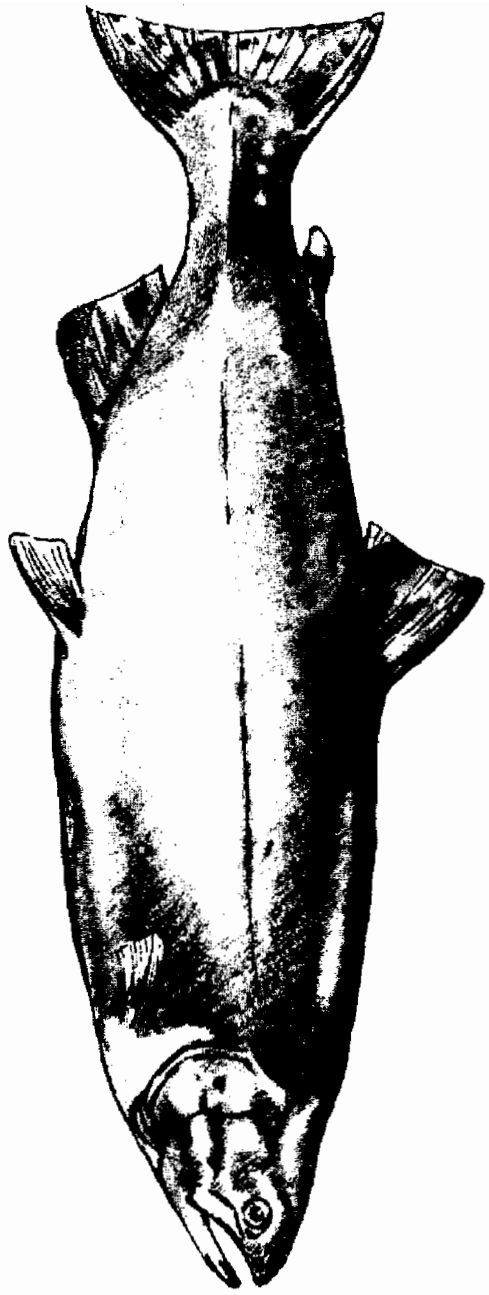


Attachment A—Glossary

Abutment.—Area of a riverbank that contacts the end of a dam. Left and right directions always assume the observer is looking downstream.

Acre-foot.—The amount of water that could cover 1 acre to a depth of 1 foot. Equivalent to 43,560 cubic feet or 325,851 gallons.

Anadromous fish.—Fish that ascend rivers from saltwater to spawn.

Appraisal level of detail.—The level of detail necessary to facilitate a decision to proceed with detailed study and evaluation of any alternative.

Appraisal study.—A study that incorporates an appraisal level of detail.

Aquatic.—Growing in water, not terrestrial.

Aquifer.—A water bearing stratum in permeable rock, sand, or gravel.

Bay.—Segment of a structure between structural/supporting piers.

Canal headworks.—The beginning of a canal.

Cofferdam.—A temporary, watertight enclosure around a construction site in a body of water. The cofferdam enables dry-site work conditions.

Cultural resource.—Any building, site, district, structure, or object that has archeological or cultural significance.

Demand.—The instaneous power requirement. Electrical demand is measured in kilowatts.

Diack decision/flows.—A 1988 Oregon Supreme Court decision requiring the Oregon Water Resources Department to establish water levels necessary to support recreation, fish, and wildlife in all State designated scenic waterways. No new permit for water use can be approved if that use would reduce the "Diack flow."

Durtbag.—A large, Styrofoam-bead filled vinyl bag used as a raft.

Easement.—An interest in land owned by another that entitles its holder to a specific limited use or uses. GPID's easements allow rights-of-way to operate and maintain canals and laterals.

Energy.—The power to do work. Electrical energy is measured in kilowatt-hours.

Elevation.—Elevation is always expressed as feet above mean sea level

Endangered species.—A species which is in danger of extinction throughout all or a significant portion of its range. To term a run of salmon "endangered" is to say that particular run is in danger of extinction.

Escapement.—Fish that return to spawn.

Feasibility study.—A study with sufficient detail of data and designs to make a economic and environmental decisions to proceed or not to proceed with implementation. Final designs are usually completed after a decision is made to implement a project.

Freshet.—A large increase in streamflow caused by heavy rains or melting snow.

Fingerling.—A juvenile fish, usually under 3-inches in length. (See also fry and smolt.)

Fish ladder or fishway.—A structure that carries water over or around an instream obstruction and allows fish to swim upstream past the obstruction.

Fish screen.—A structure that allows water passage but prevents fish passage (through water diversion facilities).

Fry.—Fish between the egg and fingerling stages. Depending on the species of fish, fry can measure from a few millimeters to a few centimeters in length. (See also fingerling and smolt.)

Habitat.—The environment of a biological population.

Harvest.—Commercially or recreationally caught fish.

Hydrology.—The science of water in nature: its properties, distribution, and behavior.

Impinge.—To strike, especially with a sharp collision. Fish impinging a fish-screen may be fatally injured.

Instream flows.—Water flows for designated uses within a defined stream channel such as minimum flows for fish, wildlife, recreation, or esthetics.

Irretrievable.—See irreversible.

Irreversible.—A commitment of resources that cannot be reversed, except perhaps in the extreme long term. An extinct species is the classic instance of an irreversible loss.

Juvenile (fish).—An immature fish that has not attained full growth (includes fry, fingerlings and smolts).

Kelt.—A steelhead that has spawned and is returning to the sea.

Log boom.—A line of floating timbers usually constructed to deflect floating material and waves away from a structure such as a dam.

Mitigation.—Specific action that can be implemented to reduce or eliminate adverse project impacts.

Modified Mercalli Scale.—A scale, used to describe earthquake intensity, which has twelve divisions ranging from I (not felt by people) to XII (nearly total damage).

Net economic benefits.—Monetary benefits less costs.

No Action Alternative.—The alternative that describes future conditions that would exist without the development of the action alternatives. The no action alternative serves as a base to measure the effects of the action alternatives.

Ogee.—An elongated "S" shape often used for dam spillways.

Plunge pool.—As used in this report, a pool constructed at the bottom of a dam or other hydraulic structure.

Public.—Any interested group or individual, including Federal, State and local agencies, special-interest groups, ad hoc groups, and the general citizenry.

Pumplift.—The vertical distance that a pump raises water.

Radial gate.—A pivoted gate with a circular arc face. The gate swings about the pivot when opening.

Reach.—A portion of a stream or a river.

Redd.—The nest that a spawning female salmon digs in gravel to deposit her eggs.

Riparian.—Related to or living or located on a water course.

Rotary-drum screen.—Cylindrical screen that rotates continuously to remove accumulated debris and allow water to flow through.

Run.—Seasonal upstream migration of anadromous fish.

Salmonids.—A family of fish that includes salmon and steelhead.

Sediment.—Any very finely divided organic and/or mineral matter deposited by water in nonturbulent areas.

Slack water.—Slow flowing water such as impoundments behind a dam.

Smolt.—Adolescent salmon or steelhead that is undergoing changes preparatory for living in salt water. Usually 3 to 7 inches long. (See also fry and fingerling.)

Spillway.—A waterway associated with a dam for release of water above a specific elevation.

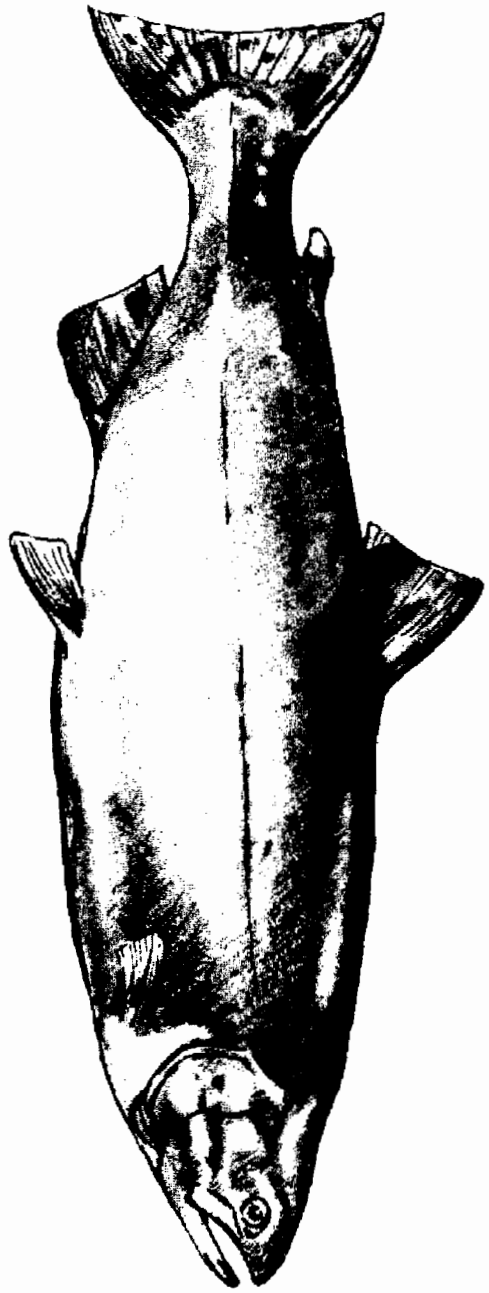
Stoplog.—A wooden plank or fabricated material structure that is added to the structural crest of a barricade to raise the water level.

Tahiti.—A type of raft.

Threatened species.—A species which is likely to become endangered within the foreseeable future.

Turbidity.—The scattering and absorption of light that makes water look murky; caused by matter suspended in the water.

Wetland.—Generally, an area characterized by periodic inundation or saturation, hydric soils, and vegetation adapted for life in saturated soil conditions.



Attachment B—GPID Temporary Water Permit

STATE OF OREGON

COUNTY OF JOSEPHINE

PERMIT TO APPROPRIATE THE PUBLIC WATERS

THIS PERMIT IS HEREBY ISSUED TO

GRANTS PASS IRRIGATION DISTRICT 503-476-2582
200 FRUITDALE DRIVE
GRANTS PASS, OREGON 97527

to use the waters of the ROGUE RIVER a tributary of PACIFIC OCEAN, in the amounts and for the period of time specified below, to make up for a deficiency in rate of diversion allowed under existing rights for Irrigation.

This Permit is issued approving Application 69246. The date of priority is AUGUST 21, 1987.

The amount of water allowed herein, together with the amount allowed under Permit 45828 shall be limited to a diversion of not to exceed 90 cubic feet per second or its equivalent in case of rotation, measured at the point of diversion. The right to use water under this permit is in addition to that described by Certificate recorded at page 50650, State Record of Water Right Certificates.

This permit shall expire on October 1, 1994, unless extended by the Water Resources Commission, or unless earlier cancelled for failure to comply with any of the conditions listed below. No later than March 1, 1994, permittee shall present to the Water Resources Commission for review and approval, a range of plans with options to reduce or eliminate the need to appropriate water under this permit, together with the permittee's recommended option.

The Permittee understands and agrees that permittee shall not perfect any right to use of water under this permit, except in conformity with and in the amount, if any, specified in the plan to be approved by the Water Resources Commission under this permit to guide reduction of permittee's water use.

PREAMBLE:

The purpose of this permit, in combination with existing water rights providing for use from the two points of diversion as described below, is to temporarily allow diversion at the permittee's historical rates and quantities and to meet any deficiencies in rate and quantities as defined in OAR 690-11-010 (4) until such time as the Water Resources Commission adopts a plan of water use reduction under this permit or cancels this permit.

The initial phase of this permit shall be called the "Study Phase". It is contemplated by the permittee, the Commission and other interested parties that the permittee, along with the United States Department of the Interior, Bureau of Reclamation, and other interested entities will conduct certain studies and investigations, and gather and assemble certain information and data, all as more particularly described below. This phase shall culminate in the formulation and presentation of a range of plans for conservation and improvements by the District designed to reduce or eliminate the need to appropriate water under this permit. These plans shall be submitted by the permittee to the Water Resources Commission by March 1, 1994.

Following submission of the foregoing plans by the permittee, the Water Resources Commission shall consider and adopt a plan of conservation and improvements by the District. This shall be designated the "Plan Adoption Phase", and a plan shall be adopted by October 1, 1994.

Following adoption of a plan by the Water Resources Commission, it is contemplated that this permit may be extended into what shall be known as the "Implementation Phase", during which the permittee will carry out the programs and make the improvements, if any, contained in the plan adopted by the Commission.

The points of diversion are located as follows:

point (1) LOT 8, SE 1/4 SE 1/4, Section 24, T 36 S, R 5 W, WM;
550 FEET NORTH & 320 FEET WEST FROM SE CORNER, SECTION 24.

point (2) LOT 1, SE 1/4 SE 1/4, Section 24, T 36 S, R 5 W, WM;
900 FEET NORTH & 20 FEET WEST FROM SE CORNER, SECTION 24.

Appropriation of water as authorized under this permit shall be subject to the instream water right of 935 cubic feet per second at the mouth of the Rogue River and subject to the conditions as follows:

STUDY PHASE

1. By March 1, 1994, the permittee shall present to the Commission for review and approval a range of options ranging from reduction to elimination of the need to appropriate water under this permit, together with its recommended option. The permittee shall obtain, develop, study, document, and consider the following:

   a. The water needs for Grants Pass Irrigation District. The water need considerations shall include climatic factors, soil types, topography, irrigation practices, prevailing crop types, and beneficial uses.

   b. The number of full and part time farms and their locations and number of acres irrigated and the crop value they produce.

   c. The number of irrigated acres in urban, suburban and industrial use and their location.

   d. Feasibility and cost of providing city water to urban, suburban, and industrial users.

   e. Feasibility and benefits of converting the district, or a portion of the district, into a water-use district or into a municipal system. Consideration shall be given to possibilities of selling the GPID's certificated water right and/or its canal system to be used for flood water drainage purposes in order to pay off the bonding on Savage Rapids Dam and to finance a move to city water or other municipal system.

f. Alternative points of diversion and methods of supplying the water to users including supplying municipal water or water from other irrigation districts.

g. Potential system improvements and operation measures which could conserve water and improve water conveyance and water use efficiency. Consideration shall be given to programs to improve on-farm efficiencies and water requirements that result from a fully enclosed (pressurized) delivery system.

h. Estimation of improvements in system efficiency which would accrue through implementation of each identified project an measure.

i. Identification of the locations at which the benefits of each project and measure would accrue including the impact on diversion rates and quantities.

j. Identification and quantification of any other beneficial uses, including but not limited to habitat, ground water recharge, instream flows to tributaries, and aesthetics. In addition, identify who the applicant or permittee should be for each of those uses.

k. Fish losses caused by Savage Rapids Dam and GPID canal system and the operation thereof. This consideration shall also include identification of options that will reduce or eliminate fish losses that may be associated with the GPID diversion and conveyance system.

l. Potential improvements and operational measures including removal of Savage Rapids Dam, which would improve fish passage and habitat and decrease fish losses. Identify the cost and benefits of such projects and measures.

m. Availability of unappropriated water for use under this permit and whether or not stored water is being used.

n. Identification of the estimated cost of each project and measure.

o. Provision of a proposed schedule for implementation of the plan.

2. The permittee shall continue its ongoing conservation and maintenance program.

3. The permittee shall form a committee to assist and provide input in the gathering of information and in the development and formulation of the options. If possible, the committee shall include representation from the GPID including a non-voting member of the GPID , the City of Grants Pass, Josephine County, Oregon Department of Fish and Wildlife, National Marine Fisheries Service, Bureau of Reclamation, Soil Conservation Service and one representative designated by WaterWatch of Oregon, Inc.

4. Beginning in the year 1992, the permittee shall submit by February 1 of each year, progress reports detailing the efforts of the permittee in gathering the required information and preparing the required plan and options.

PLAN ADOPTION PHASE:

5. After completion of the Study Phase of the permit, and by March 1, 1994, the permittee shall submit to the Water Resources Commission for review the results of the Study, the range of possible options that were developed, and the option recommended for implementation. The Water Resources Commission shall review and then adopt a plan of conservation and improvements for the district. In addition to considering the options presented by the permittee, the Commission may adopt modifications of those options and develop its own proposals in the plan. Any option adopted shall contain a schedule for implementation of the option. Any option adopted may reduce the amount of water allowed to be diverted under this permit consistent with the plan. It is contemplated that upon adoption of the plan, the Commission will renew and extend this permit consistent with the provisions of the plan.

IMPLEMENTATION PHASE:

6. After the adoption of an option by the Water Resources Commission, the permittee shall implement the plan in accordance with the schedule and reduce its diversions as may be provided therein.

7. By February 1 of each year during the Implementation Phase of the permit, the permittee shall submit to the Water Resources Commission a report detailing the efforts of the permittee in implementing the plan and the effectiveness of the plan.

PERMIT EXTENSIONS:

8. Unless extended by the Water Resources Commission, this permit shall expire on October 1, 1994. Extensions of time may be granted by the Water Resources Commission in increments of up to five years if the Water Resources Commission finds that the permittee has exercised due diligence in complying with the conditions of this permit and with the conditions of any plan adopted and that it would not impair or be detrimental to the public interest to extend the permit. The Water Resources Commission may modify the conditions of the permit as a condition of any extension.

9. At the request of the permittee, the Water Resources Commission may determine that modifications in the approved plan are in the public interest and may order such modifications subject to paragraph 10 below.

PUBLIC INTEREST HEARINGS:

10. The permittee or any other person or party may object to the plan adopted by the Water Resources Commission, to any modification to an adopted plan or to an extension of time granted by the Water Resources Commission except as to extensions of time granted in accordance with and in contemplation of the implementation schedule of an adopted plan. Any objection shall be on the basis that the plan, modification or extension impairs or is detrimental to the public interest under ORS 537.170. Upon objection thereto, a contested case hearing shall be held under ORS 183.310 to 183.550 in order to determine whether or not the plan, modification or extension would impair or be detrimental to the public interest under ORS 537.170. Any objections to the plan adopted by the Commission, to any modifications to the adopted plan or to any extensions of time granted by the Commission must be made within 60 days of the time of adoption, modification or extension.

11. This permit is for the appropriation of natural flow, not stored water. Use of stored water must be by separate permit and contract with the appropriate agency.

Failure to comply with the above conditions may result in cancellation of this permit.

The use shall conform to such reasonable rotation system as may be ordered by the proper state officer.

A description of the proposed place of use under the Permit is as follows:

	ACRES	1/4 1/4	DLC/LOT	SECTION	TOWNSHIP	RANGE, WM
Irrigation	12.00	SW NW		3	36 S	4 W
Irrigation	0.20	SE NW		3	36 S	4 W
Irrigation	27.60	NW SW		3	36 S	4 W
Irrigation	19.40	SW SW		3	36 S	4 W
Irrigation	0.50	NE NW		3	37 S	6 W
Irrigation	11.10	NW NW		3	37 S	6 W
Irrigation	0.80	SE NE		4	36 S	4 W
Irrigation	37.10	NE SE		4	36 S	4 W
Irrigation	28.70	SE SE		4	36 S	4 W
Irrigation	35.30	NE NE		4	37 S	6 W
Irrigation	30.35	NW NE		4	37 S	6 W
Irrigation	6.50	SE NE		4	37 S	6 W
Irrigation	26.60	NE NW		4	37 S	6 W
Irrigation	24.90	NW NW		4	37 S	6 W
Irrigation	2.30	NW SW		5	36 S	5 W
Irrigation	2.00	SE SW		5	36 S	5 W
Irrigation	17.90	NE NE		5	37 S	6 W
Irrigation	36.60	NW NE		5	37 S	6 W
Irrigation	19.20	SW NE		5	37 S	6 W
Irrigation	0.40	SE NE		5	37 S	6 W
Irrigation	38.30	NE NW		5	37 S	6 W
Irrigation	35.30	NW NW		5	37 S	6 W
Irrigation	8.20	SW NW		5	37 S	6 W
Irrigation	23.30	SE NW		5	37 S	6 W

Irrigation	0.20	NE SW		5	37 S	6 W
Irrigation	1.80	NW SE		5	37 S	6 W
Irrigation	2.00	SW NE		6	36 S	5 W
Irrigation	9.00	SE NE		6	36 S	5 W
Irrigation	1.00	NE SW		6	36 S	5 W
Irrigation	1.70	SE SW		6	36 S	5 W
Irrigation	22.00	NE SE		6	36 S	5 W
Irrigation	1.20	NW SE		6	36 S	5 W
Irrigation	23.00	SW SE		6	36 S	5 W
Irrigation	21.80	SE SE		6	36 S	5 W
Irrigation	17.20	NE NE		7	36 S	5 W
Irrigation	10.70	NW NE		7	36 S	5 W
Irrigation	23.10	SW NE		7	36 S	5 W
Irrigation	3.70	SE NE		7	36 S	5 W
Irrigation	12.50	SE SW		7	36 S	5 W
Irrigation	6.20	NE SE		7	36 S	5 W
Irrigation	4.70	NW SE		7	36 S	5 W
Irrigation	1.46	SW SE		7	36 S	5 W
Irrigation	10.80	SE SE		7	36 S	5 W
Irrigation	8.00	NW NE		8	36 S	5 W
Irrigation	15.40	SW NE		8	36 S	5 W
Irrigation	18.40	SE NE		8	36 S	5 W
Irrigation	7.39	NE NW		8	36 S	5 W
Irrigation	1.60	NW NW		8	36 S	5 W
Irrigation	10.79	SE NW		8	36 S	5 W
Irrigation	4.10	NE SW		8	36 S	5 W
Irrigation	1.72	NW SW		8	36 S	5 W
Irrigation	3.60	SE SW		8	36 S	5 W
Irrigation	19.70	NE SE		8	36 S	5 W
Irrigation	20.70	NW SE		8	36 S	5 W
Irrigation	10.66	SW SE		8	36 S	5 W
Irrigation	21.80	SE SE		8	36 S	5 W
Irrigation	2.90	NE NE		9	36 S	4 W
Irrigation	4.20	NE SE		9	36 S	4 W
Irrigation	25.20	SE SE		9	36 S	4 W
Irrigation	1.80	NW SW		9	36 S	5 W
Irrigation	15.10	SW SW		9	36 S	5 W
Irrigation	14.10	NW NW		10	36 S	4 W
Irrigation	13.90	SW NW		10	36 S	4 W
Irrigation	13.70	NW SW	10	10	36 S	4 W
Irrigation	16.00	SW SW	10	10	36 S	4 W
Irrigation	3.60	SW SE	10	0	36 S	6 W
Irrigation	35.30	SE SE	10	10	36 S	6 W
Irrigation	19.50	SW SW	10	11	36 S	6 W
Irrigation	0.80	NE NE	10	13	36 S	6 W
Irrigation	25.90	SW NE	10	13	36 S	6 W
Irrigation	13.60	SE NE	10	13	36 S	6 W
Irrigation	3.50	NE NW	10	13	36 S	6 W
Irrigation	1.90	NW NW	37	13	36 S	6 W
Irrigation	6.00	NW NW	1	13	36 S	6 W
Irrigation	25.40	SW NW	37	13	36 S	6 W
Irrigation	14.40	SW NW	2	13	36 S	6 W
Irrigation	36.80	SE NW		13	36 S	6 W
Irrigation	39.10	NE SW	10	13	36 S	6 W

Irrigation	25.40	NW SW	37	13	36 S	6 W
Irrigation	14.60	NW SW	3	13	36 S	6 W
Irrigation	0.20	SW SW	37	13	36 S	6 W
Irrigation	21.16	SW SW	4	13	36 S	6 W
Irrigation	33.20	SE SW		13	36 S	6 W
Irrigation	31.80	NE SE	10	13	36 S	6 W
Irrigation	33.20	NW SE	10	13	36 S	6 W
Irrigation	35.60	SW SE	10	13	36 S	6 W
Irrigation	29.60	SE SE	10	13	36 S	6 W
Irrigation	2.05	SW SW	10	14	36 S	5 W
Irrigation	2.20	SE SW	10	14	36 S	5 W
Irrigation	0.30	SW SE	10	14	36 S	5 W
Irrigation	0.70	SE SE	10	14	36 S	5 W
Irrigation	3.00	NE NE	37	14	36 S	6 W
Irrigation	4.90	NE NE	12	14	36 S	6 W
Irrigation	1.90	NW NE	37	14	36 S	6 W
Irrigation	15.60	NW NE	11	14	36 S	6 W
Irrigation	37.70	SW NE	37	14	36 S	6 W
Irrigation	39.00	SE NE	37	14	36 S	6 W
Irrigation	2.00	NE NW	37	14	36 S	6 W
Irrigation	18.70	NE NW	10	14	36 S	6 W
Irrigation	1.50	NW NW	37	14	36 S	6 W
Irrigation	4.90	NW NW	9	14	36 S	6 W
Irrigation	5.30	SW NW	37	14	36 S	6 W
Irrigation	1.60	SW NW	8	14	36 S	6 W
Irrigation	27.60	SE NW	37	14	36 S	6 W
Irrigation	11.99	NE SW	37	14	36 S	6 W
Irrigation	2.40	NW SW	5	14	36 S	6 W
Irrigation	29.90	SW SW	5	14	36 S	6 W
Irrigation	25.80	SE SW	6	14	36 S	6 W
Irrigation	40.00	NE SE	37	14	36 S	6 W
Irrigation	30.20	NW SE	37	14	36 S	6 W
Irrigation	1.90	SW SE	37	14	36 S	6 W
Irrigation	14.50	SW SE	7	14	36 S	6 W
Irrigation	3.30	SW SE	2	14	36 S	6 W
Irrigation	2.80	SE SE	37	14	36 S	6 W
Irrigation	25.14	SE SE	1	14	36 S	6 W
Irrigation	5.60	NW NW	10	15	36 S	4 W
Irrigation	23.80	SW NW	10	15	36 S	4 W
Irrigation	4.14	SE NW	10	15	36 S	4 W
Irrigation	7.40	NE SW	10	15	36 S	4 W
Irrigation	23.00	NW SW	10	15	36 S	4 W
Irrigation	9.40	SW SW	10	15	36 S	4 W
Irrigation	17.90	SE SW	10	15	36 S	4 W
Irrigation	0.10	NW SE	10	15	36 S	4 W
Irrigation	12.70	SW NW	10	15	36 S	5 W
Irrigation	2.60	NE SW	10	15	36 S	5 W
Irrigation	11.60	NW SW	10	15	36 S	5 W
Irrigation	38.60	SW SW	10	15	36 S	5 W
Irrigation	10.40	SE SW	10	15	36 S	5 W
Irrigation	17.20	NE NE	10	15	36 S	6 W
Irrigation	2.80	NW NE	10	15	36 S	6 W
Irrigation	0.90	SE SW	5	15	36 S	6 W
Irrigation	1.40	NE SE	6	15	36 S	6 W

Irrigation	15.40	SW SE	5	15	36 S	6 W
Irrigation	27.30	SE SE	6	15	36 S	6 W
Irrigation	28.30	NE NE	10	16	36 S	4 W
Irrigation	17.60	NW NE	10	16	36 S	4 W
Irrigation	24.30	SW NE	10	16	36 S	4 W
Irrigation	24.80	SE NE	10	16	36 S	4 W
Irrigation	1.00	SE SW	10	16	36 S	4 W
Irrigation	14.50	NE SE	10	16	36 S	4 W
Irrigation	17.00	NW SE	10	16	36 S	4 W
Irrigation	3.70	SW SE	2	16	36 S	4 W
Irrigation	5.30	SE SE	1	16	36 S	4 W
Irrigation	2.70	NE NW	10	16	36 S	5 W
Irrigation	16.80	NW NW	10	16	36 S	5 W
Irrigation	0.80	SW NW	1	16	36 S	5 W
Irrigation	0.70	SW NW	38	16	36 S	5 W
Irrigation	3.50	SE NW	38	16	36 S	5 W
Irrigation	4.60	SE NW	37	16	36 S	5 W
Irrigation	9.00	SE NW	2	16	36 S	5 W
Irrigation	14.10	NE SW	3	16	36 S	5 W
Irrigation	11.10	NE SW	37	16	36 S	5 W
Irrigation	3.10	NE SW	38	16	36 S	5 W
Irrigation	12.00	NW SW	38	16	36 S	5 W
Irrigation	6.80	NW SW	37	16	36 S	5 W
Irrigation	9.50	SW SW	37	16	36 S	5 W
Irrigation	12.60	SE SW	37	16	36 S	5 W
Irrigation	9.90	NE SE	10	16	36 S	5 W
Irrigation	0.80	NW SE	10	16	36 S	5 W
Irrigation	7.20	SW SE	10	16	36 S	5 W
Irrigation	35.20	SE SE	10	16	36 S	5 W
Irrigation	17.38	NE NE	10	17	36 S	5 W
Irrigation	15.60	NW NE	10	17	36 S	5 W
Irrigation	3.38	SW NE	2	17	36 S	5 W
Irrigation	5.70	SW NE	10	17	36 S	5 W
Irrigation	5.13	SE NE	1	17	36 S	5 W
Irrigation	5.92	SE NE	10	17	36 S	5 W
Irrigation	2.60	SE NW	38	17	36 S	5 W
Irrigation	0.70	NE SW	38	17	36 S	5 W
Irrigation	0.50	NE SE	38	17	36 S	5 W
Irrigation	0.40	NW SE	38	17	36 S	5 W
Irrigation	2.88	NE NE	10	18	36 S	5 W
Irrigation	7.00	NE NW	10	18	36 S	5 W
Irrigation	18.50	NW NW	10	18	36 S	5 W
Irrigation	20.70	SW NW	10	18	36 S	5 W
Irrigation	1.40	SE NW	10	18	36 S	5 W
Irrigation	8.70	NE SW	10	18	36 S	5 W
Irrigation	0.30	NW SW	10	18	36 S	5 W
Irrigation	14.50	SW SW	10	18	36 S	5 W
Irrigation	24.60	SE SW	10	18	36 S	5 W
Irrigation	1.10	SW NW	10	19	36 S	4 W
Irrigation	3.40	NW SW	10	19	36 S	4 W
Irrigation	2.60	SE SW	3	19	36 S	4 W
Irrigation	0.10	NW NE	6	19	36 S	5 W
Irrigation	11.53	SW NE	6	19	36 S	5 W
Irrigation	7.60	SE NE	7	19	36 S	5 W

Irrigation	19.23	NE NW	2	19	36 S	5 W
Irrigation	7.58	NW NW	3	19	36 S	5 W
Irrigation	3.80	SW NW	3	19	36 S	5 W
Irrigation	4.40	SW NW	4	19	36 S	5 W
Irrigation	18.68	SE NW	5	19	36 S	5 W
Irrigation	5.50	NE SW	10	19	36 S	5 W
Irrigation	0.50	NW SW	4	19	36 S	5 W
Irrigation	5.30	SW SW	10	19	36 S	5 W
Irrigation	32.00	SE SW	10	19	36 S	5 W
Irrigation	2.90	NE SE	10	19	36 S	5 W
Irrigation	3.00	NW SE	10	19	36 S	5 W
Irrigation	22.48	SW SE	10	19	36 S	5 W
Irrigation	13.95	SE SE	10	19	36 S	5 W
Irrigation	0.90	SE NE	5	20	36 S	4 W
Irrigation	2.50	NW SW	10	20	36 S	4 W
Irrigation	1.30	NE SE	5	20	36 S	4 W
Irrigation	1.70	NE NE	10	20	36 S	5 W
Irrigation	5.60	NW NE	9	20	36 S	5 W
Irrigation	6.40	NW NE	38	20	36 S	5 W
Irrigation	14.80	SW NE	2	20	36 S	5 W
Irrigation	18.60	SE NE	10	20	36 S	5 W
Irrigation	1.80	NE NW	3	20	36 S	5 W
Irrigation	0.80	NW NW	5	20	36 S	5 W
Irrigation	9.00	SW NW	5	20	36 S	5 W
Irrigation	5.70	SE NW	6	20	36 S	5 W
Irrigation	7.60	NE SW	10	20	36 S	5 W
Irrigation	10.90	NW SW	10	20	36 S	5 W
Irrigation	16.00	SW SW	10	20	36 S	5 W
Irrigation	30.00	SE SW		20	36 S	5 W
Irrigation	13.30	NE SE	8	20	36 S	5 W
Irrigation	5.20	NW SE	7	20	36 S	5 W
Irrigation	19.00	SW SE		20	36 S	5 W
Irrigation	23.51	SE SE	8	20	36 S	5 W
Irrigation	29.90	NE SE		20	36 S	6 W
Irrigation	1.40	NE NE		21	36 S	5 W
Irrigation	22.40	NW NE		21	36 S	5 W
Irrigation	30.27	SW NE	2	21	36 S	5 W
Irrigation	17.10	SE NE	1	21	36 S	5 W
Irrigation	12.90	NE NW		21	36 S	5 W
Irrigation	11.50	NW NW		21	36 S	5 W
Irrigation	29.79	SW NW		21	36 S	5 W
Irrigation	19.20	SE NW		21	36 S	5 W
Irrigation	6.60	NE SW	3	21	36 S	5 W
Irrigation	1.00	NE SW	6	21	36 S	5 W
Irrigation	7.60	NW SW	4	21	36 S	5 W
Irrigation	3.40	NW SW	5	21	36 S	5 W
Irrigation	21.77	SW SW	5	21	36 S	5 W
Irrigation	20.90	SE SW	6	21	36 S	5 W
Irrigation	2.00	NE SE	1	21	36 S	5 W
Irrigation	2.00	NE SE	8	21	36 S	5 W
Irrigation	12.50	NW SE	2	21	36 S	5 W
Irrigation	1.40	NW SE	7	21	36 S	5 W
Irrigation	6.40	SW SE		21	36 S	5 W
Irrigation	18.50	NE NE	8	21	36 S	6 W

Irrigation	4.40	NW NE	7	21	36 S	6 W
Irrigation	3.90	NW NE	15	21	36 S	6 W
Irrigation	26.00	SW NE	9	21	36 S	6 W
Irrigation	5.90	SW NE	14	21	36 S	6 W
Irrigation	36.70	SE NE		21	36 S	6 W
Irrigation	16.20	SE NW	10	21	36 S	6 W
Irrigation	36.20	NE SW		21	36 S	6 W
Irrigation	38.40	NW SW		21	36 S	6 W
Irrigation	26.60	SW SW		21	36 S	6 W
Irrigation	38.80	SE SW		21	36 S	6 W
Irrigation	38.80	NE SE		21	36 S	6 W
Irrigation	36.60	NW SE		21	36 S	6 W
Irrigation	37.40	SW SE		21	36 S	6 W
Irrigation	37.20	SE SE		21	36 S	6 W
Irrigation	2.30	NW NE		22	36 S	4 W
Irrigation	14.20	NE NW		22	36 S	4 W
Irrigation	1.80	NW NW		22	36 S	4 W
Irrigation	2.80	SE NW		22	36 S	4 W
Irrigation	0.20	NE SW	3	22	36 S	4 W
Irrigation	0.90	NE NE	8	22	36 S	5 W
Irrigation	0.10	NW NE	7	22	36 S	5 W
Irrigation	27.20	SW NE	7	22	36 S	5 W
Irrigation	33.40	SE NE	8	22	36 S	5 W
Irrigation	1.10	NE NW	3	22	36 S	5 W
Irrigation	22.40	NW NW		22	36 S	5 W
Irrigation	0.40	SW NW	4	22	36 S	5 W
Irrigation	5.20	SE NW	6	22	36 S	5 W
Irrigation	12.20	NE SW	6	22	36 S	5 W
Irrigation	17.90	NE SE		22	36 S	5 W
Irrigation	17.70	NW SE		22	36 S	5 W
Irrigation	33.90	NE NE		22	36 S	6 W
Irrigation	35.60	NW NE		22	36 S	6 W
Irrigation	39.40	SW NE		22	36 S	6 W
Irrigation	38.80	SE NE		22	36 S	6 W
Irrigation	13.60	NE NW	1	22	36 S	6 W
Irrigation	11.30	NW NW	2	22	36 S	6 W
Irrigation	38.30	SW NW		22	36 S	6 W
Irrigation	36.30	SE NW		22	36 S	6 W
Irrigation	35.60	NE SW		22	36 S	6 W
Irrigation	22.10	NW SW		22	36 S	6 W
Irrigation	30.30	SW SW		22	36 S	6 W
Irrigation	27.90	SE SW		22	36 S	6 W
Irrigation	34.60	NE SE		22	36 S	6 W
Irrigation	38.80	NW SE		22	36 S	6 W
Irrigation	27.40	SW SE		22	36 S	6 W
Irrigation	34.00	SE SE		22	36 S	6 W
Irrigation	4.95	NE NE		23	36 S	5 W
Irrigation	24.50	NW NE	3	23	36 S	5 W
Irrigation	32.80	SW NE	2	23	36 S	5 W
Irrigation	21.60	SE NE		23	36 S	5 W
Irrigation	11.60	NE NW	4	23	36 S	5 W
Irrigation	2.50	NE NW	7	23	36 S	5 W
Irrigation	4.11	NW NW	5	23	36 S	5 W
Irrigation	6.20	NW NW	6	23	36 S	5 W

Irrigation	21.00	SW NW	6	23	36 S	5 W
Irrigation	14.50	SE NW	7	23	36 S	5 W
Irrigation	14.10	NE SW	8	23	36 S	5 W
Irrigation	13.50	NW SW		23	36 S	5 W
Irrigation	3.90	SE SW		23	36 S	5 W
Irrigation	5.70	NE SE	1	23	36 S	5 W
Irrigation	3.50	NW SE	2	23	36 S	5 W
Irrigation	0.30	NW SE	9	23	36 S	5 W
Irrigation	3.00	SW SE	9	23	36 S	5 W
Irrigation	1.00	SE SE	10	23	36 S	5 W
Irrigation	2.70	NE NE	1	23	36 S	6 W
Irrigation	14.20	NE NE	2	23	36 S	6 W
Irrigation	31.90	NW NE	2	23	36 S	6 W
Irrigation	33.20	SW NE	2	23	36 S	6 W
Irrigation	36.20	SE NE	3	23	36 S	6 W
Irrigation	31.10	NE NW		23	36 S	6 W
Irrigation	37.40	NW NW		23	36 S	6 W
Irrigation	33.60	SW NW		23	36 S	6 W
Irrigation	36.70	SE NW		23	36 S	6 W
Irrigation	36.70	NE SW		23	36 S	6 W
Irrigation	25.00	NW SW		23	36 S	6 W
Irrigation	29.80	SW SW		23	36 S	6 W
Irrigation	36.01	SE SW		23	36 S	6 W
Irrigation	34.60	NE SE		23	36 S	6 W
Irrigation	32.10	NW SE		23	36 S	6 W
Irrigation	15.90	SW SE		23	36 S	6 W
Irrigation	25.80	SE SE		23	36 S	6 W
Irrigation	0.30	SW NW		24	36 S	5 W
Irrigation	0.20	NE SW	3	24	36 S	5 W
Irrigation	0.50	NE SW	6	24	36 S	5 W
Irrigation	13.30	NW SW	4	24	36 S	5 W
Irrigation	1.50	SW SW	5	24	36 S	5 W
Irrigation	6.80	SE SW	6	24	36 S	5 W
Irrigation	1.70	NW SE	7	24	36 S	5 W
Irrigation	9.00	SW SE		24	36 S	5 W
Irrigation	1.30	SE SE	8	24	36 S	5 W
Irrigation	17.70	NE NE		24	36 S	6 W
Irrigation	37.10	NW NE		24	36 S	6 W
Irrigation	28.00	SW NE	2	24	36 S	6 W
Irrigation	8.00	SE NE	1	24	36 S	6 W
Irrigation	7.90	NE NW		24	36 S	6 W
Irrigation	35.40	NW NW	4	24	36 S	6 W
Irrigation	6.40	SW NW	4	24	36 S	6 W
Irrigation	4.30	SW NW	5	24	36 S	6 W
Irrigation	1.20	SE NW	3	24	36 S	6 W
Irrigation	0.40	SE NW	6	24	36 S	6 W
Irrigation	23.60	NE SW	6	24	36 S	6 W
Irrigation	26.40	NW SW		24	36 S	6 W
Irrigation	22.00	SW SW		24	36 S	6 W
Irrigation	24.60	SE SW		24	36 S	6 W
Irrigation	8.40	NE SE	8	24	36 S	6 W
Irrigation	5.50	NW SE	7	24	36 S	6 W
Irrigation	16.20	SW SE		24	36 S	6 W
Irrigation	16.20	SE SE		24	36 S	6 W

Irrigation	21.18	NE NE	25	36 S	6 W
Irrigation	36.70	NW NE	25	36 S	6 W
Irrigation	24.30	SW NE	25	36 S	6 W
Irrigation	27.80	SE NE	25	36 S	6 W
Irrigation	30.70	NE NW	25	36 S	6 W
Irrigation	34.80	NW NW	25	36 S	6 W
Irrigation	15.70	SW NW	25	36 S	6 W
Irrigation	0.80	NW SW	25	36 S	6 W
Irrigation	20.10	NE SE	25	36 S	6 W
Irrigation	22.65	NW SE	25	36 S	6 W
Irrigation	12.20	SW SE	25	36 S	6 W
Irrigation	29.78	SE SE	25	36 S	6 W
Irrigation	25.70	NE NE	26	36 S	6 W
Irrigation	20.30	NW NE	26	36 S	6 W
Irrigation	32.00	SW NE	26	36 S	6 W
Irrigation	27.60	SE NE	26	36 S	6 W
Irrigation	28.60	NE NW	26	36 S	6 W
Irrigation	23.10	NW NW	26	36 S	6 W
Irrigation	26.59	SW NW	26	36 S	6 W
Irrigation	33.10	SE NW	26	36 S	6 W
Irrigation	16.90	NE SW	26	36 S	6 W
Irrigation	27.20	NW SW	26	36 S	6 W
Irrigation	34.30	SW SW	26	36 S	6 W
Irrigation	11.80	SE SW	26	36 S	6 W
Irrigation	25.50	NE SE	26	36 S	6 W
Irrigation	13.50	NW SE	26	36 S	6 W
Irrigation	1.00	SW SE	26	36 S	6 W
Irrigation	4.00	SE SE	26	36 S	6 W
Irrigation	34.10	NE NE	27	36 S	6 W
Irrigation	13.70	NW NE	27	36 S	6 W
Irrigation	8.40	SW NE	27	36 S	6 W
Irrigation	26.70	SE NE	27	36 S	6 W
Irrigation	19.40	NE NW	27	36 S	6 W
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Irrigation	4.50	SW NW	27	36 S	6 W
Irrigation	12.56	NE SE	27	36 S	6 W
Irrigation	10.80	SE SE	27	36 S	6 W
Irrigation	16.91	NE NW	28	36 S	5 W
Irrigation	30.74	NW NW	28	36 S	5 W
Irrigation	29.60	SW NW	28	36 S	5 W
Irrigation	4.40	SE NW	28	36 S	5 W
Irrigation	14.80	NW SW	28	36 S	5 W
Irrigation	0.10	SW SW	28	36 S	5 W
Irrigation	37.20	NE NE	28	36 S	6 W
Irrigation	33.10	NW NE	28	36 S	6 W
Irrigation	12.60	SW NE	28	36 S	6 W
Irrigation	14.10	SE NE	28	36 S	6 W
Irrigation	22.40	NE NW	28	36 S	6 W
Irrigation	0.40	NW NW	28	36 S	6 W
Irrigation	8.20	SW NW	28	36 S	6 W
Irrigation	4.80	SE NW	28	36 S	6 W
Irrigation	0.05	NW SW	28	36 S	6 W
Irrigation	0.70	NE NW	29	36 S	4 W
Irrigation	28.40	NW NW	29	36 S	4 W

Irrigation	3.90	SW NW		29	36 S	4 W
Irrigation	34.10	NE NE		29	36 S	5 W
Irrigation	37.60	NW NE		29	36 S	5 W
Irrigation	32.00	SW NE		29	36 S	5 W
Irrigation	27.00	SE NE		29	36 S	5 W
Irrigation	33.70	NE NW		29	36 S	5 W
Irrigation	25.00	NW NW		29	36 S	5 W
Irrigation	0.20	SW NW		29	36 S	5 W
Irrigation	12.00	SE NW		29	36 S	5 W
Irrigation	2.00	NE SE		29	36 S	5 W
Irrigation	1.20	SW NE		29	36 S	6 W
Irrigation	5.70	SE NE		29	36 S	6 W
Irrigation	13.60	NE SW		29	36 S	6 W
Irrigation	4.00	NW SW		29	36 S	6 W
Irrigation	7.00	SW SW		29	36 S	6 W
Irrigation	24.20	SE SW		29	36 S	6 W
Irrigation	1.90	NE SE		29	36 S	6 W
Irrigation	18.60	NW SE		29	36 S	6 W
Irrigation	26.60	SW SE		29	36 S	6 W
Irrigation	4.30	SE SE		29	36 S	6 W
Irrigation	24.50	NE NE		30	36 S	4 W
Irrigation	29.20	NW NE		30	36 S	4 W
Irrigation	0.60	SW NE		30	36 S	4 W
Irrigation	8.50	NE NW		30	36 S	4 W
Irrigation	2.80	NW NW	1	30	36 S	4 W
Irrigation	13.70	SE NW		30	36 S	4 W
Irrigation	1.60	NE SW		30	36 S	4 W
Irrigation	20.40	NE NE		30	36 S	5 W
Irrigation	25.40	NW NE		30	36 S	5 W
Irrigation	10.30	SW NE		30	36 S	5 W
Irrigation	24.40	NE NW		30	36 S	5 W
Irrigation	31.80	NW NW		30	36 S	5 W
Irrigation	36.00	SW NW		30	36 S	5 W
Irrigation	14.70	SE NW		30	36 S	5 W
Irrigation	23.40	NW SW		30	36 S	5 W
Irrigation	25.40	SW SW		30	36 S	5 W
Irrigation	3.90	SE SE		30	36 S	6 W
Irrigation	24.50	NW NW		31	36 S	5 W
Irrigation	26.80	NE SW		31	36 S	5 W
Irrigation	25.00	NW SW		31	36 S	5 W
Irrigation	19.00	SW SW		31	36 S	5 W
Irrigation	25.40	SE SW		31	36 S	5 W
Irrigation	18.80	NE NE		31	36 S	6 W
Irrigation	6.40	NW NE		31	36 S	6 W
Irrigation	1.70	SW NE		31	36 S	6 W
Irrigation	8.00	SE NE		31	36 S	6 W
Irrigation	21.70	NE NE		32	36 S	6 W
Irrigation	37.40	NW NE		32	36 S	6 W
Irrigation	32.70	SW NE		32	36 S	6 W
Irrigation	31.50	SE NE		32	36 S	6 W
Irrigation	37.00	NE NW		32	36 S	6 W
Irrigation	24.00	NW NW		32	36 S	6 W
Irrigation	26.40	SW NW		32	36 S	6 W
Irrigation	26.10	SE NW		32	36 S	6 W

Irrigation	6.40	NE SW	32	36 S	6 W
Irrigation	2.50	NW SW	32	36 S	6 W
Irrigation	21.20	SW SW	32	36 S	6 W
Irrigation	17.30	SE SW	32	36 S	6 W
Irrigation	30.00	NE SE	32	36 S	6 W
Irrigation	27.40	NW SE	32	36 S	6 W
Irrigation	37.80	SW SE	32	36 S	6 W
Irrigation	32.50	SE SE	32	36 S	6 W
Irrigation	4.60	SW NE	33	36 S	6 W
Irrigation	3.10	NW NW	33	36 S	6 W
Irrigation	33.60	SW NW	33	36 S	6 W
Irrigation	26.75	SE NW	33	36 S	6 W
Irrigation	39.40	NE SW	33	36 S	6 W
Irrigation	25.80	NW SW	33	36 S	6 W
Irrigation	35.60	SW SW	33	36 S	6 W
Irrigation	26.50	SE SW	33	36 S	6 W
Irrigation	24.80	NW SE	33	36 S	6 W
Irrigation	30.70	SW SE	33	36 S	6 W
Irrigation	16.70	SE SE	33	36 S	6 W
Irrigation	2.80	SW SW	34	36 S	6 W
Irrigation	11.20	NW NW	35	36 S	6 W
Irrigation	26.40	NE NE	36	36 S	6 W
Irrigation	16.10	NW NE	36	36 S	6 W
Irrigation	17.15	SW NE	36	36 S	6 W
Irrigation	34.59	SE NE	36	36 S	6 W
Irrigation	1.42	SE NW	36	36 S	6 W
Irrigation	35.40	NE SE	36	36 S	6 W
Irrigation	30.70	NW SE	36	36 S	6 W
Irrigation	25.70	SW SE	36	36 S	6 W
Irrigation	20.00	SE SE	36	36 S	6 W

Total: 7761.77 Irrigated acres.

Actual construction work has begun. Special conditions above under the various "Phases" of the project contain other specific performance requirements.

Failure to comply with any of the provisions of this permit may result in action including, but not limited to restrictions on the use, civil penalties, or cancellation of the permit.

By law, the land use associated with this water use must be in compliance with statewide land-use goals and any local acknowledged land-use plan.

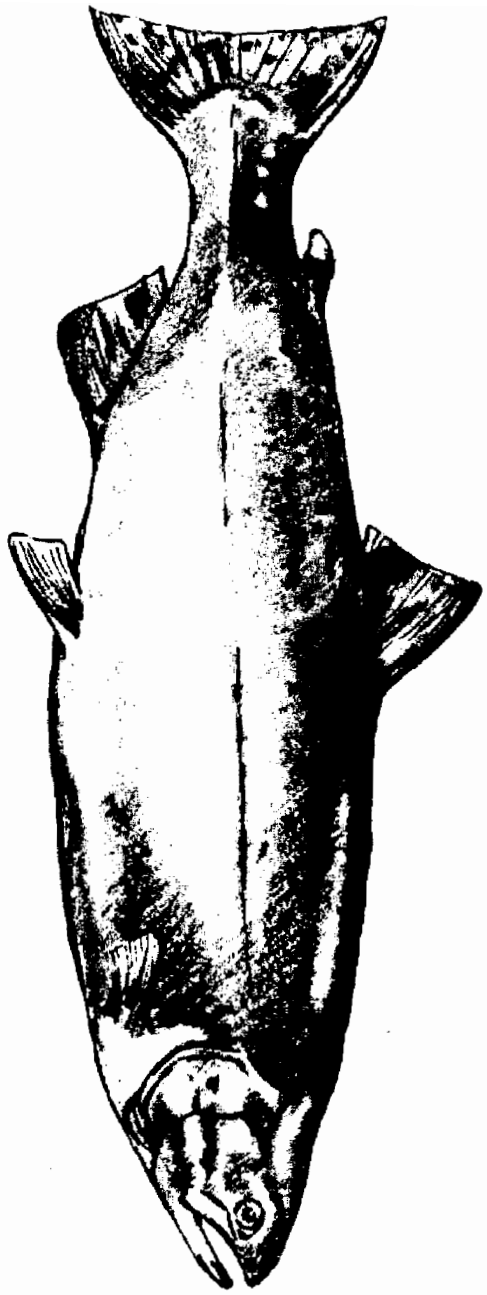
The use of water allowed herein may be made only at times when sufficient water is available to satisfy prior rights, including rights for maintaining instream flows.

This proposal was reviewed and approved by the Water Resources Commission on April 17, 1989.

Issued this date, April 13, 1990.

William N. Young

Water Resources Department
William H. Young, Director



Attachment C—USFWS Coordination Act Report and ESA Correspondence

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Portland Field Office
2600 S.E. 98th Avenue, Suite 100
Portland, Oregon 97266
(503) 231-6179 Fax: (503)-231-6195

Ref: 1-7-94-SP-114

Douglas James
Bureau of Reclamation
1150 North Curtis Road
Boise, Idaho 83706-1234

Dear Mr. James:

This is in response to your letter, dated December 21, 1993, requesting information on listed and proposed endangered and threatened species that may be present within the area of the Savage Rapids Dam Fish Passage Project in Josephine County, Oregon. The U.S. Fish and Wildlife Service (Service) received your letter on December 27, 1993.

We have attached a list (Attachment A) of threatened and endangered species that may occur within the area of the Savage Rapids Dam Fish Passage. The list fulfills the requirement of the Service under Section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 USC 1531 et seq.). The Bureau of Reclamation requirements under the Act are outlined in Attachment B.

Pursuant to 50 CFR 402 *et seq.*, the Bureau of Reclamation is required to determine whether projects may affect threatened and endangered species, and/or critical habitat. A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) which are major Federal actions significantly affecting the quality of the human environment as defined in NEPA (42 U.S.C. 4332 (2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to the Biological Assessment be undertaken to determine whether they may affect listed and proposed species. Recommended contents of a Biological Assessment are described in Attachment B, as well as 50 CFR 401.12.

If the Bureau of Reclamation determines, based on the Biological Assessment or evaluation, that threatened and endangered species and/or critical habitat may be affected by the project, the Bureau of Reclamation is required to consult with the Service following the requirements of 50 CFR 402 which implement the Act.

Attachment A includes a list of candidate species under review for listing. These candidate species have no protection under the Act but are included for consideration as it is possible candidates could be listed prior to project completion. Thus, if a proposed project may affect candidate species, the Bureau of Reclamation is not required to perform a Biological Assessment or evaluation or consult with the Service. However, the Service recommends addressing potential impacts to candidate species in order to prevent future conflicts. Therefore, if early evaluation of the project indicates that it is likely to adversely impact a candidate species, the Bureau of Reclamation may wish to request technical assistance from this office.

Your interest in endangered species is appreciated. If you have questions regarding your responsibilities under the Act, please contact Joe Burns at (503) 231-6179. All correspondence should include the above referenced case number.

Sincerely,

for Russell D. Peterson
Field Supervisor

Attachments

cc: PFO-ES
BFO-SE
ODFW (Nongame)
ONHP

ONHP/JB/NP/SP114

ATTACHMENT B

FEDERAL AGENCIES RESPONSIBILITIES UNDER SECTIONS 7(a) and (c) OF THE ENDANGERED SPECIES ACT

SECTION 7(a) - Consultation/Conference

Requires: 1) Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species;

2) Consultation with FWS when a Federal action may affect a listed endangered or threatened species to insure that any action authorized, funded or carried out by a Federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of Critical Habitat. The process is initiated by the Federal agency after they have determined if their action may affect (adversely or beneficially) a listed species; and

3) Conference with FWS when a Federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed Critical Habitat.

SECTION 7(c) - Biological Assessment for Major Construction Projects [1/]

Requires Federal agencies or their designees to prepare a Biological Assessment (BA) for construction projects only. The purpose of the BA is to identify any proposed and/or listed species which are/is likely to be affected by a construc- tion project. The process is initiated by a Federal agency in requesting a list of proposed and listed threatened and endangered species (list attached). The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the species list, the accuracy of the species list should be informally verified with our Service. No irreversible commitment of resources is to be made during the BA process which would foreclose reasonable and prudent alternatives to protect endangered species. Planning, design, and administrative actions may be taken; however, no construction may begin.

To complete the BA, your agency or its designee should: (1) conduct an on- site inspection of the area to be affected by the proposal which may include a detailed survey of the area to determine if the species is present and whether suitable habitat exists for either expanding the existing population or for potential reintroduction of the species; (2) review literature and scientific data to determine species distribution, habitat needs, and other biological requirements; (3) interview experts including those within FWS, National Marine Fisheries Service, State conservation departments, universities, and others who may have data not yet published in scientific literature; (4) review and analyze the effects of the proposal on the species in terms of individuals and populations, including consideration of cumulative effects of the proposal on the species and its habitat; (5) analyze alternative actions that may provide conservation measures and (6) prepare a report documenting the results, including a discussion of study methods used, any problems encountered, and other relevant information. The BA should conclude whether or not a listed or proposed species will be affected. Upon completion, the report should be forwarded to our Portland Office.

[1/] A construction project (or other undertaking having similar physical impacts) which is a major Federal action significantly affecting the quality of the human environment as referred to in NEPA (42 U.S.C. 4332.(2)c). On projects other than construction, it is suggested that a biological evaluation similar to the biological assessment be undertaken to conserve species influenced by the Endangered Species Act.

ATTACHMENT A

FEDERALLY LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CANDIDATE SPECIES THAT MAY OCCUR IN THE AREA OF THE SAVAGE RAPIDS DAM FISH PASSAGE 1-7-94-SP-114

LISTED SPECIES[1/]

Birds		
Bald eagle	*Haliaeetus leucocephalus*	LT
Northern spotted owl	*Strix occidentalis caurina*	LT

PROPOSED SPECIES

None

CANDIDATE SPECIES[2,3/]

Mammals		
Pacific western big-eared bat	*Plecotus townsendii townsendii*	C2
Documented occurrence within 2 miles of the Rogue River		
Amphibians and Reptiles		
Northwestern pond turtle	*Clemmys marmorata marmorata*	C2
Northern red-legged frog	*Rana aurora aurora*	C2
Plants		
Coral seeded allocarya	*Plagiobothrys figuratus* var. *corallicarpus*	C2
Documented historical occurrence from Grants Pass		

(E) - Endangered (T) - Threatened (CH) - Critical Habitat
(S) - Suspected (D) - Documented

(C1)- Category 1: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

(C2)- Category 2: Taxa for which existing information indicates may warrant listing, but for which substantial biological information to support a proposed rule is lacking.

(3A)- Category 3A: Taxa for which the Service has persuasive evidence of extinction.

(3B)- Category 3B: Names that on the basis of current taxonomic understanding do not represent taxa meeting the Act's definition of "species."

(3C)- Category 3C: Taxa that have proven to be more abundant or widespread than was previously believed and/or those that are not subject to any identifiable threat.

* *If a vertebrate or plant, a single asterisk indicates taxon is possibly extinct. If an invertebrate, a single asterisk indicates a lack of information for the taxon since 1963.*

** *Consultation with National Marine Fisheries Service required.*

1/ *U. S. Department of Interior, Fish and Wildlife Service, July 15, 1991, Endangered and Threatened Wildlife and Plants, 50 CFR 17.11 and 17.12.*

2/ *Federal Register Vol. 56, No. 225, November 21, 1991, Notice of Review-Animals*

3/ *Federal Register Vol. 58, No. 188, September 30, 1993, Notice of Review-Plants*

EN-4100
GP

ORIGINAL

CONTROL NO._____

FOLDER ID_____

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
ENVIRONMENTAL & TECHNICAL SERVICES DIVISION
911 NE 11th Avenue - Room 620
PORTLAND, OREGON 97232
503/230-5400 FAX 503/230-5435

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Mr. Douglas J. James
Regional Environmental Officer
Bureau of Reclamation
Pacific Northwest Region
1150 North Curtis Road
Boise, Idaho 83706-1234

Re: Species List Request for Savage Rapids Dam Evaluation Project

Dear Mr. James:

The National Marine Fisheries Service (NMFS) has reviewed your letter of December 21, 1993, requesting a list of threatened or endangered species for the Savage Rapids Dam project. It is our understanding that you are performing an environmental evaluation of the project, which could result in a range of possible actions from "no action" to dam removal.

We have enclosed a list of anadromous fish species presently listed as endangered or threatened under the Endangered Species Act (ESA). This inventory includes only anadromous species under NMFS jurisdiction that occur in the Pacific Northwest. The U.S. Fish and Wildlife Service should be contacted regarding the presence of species falling under its jurisdiction.

Available information indicates that none of the anadromous fish species listed as threatened or endangered under the ESA are known to be present in the proposed action area. Moreover, your project area does not fall within critical habitat for listed Snake River salmon (December 28, 1993, 58 FR 68543).

As per your request, we have also identified anadromous species in your proposed action area that are presently under NMFS review for listing under the ESA. The species present are coho salmon (*Oncorhynchus kisutch*) and steelhead (*Oncorhynchus mykiss*).

Please refer to the ESA section 7 implementing regulations, 50 CFR Part 402, for information on the consultation process. If you have further questions, please contact Steve Stone, of my staff, at (503) 231-2317.

Sincerely,

Brian J Bauman

for Merritt E. Tuttle
Division Chief

Enclosure

ENDANGERED OR THREATENED ANADROMOUS SPECIES UNDER NATIONAL MARINE FISHERIES SERVICE JURISDICTION THAT MAY OCCUR IN THE PACIFIC NORTHWEST OR ADJACENT COASTAL WATERS

Listed Species (Threatened or Endangered)

Sacramento River Winter-Run Chinook Salmon	*Oncorhynchus tshawytscha*
Snake River Sockeye Salmon	*Oncorhynchus nerka*
Snake River Fall Chinook Salmon	*Oncorhynchus tshawytscha*
Snake River Spring/Summer Chinook Salmon	*Oncorhynchus tshawytscha*

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oregon State Office
2600 S.E. 98th Avenue, Suite 100
Portland, Oregon 97266
(503) 231-6179 FAX: (503) 231-6195

July 18, 1995

Memorandum

To: Regional Director, Pacific Northwest Region, U.S. Bureau of Reclamation, Boise, Idaho
Attn: Bob Hamilton

From: Acting State Supervisor, Oregon State Office, U.S. Fish and Wildlife Service, Portland, Oregon

Subject: Final Fish and Wildlife Coordination Act Report, Savage Rapids Dam, Grants Pass Division, Rogue River, Oregon (BR)

This memorandum and the attached detailed report is the Fish and Wildlife Coordination Act (Act) Report under authority of Section 2b of the Act (PL 85-624, as amended). The report has been reviewed and concurred in by the National Marine Fisheries Service (NMFS) and Oregon Department of Fish and Wildlife (ODFW) as indicated in the attached letters. It is our understanding that the information will be used by the Bureau of Reclamation (BR) in a final feasibility level planning report and environmental impact statement for the Josephine County Water Management Improvement Study, Jackson and Josephine Counties, Oregon.

The preferred Federal action is to remove Savage Rapids Dam (SRD) and replace it with pumping plants to provide water to the Grants Pass Irrigation District (GPID), and finally resolve long-term fish passage problems that continue to exist at the dam. This action supports the decision of the Board of Directors of GPID as identified in its Water Management Study final report to the Oregon Water Resources Commission (WRC), dated March 8, 1994. The final report documents completion of the Study phase mandated by the GPID supplemental water permit of April, 1990. That permit temporarily allowed the GPID to continue diversion at the historic rate while studying a number of issues, including identification of existing water use, realistic water needs, alternative water supplies, water conservation needs, and fish passage issues at SRD. On October 28, 1994, the WRC accepted the GPID plans and granted extension of the temporary permit until October 15, 1999 for continued full service to GPID lands with a requirement for implementation of the preferred plan for fish passage (dam removal).

The findings of the Water Management Study were developed by an oversight committee consisting of the BR, Oregon Department of Fish and Wildlife (ODFW), Fish and Wildlife Service (FWS), GPID, and its consultant, David Newton

Associates, Natural Resources Conservation Service, Oregon Water Resources Department (OWRD), WaterWatch of Oregon, City of Grants Pass, Josephine County and other local interests. While GPID was formed in 1917 to irrigate a potential area of about 18,400 acres, and the original permit for water use was for 230 cubic feet per second (cfs); the historic diversion rate has ranged between 180 and 190 cfs and the maximum area irrigated was about 12,000 acres. A final proof survey completed by OWRD identified 7,755 irrigated acres and a water right for 96.94 cfs was issued.

The Water Management Study results identify the need for pumping plants sized to provide 150 cfs maximum discharge during the peak use month of August. Operationally, flows would range from a low of 100 cfs during startup and shutdown in April and October, 130 cfs in May and September, 140 cfs during June, 145 cfs in July, and 150 cfs peak in August, with a seasonal average of 139 cfs. Two pumping plants would be constructed, one on each side of the river, in the immediate vicinity of SRD utilizing existing rights-of-way. Flows would be delivered utilizing the existing distribution system. The pumping plants would be constructed before the dam is removed to insure delivery of water to GPID and continuous fish passage, then the dam would be removed. Construction scheduling will be extremely important because species of anadromous fish are present in the Rogue River year round, sometimes in very large numbers. Total costs of the preferred plan is approximately $11.2 million.

Fish passage issues at SRD have a long history, beginning with completion of the dam in 1921 with only a northside fish ladder, and not until 1934 was a southside ladder completed by the Oregon State Game Commission. In 1971 Congress authorized the BR to conduct a feasibility study of the Grants Pass Division, Rogue River Basin Project, including fish passage issues at SRD. A special report of FWS and BR in 1974, and subsequent Final Environmental Impact Statement, resulted in Congressional authorization to implement passage measures but appropriations did not support completion of the work. Some interim measures were completed between 1977-88.

The potential benefits with fish passage improvements were examined in detail in this feasibility study and still provide adequate data for estimating reasonable benefits. Additional studies to document the means and extent of harm to fish with existing conditions have been identified by ODFW, NMFS, and FWS, but funding levels and time frames have not accommodated these studies. The ODFW recently completed an independent analysis of potential benefits with passage improvements (Appendices A & B to detailed report) that is based on the latest information available for the Rogue River Basin anadromous fish. This work was completed to determine the relevancy of the earlier studies to existing conditions in the basin.

The 1970's analysis of benefits completed by NMFS estimated that approximately 45 percent of the spawning population of anadromous fish occurred upstream of SRD, ranging from 100 percent for spring chinook to 11 percent for fall chinook. Assuming a total estimated average, upstream passage of 120,450 adults to SRD, dam removal and elimination of all passage problems and associated losses would increase fish escapement by 26,700 adult fish, or

about a 22 percent increase (9,100 spring chinook, 8,200 fall chinook, 400 coho, 4,400 summer steelhead, and 4,600 winter steelhead).

Although some anadromous fish stocks in the Rogue River are at depressed levels (coho and some steelhead runs), operation of the Corps' Lost Creek Project and associated flow changes and operation of Cole Rivers hatchery for mitigation, has shifted a larger percentage of the basins production upstream of SRD. This is especially true for fall chinook, summer steelhead, and coho. Also, run sizes to the Rogue River vary as much as 10-fold, and the percent of total run component for each species/race by year also varies. Other changes that occur annually in terms of water year and conditions at SRD, operation of the project (GPID operations), hatchery practices and operation of the Lost Creek Project, also influence total numbers of fish at SRD and how they are impacted by existing passage conditions. The ODFW analysis looked at a range of mortalities to reflect this variability and found that the earlier work was still well within the range of benefits that could be expected.

Accordingly, the resource agencies recommend that the 22 percent of total run size to SRD (as estimated by counts upstream at Gold Ray Dam (18 river miles), can be used to develop a range of benefits for fish passage improvements. This range of benefits can be developed by looking at the high year, low year, last 10-year average, and an average for the total 53-year period of counts (1942-1994) at Gold Ray Dam. Numbers for this range of benefits are an increase of 30,847 adults in the high year (1987), 4,508 adults in the low year (1959), 17,227 adults for the last 10-year average (1985-1994), and 11,640 adults for the entire 53-year period average. Breakdowns by species and race are presented in the detailed report.

This range of benefits allows for a risk analysis to reflect the variability that exists within any given year for run size, while the ODFW analysis reflects the variability in mortality to adult and juvenile fish, which also changes with water conditions for a given year and associated operational practices at SRD. Thus, the 26,700 additional adult fish that would return with removal of SRD, even accounting for additional fish that would be harvested (see detailed report) are within the range of benefits from either analysis, and a reasonable estimate of benefits for purposes of this study.

An alternative to the preferred plan includes leaving SRD in place and renovating all fish passage facilities and the pumping system. While fish benefits would be substantial with this plan, the earlier analysis of benefits estimated that losses of about 5 percent of adult passage to SRD would still occur. This difference may be low because some problems (predation in the pool and at the dam) would still remain, and the opportunity to restore fall chinook spawning in gravels in the impounded reach would not be realized. Of even greater concern for the long term, with the continued urban development of the GPID service area and lands being converted to housing and placed on the Grants Pass City's water supply system, a smaller and smaller patronage may be responsible for the O & M costs. This could be particularly difficult with the higher costs of the dam retention alternative and the need to maintain expensive new fish facilities and upkeep on an old, outdated dam. For the above reasons, it is the recommendation of the resource agencies that dam removal is the most viable option at this time and dam retention should

not be a preferred plan. Only minor changes to wildlife would occur with either plan.

The NMFS has proposed that the Klamath Mountain Province steelhead (including runs in the Rogue River) be listed as a threatened species under the Endangered Species Act, and coho salmon stocks have also been petitioned for listing and may be proposed at any time. Both steelhead and coho are adversely impacted by the existing poor passage conditions at SRD and would benefit with dam removal. Additionally, habitat restoration projects in the upper Rogue basin are being implemented under several major initiatives, and increased passage of fish (upstream and downstream) at the SRD location would further the benefits of these restoration projects.

Because of the substantial benefits to anadromous fish in the Rogue River Basin with the preferred plan, and the strong connection between dam removal and habitat restoration projects being implemented on both public and private lands in the basin, the resource agencies also recommend that the BR seek to implement this plan on an accelerated basis - possibly seeking action through a congressional add-on appropriation. It is further recommended that the costs of implementing this plan be considered a Federal, non-reimbursable cost because benefits are substantially for anadromous fish, species of high national interest, some stocks of which are at very low levels of escapement and may be placed on the Endangered Species list for protection. Early efforts now to reverse declines could be important first steps to recovery.

Based on the summary of information here, and the details and discussions presented in the attached report, it is the recommendation of the Fish and Wildlife Service, Oregon Department of Fish and Wildlife, and National Marine Fisheries Service, that:

1) The Bureau of Reclamation seek Congressional authorization to remove Savage Rapids Dam and replace it with pumping plants to permanently resolve long standing fish passage problems at the dam;

2) Implementation of these measures be sought on an accelerated time frame to expedite restoration efforts for declining stocks of anadromous fish in the Rogue River Basin;

3) Funding for this effort be a non-reimbursable Federal cost because of the substantial benefits to anadromous fish; and

4) The construction schedule for dam removal be coordinated closely with the FWS, ODFW, and NMFS to coordinate the specifics of in-water work schedules and activities with fishery concerns.

Please let us know of your response to these recommendations and of any changes in project plans or details that would require new or additional analysis by the resource agencies.

RLG/ae

Attachments

Ronald L Saxt

cc: ODFW, Portland, OR
ODFW, Central Point, OR
NMFS, Portland, OR
USBR, Vancouver, WA
GPID, Grants Pass, OR
OWRD, Salem, OR

Oregon

DEPARTMENT OF
FISH AND
WILDLIFE

March 28, 1995

Mr. Russell Peterson
Field Supervisor - Portland Field Office
U.S. Fish and Wildlife Service
2600 S.E. 98th Ave., Suite 100
Portland, Oregon 97226

Subject: May, 1994 Draft Fish and Wildlife Coordination Act Report (FWCAR), Savage Rapids Dam, Grants Pass Division, Rogue River, Oregon

Dear Russ:

Oregon Department of Fish and Wildlife (ODFW) reviewed the subject draft report last year, and several staff sent comments to you in the form of "marked-up" copies of the report. We understand that you are still in the process of revising and producing the final report, which will be submitted to the U.S. Bureau of Reclamation (BOR) to assist them in preparing a final environmental statement on fish passage improvements for Savage Rapids Dam.

Since the draft Coordination Act Report was distributed, ODFW has conducted an independent analysis of fish increases expected from the two primary alternatives under consideration, dam removal and dam retention with facility improvements. Two reports describing this analysis and results were provided to your staff in October, 1994 and March, 1995, when the reports were completed. We are also attaching copies of these reports to this letter. ODFW's analysis incorporates recent information regarding fish hatchery releases and sport and commercial harvest. While this new analysis confirms that both alternatives will result in significant fish population increases, ODFW does not believe it is necessary for U.S. Fish and Wildlife Service (USFWS) to revise its estimates of fish benefits in the FWCAR. However, the FWCAR should reference this analysis and acknowledge that the range of population increases estimated from this analysis encompasses the point estimates identified in the FWCAR and earlier analyses.

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TDD (503) 229-5459

Operation and Maintenance: ODFW's analysis is based on field and laboratory studies of fish survival at dams in the Pacific Northwest, including passage through or around fish ladders, screens, and spillways. For the dam retention alternative, relatively high fish survival was assumed, based on study results at state-of-the-art fish passage facilities installed at other locations. It is important to note that these field studies were conducted soon after installation of new facilities and careful attention was paid to ensuring that the facilities were in peak operating condition. The FWCAR should specifically state that fish benefits estimated for the dam retention alternative assume fish passage facilities are operated and maintained in peak condition throughout the life of the project. It should also be noted that this assumption increases the risk that the dam retention alternative fish benefits may not be as high as estimated.

Range of Benefits versus Point Estimates: ODFW's analysis provides a range of estimated fish benefits expected from each alternative. This approach recognizes the inherent variability in benefits expected when fish populations and harvest levels vary significantly between years and when fish passage survival at screens, ladders and spillways varies within and between years. Although it is easier to compare the two alternatives using point estimates of costs and benefits, ODFW suggests that the FWCAR identify ranges of estimated benefits, which present a more realistic picture than point estimates.

Benefits to Sensitive Fish Populations: Similar to earlier analyses by USFWS and National Marine Fisheries Service (NMFS), ODFW's analysis shows that those populations which are largest will accrue the greatest benefits from improvements at Savage Rapids Dam. The economic analysis of fish benefits conducted by BOR applies this same concept: dollar benefits are higher as numbers of fish increase. Unfortunately, this type of analysis, while straightforward and simple to understand, fails to acknowledge the greater value to society of protecting sensitive fish populations from further declines. For some populations, this may mean stemming a gradual decline and preventing the population from being listed under state or federal Endangered Species Acts. The savings that accrue to society by not having to list a species have probably not been calculated, although there is ample evidence that species listing and recovery efforts incur substantial costs to both public and private sectors. If any of the salmon or steelhead populations that pass Savage Rapids Dam are eventually listed as either threatened or endangered, the value of fish passage improvements in terms of species recovery should also be considered. Clearly, the value of increasing a listed species population by, for instance, 100 or 1000 fish per year, should be as high or higher than increasing a robust population at a proportionally equivalent rate. Although ODFW does not recommend USFWS attempt to place a value on candidate or threatened or endangered species, the FWCAR should acknowledge these difficult-to-quantify values.

Non-use values: In addition to benefits resulting from increased populations of sensitive or listed species, the FWCAR should discuss other values, such as non-consumptive uses (viewing spawning fish), existence and passive use values resulting from increases in all species affected by the dam. Although ODFW does not believe it necessary for USFWS to derive economic benefits for these types of values, we recommend that the FWCAR acknowledge the other, non-economic benefits of increased fish populations in the Rogue River.

Threatened and Endangered Species

Since the Draft ES was released, NMFS has proposed to list Klamath Mountain Province steelhead under the federal Endangered Species Act. The wild summer and winter steelhead of the Rogue River are considered by NMFS to be a part of this population. In the next year, NMFS will solicit and analyze comments and additional scientific data to decide whether or not to list this population. ODFW recommends that the FWCAR clearly describe NMFS' most recent action, proposed process for further review, and how the proposed fish passage improvements at Savage Rapids Dam could aid in recovery efforts. ODFW is especially concerned that the proposed listing not be used as reason to delay implementation of the preferred alternative. Whether or not Rogue River steelhead are listed, fish passage improvements at Savage Rapids Dam will benefit these and other fish populations.

ODFW appreciates the excellent coordination efforts of USFWS in preparing and revising the draft FWCAR. We hope that these additional comments will assist you in preparing the final report.

Sincerely,

Stephanie Burchfield

Stephanie Burchfield
Water Resources Program Manager
Habitat Conservation Division

Attachments

c: Bob Hamilton, BOR - Boise
Dan Shepard, GPID - Grants Pass
Doug Parrow, OWRD - Salem
Jeff Curtis/Bob Hunter, WaterWatch (Public Information Request)

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
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F/NWO3

MAY 15 1995

Mr. Russell Peterson
Field Supervisor, Portland Field Office
U.S. Fish and Wildlife Service
Attn: Ron Garst
2600 S.E. 98th Ave., Suite 100
Portland, OR 97266

RE: Fish and Wildlife Coordination Act Report, Savage Rapids Dam, Rogue River, Oregon

Dear Mr. ~~Peterson~~ Russ:

The National Marine Fisheries Service (NMFS) has reviewed the U.S. Fish & Wildlife Service's (USFWS) Fish & Wildlife Coordination Act Report (Attachment C of the Bureau of Reclamation's December 15, 1994, Planning Report and Draft Environmental Statement for Fish Passage Improvements at Savage Rapids Dam). NMFS concurs with the USFWS' recommendations in the Fish and Wildlife Coordination Act Report that Savage Rapids Dam be removed to permanently resolve fish passage problems at the dam.

Questions concerning our comments should be directed to Lance Smith, of my staff, at (503) 231-2307.

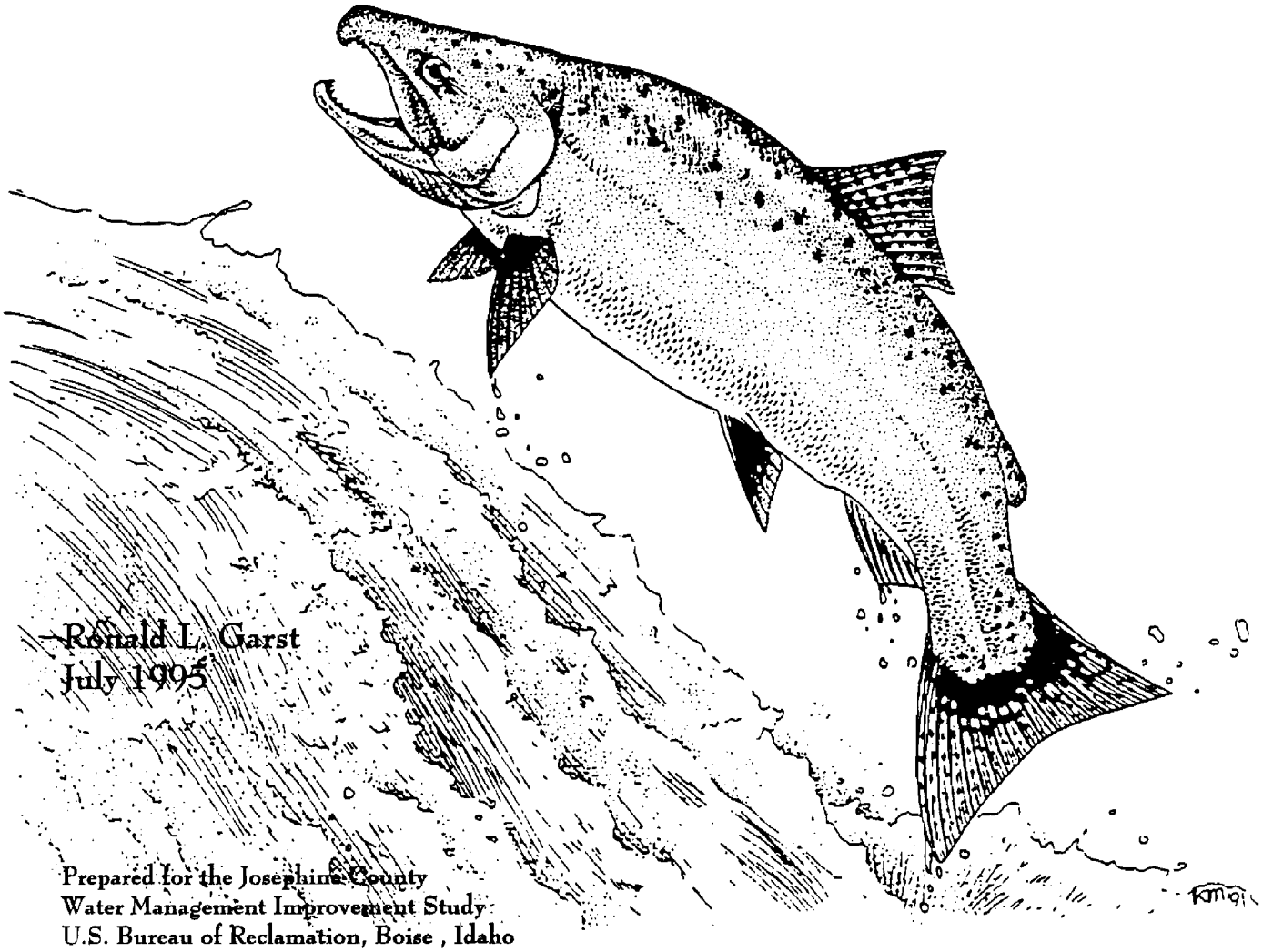
Sincerely,

Brian J. Brown

~~Jacqueline~~ V. Wyland
Division Chief

cc: BR - Robert Hamilton
ODFW - Stephanie Burchfield
GPID - Dan Shephard
Donald R. Greenwood

IMPACTS OF THE PROPOSED SAVAGE RAPIDS DAM REMOVAL ON FISH AND WILDLIFE RESOURCES



Ronald L. Garst
July 1995

Prepared for the Josephine County
Water Management Improvement Study
U.S. Bureau of Reclamation, Boise , Idaho
by the Oregon State Office
U.S. Fish and Wildlife Service, Portland, Oregon

PREFACE

This is the Fish and Wildlife Service's detailed report on the proposed Savage Rapids Dam Removal, Josephine County Water Management Improvement Study, Jackson and Josephine Counties, Oregon.

Our analysis of project impacts on fish and wildlife resources is based on project information and engineering data provided by the U.S. Bureau of Reclamation through December, 1994. Our analysis is based on a 50-year project life. A planning aid letter was submitted on this project in April, 1990.

It should be noted that the proposed project may be subject to permits over which the Fish and Wildlife Service has review responsibilities. Accordingly, our report does not preclude an additional and separate evaluation by the Service, pursuant, to the Fish and Wildlife Coordination Act (16 U.S.C. 661, et seq.), if eventual project development requires a permit. All such permits are subject to separate review by the Service under existing statues, executive order, memorandum of agreement and other authorities. In review of permit application, the Fish and Wildlife Service may concur, with or without stipulations, or object to the proposed work, depending on specific construction practices which may impact fish and wildlife resources.

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

INTRODUCTION

This report contains an evaluation of the impacts of removal of Savage Rapids Dam (SRD) on fish and wildlife resources. It was prepared in cooperation with the Oregon Department of Fish and Wildlife (ODFW), National Marine Fisheries Service (NMFS), Northwest Region of the Bureau of Reclamation (BR), and Grants Pass Irrigation District (GPID). Letters of concurrence from ODFW and NMFS are attached to the executive summary. Contents are based partially on information contained in other reports: 1) Draft Planning Report and Environmental Impact Statement (USBR, 1994); 2) Final Water Management Study Report (GPID, 1994); 3) Fish Passage Improvements Progress Report (USBR, 1992); 4) Savage Rapids Dam, Grants Pass Division, Planning Aid Memorandum from FWS to BR (FWS, 1990); and 5) earlier evaluations of fish losses and benefits associated with SRD and dam removal (FWS, 1981 and NMFS, 1979) and 6) current analysis of SRD impacts on Rogue River anadromous fish (ODFW, 1994 & 1995).

The GPID was formed in 1917 to irrigate a potential area of about 18,400 acres and the original permit for water use was issued for 230 cubic feet per second (cfs); however, the historic diversion rate has ranged between 180 and 190 cfs and the maximum area irrigated has been about 12,000 acres. A final proof survey completed by the Oregon Water Resources Department (OWRD) identified 7,755 irrigated acres and a water right of 96.94 cfs was issued in 1982. Subsequently, GPID applied for a permit to use additional water because of its inability to operate on this smaller amount, and that action became the subject of a dispute between OWRD, GPID and other parties. A negotiated agreement followed which allowed GPID to: 1) divert the average historical diversion for a period of time, during which GPID was to identify needed improvements to the diversion and delivery system; 2) implement conservation measures, where possible, as part of their management plans; 3) justify a need for any water greater than 96.94 cfs; and 4)identify solutions to the fish passage problems at SRD. These findings are presented in the GPID Water Management Study final report to the Oregon Water Resources Commission dated March 8, 1994. On October 28, 1994, the Oregon Water Resources Commission completed its review of the GPID plans and accepted them, granting an extension of a temporary permit until October 15, 1999. This permit allows for continued full service to GPID lands and the requirement to implement the preferred plan for fish passage (dam removal) within the permit time period.

Issues that were examined by GPID include water use and water needs, alternative water supplies, water conservation measures, existing and future land use and how it would affect water use, other beneficial uses (besides irrigation) supported by the present system, and fish losses caused by SRD and the water conveyance system. The findings of the study were developed by an oversight committee consisting of BR, ODFW, FWS, OWRD, GPID and its consultant, David Newton Associates, Natural Resources Conservation Service (SCS), WaterWatch of Oregon, City of Grants Pass, Josephine County, and other local interests. The issue of anadromous fish passage problems at SRD are considered to be of Federal interest because anadromous fish are species of high national interest, the subject of international treaties, some stocks have been petitioned and subsequently proposed for listing under the

Endangered Species Act, and the Federal Government has a history of involvement at SRD though contractual agreement between the GPID and the BR.

In 1971 congress authorized the BR to conduct a feasibility study of the Grants Pass Division, Rogue River Basin Project, including fish passage issues at SRD. A special report of FWS and BR in 1974, and subsequent Final Environmental Impact Statement, resulted in Congressional authorization to implement the interim measures in that report. Ongoing detailed studies indicated economic benefits for either dam removal or rehabilitation of the existing facilities, and controversies developed between these two choices. Solicitations for bids to replace the north fish ladder received only one response (which exceeded available funds) and, in 1979, a decision was made to expend remaining funds on interim improvements until agreement and sufficient funds were available for a permanent solution. The preferred Federal action is to build pumping plants, then remove SRD. The pumping plants would provide water to GPID, and, at the same time, finally resolve long-term fish passage problems existing at the dam. This action supports the decision of the Board of Directors of GPID as identified in the final Water Management Study Report, the permit extension as granted by the Commission, and is the economical and biological solution to the existing fish passage problems.

DESCRIPTION OF THE AREA

Savage Rapids Dam (SRD) is located on the Rogue River at River Mile (RM) 107 about 5 miles east of the City of Grants Pass, Oregon **(Figure 1)**. The Rogue River heads in the Cascade Range near Crater Lake and flows over 215 miles to its confluence with the Pacific Ocean at Gold Beach, Oregon. Elevations range from sea level to 8,356 feet at the highest point in the drainage. The total basin area encompasses over 5,000 square miles. Two major tributaries, the Illinois and the Applegate Rivers, head in the Siskiyou Mountains and flow north, entering the Rogue at RM 27 and 95, respectively.

The climate of the Rogue Basin is dominated by maritime influence which contributes to relatively mild, wet winters and warm, dry summers. Normally about 50 percent of the annual precipitation occurs from November through January, and less than 2 percent falls during July and August. Grants Pass receives about 31.5 inches of precipitation annually, with 90% occurring from October through April. Snow accumulates at higher elevations during winter and early spring and becomes the principle source of run-off during late spring through summer. During winter months, only 10 to 20 percent of the flow at the Rogue River mouth originates from Lost Creek Dam (Rm 157) but, in July and August, 70 to 75 percent of the total flow is from releases at the dam. (ODFW, 1985).

The Rogue River Basin is surrounded by the Siskiyou Mountains to the south, Cascade Range to the east and north (Umpqua Divide) and the Coast Range to the west. At its upper and lower end, the basin is a relatively narrow valley surrounded by heavily-forested lands managed intensively for timber resources. The basin's interior valley is broader and used mostly for agricultural purposes, supporting the area's population centers and economic development. Medford, Oregon, the largest city in the region, is located about 30 miles southeast of Grants Pass. Most of the useable land within the valley is well developed and fully utilized within limits imposed by soils, climate,

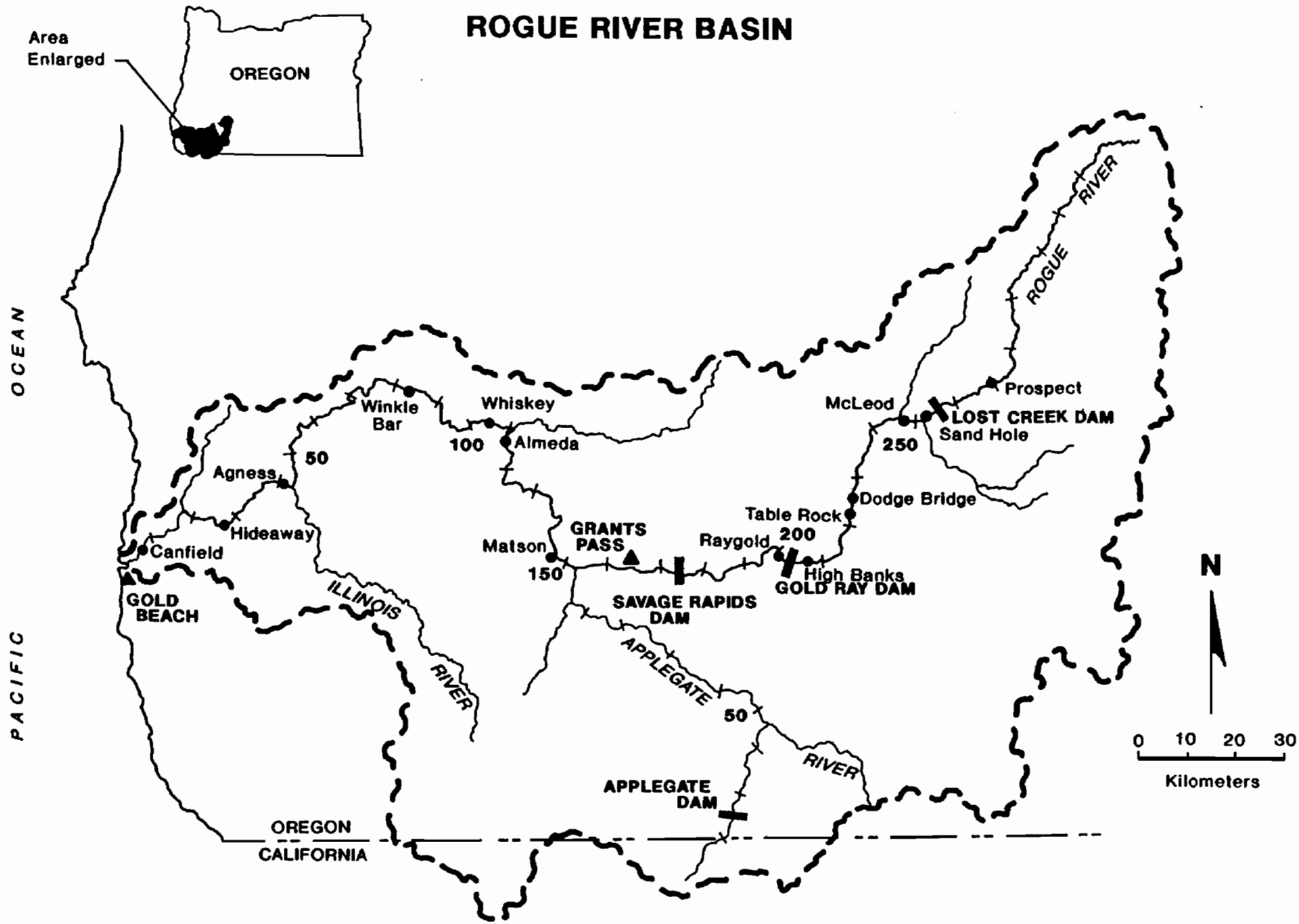


Figure 1. Map of the Rogue River Basin (Oregon Department of Fish and Wildlife, 1985).

topography, water, and-land use categories. Urban growth has significantly encroached on commercial agricultural land and continues to do so in the GPID service
area. The City of Grants Pass is located in the central and western portion of the service area and the urban growth boundary for the city encompasses about 60 percent of the service area. **Figure 2** shows the configuration of the GPID service area and distribution system of major canals and laterals relative to the location of SRD and the Rogue River. At the downstream end of the project area, the 27-mile Hellgate Recreation Area, a segment of the National Wild and Scenic Rogue River, begins at the confluence of the Applegate River and continues to Grave Creek. This river reach provides a broad range of land-and-water based recreation opportunities managed by the Bureau of Land Management (BLM) Medford District.

DESCRIPTION OF THE PROJECT

Savage Rapids Dam is 464 feet long and has a maximum height of 39 feet. From north to south the structure consists of a fish ladder, a pumping plant-sluiceway structure, a 16-bay overflow spillway section (398 feet long and 11 feet deep), two 16-foot by 7-foot radial river gates under two spillway bays, and a gravity canal headworks. During the irrigation season, stoplogs are installed in the spillway bays to raise the river surface elevation behind the dam by 11 feet. This allows diversion to be made by gravity through the canal headworks and by pumping with direct-connected hydraulic turbine-driven pumps to four canals at higher elevations. Fish facilities at the dam now include the north fish ladder and south fishway for upstream migrants, traveling screens, and a bypass system in the turbine-pump intake channels as well as rotary screens in the Gravity Canal to protect downstream migrants.

Engineering details of the specific structure, operations, and passage conditions at SRD have been presented in numerous documents in the past (FWS/BR, 1974) (BR, 1976) and (BR, 1979) and are not repeated here. **Table 1** shows a brief history of fish passage studies and construction activities that have occurred at the dam. Not all of the interim fish passage measures recommended and funded by PL 93-493 were implemented (see 1977-81, Table 1). Although replacement of the north ladder was recommended and funded, the one bid received to do the work was substantially greater than the funds remaining, and, consequently, this work was never done (BR, 1981). In 1979 a decision was made to expend remaining funds on interim improvements until agreement and sufficient funds were available for a permanent solution. New fish screens on the north side and minor modifications to the southside ladder were completed in 1981. In 1984 further fisheries study was deferred because of uncertainties regarding potential hydropower development at SRD. The last fisheries improvement measures implemented at SRD were completed in 1986 with minor modifications to the south ladder made by local fishery groups, with overview by the ODFW.

Efforts by BR to reinitiate feasibility level planning were delayed until 1988, which was when the present study began. The 1970's evaluation of fish passage problems at SRD led to the evaluation of two basic fish passage/water supply alternatives which is the basis for much of the work with the present

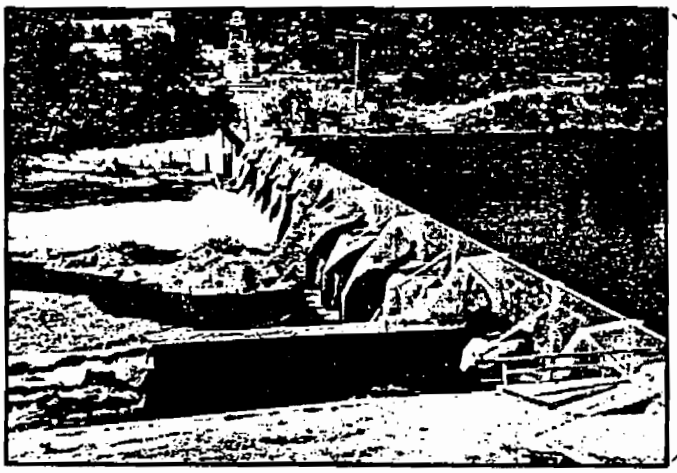


Figure 2. Savage Rapids Dam and GPID. (USBR, 1979)

Table 1. A brief history of fish passage studies and construction at Savage Rapids Dam, Rogue River, Oregon

YEAR	ITEM
1921	Savage Rapids Dam constructed with only a northside fish ladder.
1934	South fishway built by the Oregon State Game Commission.
1954	USBR installed steel stoplogs and two river gates to replace the deteriorated bascule gates.
1958	Vertical traveling water screens installed on the two, previously unscreened, hydraulic turbines.
1964-1968	Reports of ODFW and USFWS on continuing problems with fish screens.
1971	Feasibility Study for Grants Pass Division authorized (P.L. 92-199) to examine: (1) Interim fish passage problems at Savage Rapids Dam (Phase I). (2) Potential for rehabilitating GPID distribution system, and permanent solution to fish passage problems (Phase II)
1971-73	Studies conducted by USBR for interim fish passage improvements at Savage Rapids Dam.
1974	Congress authorized (P.L. 93-493) construction of interim fish passage improvements based on joint USFWS/USBR report (March, 1974).
1976	Final Environmental Statement filed on anadromous fish passage improvements at SRD. These were interim measures pending a final fish passage program. Some measures outlined in the EIS included: (1) New bulkhead gates in front of the fish screens to facilitate maintenance, (2) Modify south fishway, (3) Replace north fishway, and (4) Other miscellaneous measures.
1977-81	Installation of interim fish passage improvements (rehabilitation and addition to south fishway, renovation of north fishway, bulkhead gates and fish screens).

Continued on next page...

Continuation...

Table 1. A brief history of fish passage studies and construction at Savage Rapids Dam, Rogue River, Oregon

YEAR	ITEM
1979	Formulation Working Document summarizing Phase II study results. Basic conclusions following public review included: (1) Prospects poor for a Federal project to improve irrigation facilities, so discontinue study; 2) Upstream and downstream fish passage still a major problem, so further measures should be taken; continue this part of study.
1984	Fisheries study deferred because of uncertainty regarding hydropower development on the Rogue River.
1986	Minor modifications to portions of south ladder accomplished by local fishery groups with ODFW overview.

Water Management Study: 1) Dam retention with new fish facilities; 2) Dam removal with new pumping plants. These are summarized below:

Dam Retention Alternative

Replace north fish ladder, new screens on turbine and pump bays, replace south fish ladder, new south canal fish screens, stoplog modifications, plunge pool modification, new radial gates, juvenile fish trapping facility, public access facility - BR estimated construction costs equal $17.6 million (1993 costs). These costs include the replacement of the existing pumps, turbines, and discharge lines which have exceeded their useful service life, but not replacement of the cableway/stoplog system.

Dam Removal Alternative

Remove SRD and restore dam area and construct new pumping plants (2) in the vicinity of the existing dam, with maximum capacity of 150 cfs discharge for peak use period - BR estimated construction costs equal $11.2 million (1993 costs). This plan includes contructing a transmission line across the river at the pump sites.

Because of: 1) the additional costs for the dam retention alternative; 2) the additional fish passage benefits with dam removal (discussed later); 3) the concern for possible continued fish losses and long term need for high levels of operation, maintenance and replacement activities with dam retention (also discussed later); and 4) the support of the GPID board and Water Resources Commission for dam removal, the resource agencies believe that dam removal coupled with the construction of new pumping plants should be the preferred Federal plan. It is the recommended fish passage plan evaluated in this report.

The Water Management Study results identify the need for pumping plants sized to provide 150 cfs maximum discharge during the peak use month of August. Operationally, flows would range from a low of 100 cfs during startup and shutdown in April and October, 130 cfs in May and September and 150 cfs peak in August, with a seasonal average of 139 cfs. Anticipated monthly flow needs by canal are summarized below, with the system needs totaled.

CANAL	MAY	JUNE	JULY	AUGUST	SEPT.	SEASONAL AVERAGE
TOKAY & EVANS	27.75	30.00	31.00	32.00	27.75	29.70
GRAVITY	51.25	55.25	57.00	59.00	51.25	54.75
HIGHLINE & SAVAGE	51.00	54.75	57.00	59.00	51.00	54.55
TOTAL	130.00	140.00	145.00	150.00	130.00	139.00

Two pumping plants would be constructed, one on each side of the river, in the immediate vicinity of SRD utilizing existing rights-of-way. Flows would be

delivered utilizing the existing distribution system. The pumping plants would be constructed before the dam is removed to insure delivery of water to GPID and continuous fish passage. Coffer dams would be required on each side of the river to protect the construction sites for the pumping plants. Construction scheduling will be extremely important because species of anadromous fish are present in the Rogue River year round, sometimes in very large numbers. Schedules will be developed during the detailed design stage of implementation.

As required by its water use permit conditions, numerous other measures are proposed to be implemented by GPID for systems improvements and water conservation, and will be adopted for implementation as approved by the Water Resources Commission in October, 1994. The proposed action of dam removal and replacement with pumping plants is identified as a Federal action because of the significant benefits to anadromous fish in the Rogue River Basin. It is the only action evaluated in detail in this report.

BIOLOGICAL RESOURCES

EXISTING CONDITIONS

Fish

The Rogue River basin supports a large population of anadromous salmonids, including spring and fall chinook salmon, coho salmon, summer and winter steelhead trout, and cutthroat trout. Chinook and steelhead are the most plentiful species while the cutthroat are least abundant and occur primarily in the lower river. In total, about 375,000 anadromous salmonids are produced annually, valued at $31.5 million (ODFW, 1985). This includes about 162,000 chinook salmon harvested annually by sport and commercial fisherman and about 95,000 steelhead caught by sportsmen in the Rogue River (ODFW, 1988). The Rogue River fisheries are not only attractive to residents of the northwest, but are nationally renowned for their diversity and productivity. An ODFW administrative rule for wild fish management (OAR 635-07-525) contains a Policy giving protection and enhancement of wild stocks first and highest consideration. The Rogue River basin supports the largest wild population of anadromous salmonids in Oregon (ODFW, 1988). Wild fish make up more than 90 percent of the fall chinook and winter steelhead, and account for about 50 percent of the spring chinook, coho and summer steelhead that return to the Rogue River. The production of hatchery fish in the basin is done to mitigate the loss of habitat upstream of Lost Creek and Applegate Dams, both part of the Corps of Engineers (Corps) Rogue Basin Project.

Since most of the detailed study of fish passage issues at SRD were completed in the 1970's (Table 1), numerous studies of the Rogue River fisheries have been completed or are ongoing by ODFW in conjunction with the Corps' Rogue River Basin Project. Project features that affect either the basins fisheries, or actual passage conditions at SRD, include Lost Creek Dam at RM 157 on the mainstem Rogue River, the partially completed Elk Creek Dam on Elk Creek (a tributary at RM 152), Applegate Dam on the Applegate River (a tributary just downstream of Grants Pass) and Cole M. Rivers Fish Hatchery.

The fish hatchery is located just downstream of Lost Creek Dam and was constructed to mitigate for the impacts of the Rogue Basin Project on anadromous fish. It is operated by the ODFW and annually has produced about 2 million spring chinook salmon (smolts and pre-smolts); 200,000 coho Salmon; and 150,000 each of summer and winter steelhead trout. Releases of spring chinook pre-smolts began in 1984, peaked with a release of 800,000 in 1987, but was discontinued in 1989 because of concerns with residualism impacting wild fish. Some fall chinook were also released between 1982-1987 to study distribution in the ocean fishery, but these releases (averaging about 34,600/yr for the period) have also been discontinued. Spring chinook smolt releases have averaged about 1.6 million since 1986. The number of summer and winter steelhead releases fluctuates from year to year but the goal is to release 150,000 1-year old smolts annually for each species. Additionally, about 120,000 2-year-old winter steelhead smolts are split between the Rogue and Applegate Rivers, and since 1991 summer steelhead production has been increased by an additional 70,000 1-year-old smolts to the Rogue River. All fish produced for the Rogue River are released at the hatchery while Applegate River fish are trucked to that river and released.

Lost Creek Dam has been operational since 1977 and provides flows and temperature control to enhance anadromous fish. Elk Creek Dam construction was started in 1986 and has since been stopped by court order. The dam is about 50 percent complete and fish passage is still being provided for at the dam since flows are not being regularly impounded and significant habitat is available upstream in the basin. A fish trap and haul facility constructed downstream is being used by ODFW to collect fish for relocation upstream. It is anticipated that this facility will be used on a permanent basis until a final decision and plan of operation (or removal)is developed for Elk Creek Dam.

Although Lost Creek, Applegate, and Elk Creek (if it is completed) Dams are primarily for flood control, another major purpose of the Rogue Basin Project is to enhance anadromous fish runs. An important part of this effort has been to monitor and evaluate project operations and fishery resources to develop specific recommendations on how best to operate the projects and meet the intended purposes of fishery enhancement - or at the very least avoid conditions that would be detrimental to the production and harvest of wild salmon and steelhead. A brief list of the Rogue Basin Fisheries Evaluation Studies conducted by ODFW and funded by the Corps is presented in **Table 2**.

Generally, on a coastwide basis throughout the Pacific Northwest, salmon and steelhead stocks are at very depressed levels and all anadromous salmonid species in the region are now candidates for listing under the Endangered Species Act (ESA). Coho stocks have been especially hard hit by poor ocean survival conditions associated with the recent El Nino as well as more locally distributed chinook stocks such as Klamath River, southern Oregon (some Rogue populations included) and Columbia River tule stocks. The ocean and inriver fisheries had extremely restricted, or, in some cases, completely foregone seasons in 1994 because of the conservation crisis facing many of these stocks. Similar restrictions are anticipated in 1995. These included no ocean sport or commercial harvest for coho and only limited commercial or inriver sport harvest for chinook salmon.
Within the Rogue River Basin, winter steelhead of the Illinois River were petitioned for listing, but NMFS found that this stock did not qualify for

Table 2. A brief chronology of Rogue Basin fisheries evaluation studies Conducted by ODFW for Lost Creek and Elk Creek Dams.

YEAR	ITEM
1973	SMOLT PHYSIOLOGY AND HATCHERY STUDIES STARTED.
1974	LOST CREEK DAM FIELD STUDIES STARTED: SPRING CHINOOK — COHO SALMON FALL CHINOOK — WATER CHEMISTRY SUMMER STEELHEAD — BENTHIC BIOLOGY WINTER STEELHEAD — SALMONID GENETICS
1976	SALMONID GENETICS STUDY COMPLETED.
1976-77	LOST CREEK DAM CLOSURE STUDY CONDUCTED.
1977	WATER CHEMISTRY AND BENTHIC BIOLOGY STUDIES COMPLETED. HATCHERY EVALUATION FUNDING TAKEN OVER BY USFWS.
1979	SMOLT PHYSIOLOGY STUDY COMPLETED.
1980-82	STUDY WITH O.S.U. ON FALL CHINOOK MORTALITY CONDUCTED.
1981	LOST CREEK DAM WINTER STEELHEAD SAMPLING COMPLETED. LOST CREEK DAM JUVENILE SAMPLING REDUCED. CREEL SURVEYS REDUCED.
1985	LOST CREEK DAM FISHERIES EVALUATION PHASE 1 COMPLETION REPORT.
1986	LOST CREEK DAM FALL CHINOOK, SUMMER STEELHEAD, AND COHO SAMPLING COMPLETED.
1987	ELK CREEK DAM STUDIES STARTED.
1988	STUDIES REMAINING ARE ELK CREEK DAM AND LOST CREEK DAM SPRING CHINOOK.
1988-91	ELK CREEK DAM FISHERIES EVALUATION - ANNUAL PROGRESS REPORTS
1990	LOST CREEK DAM EFFECTS ON WINTER STEELHEAD, PHASE II COMPLETION REPORT
1991	LOST CREEK DAM EFFECTS ON COHO SALMON, PHASE II COMPLETION REPORT
1992	LOST CREEK DAM EFFECTS ON FALL CHINOOK, PHASE II COMPLETION REPORT
1993	ELK CREEK DAM FISHERIES EVALUATION - COMPLETION REPORT
1994	LOST CREEK DAM EFFECTS ON SUMMER STEELHEAD, PHASE II COMPLETION REPORT

protection under the ESA because it did not meet the definition of a "species." They did initiate a status review of all steelhead runs along the west coast (exclusive of the Columbia River), and on March 16, 1995, proposed that the Klamath Province steelhead be listed as a threatened species under the ESA. The Klamath Province steelhead was determined to be a discrete Evolutionary Significant Unit (ESU) with a distinct life history pattern (half-pounder returns) that includes all stocks of steelhead between Cape Blanco, Oregon, and Cape Mendocino, California (Federal Register, Vol. 60, No. 51, Pg. 14253-60). This ESU includes both the summer and winter run steelhead in the Rogue River. The proposal found that most of the steelhead populations within the ESU were in significant decline, even with hatchery production included, and that there were not likely any naturally self-sustaining populations. Reasons for decline were a combination of logging, mining, agriculture, municiple, industrial, and agricultural dams (including some with no passage or poor passage conditions), harvest and/or hatchery practices, and poor ocean survival conditions. Critical habitat was not proposed in this rulemaking and will be proposed seperately. The proposal to list these steelhead starts a one-year review process to collect comments, new information, and analyze conservation and restoration measures before the listing would become final.

The NMFS has also found that the petition to list coho salmon throughout its range in Oregon, Washington, California, and Idaho is warranted, and is undergoing a 1-year status review that was due for completion on October 20, 1994. NMFS expects this ruling to be announced in the summer of 1995 for six different population groups that have been identified within the range of the petition.

In March 1991, the American Fisheries Society provided a list of depleted Pacific salmon, steelhead, and searun cutthroat stocks, and found that Rogue River coho were at a high risk of extinction, and the summer steelhead were at moderate risk of extinction. Reasons for decline of these species were listed as:

> "The present or threatened destruction, modification, or curtailment of its habitat or range. (In addition to habitat damage, this category includes mainstem passage and flow problems, and predation during reservoir passage or residence.)"
>
> "Over utilization for commercial, recreational, scientific, or educational purposes. (This category includes overharvest in mixed-stock fisheries.)"
>
> "Other natural or man-made factors affecting its continued existence, hybridization, introduction of exotic or translocated species, predation not primarily associated with mainstem passage and flow problems, competition. (This category includes negative interactions with hatchery fish, such as hybridization, competition and disease. Also included here are poor ocean survival conditions.)"

How anadromous fish are affected by passage conditions at SRD is a function of numerous factors, i.e., the number, size, and condition of fish at the dam; time of year and particular water conditions (high or low flows, spill, rate of pumping, radial gates open or closed, ladders in operation); and the efficiency of the fish facilities in providing optimum passage conditions (good attraction flows, regulated and consistent flows through the ladders, appropriate screen velocities, tight seals and no places for delay or injury, etc.). These are discussed in greater detail below for the existing conditions at SRD.

The total numbers of adult anadromous fish passing SRD for the earlier studies (NMFS, 1979 & FWS, 1981) were estimated to be 120,500, including 49,700 spring chinook; 8,500 fall chinook; 1,000 coho; 37,300 summer steelhead; and 24,000 winter steelhead. This was assumed to be about 45 percent of the total spawning population in the basin at that time. More recent figures for the Rogue River Basin estimate a total return of adults to freshwater of about 260,000 fish, including 30,000 spring chinook; 45,000 fall chinook; 8,000 coho; 130,000 summer steelhead (includes half-pounders); and 47,000 winter steelhead (ODFW, 1992). Using the same percentage of inriver harvest and distribution of spawners upstream of SRD as earlier studies, these more recent adult returns would breakdown as a total of 90,100 adults upstream of SRD, which includes 36,940 spring chinook; 6,880 fall chinook; 810 coho; 28,420 summer steelhead; and 17,050 winter steelhead.

While these numbers suggest lower estimates than the earlier figures, and the most recent years have been at depressed levels (ODFW, 1992), the concern was raised in earlier studies (FWS, 1990) that changes in the Rogue River with operation of the Lost Creek Project and Cole Rivers Hatchery would increase the number of fish subject to passage problems at SRD. A better, more long-term indicator of fish numbers at SRD are the counts at Gold Ray Dam. **Table 3** lists the estimated returns of adult salmon and steelhead to Gold Ray Dam (GRD) from 1942 to the present. Indeed, since 1977, the average numbers for this period have increased for all species (almost doubling for fall chinook) and the total numbers for each year are up by about an average 30 percent, when compared to the averages for the entire 52 year period. (see bottom of Table 3).

Fish counts at Gold Ray Dam (18 miles upstream) are a good indicator of fish numbers passing there are a good estimate of numbers passing SRD except for fall chinook (because mainstem spawning areas occur on the Rogue River between the two dams (ODFW, 1985),) and steelhead. Evans Creek is the only major tributary in that reach and it receives some fall chinook and significant steelhead use. Thus, figures for fall chinook and steelhead at Gold Ray Dam would be less than numbers at SRD. ODFW estimated about 3 times as many fall chinook spawning between the dams compared to the average count at GRD (for the 1942-93 period)(ODFW, 1995). The Gold Hill area, including Evans Creek, is a major producer of summer steelhead, with fish spawning in numerous tributaries to Evans Creek (ODFW, 1990). The mainstem of Evans Creek is used by winter steelhead. The ODFW estimate of numbers of spawning summer and winter steelhead between the two dams, as compared to their average counts at GRD (1942-93 period) are 60% and 43% respectively (ODFW, 1995).

Table 3. Estimated Numbers of Salmon and Steelhead Adults Migrating Over Gold Ray Dam, Rogue River, 1942 to Present.

Run Year	Spring Chinook	Fall Chinook	Coho	Summer Steelhead	Winter Steelhead	Total
1942	41,779	1,670	4,608	7,387		55,444
1943	36,136	1,611	3,290	5,648	15,314	61,999
1944	30,632	1,223	3,230	5,530	13,380	53,995
1945	31,996	1,641	1,907	7,302	16,083	58,929
1946	28,374	1,691	3,840	4,448	8,729	47,082
1947	33,637	1,176	5,340	3,221	9,653	53,027
1948	26,979	757	1,764	2,133	8,605	40,238
1949	18,810	1,233	9,440	3,618	8,052	41,153
1950	15,530	1,204	2,007	4,583	8,684	32,008
1951	19,443	1,489	2,738	3,262	5,744	32,676
1952	15,888	2,558	320	4,200	10,648	33,614
1953	31,465	2,083	1,453	3,831	10,945	49,777
1954	24,704	955	2,138	2,222	7,228	37,247
1955	15,714	B36	480	1,703	5,239	23,972
1956	28,068	1,884	421	2,753	8,775	41,901
1957	17,710	1,060	1,075	1,323	4,508	25,676
1958	15,016	700	732	1,293	3,855	21,596
1959	13,972	735	371	865	4,550	20,493
1960	24,374	1,843	1,851	2,034	6,901	37,003
1961	31,775	1,260	232	2,408	8,965	44,640
1962	31,395	1,265	457	3,603	9,901	46,621
1963	40,567	960	3,831	1,508	9,024	55,890
1964	37,327	1,137	168	778	6,431	45,841
1965	47,644	1,776	482	2,144	7,310	59,356
1966	31,422	1,166	178	2,092	12,463	47,321
1967	14,693	1,800	89	1,637	5,150	23,369
1968	19,469	912	149	693	7,235	28,458
1969	59,043	2,190	530	7,768	6,559	76,090
1970	45,101	3,068	160	6,088	13,789	68,206
1971	29,473	2,407	181	4,909	9,442	46,412
1972	30,788	2,756	185	3,559	16,826	54,114
1973	35,276	3,816	1 93	5,236	9,566	54,087
1974	17,006	2,309	146	7,858	7,108	34,427
1975	21,483	2,312	154	8,338	10,367	42,654
1976	21,570	2,648	44	3,529	6,048	33,839

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Table 3. Estimated Numbers of Salmon and Steelhead Adults Migrating Over Gold Ray Dam, Rogue River, 1942 to Present (Cont'd).

Run Year	Spring Chinook	Fall Chinook	Coho	Summer Steelhead	Winter Steelhead	Total
1977	16,403	5,181	522	11,352	4,724	38,182
1978	47,221	5,878	756	4,977	7,867	66,699
1979	38,207	3,093	1,744	14,867	12,767	70,678
1980	36,932	2,906	5,617	7,773	13,371	66,599
1981	17,213	4,767	6,725	11,929	8,197	48,831
1982	29,942	4,595	670	13,654	6,337	55,198
1983	12,511	3,839	1,493	7,581	9,728	35,152
1984	12,690	3,184	3,236	7,397	9,486	35,993
1985	40,545	8,455	1,170	7,511	10,462	68,143
1986	89,522	14,239	4,072	14,598	16,664	139,095
1987	81,581	10,699	5,395	24,955	17,587	140,217
1988	82,591	11,497	6,882	19,283	15,019	135,272
1989	60,332	6,903	1,401	12,411	14,595	95,642
1990	24,589	3,650	697	5,959	10,487	45,382
1991	12,350	3,176	2,562	4,975	4,547	27,610
1992	5,545	6,825	3,928	3,486	3,775	23,559
1993	26,103	6,711	3,486	10,595	6,499	53,394
1994	14,076	11,530	10,685	11,085	6,581	53,957
Average(all years)	30,809	3,306	2,176	6,112	9,271	52,907
Average (77-94)	37,310	6,211	2,873	10,782	10,124	67,185
Percentage Increase	21	87%	32%	76%	9%	27%

Count Period

Spring Chinook	March	1	to	August 15
Fall Chinook	August	15	to	December 15
Coho	Sept.	15	to	January 30
Summer Steelhead	May	15	to	December 31
Winter Steelhead	January	1	to	May 15

Table 4 shows a comparison of earlier estimates of SRD passage with counts at Gold Ray Dam, for the high and low year counts, as well as the last ten year average and total period average. These figures show that the earlier estimates of passage at SRD more closely match numbers of escapement during periods of large returns, and are substantially greater than low return years or the long term average (realizing that the differences are not as great as shown because of fall chinook and steelhead production between SRD and Gold Ray Dam). For this analysis the resource agencies recommend that counts at Gold Ray Dam be used as a direct indicator of the numbers of adult fish passing SRD. This will allow a risk analysis based on the wide range in the numbers of returning adults annually and the associated wide range in benefits. This evaluation is presented in the "with the project" section of the report. While numbers will be conservative, substantially underestimating passage for fall chinook and to a lesser extent, summer steelhead and winter steelhead, they are based on actual counts of fish over a long period of time.

Table 4. Comparison of adult fish passage at Savage Rapids Dam (FWS, 1981) with counts at Gold Ray Dam for a high, low, 10-year average (1985-94) and the total 53yr period of record.

	SRD	GOLD RAY DAM			
		High Yr.	Low Yr.	10yr Avg.	53yr AVG.
SPECIES	FWS, 1981	1987	1959	1985-1994	
Spring Chinook	49,700	81,581	13,972	43,740	30,809
Fall Chinook	8,500	10,699	735	8,386	3,306
Coho	1,000	5,395	371	4,036	2,176
Summer Steelhead	37,300	24,955	865	11,488	6,112
Winter Steelhead	24,000	17,587	4,550	10,656	9,271
TOTALS	120,500	140,217	20,493	78,306	52,907

The timing of adult and juvenile fish migration also has a role in how anadromous fish are impacted at SRD. This is because different passage conditions exist at the structure at different seasons of the year (e.g. north ladder only operates during the irrigation season, flows vary by season, etc.); and the condition and size of fish varies by season and species, e.g., spring chinook hold in the upper river 3 to 4 months prior to spawning after passing SRD, while many fall chinook are ripe by the time they pass SRD and may spawn soon afterwards. The best indicators of timing for fish at SRD are the count periods for adult fish upstream at Gold Ray Dam, and catches of juvenile fish in the downstream migrant trap at SRD. **Table 5** summarizes this information.

Table 5. Timing of fish passage at Savage Rapids Dam[1]

SPECIES	TIMING
ADULTS	
Fall Chinook	Aug 16 - Nov 30 (50% thru late Sept)
Spring Chinook	April 1 - Aug 16 (50% thru middle June)
Coho	Oct 1 - Dec 15 (50% thru middle Nov)
Summer Steelhead	May 16 - Dec 31 (50% thru middle Sept)
Winter Steelhead	Jan 1 - May 15 (50% thru middle March)
JUVENILES	
Chinook	May - October
Coho	April - June
Steelhead	March - September

A number of changes have occurred that have influenced the distribution of anadromous fish in the Rogue River Basin, besides the obvious influence of Cole M. Rivers Hatchery and its operation. These changes have influenced the number of fish upstream of SRD, as well as the harvest rate of fish in the river and in the ocean. A general summary of some of these changes is listed in **Table 6**.

While Table 3 shows that the concerns about increased fish numbers at SRD has occurred, and Table 6 explains some of the likely reasons for these changes, other factors have also had an influence. Chinook numbers have been increasing above SRD because of the shift of fall chinook spawning to areas further upstream and the operation of Coles River Hatchery (spring chinook releases), although, at the same time, wild chinook production has decreased by about 60 percent. Another factor contributing to the increased counts of chinook is reduced ocean harvest to protect Klamath River stocks of chinook. Rogue and Klamath River stocks are mixed in the ocean off Northern California and Southern Oregon and reduced harvest has contributed to the increased returns (ODFW, 1989). Coho increases are associated with increased releases from Cole M. Rivers Hatchery (ODFW, 1985), as the coho run in the Rogue River upstream of Gold Ray Dam may now be basically a hatchery run. Remnant runs of wild fish may still exist in Elk Creek and Big and Little Butte Creeks, but strong correlations exist between adult counts at Gold Ray Dam and returns to the

[1]Information for adults is from count periods at Gold Ray Dam, while data for juveniles is from the trap at SRD or from seining data (ODFW, 1980) before the trap is operated.

Table 6. General changes associated with operation of Lost Creek Dam as they affect Rogue River fisheries and numbers of fish subject to passage problems at SRD.

	CHANGE
1.	Wild spring chinook production decreased and hatchery production increased.
2.	Spring chinook wild fry abundance decreased in 1978-1984 but may have increased 1985-1993.
3.	Earlier spring chinook fry emergence from gravel and reduced abundance influences faster growth in river and earlier ocean entry .
4.	Spring chinook adults mature at earlier ages (2-4 years) and don't contribute to the fisheries at lower rates than older adults (5 years)
5.	Relative abundance of fall chinook increased in the upper Rogue River.
6.	Spawning distribution of spring chinook shifted downstream while fall chinook shifted upstream.
7.	Spring chinook are more valuable to the river fishery than fall chinook, while fall chinook contribute best to the ocean fishery.
8.	Commercial harvest of chinook decreased because of lower fishing effort and a decrease in age at maturity for spring chinook.
9.	Reduced prespawning mortality for chinook is strongly correlated with increased flow and lower temperatures from Lost Creek Dam.
10.	Angler harvest in the river increased when prespawning mortality was decreased.
11.	Winter peak flows are reduced with flood control operations and summer base flows are increased substantially in the Rogue River.
12.	Returns of wild and hatchery summer steelhead have covaried between 1976-1991.

hatchery. Total steelhead numbers are reduced from long-term averages, with increases in hatchery fish and decreases in wild fish, probably related to concerns for habitat losses in tributaries as it effects wild fish production and poor ocean conditions for young steelhead (ODFW, 1994).

Opponents to dam removal have cited increased counts at Gold Ray Dam as evidence that at the least, fish losses at SRD are overstated, or at worst, losses do not really occur and runs are increasing upstream despite SRD. The resource agencies believe that most of the increases in run size upstream of SRD can be attributable to changes in the Rogue River associated with operation of the Lost Creek Dam Project (Table 6), and that there are still ample reasons to believe significant losses occur at SRD because of existing fish passage problems. A summary of the continued passage problems as they have been identified thus far is listed in **Table 7**. Most recently, an ODFW fish passage expert has visited the site and discussed the passage problems from first hand, one-time observation of conditions at SRD during that visit (ODFW, 1994, Frank Young memo). It is important to note that no evaluation of effectiveness has occurred for the passage measures that have been implemented, and in some cases (e.g. juvenile fish screens) the measures do not comply with existing fish passage criteria, or are not in use during extended periods because of breakdown or the generally poor condition of equipment and ongoing maintenance problems and/or practices. Separate photos of the north and south side areas of the dam show conditions of spill, false attraction, and generally poor passage conditions(**Figure 3**).

In summary, increases in runs of anadromous fish upstream of SRD (as evidenced in counts at Gold Ray Dam) does not mean that passage problems do not exist, but that runs could have been even greater if the problems did not exist or were minimized. Increased escapement of fish upstream of SRD, and an increased proportion of the Rogue Basin production coming from the upper basin, only means more fish are subject to poor passage conditions and the increased likelihood of fish losses. The most recent example of this is the failure of the bottom seal on one of the gravity canal drum screens in September 1991 and the estimated 100,000 spring chinook smolts directed into the canal (ODFW, 1991). Until a permanent solution to the passage problems is implemented, losses will continue and the full production potential of the Upper Rogue River Basin will not be realized.

Wildlife

Habitats in the immediate vicinity of SRD include a narrow strip of riparian vegetation on both sides of the river, disturbed areas of grass, weeds, or exposed soils associated with parking, maintenance, or visitor uses, and the river and reservoir pool upstream of the dam. The riparian vegetation consists of cottonwood, willow, alder, blackberries, nettle, and common understory grasses and forbes. The largest piece of this habitat occurs on the south shore just downstream of the South ladder and is less than 2 acres in size. Riparian vegetation on the river shore upstream of the dam has been mostly eliminated with private landowner or business practice and the desires to see the river and/or have access to it.

Table 7. Summary of continuing fish passage problems at Savage Rapids Dam, Rogue River, Oregon.

Problems
1. Regulation of flows in the south ladder.
2. Unfavorable entrance 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. Marginal use of the north ladder at all times during its operation because of poor attraction flows, steep gradient and small pools.
4. North ladder only operates during irrigation season.
5. Delays during drawdown of the reservoir (after irrigation season) because of dewatering of the south ladder or in the spring with installation of the stoplogs.
6. Increased turbidity during fall and spring flushing that occurs when crest is dewatered for removal or addition of stoplogs.
7. Impingement of juvenile fish on screens, or juveniles bypassing the screens with faulty seals or screen breakdown.
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 passing over the dam and striking the sill or rocks below; increased spill during irrigation season with increased summer flows from Lost Creek Project.
10. Steelhead kelt mortality for the same reasons (9 above).
11. Smolt losses to pressures at the sluce gates when at full pool.
12. Increased predation from Umpqua squawfish in areas immediately upstream and downstream of SRD.

Savage Rapids Dam, Rogue River

*Fig. 1**

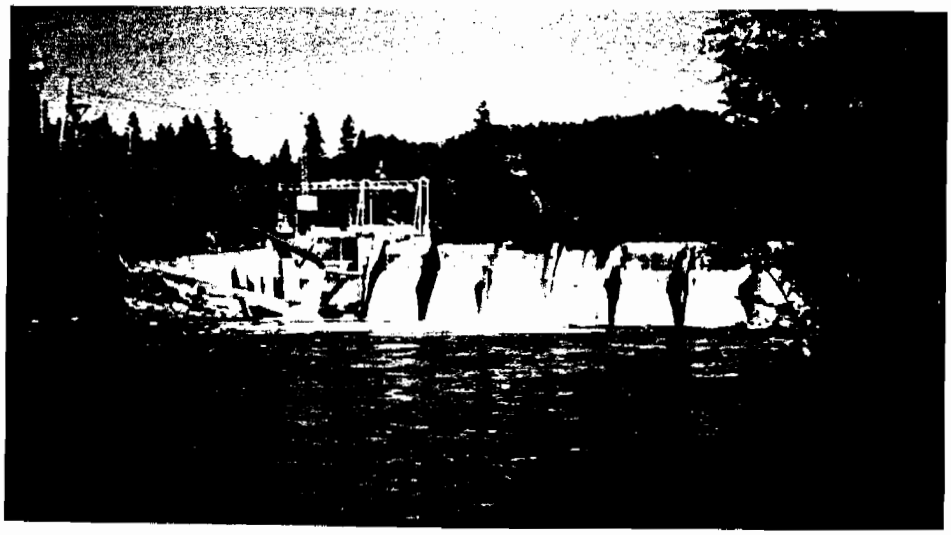

*Fig. 2***

**Fig. 1:* Savage Rapids Dam - north side spill over major obstacle to upstream migration of salmon and steelhead.
***Fig. 2:* Crest of dam - spill onto bedrock results in poor attraction of fish to ladders. Lower pools at south ladder create "hodge-podge" of passageways for fish to navigate.

During the irrigation season (April through September) when the stoplogs are in place, the level of the river is increased by about 11 feet and a small reservoir is formed behind the dam. This creates a slack-water pool of about 110 surface acres that extends upriver for approximately 3.5 miles. This shoreline area is heavily occupied by private homes or businesses, many of which have small docks, boat ramps, steps or other access means to the water. Swimming, fishing, boating, jet skiing, and water skiing are common summertime activities. In the winter, the reservoir is evacuated as the stoplogs are removed and the pool becomes riverine, with mostly river conditions of gravel bars, cobble, sand and mud flats along the shore, except for a small pool located immediately behind the dam.

Wildlife use of these habitats is mostly by those species associated with water/riparian areas where human disturbance is high. Waterfowl species are the most common, with greatest numbers occurring during spring and fall migration periods, although some species are present year-round. Diving ducks (mergansers, scaup, redheads, goldeneye, etc.) are common in the pool immediately upstream of the dam because of the numbers of small fish in this area. Migratory song birds are also common users of wooded forest or shrub areas, again mostly during spring and fall migrations. Use by wading or shore birds is limited to those areas and times when their habitats (flats, bars, shorelines) are available (drawdown) and human disturbance is limited. Aquatic mammals (mink, beaver, river otter, muskrat, nutria, raccoon) may use the area intermittently but are not likely to be permanent residences of the area.

FUTURE WITH THE PROJECT

Fish

Removal of SRD would allow unimpeded movement of anadromous fish both upstream and downstream in the Rogue River, and eliminate fish losses that presently occur. Pumping plant intakes would be placed well into the river at sites with adequate depth and flow, and with screens that meet existing screen criteria, so it is anticipated there would be relatively little (if any) fish losses with the new pumping operations.

Although some current anadromous fish runs to the Rogue River are at depressed levels (ODFW, 1992), operation of the Corps' Lost Creek Project and Cole Rivers hatchery has shifted a larger percentage of the basins production upstream of SRD (especially fall chinook, summer steelhead, and coho). Also, run sizes to the Rogue River vary as much as 10-fold, and the percent of total run component for each species/race varies by year(Table 3). Other changes that occur annually in terms of water year and conditions at SRD, operation of the irrigation system(GPID operations), hatchery practices and operation of the Lost Creek Project, also influence total numbers of fish at SRD and how they are impacted by passage conditions. Periodically since 1985 the resource agencies have discussed and recommended detailed biological studies to better understand and document the means and extent of losses at SRD, but these have never been accomplished.

The earlier prediction of losses (NMFS, 1979 & FWS, 1981) was determined by computing estimated losses that would occur for both adults moving upstream as well as for juveniles moving downstream, as a percent of the total number of

fish passing the dam, by species and race. Benefits were portrayed as increased numbers of adults returning to the Rogue River when the losses were eliminated or reduced, depending on the alternative. SRD removal and replacement with pumps would effectively eliminate all the losses. The earlier estimate was 22 percent of the total run size at SRD.

Because there have been no detailed biological studies, the resource agencies recommend that the 22 percent of total run size at SRD (as estimated by counts at Gold Ray Dam) can be used to depict a range of benefits for passage improvements for the present analysis. This range can be developed by looking at the high year, low year, last 10-year average, and an average for the total 53-year period of counts (1942-1994) at Gold Ray Dam. This analysis shows that the benefits would range from 30,850 adults in the high year (1987); 4,508 adults in the low year (1959); 17,227 adults for the last 10-year average (1985-1994); and 11,640 adults for the entire 53-year period average. Breakdowns by species and race are presented in **Table 8**.

This new analysis generates estimated benefits by mathematical calculations in a spread sheet format that varies the percentage mortalities by species and lifestage. It uses updated distribution abundance, both hatchery and wild stock, catch and escapement ratios, sport versus commercial catch, and other relevant information for each species. The range of mortalities were used based on other dams in the region with fish facilities and reasonable estimates by fish passage experts where studies have been conducted to document the mortality rates of these various fish passage facilities. This range of mortalities recognizes the variability in conditions that influence how fish are affected by passage conditions (beyond just the actual numbers of fish returning) and gives a range of values within which an average, annual loss (impact) likely lies. The mortalities ranged from a low of 5 percent for steelhead and 10 percent for salmon, up a high of 30 percent for all species, with the dam removal alternative. The dam retention alternative used low range mortalities of zero percent for both adults and juveniles (all species) and high range mortalities of 3 percent adults and 5 percent juveniles (all species).

The analysis looked at both escapement and harvest together, thus representing the total effect on production from the basin, and the full range of benefits with passage improvements. This is in contrast with the earlier analysis which looked as escapement only and calculated harvest benefits separately. **Table 9** shows a summary of the range of benefits from the ODFW updated analysis in comparison with the earlier analysis from the 1979-81 information. Based on new estimates of catch escapement ratios from the ODFW work (**Table 10**) the earlier escapement levels were used to generate existing production levels so that the estimate could be compared to these new numbers. The 26,700 spawning adults from the earlier work would represent a production level of 57,444 adults compared to the ranges of adults in the new ODFW analysis 20,865 to 93,541 for dam removal. The ODFW work has the advantage of using up-to-date information on the status and relevant life history requirements for Rogue Basin stocks of anadromous fish, and also shows that the earlier work is still a reasonable estimate of the potential benefits that would occur with passage improvements. Given the substantial number of anadromous fish passing upstream of SRD, and the very poor passage conditions that exist there now, even the lowest range of mortalities provides substantial benefits with improvements.

Table 8. Range of estimated benefits in increased adult anadromous fish returns to the Rogue River with removal of Savage Rapids Dam based on counts at Gold Ray Dam.

SPECIES	First Analysis[2]	High Year (1987)	Low Year (1959)	Last 10 Year Avg. (1985-94)	Since Lost Crk. (1977-94)	Period Avg. (1942-1994)
Spring Chinook	9,100	10,487	1,533	5,857	5,025	3,958
Fall Chinook	8,200	9,562	1,397	5,340	4,582	3,608
Coho	400	311	44	173	150	117
Summer Steelhead	4,400	4,935	721	2,756	2,364	1,862
Winter Steelhead	4,600	5,552	811	3,101	2,660	2,095
TOTAL	26,700	30,847	4,508	17,227	14,781	11,640

Using Gold Ray Dam counts for SRD passage adds a conservative factor to these benefits because of production that occurs in the mainstem Rogue River and tributaries (Evans Creek and other drainages) between these two structures. This is especially true for fall chinook and steelhead. Gold Ray Dam counts are good estimates for SRD passage numbers for spring chinook and coho salmon.

The range of numbers shown in Table 8 are developed by using the same total percentage (22%), with the same ratio for each species as its part of the total (i.e. 9,100 spring chinook out of 26,700 fish means spring chinook is 34% of the total returns to SRD, as based on counts at Gold Ray Dam. However, another likely source of variation in fish benefits with passage improvements, is the variation in rates of mortalities to adults and juveniles that would occur with different passage conditions. In other words, vary the 22 percent.

Based on criticisms that the earlier analysis and not representative of current conditions for Rogue Basin anadromous fish, and to show the benefits based on a range in levels of mortalities to both juvenile and adult fish, the ODFW conducted a separate analysis of potential benefits with passage improvements at SRD (ODFW Oct. 94 and March, 95). The details of this separate analysis are attached as appendix A & B to this report.

[2] From earlier analysis of benefits (NMFS, 1979 & FWS, 1981).

Table 9. Estimated range of benefits (increased production) from ODFW updated analysis compared to earlier analysis for SRD fish passage improvement alternatives.

SPECIES	NMFS, 79 & USFWS, 81[3]		ODFW 94 & 95[4]				
	(Escapement)	(Harvest)	Dam Removal			Dam Retention	
			(H)	(M)	(L)	(H)	(L)
Spring Chinook	9,100	9,100	30,548	14,097	6,326	30,548	2,495
Fall Chinook	8,200	16,400	13,737	7,927	5,338	10,675	1,002
Coho	400	400	1,929	890	400	1,809	787
Summer Steelhead	4,400	2,728	25,697	10,402	4,665	25,697	1,072
Winter Steelhead	4,600	2,116	21,630	10,304	4,136	21,630	159
	26,700 +	30,744					
TOTALS:	57,444		93,541	43,620	20,865	90,358	5,515

[3] Includes only dam removal alternative, dam retention has 5% less benefits because of some passage problems that would continue with new facilities (FWS, 1990). Harvest levels are determined based on catch:escapement ratios (Table 10) to develop comparable production numbers to ODFW work.

[4] Each alternative has a range of benefits - high (H) medium (M) or low (L), based on different mortalities to adults and/or juveniles, and include both escapement and harvest to show the range in total increases in productino (See Appendix A & B for spreadsheet analysis from ODFW, 1994 & 1995).

Table 10. Updated Economic Information for Conducting Benefit Analysis of Fish Passage Improvements at Savage Rapids Dam

Species	Catch[5] Escapement	%Commercial[6] Sport Harvest	Avg.[7] Weight	Exvess[8] Price	#Days[9] Sport Harvest
Spring Chinook	2:1	90:10	9.3 lbs.	$1.69	1.08
Fall Chinook	1:1	78:22	9.3 lbs.	$1.69	1.08
Coho[10]	1:1	66:34	5.3 lbs.	$1.25	1.08
Summer Steelhead (Hatchery Only-31%)	2:1	0:100			3.3[11]
Winter Steelhead (Hatchery only-23%)	2:1	0:100			2.9[12]

[5] From ODFW estimations of SRD impacts on salmon steelhead (ODFW, 1995).

[6] Statewide average for eighteen-year period, 1971-1988 (Pacific Fisheries Management Council, 1989).

[7] 1987 Statewide Average (ODFW, 1989).

[8] Ten-year Average for Period 1978-1987 (ODFW, 1989).

[9] Eight-year Average for Period 1981-1988 (Pacific Fisheries Management Council, 1989).

[10] While there was no harvest of Rogue River coho in the 94 and 95 seasons, it is assumed there would be a modest harvest rate in recovering populations based on passage improvements at SRD and implementation of other restoration efforts (watershed health initiatives, Northwest Forest Plan, etc.)

[11] Steelhead catch effort calculated from ODFW creel census information associated with Elk Creek Project (ODFW, 1989). Information is applicable to hatchery population because wild fish are catch and release only.

[12] Same as 11.

In summary, even though these numbers are conservative, they represent significant numbers of fish under any circumstances, and would contribute significantly to increased productivity in the Rogue River Basin at a time when some runs are at depressed levels and much effort is focusing on restoration and recovery.

Wildlife

Only minor changes to wildlife would occur with removal of SRD. A 110-acre, 3.5-mile-long seasonal reservoir (irrigation season) would be converted from a slack water pool to a free-flowing river. Some waterfowl species that use the pool area for foraging and resting would be displaced by wildlife associated with riverine (flowing) conditions. Dippers, mergansers, mallards, mink, raccoon, and numerous shorebirds and waders would use exposed shorelines, riffles or gravel/sand bars and flats that are now flooded during the irrigation season, i.e. when most of the shoreline is someone's back yard. Because the existing shoreline area is highly developed as private homes or businesses, and human disturbance would continue to be high with dam removal (river uses may shift from existing private use to increased public use for water-related activities, e.g., floating, rafting, boating, etc.), overall wildlife use of the project area would remain low. About 2 acres of riparian tree and shrub habitat in the area of the existing dam would be removed when the pumping plants are installed.

DISCUSSION

The preferred Federal action is to remove Savage Rapids Dam (SRD) and replace it with pumping plants to provide water to the GPID, and finally resolve long-term fish passage problems that continue to exist at the dam. This action supports the decision of the Board of Directors of GPID as identified in its Water Management Improvement Study final report to the Oregon Water Resources Commission, dated March 8, 1994; and the action of the Water Resources Commission in issuing a permit for continued withdrawal of water at SRD by GPID, pending removal of the dam within 5 years and replacement with pumps (Oct., 1994).

An alternative to the preferred plan includes leaving SRD in place and renovating all fish passage facilities and the pumping system. While fish benefits would be substantial with this plan, the earlier analysis of benefits estimated that losses of about 5 percent of adult passage at SRD would still occur. This difference may be low because some problems (predation in the pool and at the dam) would still remain, and the opportunity to restore fall chinook spawning in gravels in the impounded reach would not be realized. The ODFW analysis (Appendix B) provides a range of benefits for evaluating this alternative of SRD retention and passage improvements. The assumptions for the low range values are that the existing passage conditions at the dam cause low percentage losses to fish, and with improvements in fish passage, some low level of losses would likely continue, thus a small difference between the two. Conversely, the high range assumes an existing high level of losses, and no losses with the new passage facilities (unrealistic), and thus a large difference between the two. The straight-across assumption from the earlier report (FWS, 1990) of about five percent losses that would still occur are well within the range of values developed by the ODFW analysis.

Additionally, the dam retention plan would cost approximately $6.4 million more, and still be subject to short-term but significant fish losses at any time when there may be a system failure with any of the new fish facilities. A similar situation happened most recently in the fall of 1991 when the bottom seal on one of the gravity canal drum screens failed, and up to 100,000 spring chinook smolts were diverted into the canal. The ODFW estimated that of these about 10,000 fish were lost.

Of even greater concern for the long term with dam retention is the ongoing urban development of the GPID service area and lands being converted to housing and placed on the Grants Pass City's water supply system. This means there may be a smaller and smaller patronage responsible for the O & M costs. This could be particularly difficult with the higher costs of the dam retention alternative and the need to maintain expensive new fish facilities and upkeep on an old, outdated dam. At any such time that the costs of doing business could not be met, if the GPID would cease to exist, then the facilities could become the public's responsibility. If this unfortunate scenario occurred in the future, under either alternative, then the preferred plan has the distinct advantage in that it has dealt with what would be the biggest liability, the dam. For these reasons, it is the recommendation of the resource agencies that dam removal is the only viable option at this time, and dam retention would not be preferred by the Federal government.

To avoid a listing of salmon or steelhead species under the Endangered Species Act, it will be necessary to protect the diversity and genetic integrity of individual stocks of anadromous fish and insure connectivity between these stocks. This means recognizing the value of wild fish and the habitat it takes to produce these fish. This concept has formed the broad basis for several region-wide conservation efforts to restore fish populations to sustainable levels. Most notable in the region include the Northwest Forest Plan for ecosystems management of forests within the range of the northern spotted owl, and the Fish and Wildlife Program of the Columbia River Basin under the Northwest Power Act.

A recently completed draft handbook for identification and prioritization of salmon restoration opportunities in Oregon identifies the need to focus on healthy ecosystems and relatively sound stocks of fish as the most important starting point (Pacific Rivers Council, 1995). This system was developed by a working group that included fishery scientists, resource managers, fishing interests and conservation groups, and a test of the process was initiated in three broad western Oregon regions. A preliminary ranking from this effort identified the Lower Rogue River Basin below Gold Ray Dam as one of two areas with a "very high priority" for restoration. This area was targeted because it has several areas identified by the Northwest Forest Plan and American Fisheries Society for restoration work, and it has a history of relatively large, healthy, and/or diverse stocks of fish.

Also, the state of Oregon has adopted model watershed restoration efforts for the Grande Ronde Basin and Southern Oregon Coast (including the Rogue River Basin) to implement up to $5 million of restoration efforts in each basin by July 1995. Under the Northwest Forest Plan, BLM and Forest Service projects in the Southwest Oregon Province, Rogue River Basin, included watershed restoration for anadromous fish totaling approximately $1.5 million in 1994. These restoration efforts are all comparable in their recognition of the value

of high quality habitat in sufficient amounts to produce sustainable population levels of anadromous fish as part of healthy functioning ecosystems.

Removal of SRD and the expected increase in anadromous fish to the Rogue River Basin would strongly compliment habitat restoration efforts. Increased escapement would mean more fish to effectively utilize restored habitat. The 1970's analysis of benefits completed by NMFS and FWS estimated that approximately 45 percent of the spawning population of anadromous fish occurred upstream of SRD, ranging from 100 percent for spring chinook to 11 percent for fall chinook. Since operation of the Lost Creek project in 1977 it appears that, in general, the upper basin is producing a greater portion of the basin's total production, especially since the lower basin tributaries have extremely depressed runs (ODFW, 1992). An increase in adult returns to the Rogue River of 22 percent of the runs as estimated by counts at Gold Ray Dam is a significant number of fish in any given year, ranging between 4,508 fish to 30,847 fish for the low and high years, and an average of 17,227 adults for the last 10 years of returns, 1985-1994 (Table 8, pg -). These fish would contribute significantly to increased production of wild fish in the basin, and support significant sport and commercial fisheries that occur in the ocean and in the river. For steelhead and coho, these represent increases to stocks that are at depressed levels and/or have been or may be proposed for listing under the Endangered Species Act.

The NMFS proposal to list the Klamath Mountain Province (KMP) steelhead as a threatened species has been challenged by the ODFW as inappropriate for the status of these steelhead in Oregon waters (ODFW, 1995). ODFW's evaluation of the NMFS proposal suggests that too much emphasis was placed on catch data, incorrect data were used in a model of natural return ratios, and in particular that Rogue River steelhead populations vary differently than other populations in the KMP. Trend analyses of overall wild steelhead production in the Rogue River Basin did not show a significant change during the period 1976 through 1994, but various run components showed different responses. Wild winter steelhead were stable during this period and the early-run wild summer steelhead increased while a late-run component of the wild summer steelhead decreased.

Regardless of whether the KMP steelhead are listed, substantial numbers of steelhead would benefit from improved passage conditions at SRD. Of the 26,700 fish estimated from the earlier benefits analysis, 9,000 were steelhead (or 34% of the total). Similar figures from the ODFW analysis for dam removal (Appendix A) are 8,801 steelhead (42% of the total) for the low range estimate, and 47,328 steelhead (51% of the total) for the high range estimate. The ODFW figures also include harvest so are larger than numbers that just consider escapement (spawning fish). ODFW estimates of wild fish as a percent of the total population for runs upstream of Gold Ray Dam are 33 to 77 percent for summer steelhead and 68 to 87 percent for winter steelhead. Accordingly, a substantial portion of the benefits will occur to wild fish, thus aiding the enhancement or recovery of these runs.

For purposes of economic analysis, benefits in increased adult returns were used to calculate dollar values based on catch escapement ratios for each species/race of fish and how they contribute to the fisheries. The total dollar values from the 1981 report (FWS, 1981) were based on figures developed by NMFS for the Columbia River. Later figures for the Rogue River (ODFW, 1988)

show a total value of $31.5 million annually based on a catch of 162,000 chinook salmon (sport and commercial) and 95,000 steelhead. Of the estimated 375,000 anadromous fish produced, this would leave an escapement of 118,000, or an average value of $267 per escaping adult. This compares to the value of $236 per escaping adult when considering all species from the 1981 report.

In the 1990 letter the FWS provided an updated list of figures (FWS, 1990) that could be used for an economic analysis based on Rogue Basin data where it was available, or from state-wide averages otherwise. The USFS, BLM, ODFW and Rogue Valley Council of Governments have undertaken an economic valuation study for the Rogue Basin that should be completed in the summer of 1995. To date, early information has been developed for summer steelhead and fall chinook inriver sport fisheries. Until such time as the study is complete, we believe that the 1995 information from the ODFW analysis (Appendix A - catch escapement ratios, etc.) is the most complete information and recommend it be used for economic analysis as shown in Table 10, page -). It should be noted that the economic information in this form is very dynamic and subject to a great deal of change from year to year. For example, the overall dollar value is based on the value of an escaping adult and the contribution that production makes to future catch, when, in fact, catch has been extremely restricted to help increase escapement for runs that are depressed (in fact, all ocean coho sport and commercial harvest in 1994 was prohibited with similar restrictions in 1995). The more important value of returning fish is the biological contribution they make to preservation of stocks and recognition of their diversity and genetic integrity.

Because of the substantial benefits to anadromous fish in the Rogue River Basin with the preferred plan, and the strong connection between this action and habitat restoration projects being implemented on both public and private lands in the basin, the resource agencies also recommend that the BR seek to implement this plan on an accelerated basis - possibly seeking action through a Congressional add-on appropriation. It is further recommended that the costs of implementing this plan be considered a Federal, nonreimbursable cost because benefits are almost exclusively for anadromous fish - species of high national interest, some stocks of which are at record low levels of escapement and may be placed on the Endangered Species list for protection. Early efforts now to reverse declines could be the first major steps to recovery for some stocks.

RECOMMENDATIONS

Based on the summary of information presented here, it is the recommendation of the Fish and Wildlife Service, Oregon Department of Fish and Wildlife, and the National Marine Fisheries Service, that:

1) The Bureau of Reclamation seek Congressional authorization to remove Savage Rapids Dam and replace it with pumping plants to permanently resolve long standing fish passage problems at the dam;

2) Implementation of these measures be sought on an accelerated time frame to expedite restoration efforts for declining stocks of anadromous fish in the Rogue River Basin;

3) Funding for this effort be a nonreimbursable Federal cost because of the substantial benefits to anadromous fish; and

4) The construction schedule for dam removal be coordinated closely with the FWS, ODFW and NMFS to coordinate the specifics of in-water work schedules and activities with fishery concerns.

Please let us know of your response to these recommendations and of any changes in project plans or details that would require new or additional analysis by the resource agencies.

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APPENDICES

Appendix A: Estimation of benefits for Savage Rapids Dam removal option, spread sheet analysis conducted by the ODFW, 1994.

Appendix B: Estimation of benefits for Savage Rapids Dam retention and improvement option, spread sheet analysis conducted by the ODFW, 1995.

Editor's Note: Appendix A and B of the USFWS Coordination Act Report are not duplicated here. These two documents along with the transmittal letters of the Oregon Department of Fish and Wildlife are included in Attachment D.