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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
HABITAT CONSERVATION DIVISION
525 NE Oregon Street
PORTLAND, OREGON 97232-2737

December 1, 1998

Brig. General Robert H. Griffin
Division Commander, North Pacific Division
U.S. Army Corps of Engineers
P.O. Box 2870
Portland, Oregon 97208-2870

Re: Biological Opinion on the Berg Brothers Irrigation Withdrawal, Columbia River

Dear General Griffin:

Enclosed is a biological opinion prepared by the National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act (ESA) on permit application number 96-1676 by the Berg Brothers for construction of an irrigation withdrawal on the Columbia River. Based on the description the applicant's flow replacement program as a necessary and indispensable element of the proposed action, NMFS concludes in this opinion the impact of the irrigation withdrawal is not likely to jeopardize the continued existence of species named below as listed and proposed for listing under the ESA.

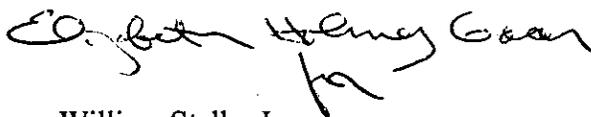
When fully carried out, the flow replacement plan will provide for instream use, at the point of the diversion or upstream of this point, an amount of water that is equivalent to the flow depletion caused by the new use. This meets NMFS' expectation that new diversions will have a "zero net impact" on biological flow objectives established in the 1995 FCRPS Opinion, and confirmed with issuance of the 1998 FCRPS Opinion, as necessary to improve survival of juvenile steelhead and salmon migrating in the Snake and Columbia Rivers.

Species addressed by this opinion include Snake River sockeye salmon and Upper Columbia River steelhead, listed as endangered, Snake River fall chinook salmon, Snake River spring/summer chinook salmon, Snake River steelhead and Lower Columbia River steelhead, listed as threatened, Upper Columbia River spring run chinook salmon, proposed for listing as endangered, and Upper Willamette River chinook, Middle Columbia River steelhead, and Upper Willamette River steelhead, proposed for listing as threatened. This opinion constitutes formal consultation for those salmon and steelhead that are listed and a formal conference for those proposed for listing.



We appreciate the cooperation of your staff in completing this consultation and look forward to working with them further to analyze existing Corps permits.

Sincerely,

A handwritten signature in cursive script, appearing to read "William Stelle, Jr.", with a large flourish at the end.

William Stelle, Jr.
Regional Administrator

Enclosure

cc: Colonel Robert T. Slusar - Portland, Corps
Colonel James M. Rigsby, Seattle, Corps
Lt. Colonel William E. Bulen - Walla Walla, Corps
John W. Keys III - Boise, Bureau of Reclamation

Endangered Species Act - Section 7
Consultation

BIOLOGICAL OPINION

Berg Brothers, Irrigation Withdrawal
Columbia River

Agency: Department of Army, Corps of Engineers, Seattle District

Consultation Conducted by: National Marine Fisheries Service, Northwest Region

Date Issued: 12/01/98

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EXECUTIVE SUMMARY

This biological opinion concludes that issuance by the U.S. Army Corps of Engineers (Corps) of a permit to construct a pumping facility in the Columbia River would not jeopardize the continued existence of anadromous steelhead and salmon listed under the Endangered Species Act (ESA). Species considered during this consultation include Snake River sockeye salmon and Upper Columbia River steelhead, listed as endangered, Snake River fall chinook salmon, Snake River spring/summer chinook salmon, Snake River steelhead and Lower Columbia River steelhead, listed as threatened, Upper Columbia River spring run chinook salmon, proposed for listing as endangered, and Upper Willamette River chinook, Middle Columbia River steelhead, and Upper Willamette River steelhead, proposed for listing as threatened.

The opinion was prepared by the National Marine Fisheries Service (NMFS) in response to a February 14, 1997, request from the Corps for formal consultation regarding the potential effects on listed Snake River salmon from issuance of permit application number 96-1676 to construct a pumping facility on the Columbia River near Paterson, Washington. The pumping facility would have a maximum withdrawal capacity of 71 cubic feet per second (cfs). A typical irrigation season runs from early April through late October. On average, the maximum withdrawal would occur roughly two weeks out of each irrigation season and would likely occur in early July.

On May 16, 1997, NMFS issued a jeopardy biological opinion to the Corps on permit application number 96-697 by the Inland Land, Inc., for construction of a pumping facility on the Columbia River. The Inland Opinion introduced an expectation of "zero net impact" for new projects likely to result in water withdrawals that will have an adverse effect on flow objectives established by NMFS in 1995 to improve survival of juvenile salmon migrating in the Snake and Columbia Rivers. At the applicant's request, completion of the Berg consultation was delayed to give the applicant an opportunity to submit a flow replacement plan to ensure their new diversion would have a "zero net impact" on flow targets. After many discussions with NMFS concerning the meaning of the replacement flow requirement, the Berg Brothers submitted a flow replacement plan to NMFS to support their application pending with the Corps on February 13, 1998.

The applicant's flow replacement plan was modified following discussions with the NMFS and is now included as a necessary and indispensable part of the proposed action. When fully carried out, the flow replacement plan will provide for instream use, at the point of the diversion or upstream of this point during periods when flow objectives are not likely to be met, an amount of water that is equivalent to the flow depletion caused by the new use. This meets the objective of "zero net impact" of the new diversion on flows needed by listed Snake River salmon. The flow replacement plan includes the following essential conditions:

- The applicant will provide a quantity of replacement flow that is equal, gallon for gallon, to the full amount withdrawn by their new diversion by promoting changes in cropping patterns to reduce water consumption on neighboring farms. The applicant will accomplish this by providing funds necessary to establish eligibility for a cost-share program known as the Environmental Quality Incentives Program (EQIP), or a comparable conservation program, administered by the Benton Conservation District (BCD). Only those reductions in consumptive use that can be ascribed to permanent changes in crop patterns on farms participating in the permittee's enhancement of the BCD EQIP program will be credited for purposes of calculating replacement flow quantity.
- All increases in water availability due to reduced crop water demand on these lands will accrue to flows upstream of the permittee's proposed new diversion site in the John Day Pool of the Columbia River.
- The applicant will ensure that diversion reduction agreements signed by the irrigation district are part the EQIP contract signed by participating farmers and BCD. The BCD will include clauses within each contract specifying the crop conversion condition and the reduced diversion amount.
- All acts necessary to accomplish crop conversions and provide full replacement flows will be completed by the applicant within six years.

The NMFS concludes in this opinion that a time lag will necessarily occur between initiation of the proposed new water withdrawal and completion of the flow replacement plan that may reduce the probability of meeting the flow objective and result in an adverse effect to listed salmon and steelhead species. However, NMFS expects that risk is temporary, increasingly discountable as flow replacement is provided, and is reversed at the conclusion of the plan by the gradual accretion of savings in water formerly lost during delivery and field application of irrigation water. Moreover, information obtained by an evaluation of the success of the flow replacement plan included in the proposed action will contribute to region-wide efforts to recover salmon by helping to resolve the larger role of agricultural water conservation to reduce the effects of irrigated agriculture on flow objectives.

I. Introduction

A. Background

In March 1995, the National Marine Fisheries Service (NMFS) issued a biological opinion for operation of the Federal Columbia River Power System (FCRPS)(the 1995 FCRPS Opinion)¹. The 1995 FCRPS Opinion concluded that the proposed operation of the FCRPS was likely to jeopardize the continued existence of the listed Snake River salmon. NMFS identified immediate, intermediate, and long-term actions to carry out its Reasonable and Prudent Alternative (RPA) to meet the no-jeopardy standard of the Endangered Species Act (ESA). One of the most important provisions of the RPA included a series of measures designed to increase flows in the Snake and Columbia Rivers to improve survival of migrating juveniles.

Concurrent to this process, the U.S. Army Corps of Engineers (Corps) initiated ESA consultations with the NMFS in 1993 for issuance of two permits, in accordance with section 10 of the Rivers and Harbors Act and section 404 of the Clean Water Act, to construct water withdrawal facilities in the Snake (Flat Top Ranch)² and Columbia Rivers (Port of Umatilla)³. These two consultations started discussions between NMFS and the Corps regarding the indirect effect of Corps section 10/404 permits resulting in the cumulative loss of streamflow throughout the Columbia Basin and the potential effect on salmon migration. The Corps concurred with the need to study cumulative effects resulting from water withdrawals.

In September 1994, NMFS signed an interagency agreement with the Bureau of Reclamation (BOR) to assess the cumulative effects of water withdrawals on streamflows. For the interim period until completion of this study, the Seattle District Corps requested that NMFS provide guidance on the question of when formal consultation should be conducted for Corps permits that are likely to result in water withdrawals. In a letter dated September 26, 1994, NMFS provided the following criteria:

¹ Reinitiation of Consultation on 1994-1998 Operation of the Federal Columbia River Power System and Juvenile Transportation Program in 1995 and future Years. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, 7600 Sand Point Way NE, Bin C15700, Bldg 1, Seattle, WA, 98115.

² Corps, Seattle District, Permit Application No. 93-2-00100.

³ Corps, Portland District, Permit Application No. 93-00941.

For the Snake River anywhere above Ice Harbor Dam, formal consultation should be conducted on any permit that is likely to result in a water withdrawal greater than 5 cfs. In the mainstem Columbia River anywhere above Bonneville Dam and on the mainstem Snake River up to Ice Harbor Dam, formal consultation should be conducted on any permit that is likely to result in a water withdrawal greater than 25 cfs.

NMFS concluded consultation on the Inland Land pumping station application with a jeopardy opinion on May 16, 1997.⁴ The Inland Opinion introduced an expectation of "zero net impact" for new projects likely to result in water withdrawals that will have an adverse effect on flow targets established by the 1995 FCRPS Opinion as necessary for salmon migration.

In the Inland Opinion, NMFS also provided recommendations to the Corps concerning requirements for new withdrawal projects. Generally, new withdrawal projects may occur at times outside the flow objective period, inside the flow objective period when objectives are being met, and inside the flow objective period when flow targets are not met if withdrawals are accompanied by replacement flows to offset depletion. Regarding replacement flow, NMFS said applicants must prove "they are ready and able to provide water that was put to beneficial use for transfer to instream use."

The replacement flow necessity was subsequently explained in this way.⁵ Because improved flows in the Columbia and Snake Rivers are necessary to create immediate improvements in the survival of migrating juvenile salmon, the Corps must ensure that the applicant secures a real-time replacement for that quantity of water from other sources or initiate formal consultation with NMFS before it issues a permit for any new use likely to deplete target flows. Thus, applicants seeking informal ESA consultation by not adversely effecting listed salmon and steelhead species must provide bucket for bucket replacement flow that meets all criteria of location, timing, and enforceability that, but for the applicant's efforts, would not otherwise be present in the river.

The FCRPS consultation was reinitiated by the action agencies on September 3, 1997, to consider the effects of carrying out the RPA contained in the 1995 FCRPS Opinion on recently listed species of anadromous fish, including Snake River Basin steelhead and Upper Columbia River steelhead, both listed in August 1998. Effects on Upper Columbia River spring-run chinook salmon and Middle Columbia River steelhead, species were proposed for listing on March 1988, were also considered. This consultation was concluded with issuance of a supplemental FCRPS Opinion in May 1998 (the 1998 FCRPS Opinion)⁶ that confirmed that the

⁴ Endangered Species Act Section 7 Biological Opinion on Permit Application Number 96-697 by the Inland Land, Inc., for Construction of a Pumping Facility on the Columbia River (May 16, 1997).

⁵ Letter from William W. Stelle, Jr., to Brig. General Robert H. Griffin (September 9, 1997)(discussing mitigation requirements for new water diversions).

⁶ Supplemental Biological Opinion on Operation of the Federal Columbia River Power System Including the Smolt Monitoring Program and the Juvenile Fish Transportation Program: A Supplement to the Biological Opinion Signed March 2, 1995, For the Same Projects (May 14, 1998).

1995 FCRPS Opinion and incidental take statement shall continue in full effect with minor changes.

Among those changes were adoption of a mid-Columbia objective of 135 kcfs from April 10 to June 30 and various specific measures, including a shift in flood control timing, to increase the likelihood that the flow objectives can be met. This was intended to provide Upper Columbia River steelhead with reductions in mortality associated with water regulation similar to those afforded Snake River spring/summer chinook salmon by the Lower Granite and McNary flow objectives specified in the 1995 RPA. Additionally, the planning date for the start of Snake River flow augmentation was changed from April 10 to April 3 to reflect the earlier migration timing of Snake River steelhead.

B. Initiation of Consultation

In a letter dated February 14, 1997, the Corps requested formal consultation for issuance of permit application number 96-1676 to construct a pumping facility on the Columbia River near Paterson, Washington. A biological assessment (BA) for the proposed action, dated October 5, 1996, was also provided. In a letter dated April 16, 1997, the Corps provided additional information, prepared by Columbia Basin Research, regarding smolt survival and travel time. The Corps concluded that the proposed action would not affect the listed Snake River salmon. In keeping with the established consultation guidance, the Corps has initiated formal consultation with NMFS.

At the applicant's request, completion of the Berg consultation was delayed to give the applicant an opportunity to submit a flow replacement plan to ensure the new diversion meets condition (2)(B) of the Inland RPA and has a "zero net impact" on flows needed by listed Snake River salmon. After many discussions with NMFS concerning the meaning of the replacement flow requirement, the Berg Brothers submitted a flow replacement plan to NMFS to support their application pending with the Corps on February 13, 1998.⁷

The objective of this Biological Opinion (BO) is to determine whether issuance of the proposed permit is likely to jeopardize the continued existence of five salmonid species listed under the Endangered Species Act and four salmonid species proposed for listing under the Endangered Species Act (Table 1), or result in the destruction or adverse modification of their designated or proposed critical habitat.

This consultation would be in place until 1999 or future years, depending on information gained from ongoing research under the 1995 and 1998 FCRPS Opinions and FCRPS reconfiguration.

II. Proposed Action

⁷ Draft Berg Brothers L.L.C. Mitigation Water Conservation Plan (1998).

The proposed action is the issuance of permit application number 96-1676 to Berg Brothers, L.L.C. (applicant), for the construction of an irrigation water withdrawal facility in the John Day pool of the Columbia River (River Mile 277) in Benton County near Paterson, Washington. The pumping facility would have a maximum withdrawal capacity of 71 cubic feet per second (cfs).

Table 1. Species considered in this Biological Opinion.

Common Name	Scientific Name	Listing Status
Snake River sockeye salmon	<i>Oncorhynchus nerka</i>	Listed (Endangered)
Snake River fall chinook salmon	<i>O. tshawytscha</i>	Listed (Threatened)
Snake River spring/summer chinook salmon	<i>O. tshawytscha</i>	Listed (Threatened)
Upper Columbia River steelhead	<i>O. mykiss</i>	Listed (Endangered)
Snake River steelhead	<i>O. mykiss</i>	Listed (Threatened)
Lower Columbia River steelhead	<i>O. mykiss</i>	Listed (Threatened)
Upper Willamette River chinook salmon	<i>O. tshawytscha</i>	Proposed (Threatened)
Upper Columbia River spring run chinook salmon	<i>O. tshawytscha</i>	Proposed (Endangered)
Middle Columbia River steelhead	<i>O. mykiss</i>	Proposed (Threatened)
Upper Willamette River steelhead	<i>O. mykiss</i>	Proposed (Threatened)

Approximately 300 cubic yards of river bottom material would be excavated to allow placement of roughly 1,400 feet of 42-inch diameter steel pipe in the Columbia River. A cylindrical wedge-wire fish screen would be placed at the intake pipe terminus. Two steel H-piles would be driven to support the pipe terminus and fish screens. The proposed pump station platform would be constructed above ordinary high water beside an existing pumping facility. All in-water construction is proposed to take place from December 1 through March 31 of any calendar year. Water withdrawals would typically occur from April through mid-October. The maximum withdrawal of 71 cfs would occur on average for one to two weeks in the end of June or first part of July.

Full accomplishment of the applicant's flow replacement plan as modified pursuant to discussions with the NMFS is a necessary and indispensable part of the proposed action. When fully carried out, the flow replacement plan will provide for instream use, at the point of the diversion or upstream of this point during periods when flow objectives are not likely to be met, an amount of water that is equivalent to the flow depletion caused by the new use. This meets the objective of "zero net impact" of the new diversion on flows needed by listed Snake River salmon. The flow replacement plan includes the following essential conditions:

Flow Replacement Program

- (1) The permittee will provide a quantity of replacement flow that is equal, gallon for gallon, to the full amount withdrawn by their new diversion by promoting changes in cropping patterns to reduce water consumption on neighboring farms. The applicant will accomplish this by providing funds necessary to establish eligibility for a cost-share program known as the Environmental Quality Incentives Program (EQIP), or a comparable conservation program, administered by the Benton Conservation District (BCD).⁸ Only those reductions in consumptive use that can be ascribed to permanent changes in crop patterns on farms participating in the applicant's enhancement of the BCD EQIP program will be credited for purposes of calculating replacement flow quantity.
- (2) All increases in water availability due to reduced crop water demand on these lands will accrue to flows upstream of the applicant's proposed new diversion site in the John Day Pool of the Columbia River.
- (3) The permittee shall ensure that diversion reduction agreements signed by the irrigation district are part the EQIP contract signed by participating farmers and BCD. BCD will include clauses within each contract specifying the crop conversion condition and the reduced diversion amount.

⁸ Benton Conservation District is a state-mandated agency dedicated to agricultural conservation in Benton County, Washington, with offices located at 24106 North Bunn Road in Prosser, Washington 99350.

(4) The permittee shall complete all acts necessary to accomplish crop conversions and provide full replacement flows within six years.

III. Biological Information and Critical Habitat

An action area is defined by NMFS regulations (50 CFR Part 402) as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." The area within designated critical habitats affected by the proposed action is the Columbia River at RM 277 downstream to the Pacific Ocean.

The proposed in-water work period differs from the migratory timing of adult and juvenile Snake River sockeye salmon, Snake River fall chinook salmon, Snake River Basin steelhead, Upper Columbia River steelhead, and Upper Columbia River spring-run chinook salmon so that it is unlikely that they would be present at the immediate project site during the construction phase. The Corps' Annual Fish Passage Reports (1992-1995) suggest that some adult Snake River spring/summer chinook salmon could be present at the immediate construction area in the last two weeks of March. It is expected that few, if any, juvenile Snake River spring/summer chinook salmon would be present at the immediate construction area during in-water construction activities.

Both adult and juvenile life stages of Middle Columbia River steelhead would be present at the project site during in-water construction activities. During the irrigation season, both adult and juvenile life stages of the listed and proposed salmon and steelhead species would be present in the action area. The proposed action would occur within designated critical habitats for the listed salmon.

The action area serves as a migratory corridor for both adult and juvenile life stages of adult and juvenile life stages of the listed and proposed salmon and steelhead species. The adult and juvenile migratory corridor for the listed species include ten essential features: (1) Substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food (juvenile only), (8) riparian vegetation, (9) space, and (10) safe passage conditions. Of these, the proposed project is likely to affect substrate, water quality, and safe passage resulting from in-water construction activities and water quantity, water velocity, and safe passage conditions because of water withdrawal operations. References for further background on listing status, biological information and critical habitat elements are included in Table 2.

IV. Evaluating Proposed Actions

The standards for determining jeopardy are set forth in Section 7(a)(2) of the ESA as defined by 50 C.F.R. Part 402 (the consultation regulations). NMFS applies these standards to listed species of Pacific salmon and steelhead in Attachment 1. NMFS must determine whether the action is likely to jeopardize the listed species and/or whether the action is likely to destroy or adversely modify critical habitats. This analysis involves the initial steps of (1) defining the biological requirements of the listed species, and (2) evaluating the relevance of the environmental baseline to the species' current status.

Subsequently, NMFS evaluates whether the action is likely to jeopardize the listed species by determining if the species can be expected to survive with an adequate potential for recovery. In making this determination, NMFS must consider the estimated level of mortality attributable to: (1) collective effects of the proposed or continuing action, (2) the environmental baseline, and

Table 2. References for additional background on listing status, biological information, and critical habitat elements for the Listed and Proposed Species addressed in this biological and conference opinion.

Common Name	Listing Status		Critical habitat	Biological Information, Population Trends
	Proposed Rule	Final Rule		
Snake River sockeye salmon		November 20, 1991, 56 FR 58619	December 28, 1993, 58 FR 68543	Waples <i>et al.</i> 1991a; Burgner 1991
Snake River fall chinook salmon		April 22, 1992, 57 FR 34653	December 28, 1993, 58 FR 68543	Waples <i>et al.</i> 1991b; Healey 1991
Snake River spring/summer chinook salmon		April 22, 1992, 57 FR 34653	December 28, 1993, 58 FR 68543	Matthews and Waples 1991; Healey 1991
Upper Columbia River steelhead		March 10, 1998, 62 FR 11798	Not Yet Proposed	Busby <i>et al.</i> 1995; Busby <i>et al.</i> 1996
Snake River steelhead		March 10, 1998, 62 FR 11798	Not Yet Proposed	Busby <i>et al.</i> 1995; Busby <i>et al.</i> 1996
Lower Columbia River steelhead		March 19, 1998, 53 FR 13347	N/A	Busby <i>et al.</i> 1995; Busby <i>et al.</i> 1996
Upper Willamette River chinook Salmon	March 9, 1998, 63 FR 11482		Proposed March 9, 1998, 63 FR 11482	Myers <i>et al.</i> 1998; Healey 1991
Upper Columbia River spring run chinook salmon	March 9, 1998, 63 FR 11482		Proposed March 9, 1998, 63 FR 11482	Myers <i>et al.</i> 1998; Healey 1991
Middle Columbia River steelhead	March 10, 1998, 63 FR 11798		Not Yet Proposed	Busby <i>et al.</i> 1995; Busby <i>et al.</i> 1996
Upper Willamette River steelhead	March 10, 1998, 63 FR 11798		Not Yet Proposed	Busby <i>et al.</i> 1995; Busby <i>et al.</i> 1996

(3) any cumulative effects. This evaluation must take into account measures for survival and recovery specific to the listed salmon and steelhead's life stages that occur beyond the action area. If NMFS finds that the action is likely to jeopardize, NMFS must identify reasonable and prudent alternatives for the action.

Furthermore, NMFS evaluates whether the action, directly or indirectly, is likely to destroy or adversely modify the listed species' critical habitat. The NMFS must determine whether habitat modifications appreciably diminish the value of critical habitats for both survival and recovery of the listed species.

The NMFS identifies those effects of the action that impair the function of any essential element of critical habitats. The NMFS then considers whether such impairment appreciably diminishes the habitat's value for the species' survival and recovery. If NMFS concludes that the action will adversely modify critical habitats it must identify any reasonable and prudent measures available.

For the proposed action, NMFS' jeopardy analysis considers direct or indirect mortality of fish attributable to the action. NMFS' critical habitat analysis considers the extent to which the proposed action impairs the function of essential elements necessary for adult and juvenile migration of the listed salmon and steelhead under the existing environmental baseline.

A. Biological Requirements

The relevant biological requirements are those necessary for the listed species to survive and recover to naturally reproducing population levels at which protection under the ESA would become unnecessary. Adequate population levels must safeguard the genetic diversity of the listed stocks, enhance their capacity to adapt to various environmental conditions, and allow them to become self-sustaining in the natural environment.

When considering the status of the listed species in all its life stages, biological requirements are expressed as cohort replacement ratios and numerical escapement goals. Refer to Table 2, and literature cited therein, and Chapter IV of the Proposed Recovery Plan for Snake River Salmon (the Proposed Recovery Plan)⁹ for a discussion of these requirements. As discussed in greater detail in the Proposed Recovery Plan, currently available scientific data and analysis are insufficient to prescribe life-stage specific numerical survival rates necessary to achieve the combined life-stage requirements described above. However, survival must improve in all life stages, given current critically low population levels.

⁹ R. Schmitt, W. Stelle, Jr., and R.P. Jones, Proposed Recovery Plan for Snake River Salmon, U.S. Department of Commerce, National Oceanic and Atmospheric Administration, various pagination (March 1995).

For actions that affect juvenile and adult migration, biological requirements include increased migration survival and improved habitat characteristics that function to support successful migration.

1. Flow and Migration Survival

Studies conducted within and outside the Columbia Basin have established that a general relationship exists between increasing fish survival and increasing river flows (Cada et al. 1994).

Causal factors, which may explain this relationship, are poorly understood and alternative factors are likely to dominate in different flow ranges and in different years (ISG 1996). Some of these potential causal factors include water velocity, spill, gas saturation, flooding, and temperature. These factors mediate survival through fish migration speed, predation, the route of passage at a dam, feeding, growth, and gas bubble trauma (ISG 1996). Additional research is needed to more clearly explain the causal factors and to learn those flows (or associated causal factors) that are necessary for survival and recovery of listed Snake River salmon. Such research is required through the RPA of the 1995 FCRPS Opinion and the NMFS Proposed Recovery Plan.

Until additional research results are available, the 1995 FCRPS Opinion established interim flow objectives to aid in improving survival of listed Snake River salmon smolts. These flow targets, as modified by the 1998 FCRPS Opinion are as follows:

	<u>Snake River at Lower Granite Dam</u>	<u>Columbia River at McNary Dam</u>
Spring	April 3 to June 20 85-100 kcfs	April 20 to June 30 220-260 kcfs
Summer	June 21 to August 31 50-55 kcfs	July 1 to August 31 200 kcfs

The 1995 and 1998 FCRPS Opinions specify management of Snake and Columbia River water to improve the ability of the FCRPS to achieve these target flows. NMFS (1995) reviewed available information through early 1995 and proposed the interim flow objectives based upon the best available information at the time. Factors considered in developing the flow objectives included: historical river flows and velocities, which were much higher than now; an analysis of the increase in juvenile travel times associated with lower river flows, which increases exposure to predation and may disrupt optimum timing of ocean entry; and the observation that years with low river flows do not correspond with years of good adult returns.

Since development of NMFS' interim flow objectives, some additional information has become available. Taken together, this information supports the conclusion that increased flow is associated with increased juvenile survival, particularly for fall chinook, which migrate during the summer months.

One fall chinook study cited in NMFS (1995), Hilborn et al. (1993), has been called into question, but newer data support the flow-survival relationship. The Hilborn study showed a significant relationship between flow and adult returns of Priest Rapids fall chinook. A reanalysis of the data in Skalski et al. (1996) suggests that it is not possible to detect the key factors that influence these hatchery return rates using available data and statistical techniques. Other recent studies, however, reaffirm the conclusion of the FCRPS Opinion that for fall chinook higher flows result in improved survival. Zabel (1994) relies on recent PIT-tag releases to conclude that a significant correlation between flow and juvenile Snake River fall chinook

travel time exists. This study also found that migration date and fish length (each of which may show degree of smoltification) significantly correlated with fall chinook travel time. One study based on PIT-tag observations in the Snake River found a significant relation between within-season reach survival of juvenile fall chinook salmon and flow (Smith et al. 1996). A recent analysis of seasonal juvenile fall chinook detection rates at Lower Granite Dam (roughly equivalent to minimum survival estimates) shows a significant correlation with both average seasonal flow and average seasonal temperature (Berggren 1996).

Some new information is also available for spring/summer chinook salmon. Reach travel time and survival estimates have been determined from PIT-tagging experiments (Iwamoto et al. 1994; Muir et al. 1995, 1996; Schiewe 1996). Analysis of these results relative to flow shows a correlation with travel time both within and between seasons and a correlation with survival when data from all years are combined (S. Smith, NMFS, pers. comm., March 1997). Correlations between flow and survival within seasons were not significant.

Based on the best available information, NMFS believes that low river flows result in reduced survival of listed juvenile Upper Columbia River steelhead and that establishing flow objectives for the mid-Columbia River, from below Chief Joseph Dam to the head of the McNary pool, will help increase juvenile survivals and that increased juvenile survivals will potentially lead to increased adult returns in the long term. Although there have been no studies of juvenile survival over a range of flows specific to listed steelhead in the mid-Columbia reach, data pertaining to other relevant stocks in the Snake River support the designation of a mid-Columbia flow objective for steelhead of 135 kcfs at Priest Rapids. This flow objective and the supporting biological rationale are further described in Appendix A of the 1998 FCRPS Opinion.

B. Environmental Baseline

The environmental baseline, to which the effects of the proposed action would be added,

include the past and present impacts of all Federal, State, or private activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process.

50 C.F.R. § 402.02.

The biological requirements of the listed salmon and steelhead are currently not being met under the environmental baseline. Maintenance or further degradation of these conditions would not reverse the declining trend. Instead, it would continue to increase the risk of adverse effects the listed salmon and steelhead face under the environmental baseline.

Continuing FCRPS actions initiated in the lower and mid-Columbia River in response to consultation for the listed stocks are expected to work toward slowing this trend toward extinction for the salmon and steelhead species considered in this consultation. The status of these species is such that a significant improvement in environmental conditions over those currently available under the environmental baseline is needed to ensure long-term survival. Any

further degradation of these conditions would have a significant impact due to the risk listed salmon and steelhead presently face under the environmental baseline.

To evaluate the environmental baseline in the action area, assessing the total quantity and significance of water withdrawals upstream of the proposed action with those within the action area is necessary. Although this proposed withdrawal would affect the listed salmon and steelhead below its point of the diversion, that effect would be added to the aggregate of all upstream withdrawals. The 1997 Inland Opinion reviewed the 1997 BOR cumulative effects study and concluded that irrigation withdrawals are the principal reason for missing flow objectives in the Snake River and contribute significantly to our ability to meet flow objectives at McNary Dam.

V. Analysis of Effects

A. Effects of Proposed Action

The Corps determined that the proposed action would have no effect on listed salmon. This determination is based on (1) all in-water construction activities would occur between December 1 and March 31 of any calendar year, and (2) any effects from water withdrawal operations would be nearly immeasurable. In reviewing this action, the NMFS reviewed the impacts of both the in-water construction activities and the pumping operations to determine effects on water quantity, water velocity, and safe passage (without impediment or delay).

1. In-Water Construction Activities

Adult Snake River spring/summer chinook salmon enter the Columbia River February through May. Data from the Corps' Annual Fish Passage Reports show that the 10-year average (1986-1995) passage of adult spring Chinook in March at Bonneville Dam is 1,212 fish. Adult fish counting at John Day and McNary Dam typically begins in April 1 and is conducted in two eight-hour shifts from 4:00 am to 8:00 pm. On April 1, five, seven, and zero fish were counted at John Day Dam in 1995, 1994, and 1993, respectively. At McNary Dam, just one fish was counted on April 1 in 1995 with no fish counted on this date in 1994 and 1993. However, 13, 31, and one fish were counted at McNary Dam by April 5 in 1995, 1994, and 1993, respectively. In addition, 96 fish were counted at McNary Dam on April 1 in 1992. Therefore, assuming that some adult Snake River spring/summer chinook salmon could be present in the John Day Pool in the last two weeks of March is reasonable.

Water quality could be reduced by turbidity created by excavation activities and accidental spills of hazardous materials. Turbidity created from construction activities would be temporary and localized and a spill prevention plan, as required by the state, would be in place to contain materials in the immediate action area. Few, if any, listed salmon and steelhead species would likely be present during the in-water work period. Exceptions to this are adult Snake River spring/summer chinook salmon that could be present in the immediate action area in the last two weeks of March and adult and juvenile Middle Columbia River steelhead. To mitigate for this potential, in-water work should be completed by March 15.

2. Pumping Operations

a. Safe Passage (fish screens)

The intake structure would be fitted with wedge-wire fish screens. The maximum screen opening would be 0.0689 inches (1.75 mm) with a design approach velocity of 0.34 feet per second. An automatic air burst system would be used for screen cleaning. These criteria satisfy NMFS fish screen requirements.¹⁰

b. Safe Passage, Water Velocity, Water Volume

Figure 3 in the BA shows the applicants expected average pumping needs during the irrigation season. It was estimated that a maximum withdrawal of 71 cfs would result in an additional 3.4 minutes of travel time through the John Day Pool under flows between 150,000 and 260,000 cfs. The Columbia River Salmon Passage Model, CRiSP 1.5.3., was used to predict change in survival under irrigation operations for both a high flow (1996 flows) and low flow (1992 flows) scenario for two reaches--McNary Dam to John Day Dam (John Day Pool) and from the Lower Granite Pool to Bonneville Dam. The model predicted no changes in survival for yearling or subyearling chinook salmon.

Additional information provided by the Corps, prepared by Columbia Basin Research, used CRiSP 1.5.3. to predict change in smolt travel time due to pumping operations. The CRiSP model has a resolution limit of 0.01 days or 15 minutes. This analysis predicts the proposed pumping operations would not add more than five minutes to smolt migration time and therefore would not affect fish survival. While the CRiSP model cannot provide resolution below 15 minutes, the authors of this analysis note that travel time would be reduced by two-thirds for all listed juvenile salmon migrants due to the estimate that approximately two-thirds of these migrants are transported. It was noted that non-transported migrants would be subject to the additional 15 minute travel times predicted by the CRiSP model.

The NMFS disagrees with the analysis presented by the Corps primarily because the Corps was unable to consider the applicant's flow replacement plan, a strategy based on information submitted to NMFS after consultation had begun. Moreover, the Corps did not consider the inadequacy of the environmental baseline in meeting the species' biological requirements, the contribution of existing water withdrawals to this inadequate environmental baseline condition, and the potential effects of this action in combination with future potential water withdrawals in the Columbia River Basin.

¹⁰ MFS Revised Juvenile Fish Screen Criteria, March 23, 1995, and a May 9, 1996, Addendum, Juvenile Fish Screen Criteria for Pump Intakes.

Despite the applicant's flow replacement plan, the NMFS also disagrees with the BA's finding that the proposed action does not affect the listed species. As described in section IV, the NMFS has concluded that flow reductions in the Snake and Columbia Rivers are a cause of decline of listed salmon and steelhead and that flow reductions have contributed to an inadequate baseline that must be mitigated by flow augmentation, especially in low flow years.

A time lag will necessarily occur between initiation of the proposed new water withdrawal and completion of the flow replacement plan that may reduce the probability of meeting the flow objective and result in an adverse effect to listed salmon and steelhead species. NMFS expects the reduction to be small and temporary. Moreover, at the conclusion of the flow replacement plan, the baseline for flows will show a net improvement.

B. Cumulative Effects

Cumulative effects are defined as

those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation.

50 CFR 402.02.

Not all water withdrawals in the Columbia River Basin require a section 10/404 permit from the Corps. Ground water withdrawals and intake structures in non-navigable waterways do not require the permits. It is likely that some future withdrawals will not be covered by Corps action and section 7 consultations and will further degrade flows in the Snake and Columbia Rivers.

C. Consistency of Proposed Action with Proposed Recovery Plan

The NMFS' Proposed Recovery Plan for the listed Snake River salmon places the highest priority on actions that will reverse the primary factors for the species' decline and eliminate impediments to recovery. For mainstem and estuarine ecosystems, one of the primary biological objectives of the Proposed Recovery Plan is to reduce loss of juvenile fish through flow augmentation and improved water management (Recovery Plan at V-2-17). Recovery actions to address this objective are identified as priority one under "Tasks to Avoid Extinction" and include steps to increase the probability that flows will be available for migrating salmon when they need it, and to manage water during the migration season in a way that ensures maximum benefits for anadromous fish (Recovery Plan at V-2-17 through 29). Moreover, tasks associated with the biological objective of providing adequate instream flows are identified as necessary to begin recovery of tributary ecosystems (Recovery Plan at V-1-53 through 56); one of these tasks calls for continuation of the existing moratoria on issuance of water rights in the Snake/Columbia River mainstems and extension of those moratoria to include tributaries and ground water in continuity with surface flows (Recovery Plan at V-1-56).

The proposed action is different from tasks in the Recovery Plan to the extent that, until fully implemented, it may increase the probability that flow objectives may not be met. However, that risk is temporary, increasingly discountable as flow replacement is provided, and is reversed to

provide a net improvement in baseline flow conditions at the conclusion of the plan through the gradual accretion of savings in water formerly lost during delivery and field application of irrigation water. Thus, completion of the flow replacement plan is expected to provide a net improvement in baseline flow conditions and increase the probability of meeting flow objectives.

This approach is consistent with the Recovery Plan's basic premise of adaptive management and its primary biological objective of providing a higher probability of meeting the spring flow objectives through improved water management.

Information obtained by an evaluation of the success of the flow replacement plan included in the proposed action will contribute to region-wide efforts to recover salmon by helping to resolve the larger issue of whether agricultural water conservation should be pursued, or whether alternatives such as cropland retirement are necessary to reduce the effects of irrigated agriculture on flow objectives. When fully completed, the proposed action will result in permanent improvements to the existing deficient baseline, improve the probability of meeting flow objectives and reduce the loss of listed species associated with poor water quality.

VI. Conclusion

After reviewing the current status of the Snake River sockeye salmon, Snake River spring/summer chinook salmon, Snake River fall chinook salmon, Snake River Basin steelhead, Upper Columbia River steelhead, Middle Columbia River steelhead, and Upper Columbia River spring-run chinook salmon, the environmental baseline for the action area, the effects of the proposed action including the applicant's flow replacement plan, and the cumulative effects, it is the NMFS' biological opinion that issuance of permit number 96-2-01676 is not likely to jeopardize the continued existence of listed Snake River sockeye salmon, Snake River spring/summer chinook salmon, and Snake River fall chinook salmon and is not likely to destroy or result in adverse modification of their critical habitat.

Under the RPA in the FCRPS Opinions, considerable effort is being expended by Federal, state, and private entities to provide flow augmentation plus other actions required in the RPA. The proposed action complements and extends the efforts of these upstream water users by contributing to permanent improvements in the environmental baseline. These actions, along with other actions under RPAs in the FCRPS Opinions, will be reevaluated in 1999. NMFS will then consider and make recommendations for carrying out long-term changes to the FCRPS to permit recovery of the listed Snake River salmon. Whatever option is chosen and carried out then, however, is likely to include flow augmentation to improve survival of spring migrating chinook and steelhead in the Mid-Columbia River.

The flow replacement plan is an integral part of the proposed action. The conclusion that this proposed project does not result in jeopardy to listed salmon and steelhead or appreciably diminish the value of critical habitat is based on the projects's ability to provide timely replacement flow. An increase in water depletions not offset by flow replacement would undermine the no jeopardy conclusion and efforts by upstream water users to contribute to recovery. Therefore, the effects of the water withdrawal, when added to the effects of the current water withdrawals under the environmental baseline and the effects of future non-federal water withdrawals discussed in the Cumulative Effects section, and offset by flow replacements, does not jeopardize the listed salmon and steelhead and adversely modify their critical habitats.

VII. Conservation Recommendations

Section 7 (a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Conservation recommendations are discretionary measures suggested to minimize or avoid adverse effects of a proposed action on listed species, to minimize or avoid adverse modification of critical habitats, or to develop additional information. NMFS believes the following conservation recommendations are consistent with these obligations, and therefore should be carried out by the Corps:

1. To the greatest extent possible, the Corps should develop a database of all existing permits that have resulted in a water withdrawal. For consistency, this database should be applied for each district and contain, where possible, the following information: (1) location by state, county, nearest town or city, waterway, and stream mile; (2) the type of facility constructed (e.g. land based pumping platform with pipes extended in water or elevated platform over water); (3) presence or absence of adequate fish screens; and (4) pumping capacity of the facility.
2. The Corps should complete all necessary work to decide whether existing permits in the Columbia and Snake River Basins are candidates for consultation as ongoing actions before spring 1999. To speed up consultation and improve salmon survival, the Corps should accelerate a feasibility study of alternatives to rank permits for reevaluation based on relative effects on salmon. Using this information, NMFS will decide in coordination with the Corps which existing permits warrant consultation. This measure is not intended to be included in the permit conditions for the proposed action. It is an evaluation NMFS believes is necessary to make progress toward salmon recovery.

In order for NMFS to be kept informed of actions minimizing or avoiding adverse effects, or those that benefit listed species or their habitat, NMFS requests notification of the implementation of any conservation recommendations.

VIII. Reinitiation of Consultation

Consultation must be reinitiated if

the amount or extent of taking specified in the Incidental Take Statement is exceeded, or is expected to be exceeded; new information reveals effects of the action may affect listed species in a way not previously considered; the action is modified in a way that causes an effect on listed species that was not previously considered; or, a new species is listed or critical habitat is designated that may be affected by the action.

50 CFR 402.16.

Failure of the applicant to make active progress on the replacement flow program or complete the plan within six years will be a modification of the action that requires the Corps to reinitiate

consultation. Significant changes in the operation and configuration of the hydropower system will be new information that warrants reexamination of these permit conditions. Reconfiguration of the FCRPS would warrant reinitiation of this consultation. Evaluation of the effectiveness of the flow replacement plan in six years would warrant reinitiation of this consultation.

If the states of Oregon, Washington, and Idaho adopt comprehensive programs to address instream flow restrictions in the Columbia Basin, that may alleviate NMFS' concerns about the cumulative effects of withdrawals and could lead to reinitiation of consultation.

IX. LITERATURE CITED

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X. Incidental Take Statement

Sections 4 (d) and 9 of the ESA prohibit any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct) of listed species without a specific permit or exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, and sheltering. Harass is defined as actions that create the likelihood of injuring listed species to such an extent as to significantly alter normal behavior patterns which include, but are not limited to, breeding, feeding, and sheltering.

Incidental take is take of listed animal species that results from, but is not the purpose of, the Federal agency or the applicant carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary; they must be implemented by the action agency so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered in this incidental take statement. If the Corps (1) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain the oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures.

A. Amount or Extent of the Take

The 1995 and 1998 FCRPS Opinions prescribe measures that avoid jeopardy and reduce incidental take. NMFS expects that the proposed action would exacerbate the efforts now occurring in the Columbia Basin to recover the listed salmon and steelhead. The proposed action, as modified by the reasonable and prudent measures is expected to result in minimal incidental take of listed salmon and steelhead.

B. Reasonable and Prudent Measures

The NMFS believes that the following reasonable and prudent measures are necessary and appropriate to minimizing take of Snake River sockeye salmon, Snake River spring/summer chinook salmon, Snake River fall chinook salmon, Snake River Basin steelhead, Upper Columbia River steelhead, Middle Columbia River steelhead, and Upper Columbia River Spring-run Chinook salmon:

1. The permit shall be conditioned to require accomplishment of the flow replacement program.
2. The permit shall be conditioned to require measuring and reporting of water use by the permittee to NMFS.
3. All in-water work shall occur between December 1 and March 15 of any calendar year.

C. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1. The permit shall be conditioned to require accomplishment of the flow replacement program.
 - a. The permittee will provide a quantity of replacement flow equal to that of their new diversion by promoting changes in cropping patterns to reduce water consumption on neighboring farms. The applicant will accomplish this by providing funds necessary to establish eligibility for a cost-share program known as the Environmental Quality Incentives Program (EQIP), or a comparable conservation program, administered by the Benton Conservation District in Prosser, Washington. Only those reductions in consumptive use that can be ascribed to permanent changes in crop patterns on farms participating in the applicant's enhancement of the BCD EQIP program will be credited for purposes of calculating replacement flow quantity.
 - b. All increases in water availability due to reduced crop water demand on these lands will accrue to flows upstream of the applicant's proposed new diversion site in the John Day Pool of the Columbia River.
 - c. The permittee shall ensure that diversion reduction agreements signed by the irrigation district are part the EQIP contract signed by participating farmers and BCD. BCD will include clauses within each contract specifying the crop conversion condition and the reduced diversion amount.
 - d. The permittee shall complete all acts necessary to accomplish crop conversions and provide full replacement flows within six years.
 - e. The applicant and BCD shall submit joint reports to the Corps and NMFS every two years. Each report will provide all necessary information to document the net accumulation of irrigation water savings, including the continued production of crops with reduced water demands and diversion reductions by irrigation districts. If reductions in conservation savings or increases in diversions are found, the applicant shall offset any such change with new or amended EQIP contracts, or otherwise to curtail or cease their own water use as necessary.
2. The permit shall be conditioned to require measuring and reporting of water use by the permittee to NMFS.

a. The permittee will maintain a measuring device in good working order, will keep a complete record of the amount of water used each week, and will submit a report that includes the recorded water use measurements to NMFS at the conclusion of each irrigation season or more frequently as required by NMFS.

3. All in-water work shall occur between December 1 and March 15 of any calendar year.

a. In-water work includes, but not limited to, blasting, excavating, pile driving, laying of pipe and fish screen manifold placement, and work by divers.

APPLICATION OF ENDANGERED SPECIES ACT STANDARDS

May 1998

National Marine Fisheries Service
Northwest Region
7600 Sand Point Way N.E.
Seattle, Washington 98115

Introduction

The National Marine Fisheries Service (NMFS) evaluates the effects of proposed Federal actions on proposed or listed anadromous fish in section 7 consultations by applying the standards of § 7(a)(2) of the ESA, as given in 16 U.S.C. § 1536(a)(2), and as interpreted by the NMFS/U.S. Fish and Wildlife Service (FWS) joint consultation regulations (50 CFR Part 402). The discretionary continuation of an action is considered to be a proposed action. When NMFS issues its biological opinion, it uses the best scientific and commercial data available to determine whether a proposed Federal action is likely to (1) jeopardize the continued existence of a listed species, or (2) destroy or adversely modify the designated critical habitat of a listed species. See ESA § 7(a)(2).

The consultation regulations define "jeopardize the continued existence of" to mean:

...to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 C.F.R. § 402.02).

The regulations also define the statutory term "destruction or adverse modification" of critical habitat to mean:

... a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical. (50 C.F.R. § 402.02)

Additionally, NMFS and FWS have issued a document that further describes the application of these standards; it is entitled "Endangered Species Consultation Handbook--Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act," (USFWS and NMFS 1998) (hereinafter referred to as "the Handbook").

The Handbook defines the regulatory terms "survival" and "recovery," as they relate to analyzing jeopardy and critical habitat, as follows:

Survival: the species' persistence, beyond conditions leading to its endangerment, with sufficient resilience to allow recovery. Said another way, survival is the condition in which a species continues to exist into the future while retaining the potential for recovery. This condition is characterized by a species with a sufficiently large population, represented by all age classes, genetic heterogeneity, and a number of sexually mature individuals producing viable offspring, that exists in an environment providing all requirements for completion of the species' entire life cycle, including reproduction, sustenance, and shelter.

Recovery: improvement in the status of a species and the ecosystems upon which they depend. Said another way, recovery is the process by which species' ecosystems are restored so they can support self-sustaining and self-regulating populations of listed species as persistent members of native biotic communities.

In implementing these standards, NMFS recognizes certain characteristics of the species' require special consideration. The Columbia River Basin drains a vast area of the Pacific Northwest. The basin is approximately 259,000 square miles in size; it drains much of the area of Washington, Oregon, and Idaho, as well as parts of Montana, Nevada, Utah, Wyoming and British Columbia. The proposed or listed salmon are born streams, lakes and rivers (depending on the species) of the Columbia River system in Idaho and eastern Oregon and Washington. Their eggs are deposited and fertilized by spawning adults and incubate within gravel substrates. They emerge from the gravel and rear for a time before they begin, as yearlings or subyearlings, their migration down the main stems of the Snake and Columbia River systems to the Pacific Ocean. There, they range from the mouth of the Columbia River in all directions. The listed species grow to adult size in the ocean and then complete their life cycle by reversing their migration, moving up the Columbia and Snake Rivers and returning to their natal habitat to spawn the next generation.

Stages of the Analysis

For each consultation concerning proposed or listed fish, NMFS performs the following analysis in applying ESA standards.

1. Define the biological requirements of the listed species.

To determine whether a proposed or continuing action is likely to jeopardize the continued existence of a listed species or adversely modify its habitat, it is first necessary to know what the species requires for continued existence. (The regulations more specifically express this in terms

of the species' survival and recovery.) Biological requirements may be described in a number of different ways: For example, they can be expressed as a ratio of recruits to spawners, as a survival rate for a given life stage (or set of life stages), as a positive population trend, or as a threshold population size. Biological requirements may also be described as the environmental conditions necessary to ensure the species' continued existence, and these can be expressed in terms of physical, chemical, and biological prerequisites (e.g., for a particular river reach, the prerequisites would include water temperature and velocity, dissolved gas saturation, etc.). The manner in which these requirements are described varies according to the nature of the action under consultation and its likely effects on the species. For example, in the consultation on the Federal Columbia River Power System (FCRPS) (NMFS 1995a), biological requirements are couched primarily in terms of individual salmon mortalities; whereas in a consultation on an action in spawning and rearing habitat, the biological requirements might be defined by changes in environmental conditions.

2. Evaluate the relevance of the environmental baseline to the species' current status.

The environmental baseline represents a basal set of conditions to which the effects of the proposed or continuing action would be added. It "includes the past and present impacts of all Federal, State, or private activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process." See 50 C.F.R. § 402.02, definition for "effects of the action." Under this definition, the environmental baseline would not include future discretionary activities (that have not undergone ESA consultation) in the action area. Thus, the species' current status is described in relation to the risks presented by the continuing effects of all previous actions and resource commitments that are not subject to further exercise of Federal discretion. For a new project, the environmental baseline represents the risks entailed by conditions in the action area that exist before the proposed actions begins. For an ongoing Federal action, it is necessary to evaluate the effects of previous resource commitments separately from the effects that would be caused by that action's proposed continuance.

Delineating the "action area" for the proposed or continuing action should be an initial consideration in identifying the environmental baseline. The regulations specify that the environmental baseline of the action area should be used in making the jeopardy determination. The "action area" is defined by the consultation regulations as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" 50 CFR §402.02.

The reason for determining the species' status under the risks presented by the environmental baseline (without the effects of the proposed or continuing action) is to better understand the relative significance of the action's effects upon the species' likelihood of survival and chances for recovery when those effects are added to the environmental baseline. The greater the risks the species face at the time of consultation, the more significant any additional adverse effects caused by the proposed or continuing action will be.

3. Determine the effects of the proposed or continuing action on proposed or listed species.

In this step of the analysis, NMFS examines the likely effects of the proposed action on the species. The analysis may consider the impact in terms of how many listed salmon will be killed during a particular life stage (and that mortality's effect upon the species' population size and variability), or the analysis may consider the impact on the species' biological requirements, such as water temperature, sediment load, total dissolved gas levels, etc. These are the effects that could be within the action agencies' discretion to cause or not. This decision is influenced by NMFS' advice in its biological opinion.

- 4. Determine whether the species can be expected to survive (with an adequate potential for recovery) under the effects of the proposed or continuing action, the environmental baseline and any cumulative effects, and considering any measures to increase survival or promote recovery that are taking place with respect to other life stages.**

In this step of the analysis, NMFS determines whether the specific action under consultation is likely to jeopardize the continued existence of the proposed or listed species. This step has two parts: First, NMFS focuses on the action area and adds the effects of the proposed or continuing action to those of the environmental baseline (and all cumulative effects). The NMFS must determine the significance of that aggregate effect upon the particular biological requirements of the listed species in the action area. In this step, NMFS considers effects such as the frequency of individual mortality and any sublethal effects caused by the action or occurring through the action's adverse modification of environmental conditions important to the species.

In the second part of the analysis, NMFS places the effects of the proposed or continuing action in the context of the full salmon life cycle. This comprehensive analysis is necessary to evaluate fully the significance of each action under consultation with respect to the biological requirements of the listed species in all life stages. The NMFS looks beyond the particular action area for this analysis in order to determine measures likely to be necessary in all life stages and that, in combination, would ensure that the biological requirements of the species are met.

At the species level, NMFS believes that the biological requirements for survival (and an adequate potential for recovery) are met when there is a high likelihood that the species' population will remain above critical escapement thresholds over a sufficiently long period of time. Additionally, the species must have a moderate to high probability of achieving its recovery population level within an adequate period of time. The particular thresholds, recovery levels, and time periods must be based upon the characteristics and circumstances of each salmon species under consultation.

The NMFS Proposed Recovery Plan for listed Snake River salmon (NMFS 1995b) calls for measures in each life stage that are based upon the best available scientific information concerning the listed species' biological requirements. The statutory goal of the recovery plan is to conserve the species so they can, at minimum, survive. It must also attempt to add all life-stage specific measures together in such a manner as to bring about the species' recovery. For this reason, the Recovery Plan is the best source for the measures that are necessary in each life stage for meeting the biological requirements of the species throughout their life cycles.

The proposed or continuing actions must reduce the risk of adverse effect in the action area to ensure that the likelihood of the species' survival and recovery is not appreciably diminished. The amount of risk reduction necessary to determine that the action will not be likely to jeopardize the listed species depends upon the current status of the species. Again, the Recovery Plan is the best source of the actions and information needed to make improvements in each life stage sufficient to satisfy the requirements of Section 7(a)(2). Therefore, NMFS will first consider whether the proposed action is consistent with the Recovery Plan. If not, NMFS will consider whether the proposed action reduces the risks to the listed species as much as or more than the Recovery Plan.

5. Identify reasonable and prudent alternatives to a proposed or continuing action that is likely to jeopardize the continued existence of the listed species.

If the proposed or continuing action is likely to jeopardize the proposed or listed species, NMFS must consider potential reasonable and prudent alternatives that would comply under Sec. 7(a)(2) of the ESA. In that case, the Proposed Snake River Salmon Recovery Plan which lays out measures "for the conservation and survival of endangered species," under § 4(f) of the ESA, is the best source of reasonable and prudent alternatives that the action agency may implement and thereby meet its obligations under ESA § 7(a)(2).

Literature Cited

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