residential—As of mid-1993, landowners had installed 106 permanent boat docks, 9 floating boat docks, and 38 boat ramps along the reservoir shoreline for personal use.

Effect of the Alternatives on Recreation

Preferred Alternative

Removing the dam would result in the restoration of a natural river channel and more fish would migrate upstream unimpeded. Fishing opportunities would be greatly enhanced in the 3-mile reach upstream from the dam.

The heavy concentration of fish and fishermen between the dam and Pierce Riffle would be eliminated as fish disperse over this reach and the 3-mile reach upstream from the pumping plants.

The popular activity of viewing migrating fish at the Savage Rapids Dam fish ladders would be eliminated. The nearest opportunity for viewing anadromous fish passing up a fish ladder would be Gold Ray Dam, approximately 18 river miles upstream.

There may be an opportunity to revamp Savage Rapids Park as a public access point for the river; however, the future of the park is uncertain at this time.

The current 520 days of motorized boat use on the seasonal reservoir would be dispersed to other sites. Travel to Lost Creek Lake, Howard Prairie Lake east of Ashland, or other area reservoirs for motorized boating will be more time consuming and expensive. Yet, these reservoirs offer safer and better opportunities for such boating since they are wider and larger than Savage Rapids reservoir. (Galesville Reservoir, located north of Grants Pass and outside the two-county area, is nearer than many other reservoirs and could be expected to receive some of the displaced use.)

Private recreation facilities associated with water recreation such as boating docks constructed by homeowners and business will become unusable. Some of these may be reconstructed closer to the new waterline and others may be abandoned or removed.

Use of drift boats, kayaks, rafts, and "durtbags" (large styrofoam-filled vinyl bags) through the 3-mile river reach above the pumping plants would likely increase. If the rapids are passable, some jet boat use could be expected. The potential for disturbance of spawning fish might lead to the regulation or prohibition of jetboat use in this reach. Changes in the length, duration, and type of boating activities would probably be most noticeable between Valley of The Rogue State Park and Grants Pass. Since this area is relatively urban, tours through the reach would not be as popular as tours through more scenic portions of the Rogue. Generally, commercial operators consider only the Rogue River west of the junction of the Applegate River or stretches of the river east of the city of Rogue River scenic for commercial purposes. However, jet boat tours might use the Savage Rapids reach as a new corridor between scenic areas.

Since this area is close to populated areas, residents and tourists could use this area for shorter, more convenient trips. Many of the commercial outfitters contacted indicated that their clients are interested in short-duration trips such as this area could provide. Rapids are the most important consideration for rafters—the configuration of rapids at the site may prove to be a barrier, a tough challenge, or just a fun ride.

Although the types of recreation activities will change, overall recreational use is not expected to change significantly. Public access to this river reach will remain essentially unchanged and problematic since public access is limited primarily to Savage Rapids Park.

Dam Retention Alternative

This alternative would have no effect on recreation.

No Action Alternative

This alternative would have no effect on recreation.

CULTURAL RESOURCES

River Corridor

The Rogue River corridor has been extensively used by prehistoric as well as historic populations, and the potential for cultural resource sites may be significant in undisturbed areas. Because of extensive disturbance due to construction in the past in areas that would be affected by new construction, it is unlikely that there are any significant resources near the dam and a survey is considered unnecessary (see “Consultation and Coordination” chapter).

Savage Rapids Dam

Savage Rapids Dam does not qualify as an historic structure. Reclamation conducted a thorough investigation of the dam and sent the results to the State Historic Preservation Officer (SHPO) for evaluation. The results of

the State's review are contained in a letter dated August 1, 1990. The SHPO agreed ". . . the dam is not eligible for the National Register of Historic Places."

Effect of the Alternatives

It is unlikely that any alternative would have an effect on cultural resources. Construction of the Preferred Alternative and the Dam Retention Alternative would take place in areas that have been highly disturbed. For that reason, it is unlikely that there would be any impact to prehistoric or historic cultural resources.

If prehistoric or historic cultural resources are identified before or during project construction, Reclamation will consult with the SHPO and the Advisory Council on Historic Preservation to determine significance and subsequent action. The resources would be preserved or mitigated. Mitigation could include excavation, avoidance, or documentation consisting of an historic overview, measured drawings, and photographs.

AIR QUALITY

Air quality in the Grants Pass area is generally good. Outdoor burning is occasionally banned but the reason is fire danger, not air quality considerations. Temperature inversions in the winter can cause decreases in air quality, but inversions are short lived because of the frequency of storms and rains.

The alternatives would have no significant effect on air quality except temporary effects associated with construction. There may be some minor and temporary impacts from construction activity, but these would be controlled by compliance with existing State permit requirements and local ordinances.

NOISE

Savage Rapids Dam is located in an urban setting with highways located on both sides of the river and a railroad on one side. As a result the noise level at the dam is fairly high.

Effect of the Preferred Alternative

Construction will result in an increased level of noise during the construction period. Contractors will be required to implement methods and operations that keep noise to an acceptable level. Brief periods of intense noise and lower levels of increased noise over a longer period can be expected. Various methods for removal of the existing facilities will be explored as intense noise for short periods (e.g., blasting) may be more acceptable than less intense noise for longer periods. This concern will be addressed during final designs.

In the long-term, the electrically powered pumping plants will add to the noise level in the general vicinity. Careful siting of facilities, addition of vegetation, and a design that focuses sound upwards will generally mitigate noise. Noise from operation of the existing dam will be eliminated. The noise level is not expected to change significantly.

Effect of the Dam Retention Alternative

Construction will result in an increased level of noise during the construction period, and contractors will be required to implement methods and operations that keep noise to an acceptable level.

In the long term, there would be no change in the level of noise at the site.

Effect of the No Action Alternative

This alternative would have no effect on noise levels.

ESTHETICS

Savage Rapids Dam is an intrusion into the general riverine view of the Rogue River. However, the area is generally urban or suburban with an interstate highway on one side and a State highway on the other side of the river in the reach from Savage Rapids Dam to the city of Rogue River. When the reservoir is raised to create the seasonal impoundment, the view of the area is generally that of a small, narrow lake. When the reservoir is drained, the view of some reaches is that of a river with wide, cobble shores that are bare of vegetation.

Effect of the Preferred Alternative

Construction of the pumping plants and demolition of Savage Rapids Dam would result in confusion and a constantly changing construction scene. These effects would be short term and are not considered significant in an urban setting.

Removal of the dam would change the scenic view from that of a small lake to a natural river. Native vegetation would reestablish through natural processes within 5 years where not seeded. Reseeding in the area of dam removal and construction of the pumping plants would result in substantial vegetation coverage in 2 years. In some cases, the river surface would no longer be visible from residences because the slope of the riverbank would block the view. In these cases, the change would be similar to what is currently experienced between irrigation seasons.

The pumping plants, pipelines, and overhead power transmission lines are designed to blend with the natural environment and would be less obtrusive than the existing dam.

Effect of the Dam Retention Alternative

Construction at Savage Rapids Dam would result in a constantly changing construction scene. These effects would be short term and are not considered significant in an urban setting.

Effect of the No Action Alternative

This alternative would have no effects on esthetics.

SOCIAL WELL BEING

Effect of the Preferred Alternative

Lakeside residents will become riverside residents. The docks and lake access facilities they have constructed will become unusable. They will have to travel farther than the end of their property line if they wish to

participate in flatwater recreation activities. Their summertime view of the lake will become a year-round view of the river. Some residents have said they will be glad to be rid of the noise associated with water skiing and jet skiing.

Local recreationists will have to travel farther to participate in flatwater recreation.

Some tour guide and boat rental businesses feel that tourism could actually increase as people are attracted to a "new" stretch of river for fishing, floating, etc. Businesses near the river will likely continue to have the same, if not an increased, level of business.

Helicopters would no longer have a fairly large area deep enough to scoop up water for fighting forest fires. However, many smaller, adequate sites should exist in the area but would not be as convenient as the existing reservoir and would vary with river lows.

Since a supply of construction workers exists in the local area, no influx of construction workers is likely. Over a short period (3 to 6 years) construction jobs will provide employment for some unemployed individuals. Other businesses may see a short-term increase in sales.

Effect of the Dam Retention Alternative

The Dam Retention Alternative will have little effect on most residents and would have no effect on those that currently use or live next to the reservoir.

Effect of the No Action Alternative

The No Action Alternative will have no effect on most residents. Salmon and steelhead fishery interests and environmental groups would probably continue to work toward removal of the dam. Patrons of the GPID, will be left in a state of anxiety on the future status of the GPID until such time as solutions are implemented.

ENERGY REQUIREMENTS

Effect of the Preferred Alternative

Conversion from hydraulic to electrically operated pumps will increase the annual power consumption at the site by an estimated 5,675,800 kWh. This is equivalent to the average use of about 380 homes in the Pacific Northwest. Forecast deficits would be increased but such an increase is not significant on a regional basis.

Effect of the Dam Retention Alternative

Electric power consumption at the site would not be increased significantly.

Effect of the No Action Alternative

There would be no effect from this alternative.

INDIAN TRUST ASSETS

There are no Indian owned lands in the vicinity of Savage Rapids Dam, there are no Indian Reservations located in the Rogue River basin, and no Indian trust assets such as hunting and fishing rights have been identified in the basin (see "Consultation and Coordination" chapter).

ENVIRONMENTAL JUSTICE

Neither the Preferred Alternative nor the Dam Retention Alternative would have an adverse impact on minorities or low-income populations and communities.

UNAVOIDABLE ADVERSE EFFECTS

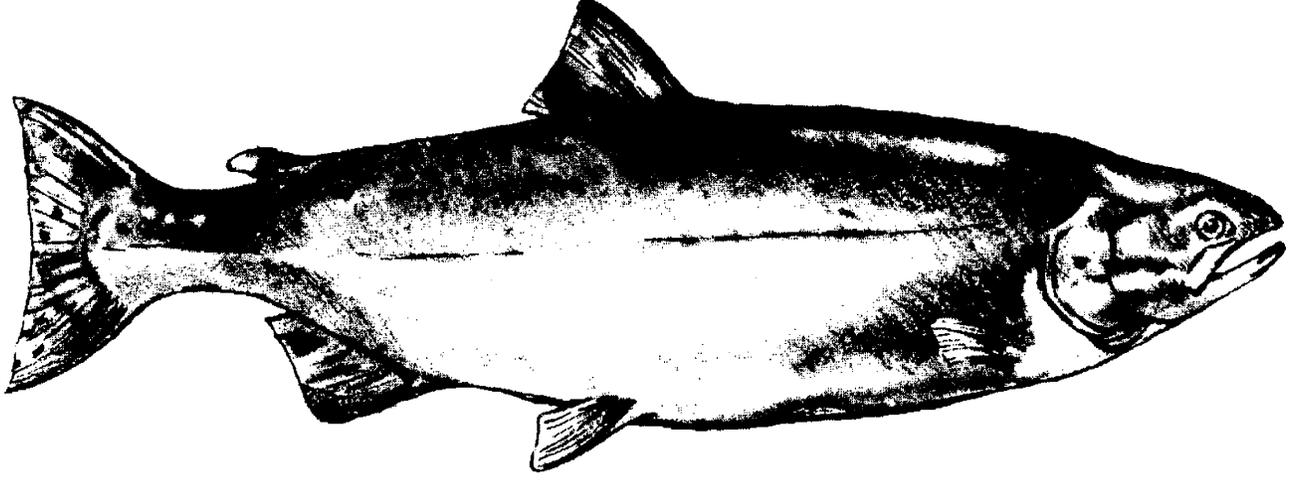
The Preferred Alternative would have two unavoidable adverse effects—loss of 110 acres of seasonal flatwater and increased electric power consumption. Neither is considered significant. Safer flatwater recreation is available at several reservoirs in the area, and the flatwater recreation loss would be offset by increased whitewater and other recreation associated with a free flowing river. The increased power consumption is not considered significant to the integrated Pacific Northwest Power Pool.

No unavoidable adverse effects were identified for the Dam Retention Alternative and the No Action Alternative.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The Preferred Alternative would eliminated 110 acres of seasonal flatwater and associated recreational opportunities. In addition, there would be an annual electric power commitment of 5,675,800 kWh.

No irreversible and irretrievable commitments of resources were identified for the Dam Retention Alternative and the No Action Alternatives.



PUBLIC INVOLVEMENT

Participation by the public and by State, Federal, County, and local entities was an integral part of plan formulation and evaluation for the JCWMIS. This participation reflects the high level of interest in the Rogue River and its uses. The public involvement program was designed to address requirements of Federal planning regulations and NEPA.

In early 1987, various departments of Josephine County and the County Commissioners appealed to the Commissioner of Reclamation to initiate a water management study for the County. In 1988, Reclamation initiated the JCWMIS in cooperation with Josephine County and the GPID. A wide range of local and environmental groups including the city of Grants Pass, the Izaak Walton League, WaterWatch of Oregon, and others showed support for the study. Further support was sought in 1990, at which time the NMFS and the American Fisheries Society agreed to participate in the study.

Public involvement activities were somewhat complicated by two events in 1990—issuance of a temporary water right permit to GPID and a significant reduction in participation by Josephine County because of budget restrictions. A draft of the temporary water right permit, made available in 1989, showed that the permit would be conditional on several factors. These included formation of a Permit Oversight Committee (POC), conducting studies of water conservation and other potentials, and annual progress reports to the Oregon Water Resources Commission. As a result of these changes, GPID and the POC became the central focus for public involvement activities for the JCWMIS.

The general public and cooperating agencies took part in the initial scoping phase, and a public involvement program was developed early and revised as needed. Some public involvement activities focused exclusively on fish passage and some focused exclusively on water conservation and facilities management. Most public involvement activities, however, involved an intermix of interests and concerns. GPID developed a public involvement program early in the study and, along with the POC, has carried out much of the public involvement since 1990. POC meetings were open to the public.

POC Members

The POC included the representatives of the following:

- GPID
- A non-voting member of the GPID
- City of Grants Pass
- Josephine County
- ODFW
- OWRD
- Bureau of Reclamation
- Natural Resources Conservation Service
- WaterWatch of Oregon

Agencies

The principal agencies that provided information or participated in the study were:

Federal: Reclamation, Bureau of Land Management (BLM), USFWS, NMFS, NRCS, and Forest Service

State: ODFW and OWRD

Local: GPID, city of Grants Pass, Jackson County, and Josephine County

Other Entities

Several environmental or other specific interest groups were actively involved in study activities or provided information. These include the following: American Fisheries Society, Izaak Walton League, Rogue River Flyfishers, and WaterWatch of Oregon.

General Activities

Much of the public involvement activities consisted of telephone or in-person contacts with individual representatives of various interests. Other activities often involved small group meetings. Many of these meetings and contacts were made to coordinate study activities, discuss study progress and findings, and to answer general questions. As an example, the Reclamation planning team met with special interest groups and private

citizens to discuss the JCWMIS and tour GPID facilities in 1989. GPID made numerous mailings to its patrons, appeared on radio shows to answer questions, and placed informational material in the local newspaper.

Reclamation prepared a progress report on the fish passage portion of the JCWMIS which was released to study participants and the interested public in July 1992.

Major public involvement activities included public meetings held in February and October of 1991 and in October 1993. Newsletters were sent by the POC to GPID patrons and to residents around the seasonal lake in November 1990 and in July 1991. GPID sent newsletters to their patrons in September 1991, March 1992, and November 1992. The planning report/draft environmental statement was distributed for public and agency review and comment in December 1994 and a public hearing was held in Grants Pass in February 1995. These activities provided opportunity for public comment on all aspects of the fish passage portion of the JCWMIS.

COORDINATION WITH FEDERAL AND STATE FISH AND WILDLIFE AGENCIES

The JCWMIS was closely coordinated with USFWS, ODFW, and NMFS. These agencies participated in identification of fish passage issues, fisheries and fish habitat in the area, and updating other information. USFWS, in cooperation with the NMFS and the ODFW, prepared a Planning Aid Memorandum in April 1990 and a draft Fish and Wildlife Coordination Act Report in 1994. ODFW provided a position paper on alternatives to GPID in December 1993. NMFS and USFWS were consulted and provided information on endangered species.

Fish and Wildlife Coordination Act Report

Findings of the Draft Fish and Wildlife Coordination Act Report were used in determining monetary and other fish and wildlife benefits of the alternatives (a copy of the Final report is included as Attachment C). The USFWS recommends that:

- Reclamation should seek authorization to remove Savage Rapids Dam and replace it with pumping plants.

- Implementation should be on an accelerated time frame.
- Funding should be nonreimbursable because of the substantial benefits to anadromous fish.
- The construction schedule should be closely coordinated with USFWS, ODFW, and NMFS.

Oregon Department of Fish and Wildlife

In December 1993, ODFW released a "position paper" to GPID (see Attachment D). ODFW indicated that:

- Their preferred alternative is dam removal.
- Replacement of fish passage structures would be acceptable provided that state-of-the-art passage structures were installed and properly maintained and operated.
- ODFW would not support any alternative that proposes to modify existing fish passage and protective structures.

Endangered Species Consultation

Consultation with the USFWS is required under section 7 of the Endangered Species Act. As an initial step in this consultation, Reclamation requested a list of threatened and endangered species from both the USFWS and the NMFS. Two species listed as threatened—bald eagle and northern spotted owl—were included in the list. In addition, there are several candidate species found in the area.

This Planning Report/Environmental Statement (PR/ES) is intended to serve as Reclamation's biological assessment of the potential effects of the alternatives on listed species. (An assessment is required under the ESA.) As indicated elsewhere, Reclamation has determined that none of the alternatives would have an effect on listed species and would have no effect on candidate species. The effects of the alternatives on anadromous fish undergoing status review or proposal for listing would be beneficial as discussed in more detail elsewhere in this document.

CULTURAL RESOURCES CONSULTATIONS

Cultural resource consultations were initiated in the 1970's when interim fish passage improvements were proposed. Findings at that time indicated that all of the affected area had been highly disturbed and it was unlikely that any cultural resources would be found. For that reason, a cultural resource survey was not needed. Areas that would be affected by implementation of the action alternatives identified in this document have been further subject to disturbance due to construction and OM&R activities since the 1970's. As a result, a cultural resource survey is not considered necessary for implementation of either action alternative. If cultural resources are found during construction, the SHPO would be consulted and appropriate actions would be taken to preserve or document any resources found.

A Reclamation historian researched the history of Savage Rapids Dam and consulted with the GPID and historical societies of Josephine and Jackson Counties. In 1991, an interpretive historic report on the dam was submitted to the SHPO who concurred in the assessment that Savage Rapids Dam was not eligible for listing in the National Record of Historic Places (see attachment H).

INDIAN TRUST ASSETS

The United States has a trust responsibility to protect and maintain rights reserved by or granted to American Indian tribes or Indian individuals by treaties, statutes, and executive orders. In 1993, the Department of the Interior and Reclamation established a policy of avoiding adverse effects to Indian Trust Assets (ITA's) where possible and assessing potential impacts to ITA's as a part of NEPA compliance policy. ITA's are defined as legal interests in property held in trust by the United States for Indian tribes or individuals, or property that the United States is otherwise chartered by law to protect. Included are lands, minerals, hunting and fishing rights, water rights, and instream flows.

The public involvement program related to scoping and developing alternative actions to improve fish passage at Savage Rapids Dam were open to all public interests. No ITA's were identified through the public involvement program. A survey of lands that could be affected by the alternatives found that none of those lands were owned by Native

Americans. Consultation with the Bureau of Indian Affairs, indicates that there are no known ITA's in the Rogue River basin.

An assessment of impacts to ITA's is not needed because there are no identified ITA that would be affected.

RECREATION CONSULTATIONS

A Reclamation recreation specialist toured the project area and consulted with Josephine and Jackson County Parks Departments, Josephine County Planning Department, BLM, and OWRD on recreation opportunities and the use of the seasonal impoundment and adjacent lands. The general consensus of the various agencies was that the alternatives would have negligible impacts on recreation.

REGULATORY COMPLIANCE

This document was prepared in compliance with the National Environmental Protection Act of 1969 (Public Law 91-190) and current regulations and guidelines established by the Department of the Interior and Reclamation. A Notice of Intent to prepare an environmental statement was published in the *Federal Register* on July 26, 1993, page 39834.

It is the intent of this document to comply with other applicable laws and Executive Orders. This section discusses some of the applicable legislation.

National Historic Preservation Act (Public Law 89-665)

This act provides for the maintenance of an expanded program to preserve historic properties throughout the United States. It provides for an Advisory Council on Historic Preservation with the responsibility to review and comment on all Federal actions that affect properties eligible for listing or already listed in the National Register of Historic Places. Subsequent amendments designated the SHPO as the individual responsible for administering programs for the state. Consultation with the SHPO has been concluded.

Clean Water Act (33 U.S.C. 1251 et seq.)

This act aspires to "maintain the chemical, physical, and biological integrity of the Nation's water" by eliminating pollutant discharge into navigable waters of the United States. It established an effluent limitation and discharge permitting program. It required owners/operators of each point source to obtain a permit and monitor and maintain effluent records.

Section 404 of the Act establishes a permit program administered by the Corps to regulate discharge of dredge and fill materials into United States waters. Required permits, including a National Pollutant Discharge Elimination System permit, would be obtained before construction through coordination with EPA, the State of Oregon, and the Corps.

Fish and Wildlife Coordination Act of 1958 (Public Law 85-624)

This act provides for equal consideration of wildlife conservation in coordination with other features of water resource development programs. The Act requires that any plans to impound, divert, control, or modify any stream or other body of water must be coordinated with the USFWS and state fish and wildlife agency through consultation directed toward the prevention of fish and wildlife losses and development/enhancement of these resources. Coordination with the USFWS and ODFW have been completed in compliance with the intent of this act and a final Fish and Wildlife Coordination Act Report has been received. (See also "Fish and Wildlife Coordination Act Report" in this chapter.)

Endangered Species Act of 1973 (Public Law 93-205)

This act provides for the protection of animal and plant species currently in danger of extinction (endangered) and those species that may become so in the near future (threatened). Section 7 of the Act sets forth the procedural requirements to ensure that Federal actions do not adversely impact threatened or endangered (T&E) species or their critical habitats. First, a determination is made whether the project area contains any T&E species, and then a biological assessment of impacts on the T&E species is made. A copy of the biological assessment is transmitted to the USFWS or NMFS

office having jurisdiction. If a "may affect" determination is made, a request to enter into formal consultation accompanies the biological assessment. The USFWS or NMFS evaluates the assessment and responds back to Reclamation with a biological opinion or a request for additional information or time within a 60-day period.

The appropriate fish and wildlife agencies have provided Reclamation with a list of threatened and endangered species found in the area, and Reclamation has made an assessment of potential impacts. This PR/ES serves as Reclamation's biological assessment that neither of the action alternatives is likely to adversely affect listed species and would have a beneficial effect on all fish species through improved fish passage.

Wild and Scenic Rivers Act of 1968 (Public Law 90-542)

Selected rivers are placed in the National Rivers Inventory to be preserved in a free flowing condition and to protect their local environments. Currently, portions of the Rogue River have been placed in the National Rivers Inventory. The Wild and Scenic Rivers Act precludes Federal assistance to water resource projects that would invade or unreasonably diminish the scenic, recreational, and fish and wildlife values of a wild and scenic river. In addition, the State of Oregon has placed portions of the Rogue River in the State inventory of wild and scenic rivers.

Reclamation has assessed potential impacts. This PR/DES served as an assessment that none of the action alternatives would invade or have a significant negative effect on the Rogue River. The only significant or measurable effect that either action alternative would have on the Rogue River is to enhance salmon and steelhead. A Section 7(a) Determination by the U.S. Forest Service and the BLM concurs with this assessment (see attachment J).

Executive Order 11988 (Floodplain Management, 1977)

Federal agencies are required to reduce the risk of floodplain loss; minimize the impact of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values provided by floodplains in carrying out specific actions. For water diversion projects,

there is no alternative to the construction of some of facilities within the floodplain. Reclamation addresses this executive order, in part, by locating most facilities above the 100-year flood elevation and by designing other structures to withstand the 100-year flood. The Preferred Alternative would slightly reduce potential damage and the Dam Retention Alternative would have no effect on flood damage potential.

Executive Order 11990 (Protection of Wetlands, 1977)

This executive order provides for minimal destruction, loss, or degradation of wetlands, and for action to preserve and enhance the values of wetlands by Federal agencies in fulfilling land management responsibilities. The pool formed by Savage Rapids Dam is a seasonal pool raised for 6 months and lowered for 6 months. For that reason, there are no permanent wetlands in the affected area that result from the pool or would be eliminated by removal of the dam. None of the alternatives would have a measurable effect with regard to wetlands.

DISTRIBUTION LIST

Copies of this PR/FES were distributed to all of the agencies, organizations, and individuals listed in this section. In December 1994, the PR/DES was distributed for review and comment to agencies, organizations, and individuals. The open period for comment was from December 15, 1994 to March 20, 1995. A public hearing for oral testimony was held on February 16, 1995 in Grants Pass, Oregon, and the period until February 27, 1995 was open for written testimony of those who could not attend the hearing or wished to supplement their oral remarks. The following marks are used in the distribution list to show receipt of the PR/DES, written comment on the PR/DES, and testimony for the hearing:

- ✓ Received a copy of the PR/DES from Reclamation
- ✍ Provided written comments on the PR/DES
- ☎ Provided oral or written testimony for the hearing record

U.S. Congressional Delegation

- ✓ Honorable Mark Hatfield, U.S. Senate, Washington DC; Portland OR; Salem OR
- ✓ Honorable Bob Packwood, U.S. Senate, Washington DC; Portland OR
- ✓ Honorable Wes Cooley, House of Representative, Washington D.C., Medford OR
- ✓ Honorable Peter A. DeFazio, U.S. House of Representatives, Washington DC; Eugene OR; Coos Bay OR
- ✓ Honorable Robert F. Smith, House of Representatives Washington D.C.; Medford OR, Salem OR

State Delegation

- ✓ Honorable John Kitzhaber, Governor, State of Oregon, Salem OR
- ✓ Honorable Brady Adams, Oregon State Senate, Grants Pass OR
- ✓ Honorable Lenn L. Hannon, Oregon State Senate, Ashland OR
- ✓ Honorable Eldon Johnson, Oregon House of Representatives, Medford OR
- ✓ Honorable Bill Markham, Oregon House of Representatives, Riddle OR
- ✓ Honorable Bob Repine, Oregon House of Representatives, Grants Pass OR
- ✓ Honorable John Watt, Oregon House of Representatives, Medford OR

Federal Agencies

- ✓ Advisory Council on Historic Preservation, Washington DC
- ✓ Bonneville Power Administration, Portland OR, Boise, ID
- ✓ Bureau of Indian Affairs, Washington DC
- ✓ Bureau of Land Management, Medford OR
- ✓ Council on Environmental Quality, Washington DC
- ✓  Environmental Protection Agency, Region, Seattle WA
- ✓ Environmental Protection Agency, Washington DC
- ✓ Federal Energy Regulatory Commission, Washington DC
- ✓  National Marine Fisheries Service, Portland OR
- ✓  National Park Service, Seattle WA
- ✓ National Park Service, Washington D.C.; Denver CO
- ✓ Northwest Power Planning Council, Portland OR
- ✓ Natural Resources Conservation Service, Grants Pass OR; Bend OR
- ✓ U.S. Army Corps of Engineers, Portland OR

- ✓ U.S. Army Corps of Engineers, Lost Creek Project, Trail OR
- ✓☎ U.S. Fish & Wildlife Service, Portland OR
- ✓ U.S. Fish & Wildlife Service, Washington DC
- ✓ U.S. Fish and Wildlife Service, Ecological Services, Sacramento CA
- ✓ U.S. Forest Service, Rogue River National Forest, Medford OR
- ✓ U.S. Forest Service, Siskiyou National Forest, Grants Pass OR

Indian, State, and Other Agencies

- ✓ Lower Elwha S’Klallam Tribe, Director Natural Resources, Port Angeles WA
- ✓✎ Oregon Department of Fish & Wildlife, Portland OR
- ✓ Oregon Department of Fish & Wildlife, Central Point OR; Grants Pass, OR
- ✓ Oregon Department of Fish & Wildlife, Watershed Health Team, Grants Pass OR
- ✓ Oregon Department of Transportation, Roseburg District Office, Roseburg OR
- ✓✎ Oregon Parks and Recreation Department, Salem OR
- ✓☎ Oregon Water Resources Commission, Salem OR
- ✓✎ Oregon Water Resources Department, Salem OR; Grants Pass OR

Local Entities

- ✓☎ City of Grants Pass, Mayor, Grants Pass OR
- ✓ City of Grants Pass, City Manager, Grants Pass OR
- ✓ City of Grants Pass, Utility Manager, Grants Pass OR
- ✓☎ City of Rogue River, Mayor, Rogue River OR
- ✓ Grants Pass Chamber of Commerce, Grants Pass OR
- ✓☎ Grants Pass Irrigation District, Grants Pass OR
- ✓☎ Jackson County Commission, Medford OR
- ✓ Jackson County Parks & Recreation Department, Medford OR
- ✓ Josephine County Commission, Grants Pass OR
- ✓ Josephine County Parks Department, Grants Pass OR
- ✓ Josephine County Planning Office, Grants Pass OR
- ✓ Josephine County Water Resources Department, Grants Pass OR
- ✓ Josephine Soil and Water Conservation District, Wolf Creek OR
- ✓ Rogue River Chamber of Commerce, Rogue River OR
- ✓ Rogue Valley Council of Governments, Central Point OR

Libraries

- ✓ Josephine County Public Library, Grants Pass OR
- ✓ Medford Public Library, Medford OR
- ✓ Rogue River Public Library, Rogue River OR

Radio and TV Media

- ✓ KAGI Radio News - 930, Grants Pass OR
- ✓ KAJO - 1270, Grants Pass OR
- ✓ KDRV - Channel 12, Medford OR
- ✓ KFMJ - FM 96.9, Grants Pass OR
- ✓ KOBI - Channel 5, Medford OR
- ✓ KTVL - Channel 10, Medford OR

Newspapers

- ✓ Medford Mail Tribune, Medford OR
- ✓ Grants Pass Daily Courier, Grants Pass OR
- ✓ Rogue River Press, Rogue River OR

Organizations and Individuals

- ✓✍ American Fisheries Society, Oregon Chapter, Corvallis OR; Bethesda MD
- ✓✍ American Rivers, Washington DC; Seattle WA
- ✓ American Water Resources Association, Bethesda MD
- ✓ Bitterroot Native Growers, Corvallis MT
- ✍ Center for International Environmental Law, Washington DC
- ☉ Curry Guides Assn., Grants Pass OR
- ✓ David J. Newton Associates, Inc., Portland OR
- ✓ Defenders of Wildlife, Washington DC
- ✓ Ducks Unlimited, Long Grove IL
- ✓ Environmental Defense Fund, Inc., New York NY
- ✓ Foster Wheeler Environmental, Bellevue WA
- ✓ Friends of the Earth, Seattle WA
- ✓ Greystone Development Consultants Inc., Englewood CO
- ✓ Harza NW, Bellevue WA
- ✓ Hydrowire Newsletter, Kansas City
- ✍ International Rivers Network, Berkeley CA

- ✓ Izaak Walton League of America, Grants Pass OR
- ✓✎ Izaak Walton League of America, Portland OR
- ⊗ Josephine County Farm Bureau, Grants Pass OR
- ✎ Kalmiopsis Audubon Society of Curry County, Port Orford OR
- ManTech Inc., Corvallis OR
- ✓ Meyer Resources, Inc., Metchosin BC
- ✎ Morrison's Rogue River Lodge, Merlin OR
- ✓ National Audubon Society, New York NY
- ✓ National Water Resources Association, Arlington VA
- ✓ National Wildlife Federation, Washington DC
- ✓ Natural Resources Defense Council, Inc. New York NY
- ✎ Northwest Environmental Defense Center, Portland OR
- ✓ Northwest Steelheaders, Milwaukee OR
- ✓ Oregon Guides & Packers, Gold Beach OR; Eugene OR
- ⊗ Oregon Guides and Packers Assn., Grants Pass OR
- ✎⊗ Oregon Natural Resources Council, Portland OR
- ✓ Oregon Rivers Council, Eugene OR
- ✓ Oregon Trout, Portland OR
- ✓⊗ Oregon Water Resources Congress, Salem OR; Ashland OR
- ✓ Pacific Fisheries Management Council, Portland OR
- ✓✎ Pacific States Marine Fisheries Commission, Gladstone OR
- ✎ Piazza & Piazza, Medford OR
- ✎ Randy Nelson's Lower Rogue Canyon Outfitters, Central Point OR
- ✎ River Trips Unlimited, Medford OR
- ✓ Robert E. Meyer Consultants Inc., Beaverton OR
- ✓✎ Rogue Flyfishers, Medford OR
- ✓✎ Rogue River Guides Association, Medford OR
- Rogue River Guides Association, Grants Pass OR
- ⊗ Rogue River Wilderness, Inc., Grants Pass OR
- ⊗ Sierra Club, Oregon Chapter, Monmouth OR
- ✓ Sierra Club, San Francisco CA
- ✓ Sierra Club, Rogue Group, Medford OR
- ✓ Siskiyou Audubon, Grants Pass OR
- S.P. Cramer & Associates, Gresham OR
- ✓ Stone and Webster, Boston MA
- ✓ STRA, Arlington VA
- ✓ Ted Sorenson Engineers, Idaho Falls
- ✓ The Nature Conservancy, Arlington VA
- ✓ The Wildlife Society, Bethesda MD
- ✓ The Fund for Animals, Inc., New York NY; Silver Spring MD
- ✎ Three Rivers Watershed Council, Inc., Rogue River OR
- ✓ Total Quality NEPA, Superior CO
- ✓ Trout Unlimited, Vienna VA

Chapter VII—Consultation and Coordination

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- ✓✎ WaterWatch of Oregon Inc., Portland OR
- ✓ WaterWatch, Medford OR; Hillsboro OR
- ✓ Wilkinson Barker, Washington DC
- ✓ Woodward-Clyde, Oakland CA

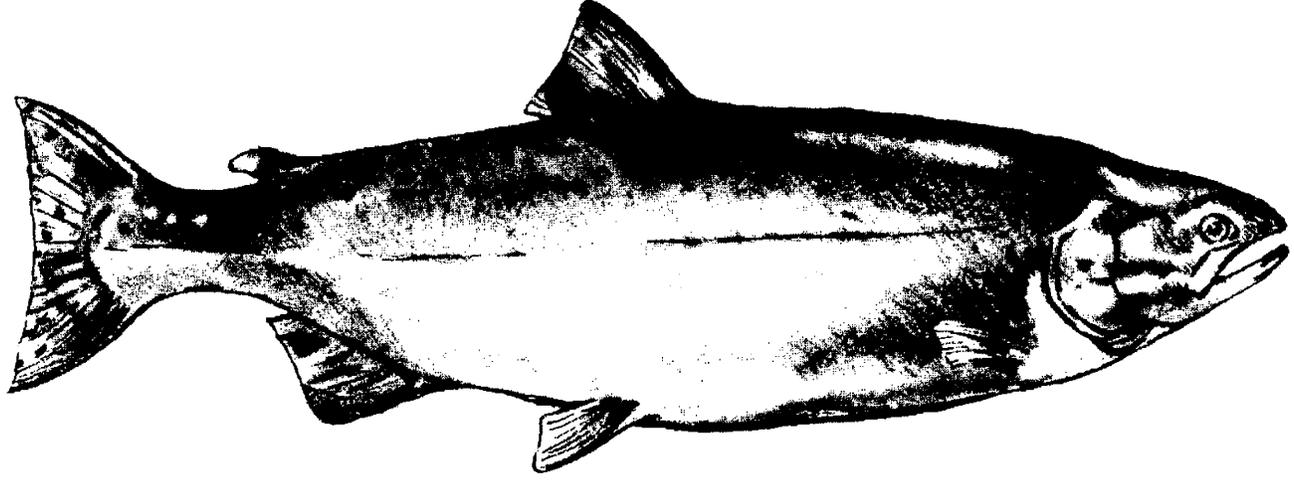
- ✓ Mr. Wilfred Allington, Englewood CO
- ✓ Mr. Fred Ayer, Portland ME
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- ✓ Mr. William Bailey, Grants Pass OR
- ⊗ Ms. Jeanne Y. Balt, Grants Pass OR
- ✎✎ Mr. Dennis Becklin, Grants Pass OR
- ✎ Ms. Lucy Bennett, Grants Pass OR
- ✎ Mr. Lynn and Ms. Della Berntson, Rogue River OR
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- Mr. Gerald Briggs, Grants Pass OR
- ⊗ Ms. Esther Bristol, Grants Pass OR
- ✎ Ms. Helen E. Brown, Medford OR
- ✎ Mr. Clint Brumitt, Central Point OR
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- ✎ Mr. James Lamp, Jr., Central Point OR
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- ✎ Ms. Alice L. Petty, Grants Pass OR
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- ⊗ Mr. Eric Staal, Ashland OR
- ⊗ Mr. Charles Stevens, Grants Pass OR
- ⊗ Mr. Willis Stiehl, Rogue River OR

- ✓ Mr. Bob Steimer, Grants Pass OR
- ⊗ Mr. Mark Swisher, Ashland OR
- ✓ Mr. Edward S. Syrjala, Centerville MA
- ⊗ Mr. Robert Taylor, Grants Pass OR
- ⊗ Ms. Pella Taylor, Grants Pass OR
- ⊗ Mr. John Tefteller, Grants Pass OR
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- ⊗ Mr. Dick Twogood, Grants Pass OR
- ✓⊗ Mr. Irv Urie, Medford OR
- ✎ Mr. Hank Vann, Grants Pass OR
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- ✓ Mr. Michael L. Walker, Medford OR
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- ✎ Mr. Charles Weaver, Grants Pass OR
- ⊗ Mr. Larry and Ms. Repita Webb, Williams OR
- ✎ Ms. Kelley Webb, Portland OR
- ✓ Mr. Joe Whalen, Grants Pass OR
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Chapter VIII—Formulation and Evaluation

GENERAL PLANNING CRITERIA

This investigation was conducted according to the *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* (P&G) (Water Resource Council 1983). Formulation and evaluation of alternatives followed Reclamation policy and procedures for implementing NEPA and other applicable Federal rules and regulations. The overall Federal objective for such planning is to contribute to national economic development consistent with protecting the Nation's environment.

Alternatives were formulated in a systematic manner to ensure that a full range of reasonable alternatives was identified. Under the P&G, one alternative is developed that maximizes net national economic development benefits to the Nation (national economic benefits exceed costs). Plans which address State and local concerns or emphasize other functions may also be formulated. A no action plan is identified which describes conditions that would exist in the future if the current planning effort does not result in implementation of a development plan. The no action plan also serves as a base from which to measure the benefits and impacts of the alternative development plans.

Each identified alternative was tested against four criteria to determine if it is viable. The four criteria are:

- Completeness—the extent to which a plan accounts for all investments or actions to ensure realization of planned effects.
- Effectiveness—the extent to which a plan alleviates specified problems.
- Efficiency—the extent to which a plan is responsive to the most cost-effective means of alleviating specified problems while being consistent with protecting the Nation's environment.
- Acceptability—the plan is workable with respect to State and local entities and the public and is compatible with existing laws, regulations, and public policies.

After viable alternatives were formulated they were evaluated and compared through a four-account system that consists of:

1. The national economic development account which displays changes in the economic value of the national output of goods and services.
2. The environmental quality account which displays nonmonetary effects on significant natural and cultural resources.
3. The regional economic development account which displays changes in the distribution of regional economic activity.
4. The social well-being account which displays plan effects not reflected in the other accounts.

FORMULATION PROCESS

Potential actions for improving fish passage at Savage Rapids Dam have been under study and alternatives identified since the 1970's. These alternatives were presented in a variety of publications for public review and were commonly discussed among fishery resource agencies, water resource agencies, and special interest fishery and environmental groups. Alternatives from earlier studies were reviewed as part of the formulation process and newer technology and experience gained over the intervening years were applied in reformulating and modifying the alternatives. All of the formulation activities were under the direction or review of the POC (see Consultation and Coordination chapter).

Nonstructural Alternatives

A viable nonstructural alternative was not identified, and indeed, is not possible. Since the focus of this study is a problem caused by man-made structures, any viable alternative would require structural changes of some kind.

Non-viable nonstructural alternatives could be formulated but there was no attempt to do so in this study. Any action that would ignore the anadromous fishery or that would not significantly improve fish passage at Savage Rapids Dam would be unacceptable.

No Action Alternative

A No Action Alternative was formulated to (1) identify anticipated conditions including the needs expected to exist in the future and (2) to provide a baseline for evaluation of the action alternatives. Identification and evaluation of a No Action Alternative is also required by NEPA. The No Action Alternative assumes that the current study would end, and that an action alternative would not be implemented. In formulating a No Action Alternative, Reclamation recognized that the continued loss of salmon and steelhead at Savage Rapids Dam is unacceptable to Federal, State, and local entities; private organizations; and many individuals. The major uncertainties are (1) the action(s) that would be taken and (2) the timeframe of that action.

For this analysis, it was assumed that salmon and steelhead losses at Savage Rapids Dam would continue at current or near current levels for up to 20 years. As a result, the analysis of benefits and costs for this study are based on a 20-year period in contrast to a 100-year period (life of project facilities) normally used with Reclamation projects.

Structural Alternatives

The purpose of formulating more than one alternative is to address the varying concerns and interests of the publics that may be affected. For example, under the P&G criteria one alternative should maximize economic benefits to the Nation. Other alternatives may be formulated to better address local or State concerns. However, an alternative must pass the four criteria of viability to be considered. For example, an alternative that does not substantially reduce salmon and steelhead losses would not meet the effectiveness criteria and would not be considered.

Two structural alternatives were identified that meet the four criteria of viability.

- Remove the dam and build pumping plants along the river to supply GPID with irrigation water (Preferred (Pumping) Alternative).
- Redesign and replace existing fish ladders and screens using state-of-the-art technology and replacement of irrigation pumping facilities (Dam Retention Alternative).

Optional features and variations of the pumping alternative were identified and discussed at length in a 1992 Progress Report (Reclamation 1992a). These options generally relate to pump sizes and locations. Consideration and selection among the options were based primarily on irrigation water management considerations and costs as these options were considered equivalent for fish passage considerations. The final arrangement of pumps and pipes discussed in the preferred alternative was selected after cost comparisons indicated that two new pumping facilities, one on each side of the river, with a connecting overhead power transmission line, would be less costly than one pumping site on the south side of the river and a buried pipe extending across the river to supply the Tokay Canal and Evans Creek Lateral. The option of three equal-sized pumps versus two equal-sized pumps per canal served was selected on the basis of increased operational flexibility.

A potential recreation element was identified for the pumping alternative but is not proposed as a feature in this document. This option consists of constructing a challenging river course for rafts, drift boats, and kayaks in the river reach where the dam is removed. The design would depend on the as-yet-unknown configuration of Savage Rapids, but could be designed to allow jet boat passage or to be a barrier to jet boats. This option appears to be beyond the scope of this study. Future consideration of this action would not be precluded if the pumping alternative is implemented.

Formulation Concerns

At the outset of this study, it was clear that an acceptable alternative must include (1) improved anadromous fish passage and (2) facilities for GPID water diversion. Although there were elements of the public that proposed alternatives that included only one function, these alternatives were considered unacceptable and not developed or analyzed.

The range of possible diversion options is limited to retaining Savage Rapids Dam for gravity diversion and hydraulic pumping power or installing electric powered pumps. Concepts for improving fish passage were limited to: removal of Savage Rapids Dam, construction of new fish passage and protective facilities, and modification of current fish passage and protective facilities. State and Federal fish and wildlife agencies indicated that the latter would not be acceptable.

As a result, it was clear that there could be only two viable alternatives: (1) remove Savage Rapids Dam and construct some arrangement of pumping plants and (2) retain Savage Rapids Dam and replace current fish passage and protective facilities and hydraulic pumps with new facilities.

Concerns related to retaining and to removing Savage Rapids Dam are rather polarized. Some people want to retain the dam, primarily for the flatwater recreation benefit of the seasonal reservoir. Federal and State fish and wildlife agencies, environmental groups, and many local interests want the dam removed. These views were considered during the formulation process and major points of discussion are summarized below.

Dam Removal

Major concerns expressed by the public on dam removal were:

- Effect on recreation values with elimination of the seasonal lake created by dam operations.
- Effect of sediment release on fish habitat downstream.
- Effect of long-term power costs for pumping.
- Cost sharing responsibilities.

Return of the Federal investment was an expressed concern. Analysis by Reclamation indicated that the Federal investment would be recovered in about 10 years with dam removal (Preferred Alternative) assuming the current Federal discount rate of 8 percent.

Dam Retention

The major concern related to retention of the dam is the future of GPID and the long-term integrity of the action. Rapid urban development has significantly altered the composition of GPID patrons. Past indifference and lack of cooperation between developers and administering officials have left GPID with a number of patrons who are unable to receive water. In some areas, right-of-way access to service distribution systems has been severely hampered. Recently, State legislation has made it possible and more affordable for all irrigation district patrons (those who receive water and those who do not) to buy out of irrigation districts if they feel their

needs are not being met. These actions increase uncertainty and the potential for an irrigation district to suffer financial difficulties.

One concern is that immediate action would be needed to ensure safe fish passage if GPID should become insolvent in the future. Another concern is that the Federal cost of improving fish passage while retaining the dam would not be recovered. Reclamation analysis indicates that based on the monetary costs and benefits of the Dam Retention Alternative, the Federal Government would recover its investment in about 15 years assuming the current Federal discount rate of 8 percent.

Some of these concerns could be alleviated if a vigorous and forceful program were developed to:

- Market GPID's services.
- Improve operational efficiencies.
- Achieve consistent cooperation between developers and city and county administrators where GPID services are involved.
- Enforce laws that protect GPID's interests.

COMPARATIVE ANALYSES

An abbreviated four-account display of the two action alternatives—pumping alternative (Preferred Alternative) and the Dam Retention Alternative—is presented here. Significant differences exist between the two action alternatives primarily in the National Economic Development Account and salmon and steelhead resources of the Environmental Quality Account. Meaningful differences between the alternatives in regional economic development, other environmental quality categories, and other social effects are not apparent from the available data.

Concern has been expressed by the public that data on fish losses and values are out of date and new studies should be conducted. Another concern expressed is a lack of data on the potential effects on local business with removal of the dam and loss of the seasonal reservoir. Reclamation considers existing data sufficient for decisionmaking.

National Economic Development (NED)

The NED account describes beneficial effects of a plan in terms of (1) the economic value of the national output of goods and services, (2) the value of output resulting from external economies, and (3) the value associated with the use of otherwise unemployed or under-employed labor resources. Adverse effects of the plan are described in terms of opportunity costs of resources used in project investment and operation.

In this analysis, benefits from external economies and the value associated with unemployed or under-employed labor resources were not identified.

The NED benefits of the Preferred Alternative and the Dam Retention Alternative are based on an increase in the monetary value of commercial and sport harvest of the salmon and steelhead fishery. This increase stems from an increase in salmon and steelhead escapement at Savage Rapids Dam of 22 percent with the Preferred Alternative and about 17 percent with the Dam Retention Alternative. NED effects are summarized in table VIII-1

Table VIII-1.—National economic development account

Component	Preferred Alternative (Pumping Alternative)	Dam Retention Alternative
Beneficial effects ¹		
Fish enhancement	\$4,998,600	\$3,870,900
Adverse effects (costs) ¹		
Project investment	\$1,350,000	2,173,800
Operation	233,700	104,800
Total	\$1,583,700	\$2,278,600
Benefit-cost ratio	3.2 to 1	1.7 to 1
Economic rate of return	23.2 percent	12.6 percent
Net annual benefits	\$3,414,900	\$1,592,300

¹Annual equivalent using the 1994 Federal discount rate (8 percent) for a 20-year period.

Environmental Quality

The environmental quality account is a nonmonetary description of beneficial and adverse changes in the ecological, aesthetic, and cultural attributes of natural and cultural resources.

The primary long-term effect of the two action alternatives would be to increase the escapement of salmon and steelhead passing the current site of Savage Rapids Dam. The preferred alternative, in addition, would eliminate the seasonal reservoir. The 3.5 mile reach immediately upstream of Savage Rapids Dam would revert to a free flowing reach with permanent vegetation being reestablished next to the new high waterline. The site of the existing dam would revert to native vegetation. The alternatives would not affect any other geographical area. Except for effects on the salmon and steelhead, most effects of the action alternatives would be temporary short-term effects due to construction. Environmental effects are summarized in Table VIII-2.

Table VIII-2.—Environmental quality account

Category	Preferred Alternative (Pumping Alternative)	Dam Retention Alternative	No Action
Biological resources			
Salmon and steelhead	Escapement increase of 26,700	Escapement increase of 20,700	Continued loss at near current rate, possible listing as threatened or endangered
Resident fish	No measurable change, increased movement	No measurable change	No measurable change
Wildlife	Minor adverse impacts during construction. Insignificant long-term increase along river corridor	Minor negative impacts during construction	No change from present
Vegetation	Minor adverse impacts during construction. Small increase of vegetation along shoreline	Minor adverse impacts during construction	No change from present
Threatened and endangered species	No impact	No impact	No impact
Ecological systems			
Aquatic	Aquatic ecology of the 3.5-mile reach upstream from the dam would change to a typical riverine ecology. Aquatic productivity could increase slightly	No change from present	No change from present
Terrestrial	Slight improvement in streamside vegetation. No significant impact on existing vegetation.	No change from present	No change from present
Water quality	Slight decrease in quality during construction	Slight decrease in quality during construction	No impact
Air quality	Slight decreased during construction	Slight decrease during construction	No impact
Sound quality	Increased noise during construction with brief periods of intense noise. Slight increase in noise near operating pumping plants	Increased noise during construction with brief periods of intense noise.	No impact
Visual quality	Change from seasonal small reservoir view to permanent river view	No change from present	No change from present
Land quality	No significant change from present	No change from present	No change from present
Streams and stream systems	3.5 miles of the Rogue River changed from seasonal reservoir to free flowing year-round	No change from present	No change from present
Lakes and reservoirs	Loss of 110 acres of seasonal reservoir	No change from present	No change from present
Open spaces and greenbelts	Area formerly inundated seasonally would be developed over time resulting in some loss of open space	No impact	No impact
Cultural resources	No impact	No impact	No impact

Regional Economic Development (RED)

The RED account described beneficial effects in terms of NED benefits that accrue to the region, plus transfer of income to the region from outside the region, and increased regional employment. Negative effects are those transfers from the region to outside the region.

The primary effects of the two alternatives on the regional economy would be beneficial effects from construction and OM&R. Short-term and long-term effects on recreation, businesses, and property values were not quantified since significant or measurable changes are not anticipated with either action alternative.

All of the regional economic development effects identified for the two action alternatives are short-term temporary effects that result from construction. Construction impacts represent the initial dollar impact on the regional economy. Once spent, a given dollar within a regional economy may be respent a number of times resulting in a multiplier effect. For this analysis, the expenditure-based economic impacts for the construction area are determined in output (sales), total income or earnings (labor income: wages, salaries, and proprietors' income), and employment. Jackson and Josephine Counties are defined as the region for this analysis.

Construction impacts are short-term corresponding to the length of the planned construction as well as the distribution of spending across that period. This period is 5 years for the Preferred Alternative and 6 years for the Dam Retention Alternative. Table VIII-3 summarizes regional economic effect.

Table VIII-3.—Regional economic development account
(short-term construction impacts)

Item	Preferred Alternative (Pumping Alternative)	Dam Retention Alternative
Construction period	5 years	6 years
Construction expenditure (total)	\$11,000,000	\$17,000,000
Regional output (total)	\$15,200,000	\$23,900,000
Employment	120 jobs	190 jobs
Increased personal income (annual)	\$2,205,000	\$3,950,000
Increased total income (annual)	\$4,266,000	\$6,713,000

A local impact of the Dam Retention Alternative would be repayment of construction costs assigned to the GPID. The construction cost to be borne by the GPID totals \$2,848,000. If financed over 30 years at 6 percent interest, this cost would increase the total of GPID's annual assessments by an estimated \$207,000.

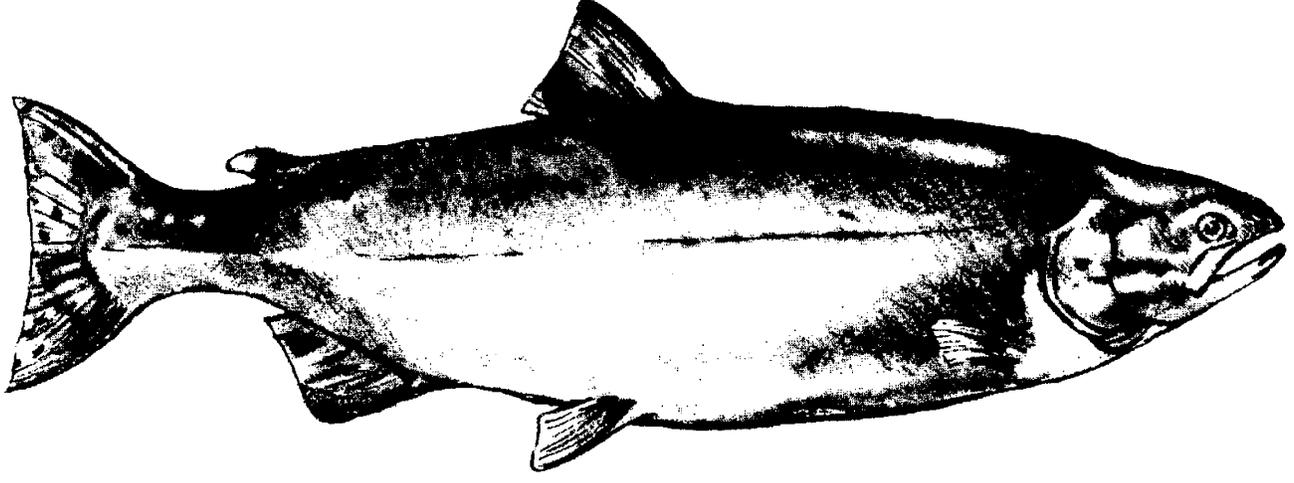
Other Social Effects

The other social effects account summarizes effects that cannot be satisfactorily quantified or described in the other three accounts. Included are urban and community effects; life, health and safety factors; displacements; long-term productivity; and energy requirements and conservation. Social effects of the alternatives accrue primarily from construction (short-term effects) and removal of Savage Rapids Dam including loss of the seasonal reservoir (long-term effects). Other social effects are summarized in table VIII-4.

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Table VIII-4.—Other social effects account

Component	Preferred Alternative (Pumping Alternative)	Dam Retention Alternative	No Action
Urban and Community			
Employment	Construction employment would provide about 120 jobs for 5 years	Construction employment would provide about 190 jobs for 6 years	
Income	Short-term increase in personal and other income. The few construction jobs would temporarily increase family income for those affected	Short-term increase in personal and other income. The few construction jobs would temporarily increase family income for those affected	No impact
Population	No impact	No impact	No impact
Attitudes	Favored by most fish and wildlife agencies and interests and whitewater recreationists	Favored by many or most property owners with river frontage (214 tax lots)	Favored by a minority
Life, Health, and Safety			
Safety	Traffic hazards increased during construction. Flatwater boating hazards eliminated. Whitewater recreation hazards increased	Traffic hazards increased during construction	No impact
Environment	Minor impacts (noise, air, and water) for those living near the construction area	Minor impacts (noise, air, and water) for those living near the construction area	No impact
Displacements			
Services and facilities	Some change of business emphasis from flatwater to river activities.	No impact	No measurable impact
Recreation	Reduced flatwater recreation in the immediate area. Increased opportunity for whitewater recreation.	No impact	No impact
Family	Those with riverfront lots would lose adjacent flatwater recreation.	No impact	No impact
Energy			
Power	Increase of projected Northwest energy shortfall by 5,675,800 kilowatt-hours (equivalent to the needs of 380 households)	Insignificant increase	No impact



- CH2M Hill, Inc., 1980, *Water Service Plan for the Urbanizing Area South of Grants Pass*, November 1980.
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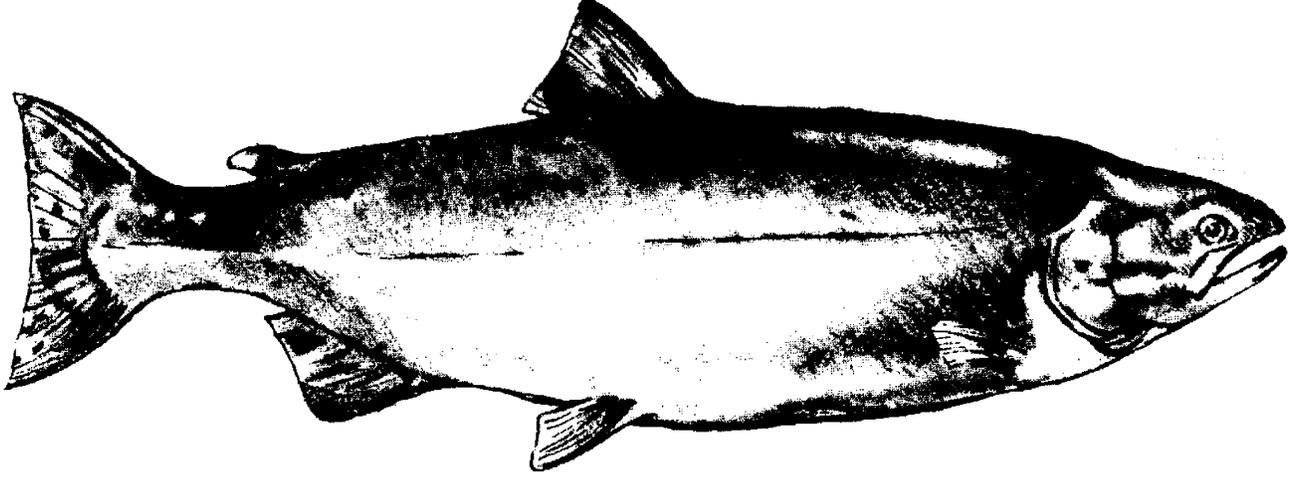
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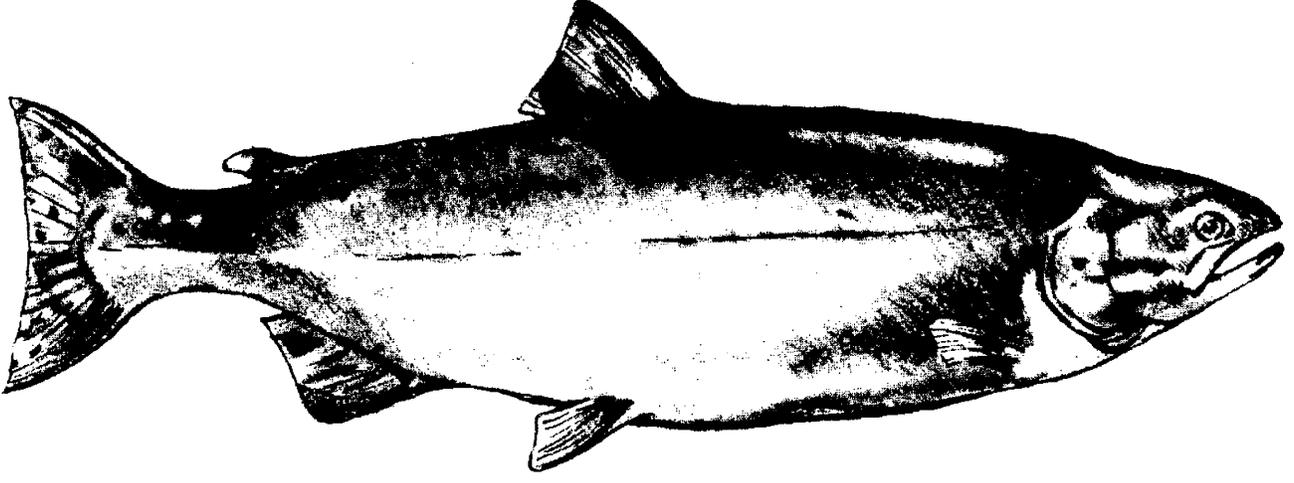
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