**UNITED STATES DEPARTMENT OF COMMERCE**
**National Oceanic and Atmospheric Administration**
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

**Refer to:**
**2001/01415**

April 23, 2004

Ronald J. Eggers
U.S. Bureau of Reclamation
Pacific Northwest Region
Lower Columbia Area Office
825 NE Multnomah Street, Suite 1110
Portland, OR 97232-2135

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Ongoing Operation of the Umatilla Project and the Umatilla Basin Project and Informal Consultation for the 2004 Westland Irrigation District Temporary Water Service Contract, Columbia River, Umatilla River, and McKay Creek, HUCs - 17070103 (Umatilla) and 17070101 (Middle Columbia-Lake Wallula), Umatilla and Morrow Counties, Oregon

Dear Mr. Eggers:

Enclosed is a biological opinion (Opinion) prepared by the NOAA's National Marine Fisheries Service (NOAA Fisheries) pursuant to section 7 of the Endangered Species Act (ESA) on the effects of operating the Umatilla Project and the Umatilla Basin Project and issuing a temporary water service contract to Westland Irrigation District (WID) in 2004 in Umatilla and Morrow Counties, Oregon. NOAA Fisheries concludes in this Opinion that the operation of the Umatilla and Umatilla Basin Projects is not likely to jeopardize the continued existence of ESA-listed Middle Columbia River (MCR) steelhead (*Oncorhynchus mykiss*), or destroy or adversely modify designated critical habitat, and that issuing a temporary water service contract to WID in 2004 is not likely to adversely affect MCR steelhead, or designated critical habitat. As required by section 7 of the ESA, NOAA Fisheries included reasonable and prudent measures with nondiscretionary terms and conditions that NOAA Fisheries believes are necessary to avoid or minimize the effect of incidental take caused by this action.

This document also serves as consultation on essential fish habitat pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations at 50 CFR Part 600. The Umatilla River subbasin has been designated as EFH for Chinook salmon (*O. tshawytscha*). NOAA Fisheries concludes that the proposed action may adversely affect designated EFH for chinook salmon. As required by section 305(b)(4)(A) of the MSA, included are conservation recommendations that NOAA Fisheries believes will avoid, minimize, mitigate, or otherwise offset adverse effects on EFH resulting from the proposed action. As described in the enclosed consultation, 305(b)(4)(B) of the MSA requires that a Federal action agency must provide a detailed response in writing within 30 days of receiving an EFH conservation recommendation.

Please direct any questions regarding these consultations to Scott Hoefer of my staff in the Oregon State Habitat Office at 503.231.6938.

Sincerely,

for Michael R Crouse

D. Robert Lohn
Regional Administrator

# Endangered Species Act - Section 7 Consultation
# Biological Opinion

&

# Magnuson-Stevens Fishery Conservation and Management Act
# Essential Fish Habitat Consultation

Ongoing Operation of the Umatilla Project and the Umatilla Basin Project,
Columbia River, Umatilla River, and McKay Creek,
HUCs - 17070103 (Umatilla) and 17070101 (Middle Columbia-Lake Wallula),
Umatilla and Morrow Counties, Oregon

Agency: Bureau of Reclamation

Consultation
Conducted By: National Marine Fisheries Service,
Northwest Region

Date Issued: April 23, 2004

for Michael R Crouse

Issued by: _________________
D. Robert Lohn
Regional Administrator

**Refer to:** **2001/01415**

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# 1. INTRODUCTION

The Endangered Species Act (ESA) of 1973 (16 USC 1531-1544), as amended, establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat on which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with NOAA's National Marine Fisheries Service (NOAA Fisheries) and U.S. Fish and Wildlife Service (FWS) (together "Services"), as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitats. This biological opinion (Opinion) is the product of an interagency consultation pursuant to section 7(a)(2) of the ESA and implementing regulations 50 CFR 402.

The analysis also fulfills the essential fish habitat (EFH) requirements under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan. Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (section 305(b)(2)).

The U.S. Bureau of Reclamation (BOR) proposes the continued operation and maintenance of the Umatilla and Umatilla Basin Projects. The BOR is proposing the action according to its authority under the Umatilla Project originally authorized in 1906 and completed in the 1920's. Its original purpose was to supply irrigation water to approximately 29,874 acres, although the Project serves approximately 45,000 acres currently (Stene 1993). This Project was reauthorized for fish and wildlife and flood control purposes in 1976. The Umatilla Basin Project was authorized by Congress in 1988 as Title II of Public Law 100-557 and its central purpose is to store, deliver and exchange water for the purpose of comprehensive anadromous fish restoration in the basin while continuing to supply water to lands irrigated before October 1, 1988.[1] The Umatilla Basin Project provided for water exchanges so Columbia River water could be used to irrigate lands in the Project in exchange for leaving Umatilla River flows instream to benefit habitat for anadromous fish (BOR 2001). The administrative record for this consultation is on file at the Oregon State Habitat Office.

## 1.1 Background and Consultation History

On January 29, 2001, NOAA Fisheries received a letter with an attached biological assessment (BA) from the BOR requesting section 7 formal consultation on the continued operation and maintenance of the Umatilla Basin Project.[2] In a letter dated March 29, 2001, NOAA Fisheries

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[1] Title II of P.L. 100-557, the Oregon Wild and Scenic Rivers Act of 1988.

[2] Letter from Dave Kaumheimer, BOR to Michael Tehan, NOAA Fisheries, January 29, 2001.

responded that the BA submitted was insufficient to initiate formal consultation and requested additional information and analyses in order for formal consultation to proceed.[3] The information requested by NOAA Fisheries included instream flow analyses and other key project data required to better analyze the proposed action's impacts on anadromous species. Follow-up meetings and telephone conversations between NOAA Fisheries and the BOR were conducted to both refine the scope of information needed as well as to identify existing BOR and NOAA Fisheries tools that could be used to develop the information required to initiate formal consultation.

In a letter dated June 22, 2001, NOAA Fisheries reiterated and expanded upon its earlier request for additional information to initiate section 7 informal consultation on the Umatilla and Umatilla Basin Projects. NOAA Fisheries requested data regarding: (1) Water rights; (2) storage allocation and carry-over procedures; (3) instream flows; (4) Federal facilities used in operations; (5) maintenance records for fish screens and ladders; (6) precise descriptions of the temporary water service contracts (TWSCs), amounts of water used, and the impact of this use on stream flow in the Umatilla River; and (7) and inclusion of Oregon Department of Environmental Quality (ODEQ) temperature studies for the Umatilla Basin. The information requests were for the most part agreed to by the BOR in phone conversations that occurred in early July 2001.[4]

On September 1, 2001, NOAA Fisheries received a letter from the BOR containing a revised BA and request for formal consultation. In this letter the BOR informed NOAA Fisheries that it could not include information on the TWSCs because it was not yet available. Upon further inquiry, the BOR promised the delivery of this data as soon as it was compiled. The BOR also indicated that it would not use the ODEQ temperature study because of incompatible time steps between the BOR's and ODEQ's models. In a letter dated September 20, 2001, NOAA Fisheries accepted the BOR's BA as final and initiated formal consultation. In this letter, NOAA Fisheries indicated that completion of the Opinion depended on receipt of the requested TWSC information.

In phone conversations with the BOR in October, November, and December 2001, NOAA Fisheries requested status reports on the requested TWSC information. On December 4, 2001, the BOR informed NOAA Fisheries of its inability to complete this requested analysis until the end of December. In a meeting on December 19, 2001, NOAA Fisheries informed the BOR that completion of the Opinion would be delayed pending receipt of the requested information or, in the alternative, NOAA Fisheries would have to make conservative assumptions in its analysis. A revised timetable for completion of the Opinion was mutually agreed to in this meeting.

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[3] Letter from Michael Tehan, Oregon Habitat Branch Chief, to Dave Kaumheimer, BOR, March 29, 2001.

[4] Telephone conversations between G. Torretta, Reclamation Fisheries biologist and C. Vandemoer, NOAA Fisheries (July 17, 20 and 23, 2001).

In a letter dated February 26, 2002, NOAA Fisheries requested a 60-day extension for completion of the Opinion, and in a letter dated March 21, 2002, the BOR granted the 60-day extension. On April 6, 2002, NOAA Fisheries transmitted the draft Opinion to the BOR and the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) for review and comment. Enclosed with a cover letter dated May 21, 2002, the BOR transmitted comments on the draft Opinion documenting its concerns regarding the Opinion's treatment of the environmental baseline, the effects analysis, and the reasonable and prudent alternative. In a letter dated May 15, 2002, the CTUIR provided comments on the draft Opinion regarding the use of McKay Reservoir storage for fish flows, the BOR's discretionary authority, government to government consultation, the importance of habitat restoration, and various technical issues.

The draft Opinion generated active discussions between the BOR and NOAA Fisheries. During these discussions, it became apparent that NOAA Fisheries and the BOR did not have a mutual understanding of the proposed action, how it affects the baseline, and other matters. Michael Crouse and Michael Tehan of NOAA Fisheries met with Rich Rigby and Ron Eggers of the BOR on May 29 and July 30, 2002, to develop a process for completing consultation. The BOR's August 19, 2002 letter oulined the process. This process included the development of a supplemental BA by the BOR, technical discussions between NOAA Fisheries and Reclamation staff, and engaging the CTUIR and the four project irrigation districts. NOAA Fisheries received the draft supplemental BA from the BOR on January 2, 2003, and provided comments to the BOR in a March 6, 2003, meeting. NOAA Fisheries received a complete supplemental BA on the Umatilla and Umatilla Basin Projects on May 27, 2003, and consultation was initiated at that time.

On August 12, 2003, NOAA Fisheries met with the BOR to discuss the consultation. NOAA Fisheries informed the BOR that their focus would be on McKay Creek since the projects greatest effects on Middle Columbia River (MCR) steelhead (*Oncorhynchus mykiss*) were associated with McKay Creek. The BOR was supportive of this approach. Plans were made to set up a meeting in the field to discuss the operation of the Umatilla and Umatilla Basin Projects, visit the facilities, and visit McKay Creek to gain a preliminary understanding of habitat condition and information needs. The meeting in the field occurred on September 9 and 10, 2003, and was attended by the BOR, NOAA Fisheries, FWS, CTUIR, Oregon Water Resources Department, Oregon Department of Fish and Wildlife (ODFW), and Westland Irrigation District. The meeting included a discussion of the details of the operation and maintenance of the Umatilla and Umatilla Basin Projects, as well as issues associated with allowing adult salmonid use in McKay Creek.

The continued operation and maintenance of the Umatilla and Umatilla Basin Projects would likely affect tribal trust resources. Because the action is likely to affect tribal trust resources, NOAA Fisheries has contacted the CTUIR pursuant to the Secretarial Order (June 5, 1997). On August 6, 2003, Scott Hoefer, NOAA Fisheries, had a conference call with Brian Zimmerman and Harold Shepherd, both of CTUIR, to discuss NOAA Fisheries' approach to the consultation. CTUIR was supportive of NOAA Fisheries' approach, but was concerned that any additional flows necessary to improve conditions in McKay Creek would come out of the existing fish pool in McKay Reservoir and limit their ability to meet established fish target flows in the lower Umatilla River.

NOAA Fisheries shared draft biological opinions with the BOR on November 20, 2003, and again February 27, 2004, receiving their comments and incorporating them into the document.

### 1.2 Proposed Action

Proposed actions are defined in the Services' consultation regulations (50 CFR 402.02) as "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas." Additionally, U.S. Code (16 U.S.C. 1855(b)(2)) further defines a Federal action as "any action authorized, funded, or undertaken or proposed to be authorized, funded, or undertaken by a Federal agency." Because the BOR proposes to continually operate and maintain the Umatilla and Umatilla Basin Projects that may affect listed resources, it must consult under ESA section 7(a)(2) and MSA section 305(b)(2).

The BOR's proposed action is the continued operation and maintenance of Project facilities in the Umatilla River basin. This includes the operation and maintenance of McKay and Cold Springs Reservoir storage facilities, diversion and delivery facilities for West Extension Irrigation District (WEID) and Hermiston Irrigation District (HID), and Federal fish passsage and screening facilities associated with the Project facilities constructed to implement the Project water exchanges.

The facilities are operated to meet authorized Project purposes, including storage and delivery of irrigation water and anadromous fish mitigation. The Project is operated to provide a reliable water supply to participating irrigation districts and to provide favorable conditions in the Umatilla River basin for the recovery of the native steelhead trout population and the continued re-establishment of spring and fall chinook salmon (*O. tshawytscha*) and coho salmon (*O. kisutch*) populations.

The ongoing operational plan provides target flows for migrating anadromous salmonids while continuing to meet existing irrigation needs. The historical diversion practices of Stanfield Irrigation District (SID), HID, and WEID have been altered to help meet instream target flows identified in the 1986 Project Environmental Impact Statement. Project water exchange actions, also known as Phase I and II, replace water diversions from the Umatilla River with water pumped from the Columbia River. The exchange operations are part of an overall plan that includes hatchery production, modern fish release techniques, habitat improvements, and fish passage and protection facilities.

The proposed action also includes the delivery of water through a temporary water service contract (TWSC) to Westland Irrigation District (WID) for the 2004 irrigation season. The TWSC is needed while the BOR continues its assessment of the proposed WID boundary adjustment. The BOR has been issuing TWSCs since 1995, to irrigate lands outside of the WID boundary. The TWSC will not increase the amount of Federal water delivered to the district before the first TWSC in 1995; it will, however, increase the land area on which Federal water can legally be distributed. The BOR has determined, using the Riverware Model, that 1,897 acre-feet of WID water from McKay Reservoir is necessary to mitigate for changes in return flows resulting from the issuance of the TWSC. Before the recent development of the ground water object for the Riverware Model, 6,301 acre-feet of McKay Reservoir water was used to mitigate for changes in return flows resulting from the issuance of the TWSC. This water was a combination of WID contracted water and residual water.

The action area is defined as all areas affected directly or indirectly by the Federal action, except as covered by the FCRPS BA. In general, the action area begins at the Project reservoirs and includes the stream/river reaches downstream from the reservoirs, the mainstem Umatilla River to its confluence with the Columbia River, the Columbia River from the mouth of the Umatilla River upstream 8.5 river miles to the BOR's Columbia River Pumping Plant, and the Federal irrigation facilities that make up the three Project irrigation divisions in north central Oregon. The East Division includes HID, the West Division includes WEID, and the South Division includes SID, WID, and numerous individuals. The Columbia River downstream of the Umatilla River is not within the action area, because the aggregate effects of all 19 BOR tributary projects, including the Umatilla and Umatilla Basin Projects, on streamflows in the mainstem Columbia River were considered in the FCRPS Opinion.

### 1.2.1 Phase I and II Exchange Operations

The essence of the Umatilla Basin Project is a water exchange program which allows live and stored Umatilla River flows to remain instream for fish while Columbia River water is used for irrigation. The exchange involves Umatilla River live flows, stored water in McKay reservoir, and Columbia River water. Exchange facilities were constructed in two phases: Phase I was completed in 1992 and Phase II was completed in September 1999. The exchanges are triggered when Umatilla River flows begin to fall and approach the target flows identified in Table 1.1. When an exchange is in place, some Federal irrigation diversions from the Umatilla River are reduced or eliminated (BOR 2001).

**Table 1.1** Umatilla River Target Flows, Mouth to McKay Creek (BOR 2001).

| Period | Target Flow (cfs) |
|---|---|
| October 1 - November 15 | 300 |
| November 16 - June 30 | 250 |
| July 1 - September 15 | 0 |
| September 16 - September 30 | 250 |

#### 1.2.1.1 Phase I Exchange

Phase I exchange facilities were constructed to deliver exchange water to WEID. Columbia River exchange water is diverted at the McNary Dam left bank fish ladder structure, conveyed two miles by a concrete lined canal to a pumping plant near the city of Umatilla. Water is then pumped through a 3/4-mile pipeline into the existing WEID canal. The exchange facilities include a pumping plant south of the City of Umatilla. This plant has five pumps with a total design capacity of 140 cfs (BOR 2001).

The purpose of the WEID water exchange is to augment instream flows for the lower three miles of the Umatilla River when river flows approach or fall below seasonal target flows at Three Mile Dam at River Mile (RM) 3 (BOR 2001). In exchange for receiving pumped Columbia River water, WEID reduces its Umatilla River diversion by up to 140 cfs at the Three Mile Diversion Dam, allowing the water to flow in channel to the Columbia River. The WEID water exchange is a bucket for bucket, simultaneous exchange. The primary operational months for the WEID water exchange are May-June, and August-October (BOR 2001). Water exchange facilities first became fully operational for the 1993 irrigation season. During summer months (July 1 to August 15), WEID irrigation water is diverted from the Umatilla River at the WEID canal or at their private pump at RM 0.5 on the Umatilla River (BOR 2001).

In operating the Phase I exchange, the Umatilla River Coordinator (BOR employee) notifies WEID of the amount of water that is protected at Three Mile Dam (McKay fish flow releases, plus SID and HID live flows foregone under senior water rights), and the amount that can be exchanged (the lesser of WEID’s demand and the live flow available to divert). If the target flow is greater than the flow already protected, the amount that can be exchanged for pump water is the difference between the two (up to a maximum of 140 cfs).

#### 1.2.1.2 Phase II Exchange Facilities

Phase II water exchange facilities were constructed to serve HID and SID. The purpose of the water exchange is to provide Umatilla River instream flows from McKay Creek downstream to the Columbia River and to assure continued water deliveries to the irrigation districts (BOR 2001). Major exchange facilities include the Columbia River Pumping Plant, Columbia-Cold Springs Reservoir Canal, Cold Springs Pumping Plant and various other canals and relift pumps. Construction of Phase II facilities began in 1993 and was completed in September 1999 (BOR 2001).

Phase II Project facilities deliver exchange water from the Columbia River Pumping Plant (approximately 8.5 miles upstream from the mouth of the Umatilla River) to SID and HID when flows in the Umatilla River approach or fall below seasonal targets (Table 1.1). Exchange facilities can pump a maximum of 240 cfs from the Columbia River. HID exchange water is stored or routed through Cold Springs Reservoir, and SID exchange water is delivered directly into the SID system (BOR 2001).

### HID Phase II Exchange

The Phase II HID exchange involves the pumping of water to Cold Springs Reservoir from the Columbia River in exchange for foregone diversions from the Umatilla River by HID. HID forgoes Feed Canal diversions when there is less than 80 cfs of live flow above seasonal target flows in the Umatilla River (Table 1.1).

Since Cold Springs is filled during the winter and spring when Umatilla River flows are above target flows, this exchange uses a crediting system (BOR 2001). If winter/spring diversions are foregone, HID accumulates exchange credits equal to the amount of the foregone diversions, with the credits accumulating over the course of the normal Cold Springs Reservoir refill period. If at the end of the refill period winter/spring flows have been sufficient in the Umatilla River to enable HID to divert their full storage right into Cold Springs, then the exchange credits are not used during the irrigation season and no water is pumped from the Columbia River to Cold Springs. Conversely, if the reservoir does not fill, then water can be pumped from the Columbia River into Cold Springs over the course of the irrigation season at slow rates, or at higher rates over shorter time period of favorable flows in the Columbia River. Water pumped from the Columbia River to Cold Springs Reservoir cannot exceed the total amount of exchange credits available (BOR 1988, 2001).

HID can request pumped exchange water when Cold Springs storage is projected to be insufficient to meet HID's needs for the season. During the period of 1997-1999, HID requested exchange water one season (BOR 2001). From July 31 to September 4, 1998, 11,000 acre-feet of Columbia River water was pumped into Cold Springs Reservoir for HID at an average rate of 140 cfs (BOR 2001).

### SID Phase II Exchange

SID historically diverted live Umatilla River flows and water releases from McKay Reservoir into the Furnish Canal for direct supply to district and other contracted users. Under Phase II water exchanges, SID forgoes some live flow diversions from the Umatilla River when decreasing river flows approach target flows (Table 1.1). This exchange is implemented mid to late spring when flows in the Umatilla River begin to decline (BOR 2001).[5] SID also exchanges its contracted and reserved storage water in McKay Reservoir (up to about 25,000 acre-feet) for Columbia River water. As long as the exchange facilities are operating, virtually all of SID's McKay storage is exchanged (BOR 2001).[6] Timing of the release of the exchanged storage is at the discretion of the CTUIR and the ODFW. Once the exchanged water is released from McKay it is protected from further appropriation in the Umatilla River down to the mouth.

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[5] Live flow diversions that are foregone and exchanged are protected from further appropriation in the Umatilla River down to the mouth.

[6] After water exchange begins, the Furnish Canal is still used to divert live flow and McKay water to serve 606 non-federal acres that are not part of the exchange. Approximately 8 cubic feet per second (cfs) is diverted during this period (BOR 2001).

Foregone natural flows are used to meet instream target flows in the Umatilla River for fish passage. McKay storage releases may also be used to meet instream target flows (BOR 2001). The SID exchange provides the district with an annual supply of up to 34,700 acre-feet from the Umatilla and Columbia Rivers. This exchange is intended to be bucket for bucket exchange over the long term. BOR project data indicate that the amount of water left instream and exchanged does not balance every year, but does average out over time (BOR 2001).

### 1.2.2 Cold Springs Dam

Cold Springs Dam is on Cold Springs Creek near Hermiston, Oregon, and has an active storage capacity of 38,330 acre-feet (BOR 2001). Flow releases from Cold Springs are entirely for irrigation. Historical operations involved the diversion of water from the Umatilla River from November to June through Feed Canal at RM 29 near the town of Echo, into Cold Springs Reservoir. Water is then released for irrigation purposes during April-September. Columbia River water can be fed into the reservoir from the Columbia-Cold Springs Canal as part of the exchange program (BOR 2001).

Current operations, which involve an exchange with the Columbia River, still involve the diversion of live Umatilla River flow during the period from November to June, however, diversions are foregone in exchange for Columbia River diversions if flow conditions in the Umatilla River approach the target flows utilized by the BOR (Table 1.1). Under a credit system, if November to June diversions for Cold Springs Reservoir are foregone, Columbia River pumping fills the reservoir during the spring or summer. Flow releases from Cold Springs reservoir occur from April to September (BOR 2001).

### 1.2.3 McKay Reservoir Ongoing Operations

#### 1.2.3.1 Storage

Water is stored in McKay Reservoir and subsequently used for irrigation and the tribal fishery. The reservoir also supports a warm water bass fishery. McKay Reservoir provides 6,000 acre-feet of exclusive flood control capacity.

Irrigation

Pursuant to a series of contracts, the BOR has delivered and proposes to continue delivering, water stored in McKay Reservoir to the WID and 75 individual contracts. In recent years, stored water has been made available to the parties for irrigation in the maximum amounts shown in Table 1.2, in years when McKay Reservoir fills.

**Table 1.2** Maximum amount of McKay Reservoir storage water made available to parties for irrigation in recent years when the reservoir has filled (BOR 2003a).

| Contractor | Maximum Volume Available (acre-feet) |
|---|---|
| WID | 25,752 |
| 75 Individual Contracts | 5,986[7] |
| **Total** | **31,738** |

The amount available to WID is less than that available to the district before 1995, when a series of one-year TWSCs were issued for the irrigation of lands outside the formal district boundary. In conjunction with this contract action, WID has made water available to the CTUIR fishery as mitigation to the stream for impacts associated with service to out-of-boundary lands. Past and present mitigation efforts, and future expectations, are discussed below.

The water available to individual contractors has declined slightly over the years, as minor adjustments have been made when contract assignments or changes in place of use have been approved. When McKay Reservoir does not fill, water supplies available to each contractor are prorated according to contract provisions based on the actual volume of stored water available.

CTUIR Fishery

The BOR has delivered, and proposes to continue delivering, water stored in McKay Reservoir to the CTUIR fishery. Table 1.3 shows the volumes of stored water that have been made available to the CTUIR fishery when McKay Reservoir fills.

**Table 1.3** Maximum amount of McKay Reservoir storage water made available to the CTUIR fishery in recent years when the reservoir has filled (BOR 2003a).

| Source | Maximum Volume Available (acre-feet) |
|---|---|
| SID | 27, 330 |
| Not Contracted to Individuals | 165[8] |
| Mitigation from WID | 6,301 |
| **Total** | **33,796** |

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[7] Includes 280 acre-feet identified for potential resolution of existing controversy over the contract rights of the Marion Jack Improvement Ditch Company.

[8] Does not include 280 acre-feet that has been identified for resolution of a contract dispute. If resolution is not achieved in the near term, this water would presumably be dedicated to the CTUIR fishery.

The 27,330 acre-feet attributed to SID represents water that had been made available to SID before implementation of the exchange authorized under the Umatilla Basin Project Act of October 10, 1988. The 165 acre-feet not contracted to individuals is water that the BOR has separately dedicated to the CTUIR fishery.

The 6,301 acre-feet attributed to WID is McKay water that was dedicated to the CTUIR fishery from water previously made available to WID, to mitigate for TWSCs serving lands outside the district boundary approved by the BOR. The volume of mitigation water was set through negotiations between the CTUIR and WID.

Beginning with the 2003 season, the CTUIR and the WID agreed to identify the volume of storage space required for mitigation through the BOR's Riverware hydrology model, developed for this purpose. The model was refined through the active participation of model experts from the BOR, WID, CTUIR, and a Bureau of Indian Affairs consultant. The model was used to determine that 1,897 acre-feet of water is required to mitigate the effects of the 2003 and 2004 TWSC on return flows (BOR 2003b). Table 1.4 shows the volumes of stored water made available to the CTUIR fishery in 2003 (CTUIR 2003).

**Table 1.4** Amount of McKay Reservoir storage water made available to the CTUIR fishery in 2003 (CTUIR 2003).

| Source | Volume (acre-feet) |
|---|---|
| SID | 25,223 |
| Mitigation from WID | 1,897 |
| Other | 2,619 |
| **Total** | **29,739** |

Flood Control

The Act of March 11, 1976 (90 Stat. 205, Public Law 94-288), assigned 6,000 acre-feet of McKay Reservoir space to flood control. This reservation is exclusive, meaning no water is stored in the flood control space.

Pool for Resident Fish

The BOR's February 12, 1988, *Umatilla Basin Report Planning Report – Final Environmental Statement* provided, in the Environmental Commitments section, for maintenance of a minimum reservoir pool of 6,800 acre-feet for the in-reservoir fishery. Actual operations in severe drought conditions since 1988 have resulted in minimum elevations below 6,800 acre-feet.

#### 1.2.3.2 Operations

Runoff is captured and stored in McKay during the winter and spring (December-May). The present operating scheme to reduce risk of dam failure in the probable maximum flood and to reduce risk of irrigation shortages in dry years, is to limit storage to a maximum of 29,000 acre-feet from the end of the irrigation season until December 1. From December 1 until February 28, the reservoir is allowed to fill to 61,700 acre-feet at an approximately uniform rate. From February 28 to March 31, the reservoir can fill to 65,534 acre-feet. The remaining 6,000 acre-feet of space is maintained exclusively for flood control. Should the reservoir inflow exceed the allowable fill rate as previously described, releases occur to maintain the filling schedule without exceeding the maximum release of 1,000 cfs before April 1, when vacant space exceeds 6,000 acre-feet, and 2,000 cfs after April 1. If inflows are insufficient to follow the filling schedule, all available inflow, over the minimum 10 cfs release, will be stored.

With implementation of Phase II exchange, McKay Reservoir will have higher water levels during the summer months than has historically occurred, since water will not be released for diversion by SID. SID's storage water in McKay will be used by ODFW and CTUIR for enhancing stream flows and providing attraction flows for returning adult salmonids. CTUIR and ODFW have developed recommendations for augmenting flow using McKay Reservoir water releases. Table 1.5 displays these recommendations for 2001. This prioritization schedule is dynamic, and the flow releases are not exact. They will attempt to maximize or exceed these levels depending on storage availability. Water supply estimations are made in late May or early June by ODFW and CTUIR to help decide if priority 3 flow releases can be accomplished that year without threatening the ability to meet priority 2 flow releases later in the fall. Storage levels in McKay Reservoir, and Umatilla River flows at Pendleton in late May are the most important parameters examined to determine if priority 3 flows can be made.

**Table 1.5** Recommended 2001 McKay Reservoir releases, for lower Umatilla River flow augmentation.

| Release Period | Flow (cfs) | Primary Release Purpose | Release Priority |
|---|---|---|---|
| Spring - June 30 | 150 | spring chinook adults, juvenile fall chinook out-migration, lamprey adults | 1 |
| July 1 - September 30 | 50 | steelhead, coho, lamprey juvenile rearing, juvenile fall chinook out-migration, lamprey adults | 3 |
| October 1 - November 15 | 150 | Adult fall chinook, steelhead, and coho | 2 |

The CTUIR and ODFW have authority to make requests for McKay fish water releases through the BOR's River Coordinator who will then request the BOR to implement the action. The BOR's River Coordinator, CTUIR, and ODFW have the primary responsibility to monitor the river flows.

The Umatilla River water master will monitor fish water (through Hydromet gauges) released from McKay Reservoir or bypassed at irrigation diversions, with the objective of assuring this water reaches the mouth of the Umatilla River.

Fish migration flows from McKay Reservoir are protected by the Oregon Water Resources Department (OWRD) to ensure that water released for fish remains in the Umatilla River and flows into the Columbia River. The OWRD regulates project related flows in accordance with permits, rights, and agreements applicable to the project, and monitors to ensure 95% of McKay fish flow releases to arrive at the Umatilla River below Dillon Diversion (UMDO) gauge (RM 24) and 90% at the Umatilla River near Umatilla, Oregon (UMAO) gauge (RM 2). This protected water cannot legally be diverted for other uses. Onsite water regulation and enforcement is provided through OWRD's water master division office in Pendleton, Oregon.

### McKay Creek Fish Barrier

After reintroduction of spring chinook and coho salmon to the basin, it was discovered that adult salmon and steelhead were attracted to McKay Creek, particularly in the fall months when flows in the Umatilla River were low and warm, and McKay Creek had higher flows of cool water. It was not desired to have salmon spawning in McKay Creek however, because historical dam operations shut down all water releases from the reservoir during winter-spring months, which dewatered McKay Creek.

In 1995, a fish weir was constructed at the mouth of McKay Creek, to prevent adult salmon and steelhead from accessing the lower six miles of the stream below McKay Reservoir. The barrier weir was built by the BOR and ODFW. The barrier weir is constructed of slanted bars, spaced to prevent passage of adult salmonids.

The BOR maintains and cleans the weir of debris, which collects on the slats. Debris collecting on the weir is particularly problematic during leaf fall periods, and in the spring when property owners dump yard waste into McKay Creek. These time periods coincide with the returns of adult salmon and steelhead into the basin. Fish attraction to McKay Creek is especially high in the fall (September-November), when McKay Reservoir water releases for instream flows are higher than flows coming down the main Umatilla River. Water temperatures in McKay Creek are usually cooler than the main Umatilla River in September and October. Debris buildup causes sections of slats to collapse, rendering the barrier ineffective until it is cleaned. Cleaning the structure requires use of hand rakes from a walkway above the barrier.

In December of 1999, it was discovered that large numbers of juvenile steelhead/rainbow trout and salmon had been using lower McKay Creek as rearing habitat, upstream of the fish barrier. Juvenile salmonids can swim through the fish barrier slats. After flow releases were shut off from the dam and the channel was dewatering, ODFW was notified of potential adult steelhead trapped in the receding pools of McKay Creek. During fish salvage efforts by ODFW and CTUIR, about 2,300 juvenile coho salmon, 1,100 juvenile steelhead/rainbow trout, one adult steelhead, 600 whitefish, and two bull trout were salvaged from the receding flows of McKay Creek. These fish were released in good condition into the Umatilla River. However, several hundred additional juvenile salmonids had perished in dry channel areas, along with several adult coho and fall chinook salmon.

Fish Passage and Fish Protective Facilities
Bonneville Power Administration (BPA) contracts with the irrigation districts for the operation and maintenance of the fish protection facilities. These facilities meet NOAA Fisheries' juvenile fish screen criteria (NMFS 1995). The CTUIR and ODFW staff oversee all passage efforts. They oversee Westland and Three Mile trap and haul efforts during times when flows require fish to be trapped and hauled around dry sections of stream, and determine the type and timing of needed maintenance. All drum screens will be rescreened over the next three years.

### 1.2.4 Irrigation Diversion Operations

#### 1.2.4.1 West Extension Irrigation District

WEID currently irrigates about 9,275 acres of land, with 2,860 of these acres outside of federally-recognized boundaries. WEID typically uses about 68,000 acre-feet of water annually. WEID has a variety of water rights which are used to provide water to its customers. During most of the irrigation season, WEID's demands are met from Umatilla River live flows, either by diversion of those flows or by exchange. When WEID's demands are greater than the Umatilla River live flow available for diversion or exchange, WEID's water needs can then be met through use of their secondary Columbia River water right. This water right can be delivered through Phase I exchange facilities, when capacity is available and WEID agrees to pay the conjunctive use charge. This water right can also be delivered through WEID's private pump station on the Umatilla River. In recent years, WEID has not purchased conjunctive use water from the BOR because they find that pumping costs are lower using their private facilities.

WEID's private pumping faciility is near the mouth of the Umatilla River (RM 0.5), and utilizes a Columbia River water right from backwaters of the John Day Dam. This facility was constructed in 1968 and has three vertical turbine pumps with a combined capacity of 90 cfs. The station delivers water through a 770-foot long, 36-inch diameter pipeline into the WEID main canal (a BOR canal) with a lift of about 120 feet. This pump had fish screens installed in the late 1990s. WEID typically pumps water from their private facility during peak demand periods, primarily July and August, when their water demand can not be met from diversions at Three Mile Dam or Phase 1 exchange flows.

WEID's irrigation return flows spill directly or seep to the Coumbia River. Spill facilities are used operationally and under emergency situations. A spillway at the end of the main WEID canal drains water into the Columbia River west of Boardman, Oregon. Another operational spill drains water into the Umatilla National Wildlife Refuge and two ponds near Irrigon, Oregon. An emergency spill facility drains water directly into the Columbia River from the main WEID canal near their private pumping plant on the Umatilla River. Other emergency spill facilities near Coyote Springs (seeps into ground), at pond sites west of Irrigon, and the Umatilla National Wildlife Refuge, where the main canal intersects Interstate 84. Water quality monitoring data is not available on water drained directly into the Columbia River from WEID operations.

#### 1.2.4.2 Westland Irrigation District

In recent years, WID has been delivering Federal project water to about 7,395 acres within their federally-recognized boundaries, and to about 7,023 acres outside of their federally-recognized boundaries. Federal project water to WID comes exclusively from releases of water stored in McKay Reservoir. Since 1995, the BOR has issued a TWSC annually to WID, authorizing delivery of Federal water to out-of-boundary lands. The BOR is in the process of a boundary adjustment for WID. Current operations include water delivered to WID under a TWSC while the boundary adjustment proceeds.

Irrigation return flow from WID drains into the Umatilla River at RM 5. The F Canal Drain is at the end of a branch of the Westland Canal. Water quality monitoring of return flows is not available.

#### 1.2.4.3 Stanfield Irrigation District

In recent years, SID has been delivering Federal project water to about 7,520 acres within their federally-recognized boundaries, and to about 255 acres outside of their federally-recognized boundaries. The boundary adjustment for SID is almost complete pending the signature of the contract. Compliance activities have been completed. Current operations include water delivered to SID. Historically, Federal project water to SID came exclusively from releases of stored water in McKay Reservoir. SID is entitled, under Oregon State law, to divert up to 34,700 acre-feet of water annually. As outlined in the permit, the 34,700 acre-feet was based on SID's "historical average supply of Umatilla River and McKay Reservoir water." The exchange agreement covers all of SID's diversions, including water delivered under Federal storage contract, which, before Project water exchanges, was provided from McKay Reservoir. SID delivers non-federal water to 2,987 acres of land outside of their federally-recognized boundaries, using their 1965 live flow water right.

McKay Reservoir water contracted to, or historically used by SID (up to about 25,000 acre-feet), is now exchanged with Columbia River water and used to augment streamflows in the Umatilla River during migrational periods for anadromous salmonids. Some of SID's McKay storage is still used for irrigation. There are a few water users on the Furnish Canal near the headgate who cannot be served by the exchange facilities. Approximately eight cfs serves 606 acres that are not part of the exchange. In the event that there is an outage at the Columbia River Pumping Plant and it cannot provide exchange water for SID's McKay storage, SID retains the right to receive water from McKay Reservoir.

Periods of water exchange are refined by calls made for fishery migration water (within the target flow quantity) by CTUIR and ODFW. The SID operates under 1992 and 1995 Exchange

Agreements with the BOR. The CTUIR and ODFW manage the timing and quantity of water releases using SID's McKay Reservoir storage space.

When SID's water demand cannot be met by live flow diversions (or live flow exchange water), they call for Columbia River pumped water in exchange for their McKay Reservoir storage. SID's live flow diversions from the Umatilla River are measured in the Furnish Canal gauge (FURO). Appendix A in the August 2001 final BA contains 1996-1999 records of this diversion and SID's exchange water from the Columbia river (SBEO minus CRSO). The SBEO gauge measures all Phase II exchange water coming from the Columbia River, and the CRSO gauge measures operational spill water, and any requested exchange water for HID (delivered into Cold Springs Reservoir).

The Columbia River Pumping Plant will deliver water to canals and pumping facilities serving SID, and to Cold Springs Reservoir for release to HID. During the summer months, pumping will vary from about 50 to 250 cfs, with the full capacity being used only in years when both SID and HID are receiving exchange waters (when Cold Springs Reservoir can not be filled due to exchange operations). SID's exchange water will be routed around Cold Springs Reservoir via the Cold Springs Pumping Plant, and then through the Stanfield Relift Pumping Plant to SID lands.

Irrigation return flows from SID empty into the Umatilla River at the Stanfield Canal Drain near RM 21.9. The Stanfield drain primarily carries return flow from SID and limited surface drainage from the intermittent Stage Gulch. Since 1996, the CTUIR has been monitoring the water quality of return flows in the Stanfield Drain.

#### 1.2.4.4 Hermiston Irrigation District

The boundary adjustment for HID is almost complete pending the signature of the contract. Current operations include water delivered to HID. In recent years, HID has been delivering Federal project water to about 9,725 acres within their federally-recognized boundaries, and to about 1,102 acres outside of their federally-recognized boundaries. Included in these lands are approximately 385 acres which are within the SID boundaries and 175 acres at the Oregon State University Experiment Station which are authorized to receive Federal project water. HID's water rights are held in the name of the U.S. Government. HID's water rights allow live flow diversion of about 50,000 acre-feet of water each year through the Feed Canal, at a maximum rate of 280 cfs. At the discretion of the watermaster, HID may divert up to 20% more water into Feed Canal, to make up for seepage losses. HID also has live flow diversion rights at Maxwell Dam, at a maximum rate of 75 cfs. Diversions at Maxwell Dam typically occur between early April and mid-September, and are not subject to target flow restrictions. HID's total annual use of water from Maxwell diversions and Cold Springs Reservoir releases combined is limited to 49,860 acre-feet. Between 1996 and 1999, an average of 9,306 acre-feet of water was diverted annually at Maxwell Dam. Between 1997 and 1999, an average of 42,780 acre-feet of water was diverted annually into the Feed Canal from the Umatilla River.

Irrigation return flows from HID empty into the Umatilla River at three locations. The Maxwell Canal Drain is at RM 9, the Hermiston Canal South Drain at RM 7, and the Hermiston Canal North Drain at RM 5.5.

### 1.2.5 Westland Irrigation District Temporary Water Service Contract for 2004

In 1993, each irrigation district requested adjustment of their boundaries. Every year since 1994, HID, SID, and WID have made annual requests for a TWSC to allow them to deliver water to out-of-boundary lands. As of March 2003, boundary adjustments for HID and SID are almost complete, pending the signature of the contract. NEPA process for WID's boundary adjustment began in 1993, and was reinitiated in 2003, after the necessary analytical tool was developed.

As a component of the proposed actions assessed in this BA, a TWSC would be issued to WID for the 2004 calendar year. This contract authorizes delivery of Federal Project water for lands outside of federally-recognized boundaries. These farmlands historically received water service before October 1988. Issuing a TWSC for the 2004 calendar year will not increase the amount of water the district can legally divert from live flows or reservoir storage, but will increase the land area on which Federal water can legally be distributed. A total of 7,023 acres are proposed for service by WID.

WID is entitled, under Oregon State law to approximately 28,613 acre-feet of water annually from McKay Reservoir storage. This water is provided under Federal storage contract with the BOR. In recent years, WID has been delivering Federal project water to about 7,023 acres outside of their federally-recognized boundaries.

This proposed action involves the release of stored water from McKay Reservoir (typically between May through September each year), for diversion at RM 28 from the Umatilla River. From the diversion dam, water would be conveyed through private canal facilities to farm lands both within and outside of federally-recognized district boundaries. No flow guages exist to track specific quantities of Project water delivered to TWSC lands. It is proposed to allow supplemental irrigation on up to 7,023 acres of out-of-boundary lands through a TWSC. The amount of McKay Reservoir storage water delivered annually to out-of-boundary lands may not exceed 8,000 acre-feet. Lands included in the proposed boundary adjustment all have a primary water right. This proposed action is similar to previous annual water service contracts, which have been issued annually to WID since 1995, with mitigation measures.

On April 29, 2003, WID and the CTUIR signed a Memorandum of Agreement to document agreements for the TWSC and pending boundary adjustment. It provides that WID will mitigate in the Umatilla River for all flow impacts to the stream resulting from the boundary change, as reflected in BOR's Riverware model. The model was refined through the active participation of model experts from the BOR, WID, CTUIR, and a Bureau of Indian Affairs consultant. The model was used to determine that 1,897 acre-feet of water is required to mitigate the effects of the 2004 TWSC on return flows (BOR 2003b). Prior to the recent development of the ground water object for the Riverware Model, 6,301 acre-feet of McKay Reservoir water was used to mitigate changes in return flows resulting from issuance of the TWSC. This water was a combination of WID contracted water and residual water.

NOAA Fisheries determines that the issuance of the WID 2004 TWSC is not likely to adversely affect listed species for the following reason: The TWSC is limited to one year. Adjusting the boundaries will not alter WID's water rights or their actual diversions from the Umatilla River. The only potential source of impact from the proposed action is the alteration of return flows, that could in turn reduce the suitability of instream habitat in the mainstem Umatilla River by reducing instream flow levels, altering the timing of return flows, or altering the location of return flows. Reclamation has modeled the return flow changes associated with delivering water to out of boundary lands and determined that the potential return flow impact is 1,897 acre-feet of water, and therefore WID will relinquish 1,897 acre-feet of McKay Reservoir storage water for off-setting mitigation flows. The 1,897 acre-feet of water will be used for augmenting seasonal instream flows in the Umatilla River from the mouth of McKay Creek to the mouth of the Umatilla River. The timing and quantity of the release of fisheries mitigation flows will be controlled by the CTUIR and the ODFW. The WID 2004 TWSC will not be discussed further in this Opinion.

### 1.3 Description of the Action Area

An action area is defined by the Services' 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 action area affected by the proposed action includes the Umatilla River from its mouth upstream to McKay Creek, McKay Creek from its mouth upstream to and including McKay Reservoir, Cold Springs Creek from its mouth upstream to and including Cold Springs Reservoir, and the Columbia River from the Umatilla River upstream 8.5 river miles to the BOR's Columbia River Pumping Plant. The action area includes all land irrigated by Federal project water. The Columbia River downstream of the Umatilla River is not within the action area, because the aggregate effects of all 19 BOR tributary projects, including the Umatilla and Umatilla Basin Projects, on streamflows in the mainstem Columbia River were considered in the FCRPS Opinion. The action area is within the Umatilla (17070103) hydrologic unit code (HUC) and the Middle Columbia-Lake Wallula (17070101) HUC. The portion of the Umatilla River within the action area serves as rearing habitat for juvenile Middle Columbia River (MCR) steelhead (*Oncorhynchus mykiss*) and as a migratory corridor for juvenile and adult MCR steelhead. McKay Creek, below McKay Reservoir, currently serves only as rearing habitat and a migratory corridor for juvenile MCR steelhead, because of the adult barrier at its mouth. The portion of the Columbia River within the action area serves as a migratory corridor for juvenile and adult MCR steelhead, Snake River Basin (SRB) steelhead, Upper Columbia River (UCR) steelhead, SR spring/summer chinook salmon (*O. tshawytscha*), SR fall chinook salmon, UCR spring-run chinook salmon, and SR sockeye salmon (*O. nerka*). This portion of the Columbia River also provides rearing habitat for some UCR steelhead and UCR spring-run chinook salmon. The entire action area is designated EFH for fall and spring chinook salmon.

# 2. ENDANGERED SPECIES ACT - BIOLOGICAL OPINION

The objective of this Opinion is to determine whether the continued operation and maintenance of the Umatilla and Umatilla Basin Projects is likely to jeopardize the continued existence of the ESA-listed species in Table 2.1 or destroy or adversely modify their designated critical habitat. Critical habitat is designated for SR fall-run chinook salmon, SR spring/summer run chinook salmon, and SR sockeye salmon, but not for the remaining species addressed in this consultation. Therefore, the only part of the action area designated as critical habitat is the 8.5 miles of the Columbia River upstream from the mouth of the Umatilla River.

## 2.1 Evaluating the Effects of the Proposed Action

The standards for determining jeopardy and destruction or adverse modification of critical habitat are set forth in section 7(a)(2) of the ESA. In conducting analyses of habitat-altering actions under section 7 of the ESA, NOAA Fisheries uses the following steps: (1) Consider the biological requirements and status of the listed species; (2) evaluate the relevance of the environmental baseline in the action area to the species' current status; (3) determine the effects of the proposed or continuing action on the species; and (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 effects of the environmental baseline, and any cumulative effects. In completing this analysis, NOAA Fisheries determines whether the action under consultation, together with all cumulative effects when added to the environmental baseline, is likely to jeopardize the ESA-listed species or result in the destruction or adverse modification of critical habitat.

### 2.1.1 Biological Requirements

The first step NOAA Fisheries uses when applying ESA section 7(a)(2) to the listed ESUs considered in this Opinion includes defining the species' biological requirements within the action area. Biological requirements are population characteristics necessary for the listed ESUs to survive and recover to naturally-reproducing population sizes, at which time protection under the ESA would become unnecessary. The listed species' biological requirements may be described as characteristics of the habitat, population or both (McElhany *et al.* 2000).

For actions that affect freshwater habitat, NOAA Fisheries may describe the habitat portion of a species' biological requirements in terms of a concept called properly functioning condition (PFC). PFC is defined as the sustained presence of natural habitat-forming processes in a watershed that are necessary for the long-term survival of the species through the full range of environmental variation (NMFS 1999). PFC constitutes the habitat component of a species' biological requirements. NOAA Fisheries typically considers the status of habitat variables in a matrix of pathways and indicators (MPI) (NMFS [1996], Table 1) in which baseline environmental conditions are described as "properly functioning," "at risk," or "not properly functioning."

Key habitat components for the listed species are: (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. For this consultation, the key habitat components that function to support successful adult and juvenile migration, adult holding, spawning, incubation, rearing, and growth and development to adulthood include substrate, water quality, water quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, and safe passage conditions. The majority of the key habitat components are included in the MPI (NMFS 1996) (discussed in more detail in section 2.2.1). Many of the key habitat components have streamflow and water quality as a common denominator in that flowing water of sufficient quality is central to the sustained presence of natural habitat-forming processes needed to meet the life stage needs of listed species. These include juvenile rearing areas and migration corridors, adult migration corridors and spawning areas, and areas for growth and development to adulthood.

### 2.1.2 Status and Generalized Life History of Listed Species

In this step, NOAA Fisheries considers the current status of the listed species within the action area, taking into account population size, trends, distribution, and genetic diversity. To assess current status of the listed species, NOAA Fisheries starts with the determinations made in its decision to list the species and considers any new data that is relevant to the species' status. Please refer to Appendix A which includes a discussion of the general life history of the listed species.

The BOR found that ongoing operation and maintenance of the Umatilla and Umatilla Basin Projects is likely to adversely affect MCR steelhead, and not likely to adversely affect SRB steelhead, UCR steelhead, SR spring/summer chinook salmon, SR fall chinook salmon, UCR spring-run chinook salmon, and SR sockeye salmon and designated critical habitat identified in Table 2.1. Based on the life history of MCR steelhead, the BOR determined it likely that incubating eggs, juveniles, smolts, and adults of this listed species would be adversely affected by ongoing operation and maintenance of the Umatilla and Umatilla Basin Projects. Based on life histories of the remaining ESUs the BOR determined it is not likely that rearing and migrating juveniles and migrating adults would be adversely affected by the ongoing operation and maintenance of the projects. However, as the following analysis documents, NOAA Fisheries has determined it is likely that rearing and migrating juveniles and migrating adults would be adversely affected by the ongoing operation and maintenance of the projects.

Of the seven listed species addressed in this consultation, only MCR steelhead are found in the Umatilla Basin. The remaining six species are only found in the Columbia River, and primarily use it as a migration corridor. There may be some rearing in the Columbia River portion of the project area by juvenile UCR spring-run chinook, UCR steelhead, and SR fall-run chinook carried downstream during high flow events. Appendix A discusses species descriptions, critical habitat designations, general life histories, population dynamics and distribution at the ESU scale, and the potential for extinction for each of the species. Some additional details regarding MCR steelhead in the Umatilla Basin are discussed below.

**Table 2.1** References for additional background on listing status, critical habitat designation, protective regulations, and life history for the ESA-listed species considered in this consultation.

| Species ESU | Status | Critical Habitat Designation | Protective Regulations | Biological Information/Population Trends |
|---|---|---|---|---|
| **Steelhead** (*Oncorhynchus mykiss*) | | | | |
| Middle Columbia River | Threatened; March 25, 1999; 64 FR 14517 | February 16, 2000, 65 FR 7764* | July 10, 2000; 65 FR 42422 | Busby *et al.* 1995; Busby *et al.* 1996; ODFW and WDFW 1998 |
| Snake River Basin | Threatened; August 18, 1997; 62 FR 43937 | February 16, 2000, 65 FR 7764* | July 10, 2000; 65 FR 42423 | Busby *et al.* 1995; Busby *et al.* 1996; ODFW and WDFW 1998 |
| Upper Columbia River | Endangered; August 18, 1997; 62 FR 43937 | February 16, 2000, 65 FR 7764* | ESA prohibition on take applies | Busby *et al.* 1995; Busby *et al.* 1996; ODFW and WDFW 1998 |
| **Chinook Salmon** (*O. tshawytscha*) | | | | |
| Snake River fall-run | Threatened; April 22, 1992; 57 FR 14653 | December 28, 1993, 58 FR 68543 | July 22, 1992; 57 FR 14653 | Waples *et al.* 1991a; Healey 1991; ODFW and WDFW 1998 |
| Snake River spring/summer-run | Threatened; April 22, 1992; 57 FR 14653 | December 28, 1993, 58 FR 68543 and October 25, 1999, 64 FR 57399 | April 22, 1992; 57 FR 14653 | Matthews and Waples 1991; Healey 1991; ODFW and WDFW 1998 |
| Upper Columbia River spring-run | Endangered; March 24, 1999; 64 FR 14308 | February 16, 2000; 65 FR 7764* | ESA prohibition on take applies | Myers *et al.* 1998; Healey 1991; ODFW and WDFW 1998 |
| **Sockeye Salmon** (*O. nerka*) | | | | |
| Snake River | Endangered; November 20, 1991; 56 FR 58619 | December 28, 1993; 58 FR 68543 | ESA prohibition on take applies | Waples *et al.* 1991; Burgner 1991; ODFW and WDFW 1998 |

*On April 30, 2002, the United States District Court for the District of Columbia adopted a consent decree resolving the claims in the National Association of Homebuilders, *et al.* v. Evans, Civil Action No. 00-2799 (CKK) (D.D.C., April 30, 2002). Pursuant to that consent decree, the court issued an order vacating critical habitat designations for this species.

#### 2.1.2.1 Middle Columbia River Steelhead

MCR steelhead spawn throughout the Umatilla River and tributaries where habitat is accessible and conditions are suitable. In the Umatilla River, spawning occurs primarily above Meacham Creek. One to 10 adult steelhead have been documented at Three Mile Dam during the month of August, since 1998, but the peak of the adult migration into the Umatilla River occurs between December and March. Spawning normally begins in March, with peak spawning occurring in April and May. Fry typically emerge between mid-to-late May to early July, depending on time of spawning and water temperature during incubation (BOR 2003a). Wild smolt outmigration for MCR steelhead in the Umatilla Basin occurs from January to July, and peaks in May at Three Mile Dam (BOR 2003a).

All adult steelhead have been trapped and counted at Three Mile Dam since the 1990 brood year (BOR 2003a). Table 2.2 shows the total number of adults passing Three Mile Dam for return years 1990 through 2002. The upward trend in population abundance from the low adult return in 1998 is likely the result of several environmental factors, including but not limited to improved ocean conditions which includes cooler water temperatures, altered distribution of predators, and increased productivity that enhances juvenile steelhead survival during their early ocean residency; improved smolt passage conditions in the lower Columbia River migratory corridor at the three U.S. Army Corps of Engineers dams (John Day, The Dalles, and Bonneville) which included more efficient passage, bar screens, increased spill, and decreased total dissolved gas (TDG); improved environmental conditions and improved streamflows within the basin; and the pump exchange improvement in the Umatilla River. The total returning adult steelhead population has more than doubled since 1988, while the natural component of the run has increased about 60% (BOR 2003a).

Since the 1988 return year, adult hatchery steelhead have made up an average of 31.3% of the total adult steelhead run. Percentages ranged from a low of 6.7% in 1988, to a high of 59.1% in 1997. The arrival time of wild and hatchery adult steelhead at Three Mile Dam was very similar for return years 1994 to 2000 (BOR 2003a). Table 2.3 shows the number of hatchery and wild adults at Three Mile Dam for return years 1988 to 2002. The April 2002 Interior Columbia Basin interim abundance target for the Umatilla population of the MCR steelhead ESU is 2,300 spawning individuals (NOAA Fisheries 2002). This value was exceeded by 11.9% for return year 2001 and 59% for return year 2002.

**Table 2.2** Monthly and annual passage of adult steelhead over Three Mile Dam (BOR 2003a).

| Ret. Year | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1990 | 0 | 0 | 119 | 63 | 7 | 484 | 221 | 551 | 164 | 85 | 0 | 0 | 1,694 |
| 1991 | 0 | 0 | 15 | 47 | 46 | 62 | 452 | 219 | 238 | 32 | 1 | 0 | 1,112 |
| 1992 | 0 | 41 | 118 | 378 | 773 | 131 | 306 | 568 | 435 | 19 | 0 | 0 | 2,769 |
| 1993 | 0 | 0 | 2 | 23 | 28 | 81 | 163 | 771 | 796 | 49 | 0 | 0 | 1,913 |
| 1994 | 6 | 16 | 102 | 5 | 23 | 505 | 29 | 365 | 226 | 13 | 0 | 0 | 1,290 |
| 1995 | 0 | 1 | 60 | 111 | 298 | 254 | 383 | 295 | 114 | 13 | 2 | 0 | 1,531 |
| 1996 | 0 | 63 | 199 | 320 | 540 | 301 | 54 | 465 | 123 | 14 | 2 | 0 | 2,081 |
| 1997 | 0 | 29 | 174 | 94 | 384 | 579 | 454 | 491 | 324 | 29 | 9 | 0 | 2,477 |
| 1998 | 1 | 149 | 182 | 156 | 68 | 287 | 237 | 500 | 176 | 6 | 3 | 0 | 1,765 |
| 1999 | 0 | 190 | 193 | 374 | 182 | 403 | 62 | 350 | 115 | 5 | 6 | 6 | 1,886 |
| 2000 | 1 | 251 | 241 | 323 | 637 | 182 | 363 | 620 | 342 | 9 | 10 | 3 | 2,892 |
| 2001 | 10 | 183 | 677 | 67 | 41 | 179 | 457 | 1,489 | 502 | 34 | 12 | 1 | 3,662 |
| 2002 | 0 | 89 | 1,111 | 306 | 422 | 671 | 290 | 1,633 | 981 | 16 | 0 | 5 | 5,519 |

**Table 2.3** Hatchery and wild summer steelhead counts at Three Mile Dam (BOR 2003a).

| Return Year | Hatchery | Wild | Total |
|---|---|---|---|
| 1988 | 166 | 2,316 | 2,482 |
| 1989 | 371 | 2,104 | 2,475 |
| 1990 | 246 | 1,422 | 1,668 |
| 1991 | 387 | 725 | 1,112 |
| 1992 | 523 | 2,246 | 2,769 |
| 1993 | 616 | 1,297 | 1,913 |
| 1994 | 345 | 945 | 1,290 |
| 1995 | 656 | 875 | 1,531 |
| 1996 | 785 | 1,296 | 2,081 |
| 1997 | 1,463 | 1,014 | 2,477 |
| 1998 | 903 | 862 | 1,765 |
| 1999 | 751 | 1,135 | 1,886 |
| 2000 | 739 | 2,153 | 2,892 |
| 2001 | 1,089 | 2,573 | 3,662 |
| 2002 | 1,860 | 3,659 | 5,519 |

### 2.1.3 Environmental Baseline in the Action Area

The environmental baseline is defined as: "the past and present impacts of all Federal, state, or private actions and other human activities in the action area, including the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation and the impacts of state and private actions that are contemporaneous with the consultation in progress" (50 CFR 402.02). In step 2, NOAA Fisheries' evaluates the relevance of the environmental baseline in the action area to the species' current status. In describing the environmental baseline, NOAA Fisheries evaluates key habitat components for the listed Pacific salmon ESUs affected by the proposed action.

#### 2.1.3.1 The Umatilla Basin

The Umatilla stock of listed MCR steelhead historically and currently use and are extensively distributed throughout the Umatilla River and eight major tributaries (ODEQ 2001, CTUIR 1990). Key habitat for listed MCR steelhead in the Umatilla Basin includes access to juvenile rearing areas and migration corridors, spawning areas, and adult migration corridors in the mainstem Umatilla River and tributaries.

The location, geology and climate of the Umatilla Basin creates a unique aquatic system for MCR steelhead and other anadromous fish. The Umatilla River and its tributaries originate as cold water at high elevations in the Blue Mountains in conifer forest and flow out of the mountains north and northwest through the semi-arid shrub steppe of the Deschutes-Umatilla plateau, entering the Columbia River near the town of Umatilla, Oregon. The headwater topography is steep, resulting in considerable bedload transport. Most of the basin topography is gently sloping, with expansive plateaus, steppes and rolling hills incised by the narrow and steep-walled valleys of the Umatilla River drainage. This structural framework allows for the recharge of ground water in the upper elevations and its transmittal to the lower basin as important cool water spring flow in the lower Umatilla River (Ely 2001).

Alluvial material in the mainstem Umatilla River and its tributaries provide vast amounts of sand and gravel. These alluvial materials not only provide spawning gravel in the tributaries and upper mainstem Umatilla River, they also serve to store and transmit ground water which contributes to late season streamflow in lower parts of the Umatilla River. Glacial and wind-blown silt and fine sand blanket much of the basin. This soil is highly erodible and contributes sediment to the Umatilla system (ODEQ 2001). Coarse glacial-riverine deposits occur in the lower basin.

Historic run size estimates, reports of extensive runs of chinook salmon and steelhead, and long term tribal inhabitation of the basin and reliance on salmon and steelhead indicate that historically, the Umatilla Basin provided sufficient water quantity, water quality, substrate, cover/shelter, food, rearing space and migration conditions to support large populations of anadromous fish (NMFS 2000, CTUIR 1990, 2001).

### Habitat and Water Quality

In a study of landscape change in the Umatilla Basin from 1850 and 1990, Kagan (1999) examines the differences between current and pre-settlement vegetation coverages (ODEQ 2001). The report cited by Kagan notes that the most significant change is the conversion of native prairie to farmland and the disappearance of the large forested riparian areas along the Umatilla River. The report estimated that bottomland hardwood and willow communities have been reduced by 87% since 1850. The report also notes the current lack of water in many areas where the original General Land Office (GLO) surveyors reported abundant springs and small creeks. Approximately 70% of the Umatilla River has been levied or channeled (Northwest Power Planning Council (NPPC) 2001). It is estimated that 70% of all Umatilla River tributaries are in need of riparian improvement (ODEQ 2001).

Extensive vegetation removal and disturbance associated with urban development, cultivation, grazing, forestry, transportation corridors, flood control and navigation continues to occur in the subbasin, and has blocked access to and degraded juvenile rearing areas and suitable migration conditions, spawning, and adult migration historically available to salmonids. The collective result of habitat degradation in the basin is an aquatic landscape characterized by inadequate streamflows, excessive temperatures, structural impediments, inadequate riparian corridors, simplified and reduced instream habitat, and excessive erosion (NPPC 2001). Currently, many of the streams in the Umatilla Basin are on the Clean Water Act (CWA) 303(d) list for temperature, sediment and nutrients (ODEQ 2001).

Continuous water temperature data for the middle Umatilla River (RM 59-87) are shown in Figure 2-1. ODEQ found that water temperatures are the coolest in winter and early spring months. This figure shows how upper Umatilla River tributary land uses and habitat alteration are manifested in temperature increases in the middle Umatilla River.  Stream temperatures here can exceed 75°F and routinely exceed state water temperature criteria for spawning (64°F)(ODEQ 2001).

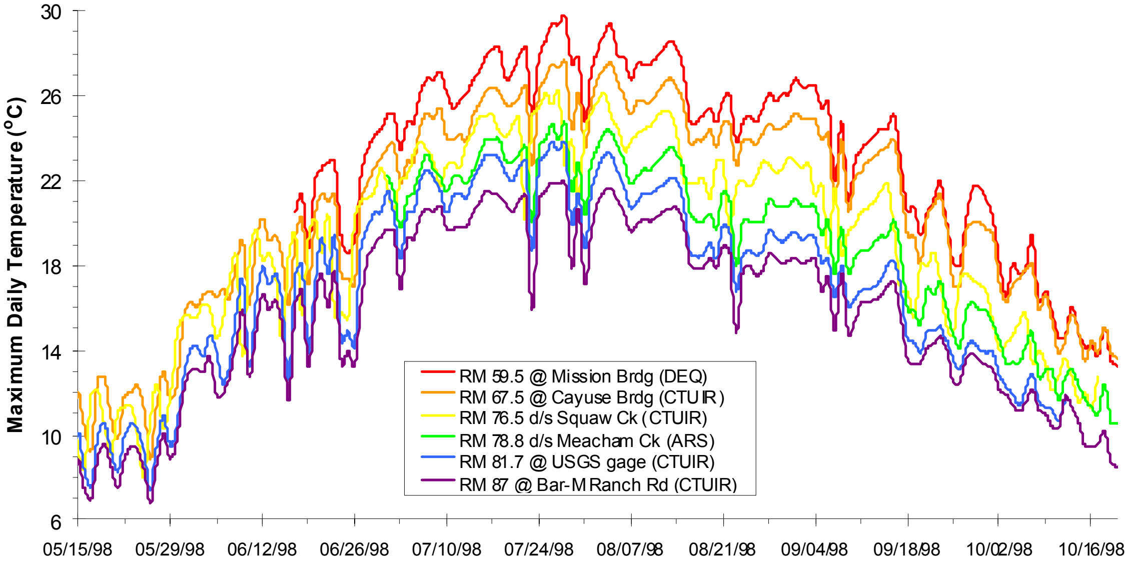

Figure 2-1.  Continuous water temperature for the middle Umatilla River, RM 59-87, May-October 1998 (ODEQ 1999).

For the Umatilla Basin in general, ODEQ found that stream temperatures exceed State water quality standards in summer and early fall months (June-September).  Warmest stream temperatures correspond to prolonged solar radiation exposures due to lack of shaded, warm air temperature, low flow conditions, and decreased ground water contributions.  Daily variations in temperature are significant (ODEQ 2001).  A survey of habitat conditions for the stream systems throughout the Umatilla Basin ranked the general condition of streams as poor to fair using habitat features such as pool area, percent dry channel, width-depth ratios,  percent substrate fines, canopy closure and woody debris (NPPC 2001).  A summary of key habitat parameters relative to benchmarks developed by the ODFW Aquatic Inventories Program identified that several important steelhead tributaries lacked key habitat parameters, such as stream complexity, pools, woody debris, and suitable substrate, generally making them undesirable as salmon habitat (NPPC 2001).

In 2001, a general evaluation of current baseline habitat conditions from Umatilla RM 50 to the mouth was conducted by the BOR using NOAA Fisheries' *Matrix of Pathways and Indicators* (MPI). The NOAA Fisheries MPI evaluates the baseline condition by assessing the components of habitat essential to proper functioning conditions, including water quality, habitat access, habitat elements such as substrate, large woody debris, and pool frequency, channel condition, and hydrology. The BOR evaluation used physical habitat survey data (BPA 1997a), and reviewed water flow, water quality data and other current information (BOR 2001). The BOR review analyzed three segments of stream: McKay Creek from McKay Reservoir to its mouth, the Umatilla River from McKay Creek to the Stanfield Dam and diversion, and the Umatilla River from Stanfield to the mouth. For each of the segments analyzed, and for all of the elements of habitat essential for functioning systems, the analysis indicated that each stream segment is either not properly functioning or is functioning at risk (BOR 2001). These results are shown in Tables 2.4, 2.5, and 2.6, and generally support the results of other investigations (ODEQ 2001, CTUIR 2001). NOAA Fisheries refined the data in Table 2.6 using the additional information reviewed for and discussed in this analysis (denoted by ***XX*** in the table).

The historic abundance of steelhead in McKay Creek is unknown, but CTUIR tribal members report that a high number of steelhead spawned in McKay Creek before the construction of McKay Reservoir (CTUIR 2001). Prior to 1995, the lower six miles of McKay Creek was accessible to steelhead, but historical dam operations shut down all water releases from the reservoir during winter-spring months, which dewatered McKay Creek stranding adults and juveniles and dewatering salmon redds. In 1995, a fish weir was constructed at the mouth of McKay Creek, to prevent adult salmon and steelhead from accessing the lower six miles of the stream below McKay Reservoir. The barrier weir was built by the BOR and ODFW. The barrier weir is constructed of slanted bars, spaced to prevent passage of adult salmonids. Juvenile salmon and steelhead are able to pass by the barrier and rear in McKay Creek. In December 1999, when releases from the reservoir were shut down, CTUIR conducted salvage operations and found almost 1,100 juvenile steelhead. Since 2000, an attempt has been made to keep a minimum of 10 cfs in McKay Creek to benefit salmonids. CTUIR sampled McKay Creek during the summer of 2000 and found many juvenile salmon and steelhead that were large and in good condition (CTUIR 2001).

The lower 0.75 miles of McKay Creek contains several springs that provide 3 to 5 cfs of flow which function to minimize icing. The lower six miles of McKay Creek have been impacted by a variety of management activities. McKay Creek has been channelized; has a low pool to riffle ratio; and lacks cover, meanders, depth, and structure (CTUIR 2001). In addition, Pendleton's sewage treatment effluent enters McKay Creek at RM 0.1, and appears to impact water quality based on surface scum, unsanitary color of water, and a pungent smell of sewage and detergent (CTUIR 2001).

Despite the habitat and land use problems in the Umatilla basin, a limited amount of high quality salmonid habitat continues to persist in the subbasin (CTUIR 2001). Habitat conditions generally follow an elevation gradient with higher quality habitat in the upper portion of the subbasin, and lowland portions of the basin containing the most degraded habitat (NPPC 2001).

**Table 2.4** Checklist for documenting environmental baseline relevant indicators for McKay Creek McKay Reservoir to Mouth (BOR 2001).

| **PATHWAYS:** | **ENVIRONMENTAL BASELINE** | | |
|---|---|---|---|
| **INDICATORS** | Properly Functioning | At Risk | Not Properly Functioning |
| **Water Quality:**<br>Temperature | X | | |
| Sediment | | X | |
| Chem. Contam./Nut. | | X | |
| **Habitat Access:**<br>Physical Barriers | | | X |
| **Habitat Elements:**<br>Substrate | | X | |
| Large Woody Debris | | | X |
| Pool Frequency | | | X |
| Pool Quality | | X | |
| Off-Channel Habitat | | | X |
| Refugia | | | X |
| **Channel Cond. & Dyn:**<br>Width/Depth Ratio | | | X |
| Streambank Cond. | | | X |
| Floodplain Connectivity | | X | |
| **Flow/Hydrology:**<br>Peak/Base Flows | | | X |
| Drainage Network Increase | N/A | | |
| **Watershed Conditions:**<br>Road Dens. & Loc. | N/A | | |
| Disturbance History | N/A | | |
| Riparian Reserves | | X | |

**Table 2.5** Checklist for documenting environmental baseline indicators for the Umatilla River, McKay Creek to Stanfield Dam (BOR 2001)

| **PATHWAYS:** <br> **INDICATORS** | **ENVIRONMENTAL BASELINE** | | |
|---|---|---|---|
| | Properly Functioning | At Risk | Not Properly Functioning |
| **Water Quality:** <br> Temperature | | X | |
| Sediment | | X | |
| Chem. Contam./Nut. | | X | |
| **Habitat Access:** <br> Physical Barriers | | X | |
| **Habitat Elements:** <br> Substrate | | X | |
| Large Woody Debris | | | X |
| Pool Frequency | | | X |
| Pool Quality | | X | |
| Off-Channel Habitat | | X | |
| Refugia | | | X |
| **Channel Cond. & Dyn:** <br> Width/Depth Ratio | | | X |
| Streambank Cond. | | | X |
| Floodplain Connectivity | | X | |
| **Flow/Hydrology:** <br> Peak/Base Flows | | | X |
| Drainage Network Increase | N/A | | |
| **Watershed Conditions:** <br> Road Dens. & Loc. | N/A | | |
| Disturbance History | N/A | | |
| Riparian Reserves | | X | |

**Table 2.6** Checklist for documenting environmental baseline for the Umatilla River, Stanfield Dam to Mouth (BOR 2001)

| **PATHWAYS:**<br>**INDICATORS** | **ENVIRONMENTAL BASELINE** | | |
|---|---|---|---|
| | **Properly Functioning** | **At Risk** | **Not Properly Functioning** |
| **Water Quality:**<br>Temperature | | | X |
| Sediment | | X | ***XX*** |
| Chem. Contam./Nut. | | | X |
| **Habitat Access:**<br>Physical Barriers | | X | ***XX*** |
| **Habitat Elements:**<br>Substrate | | X | |
| Large Woody Debris | | | ***XX*** |
| Pool Frequency | | | ***XX*** |
| Pool Quality | | X | |
| Off-Channel Habitat | | X | ***XX*** |
| Refugia | | | X |
| **Channel Cond. & Dyn:**<br>Width/Depth Ratio | | | X |
| Streambank Cond. | | | X |
| Floodplain Connectivity | | X | ***XX*** |
| **Flow/Hydrology:**<br>Peak/Base Flows | | | X |
| Drainage Network Increase | N/A | | |
| **Watershed Conditions:**<br>Road Dens. & Loc. | N/A | | |
| Disturbance History | N/A | | |
| Riparian Reserves | | X | |

Water Resource Development

The past and present effects of large-scale water development activities associated with the BOR's Umatilla Project (1906) and Umatilla Basin Project Act (1988) are included as part of the environmental baseline. The 1906 Umatilla Project allowed large quantities of water to be stored for and removed by irrigation diversions largely in the lower Umatilla River (BOR 2001). Alteration of the natural streamflow hydrograph through diversion and storage of water reduced or eliminated migration flows, access to spawning areas and rearing habitat (BOR 1988, 2001). Water quality and water temperature, riparian ecosystems, stream channel complexity, and other indicators of functioning habitat are also degraded. Construction of McKay Dam and Reservoir in 1927 blocked salmon and steelhead access to approximately 108 miles of highly productive tributary habitat in upper McKay Creek (CTUIR 2001). McKay Creek below the dam was historically dried up during winter and early spring while storing water, but since 2000 an attempt has been made to maintain a flow of 10 cfs in McKay Creek during winter and early spring to benefit salmonids. In 1995, an adult barrier was placed at the mouth of McKay Creek to prevent the stranding of adults and dewatering of redds.

Large scale streamflow depletions routinely dewatered the entire lower Umatilla River (BOR 2001). Some of the water was and is replaced with irrigation return flows occurring below the Stanfield, Westland and Hermiston Irrigation Districts (BOR 2001). These return flows became a primary source of water for the lowermost irrigation diversion, the West Extension Irrigation District (BOR 2001), and important sources of cool water for fish in a temperature-impaired section of the river. Conservation measures implemented in some of the irrigation districts reduced irrigation return flow to the lower Umatilla River as the conserved water was instead used for the areal expansion of the irrigated land base outside of federally-recognized irrigation districts (BOR 2001).

Irrigation depletions associated with the Umatilla Project and other point and non-point pollution sources and lack of riparian vegetation on the lower Umatilla River cause Umatilla River temperatures to rise significantly from Pendleton to the mouth, primarily from July through mid-September or later (ODEQ 2001). In addition, lower Umatilla River tributary inputs provide additional sources of hot water inasmuch as these tributaries are nearly devoid of riparian vegetation.

Maximum daily stream temperatures at the mouth of the Umatilla River in August can exceed 75°F (ODEQ 2001, BOR 2001). These temperatures exceed NOAA Fisheries criteria for proper functioning stream temperature conditions and are unsuitable for adult migration (Sauter *et al.* 2001).

Water development and management activities associated with the 1988 Umatilla Basin Project were designed to remedy some of the streamflow, habitat and resultant fishery impacts of the Umatilla Project. The Umatilla Basin Project did not remove irrigation diversions nor the use of conserved water to expand the irrigated land base. However, the Umatilla Basin Project did utilize McKay Reservoir and the Columbia River exchange program to provide fall and spring migration flows for anadromous fish (BOR 2001) and to in part mitigate for the areal expansion of irrigation. The Umatilla Basin Project has reduced the length of time the lower Umatilla River is subject to sectionally dewatered or reduced flow conditions to mid-July through mid-August or early September. However, sections of the lower 37 miles of the Umatilla River are dewatered or consist of extremely low flows on an annual basis during from about mid-July to mid-late August (BOR 2001).

McKay irrigation flow releases during mid-August provide cool water in McKay Creek and dramatic cooling effects on  mainstem Umatilla River temperatures (Figure 2-1).  Releases from the dam are typically below 64°F.  Under the current baseline, higher flows return to the system in mid-late August, and cooler temperatures prevail from mid- to late September through June (BOR 2001, ODEQ 2001).

### Factors Affecting the Species in the Environment

Included as part of the environmental baseline, other factors affecting the listed species in the action area's environment include hydrosystem development, water resource management strategies, water quality, hatchery influences, harvest and passage (NMFS 2000).  In addition to the habitat conditions outlined above, each of these factors influence to one degree or another the availability of salmonid juvenile rearing areas, adult spawning areas, and the condition of migration corridors in the action area.

#### Hydrosystem Effects

It is clear that the existence and past operation of federally-owned hydroelectric projects has affected species considered in this consultation and that many of these effects will continue into the future.  These effects are discussed in detail in the FCRPS Opinion, Chapter 5.  It is equally clear that the future effect attributable to the discretionary operation of these projects cannot be considered in the environmental baseline of this Opinion because the ESA Section 7(a)(2) consultation has been remanded.[9]  There have been numerous changes in the operation and configuration of the FCRPS as a result of ESA consultations between the Action Agencies (BPA, the Corps, and BOR) and the Services.  The changes have improved survival for the listed fish migrating past McNary Dam.[10]  Increased spill at McNary Dam allows smolts to avoid both

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[9] The 2000 biological opinion for the operation of the FCRPS was remanded but not set aside while NOAA Fisheries considers remedies to address concerns identified by the Court in NWF v. NMFS, CV 01-640-RE (D. Or. Order dated 6/2/03). For the purposes of this consultation, the effects of the RPA recommended by that biological opinion are not considered part of the environmental baseline to the extent they occur beyond June 2, 2004. After that date, by which the remand must be accomplished, NOAA Fisheries anticipates that there will be a new consultation for the FCRPS. This means that the existence effects of the FCRPS, which are part of the environmental baseline, will include the operation effects of the current operation under the 2000 biological opinion RPA until June 2, 2004. While this is the legal effect of the restrictions in the regulatory definition of "effects of the action" 50 CFR 402.02 (no consideration of future Federal actions that have not yet completed Section 7 consultation), as a practical matter this analysis can only qualitatively assume that the level of take caused by the FCRPS will be significantly reduced in the action area as a result of this consideration. Quantitative estimates of this reduced take are not possible.

[10] In addition to spill, flow, and transportation improvements, the Corps implemented numerous other improvements to project operations and maintenance at all Columbia and Snake river dams. These improvements, such as operating turbines at peak efficiency, new extended-length screens, and extended operation of bypass screens are discussed in greater detail in the 1995 FCRPS Biological Opinion.

turbine intakes and bypass systems. Increased flow in the mainstem Columbia River portion of the action area provides better in-river conditions for smolts.

Water Resource Management Strategies

As a result of historic water management practices and current streamflow depletions, streamside land uses, gravel mining, and other factors in the action area, the riffle-pool structure of the Umatilla River has been altered. Large sections of the Umatilla River consist of disconnected pools or are completely dewatered at key times of the year. Riffles are disconnected from pools and in most instances access to side channels has been eliminated as a result of water diversions, land use practices and stream channelization. There are few overhanging banks and the river has poor width-depth ratios and insufficient woody debris (NPPC 2001). Due to water depletions there is reduced food production area, reduced rearing space, reduced longitudinal connectivity along stream courses, and reduced habitat diversity (ODEQ 2001).

Water Quality

Water quality conditions throughout the Umatilla basin are limiting factors for salmonid production in the action area, and have been cited as one factor linked specifically to the poor egg-to-smolt survival ratios in the basin (ODEQ 2001). While many of the temperature problems can be traced to flow depletions and irrigation return flows, many other point and non-point sources of pollution contribute to generally poor water quality conditions for salmonids in the basin. Point sources include five wastewater treatment plants, two above the area influenced by BOR operations whose effluent load temperatures are 74° F. By the time the Umatilla River enters the area most immediately influenced by BOR operations, water quality impairments include pH, algae and aquatic weeds, sediment and temperature (ODEQ 2001).[11] Three other wastewater treatment plants occur between RM 37 and the mouth. High sediment levels and turbidity are attributed to streambank erosion, removal of stream side vegetation, and agricultural practices on highly erodible soils. Increased temperatures and levels of bacteria occur from RM 37 to the mouth, and levels of ammonia that exceed state water quality standards occur from RM 5 to the mouth (ODEQ 2001).

Contemporaneous with this consultation, the ODEQ conducted an extensive assessment of the Umatilla Basin to develop a Total Maximum Daily Load (TMDL) allocation framework to improve water quality in the basin.[12] Factors evaluated as influencing stream temperature

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[11] High water temperatures for the Umatilla mainstem were noted in 1892 by the United States Fish Commission: "The Umatilla River was examined August 23 near its mouth, and on August 12 near Pendelton, Oregon. At Pendelton, it had an average width of 25 feet, depth of 14 inches and a velocity of 1 foot. Temperatures at 11 a.m. was 70°F. The bottom was coarse gravel covered with algae, and the water was clear."(cited in ODEQ, 2001).

[12] A TMDL defines the maximum amount of a pollutant that can be present in a waterbody without causing departure from water quality standards. An essential part of a TMDL is a discharge permit and/or a water quality management plan designed to implement TMDLs. Section 303(d) of the Clean Water Act (CWA) request that a list be developed of all impaired or threatened waters within a State and develop measures for delineation of the factors which

included stream flow, effective riparian shade, and morphological features of the stream channel affecting width and depth of flow. ODEQ found that changes in stream channel morphology resulting from past disturbance to the Umatilla River, including channel widening, have significantly impacted stream temperatures. Further, the wide channels in the Umatilla River are likely to have decreased levels of shade due to simple geometrical relationships between riparian height and channel width (ODEQ 2001). Channel widths are in excess of 75 feet, with flow levels covering less than one-fifth of this width at depths ranging from a few inches to less than ½ foot (ODEQ 2001). In the lower Umatilla River, there are sections of the river that flow over black basalt bedrock. Shallow depths in these reaches combined with bed conduction can dramatically increase water temperatures.

Hatchery Influences

For more than 100 years, hatcheries in the Pacific Northwest have been used to replace harvest that was lost as a result of the construction of the FCRPS, habitat degradation, and over fishing, not to protect and rebuild natural populations (NMFS 2001). As a result, most salmon populations in this region are primarily hatchery fish.

Artificial production within the Umatilla subbasin includes summer steelhead, coho, and spring and fall chinook salmon programs.[13] The principal goal of each program is to increase harvest and natural production (CTUIR 1990). The first releases of hatchery summer steelhead occurred in1967, and the first release of Umatilla stock steelhead occurred in 1975. Releases every year since then have been of endemic stock.

In addition to steelhead supplementation programs, coho and spring and fall chinook salmon have been released in the basin since 1966, 1986, and 1992, respectively. Fall chinook are also released and include both yearling and subyearling life history stages. The current plan is to acclimate and release 480,000 yearling and 600,000 subyearling smolts annually into the mainstem Umatilla River (ODEQ 2001). Additional hatchery influences include an adult fall chinook out-planting program,[14] and the stocking of non-native rainbow trout in the Umatilla River basin (ODEQ 2001).

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cause water quality impairment. For the Umatilla River, the State list includes ten factors, including temperature and flow modification . Water quality standards are based on beneficial uses of water, which for Oregon include fisheries (salmonid passage, rearing, spawning), resident fish, aquatic life, drinking water, recreation and irrigation among others. Stream monitoring information is collected to determine whether standards are being met. Applicable regulations include 40 CFR 130-131; ORS Chapter 468, and OAR Chapter 340 Division 41 (Table 11).

[13] A Memorandum of Agreement (MOA) between ODFW and CTUIR sets the foundation for the parties to co-manage anadromous fishery resources in the Umatilla Basin. All hatchery production plans and related harvest plans for anadromous fish in the Umatilla Basin have been jointly developed to reflect the direction of the Columbia River fish Management Plan in U.S. v. Oregon. ODFW and CTUIR differ substantially on their management intent with regard to the disposition of hatchery origin steelhead returning to the Umatilla River (ODFW 2001).

[14] The goal of the program is to release 1000 adults annually into the mid-Umatilla River. Actual releases range from 200 to 970 (ODEQ 2001).

While hatcheries have contributed greatly to the overall numbers of salmon in the Umatilla Basin, there is concern about the effect of hatcheries on native wild populations (NMFS 2000, Chilcote 2001). Hatchery fish are present in the production areas used by wild fish and spawn naturally in the Umatilla Basin and other watersheds in the MCR steelhead ESU (Chilcote 2001). In a study of the relationships between the proportion of hatchery fish in 15 natural populations and their respective productivity, Chilcote (2001) found that the higher the proportion of hatchery fish in the spawning population, the more population productivity declined. Overall population productivity can be adversely affected by naturally-spawning hatchery fish, such that at some proportion of hatchery fish, the natural population can no longer replace itself (Chilcote 2001, NMFS 2000).[15] It is unclear whether the mechanism underlying this relationship is genetic or environmental, however, when too many hatchery fish mix with wild fish in natural production areas, the overall productivity of the population declines (Chilcote 2001).

In the Umatilla basin, hatchery steelhead may pose risk to native steelhead populations by increasing predation on, displacement of, and/or competition with wild fish (NMFS 2000). These effects are likely to occur if fish are released in poor condition and/or are unable or don't migrate to marine waters, and therefore remain in the streams for extended periods during which they may prey on or compete with wild fish for food, cover and rearing space (NMFS 2000).[16]

### Harvest

Since the late 1970s, an increasing number of steelhead fisheries have required that all wild steelhead caught by anglers be released unharmed. However, evidence suggests that not all wild steelhead survive the handling and stress of being caught and released (Chilcote 1998). In the Umatilla Basin, where harvest regulations are jointly developed by ODFW and CTUIR, angling regulations are maintained to protect the wild steelhead population.

### Juvenile and Adult Fish Passage Facilities

Listed MCR steelhead pass through and are affected by several major facilities on the Umatilla mainstem from RM 50 to the mouth which are owned, operated or were constructed by private parties, BOR or others as shown in Table 2.7 (BOR 2001). Most fish screens on Federal and non-federal diversion facilities meet NOAA Fisheries' criteria, although approach velocities may limit effectiveness in some instances (BOR 2001, ODFW 1997).

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[15] Chilcote suggests that this threshold is reached when the proportion of hatchery fish is 60%. Regardless of the exact proportion, the effectiveness of hatchery fish spawning in the wild is one key parameter used in assessing the impact of hatchery fish on wild populations (NMFS 2000).

[16] NOAA Fisheries has identified four primary categories of risk that hatcheries can pose on wild-run salmon and steelhead: 1) ecological effects, 2) genetic effects, 3) over harvest effects, and 4) masking effects.

From 1991 to 1995, the ODFW conducted studies to evaluate whether juvenile salmonids were able to safely and quickly pass through reconstructed juvenile fish bypass and adult fish ladder facilities associated with major irrigation dams on the lower Umatilla River (ODFW 1997). Using mark-recapture methodologies, ODFW assessed: (1) Facility-caused injury, (2) rate of travel and recapture, and (3) screen efficiency (leakage) and impingement (rollover). The study found that subyearling fall chinook salmon were injured in the passage section of the east bank fish ladder at Three Mile Falls Dam and the auxiliary water system of the fish ladder at Westland Dam suffering descaling or mortality. Mortalities were attributed to different facilities at each site.[17]

Juvenile salmonids pass safely through smaller adult ladders on the lower Umatilla River but not on the larger ladders, and incur significant injury in the passage section at Three Mile Falls Dam (BPA 1997b). Between 20% and 50% of juvenile fish are injured at this facility (ODFW 1997).

**Table 2.7** Umatilla Basin Project Fish Passage and Protective Facilities

| **Project** | **Completion Date** |
|---|---|
| Three Mile Dam, east bank fish ladder and trap | November 1987 |
| Three Mile Dam, west bank fish ladder, trap and canal fish screens | July 1988 |
| Maxwell Canal fish screens | April 1989 |
| Feed Canal fish screens and fish ladder | January 1990 |
| Furnish Canal (SID) fish screens and fish ladder | March 1991 |
| Westland Canal fish screens and fish ladder | March 1991 |
| Columbia River Pumping Plant | March 1995 |
| McKay Creek Fish Barrier | June 1995 |

#### 2.1.3.2 Summary of Baseline Conditions

This assessment of the environmental baseline conditions in the action area, in conjunction with the biological information, indicates that the health of listed MCR steelhead populations under the current baseline condition is poor, notwithstanding recent increased adult steelhead returns to the basin and an increasing proportion of wild fish (Chilcote 2001, NMFS 2000). Analyses of baseline conditions in the Columbia River and Umatilla Basin portions of the action area by the

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[17] Mid-channel diffusers caused most of the descaling at both sites; the slot and pool segment of the passage section caused most of the mortality at Three Mile Falls Dam (BPA 1997b). Underwater video work conducted in 1996 at Three Mile Falls Dam documented hundreds of fish following currents across the upstream side of the diffusers and frequently impacting it. Subyearling fall chinook salmon appear to impact the diffuser more frequently than the yearling chinook salmon or steelhead, apparently because of weaker swimming ability (ODFW 1997).

BOR (2001), ODEQ (2001), CTUIR (1990, 2001), and NOAA Fisheries (2000) all indicate that the habitat conditions in the environmental baseline are degraded and are not properly functioning or functioning at risk with respect to the biological needs of listed salmonids.

Resource development in the entire Umatilla Basin led to wide-spread riparian vegetation removal and increased soil erosion. This caused significant adverse affects to stream substrate composition and changes in stream channel morphology and complexity (ODEQ 2001). These effects reduced MCR steelhead access to juvenile rearing areas, adult spawning areas, and altered the timing and length of the adult and smolt migration windows (Chilcote 2001, NMFS 2000). Basin-wide land uses also contributed to mainstem Umatilla River temperature increases that are unsuitable and at times lethal for salmonids. Annual dewatering of the lower Umatilla River during July and August affects riparian ecology and longitudinal connectivity along the stream course (Chilcote 2001).

Because the entire basin is functioning at some risk from a habitat perspective, the current baseline cannot support the biological needs for the survival and recovery of listed MCR steelhead (NMFS 2000, ODEQ 2001, BOR 2001). Key pieces of intact habitat remain in the upper Umatilla Basin, and state, tribal, and private habitat conservation efforts are likely to be concentrated in these areas.

## 2.2 Analysis of Effects

Effects of the action are defined as: "the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with the action, that will be added to the environmental baseline" (50 CFR 402.02). Direct effects occur at the project site and may extend upstream or downstream based on the potential for impairing the value of habitat for meeting the species' biological requirements or impairing the essential features of critical habitat. Indirect effects are defined in 50 CFR 402.02 as "those that are caused by the proposed action and are later in time, but still are reasonably certain to occur." They include the effects on listed species or critical habitat of future activities that are induced by the proposed action and that occur after the action is completed. "Interrelated actions are those that are part of a larger action and depend on the larger action for their justification" (50 CFR 403.02). "Interdependent actions are those that have no independent utility apart from the action under consideration" (50 CFR 402.02).

In step 3 of the jeopardy and adverse modification analysis, NOAA Fisheries evaluates the effects of proposed actions on listed species and seeks to answer the question of whether the species can be expected to survive with an adequate potential for recovery. In watersheds where critical habitat has been designated, NOAA Fisheries must make a separate determination of whether the action will result in the destruction or adverse modification of critical habitat (ESA, section 3, (3) and section 3(5A)). As described earlier, designated critical habitat is only present in the Columbia River portion of the action area. There is no designated critical habitat in the Umatilla Basin itself.

### 2.2.1 Habitat Effects (which may also affect listed species)

The BA and supplemental BA provide an analysis of the effects of the proposed action on MCR steelhead and their habitat in the action area. The analysis uses the MPI and procedures in NOAA Fisheries (1996), the information in the BA and supplemental BA, and the best scientific and commercial data available to evaluate elements of the proposed action that have the potential to affect the listed fish or essential features of their critical habitat.

The primary effects on MCR steelhead resulting from the ongoing operation and maintenance of the Umatilla and Umatilla Basin Projects are flow related. In the supplemental BA, the BOR evaluated project effects by modeling and comparing flows resulting from two scenarios using the Riverware computer modeling tool. The first scenario modeled flows resulting from implementation of the proposed action, and the second scenario modeled flows that would result without the proposed action. Flows for the two scenarios were modeled at MCKO, YOKO, UMDO, and UMAO Hydromet gaging stations for five different time periods including: April through June, July through August, September, October through November, and December through March. Specific modeled flow effects at each gaging station are discussed below by reach in section 2.2.1.5, Effects of Irrigation Diversion Operations. The scenario without the proposed action represents the hydrology on the Umatilla River without BOR operations or diversions. The assumptions and operations of the without the proposed action scenario include: No storage operations at McKay Dam (reservoir empty with outflow equal to inflow), no storage operations at Cold Springs Dam, no Columbia River Phase I or II exchange operations, no diversions at Feed or Maxwell canals, only pre-project water rights in-place for WEID canal, non-federal state water rights diversions in-place and operating to state water right capacities, and irrigation deliveries are based on live flow availability.

Table 2.8 shows that the proposed action scenario when compared to the scenario without the proposed action usually results in less water in the Umatilla River during the winter and early spring and more water in the Umatilla River from late spring through fall. Less water during winter and early spring is the result of water being stored in McKay and Cold Springs Reservoirs, and more water in the late spring through fall is the result of water being released from McKay Reservoir for irrigation and fish target flows. Under the proposed action, the decrease in winter flows associated with storage may slightly decrease winter edge rearing habitat, but it is negligible due to the high width to depth of the river, availability of shallow water habitat in other areas of the channel, and the lack of abundant and thick vegetation. Increased flows in the late spring aid juvenile steelhead in their outmigration and increased flows in the fall aid adult steelhead in their upstream migration. Both adults and juveniles at the extreme edge of their migration periods encounter low flows and elevated water temperatures in the Umatilla River, but conditions under the proposed action are no worse, and in most cases are better, than conditions without the proposed action.

**Table 2.8** Median Flows (cfs) for operations with and without the proposed action (PA).

| | Dec - Mar | | Apr - Jun | | Jul - Aug | | Sep | | Oct - Nov | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **w/PA** | **w/o PA** | **w/PA** | **w/o PA** | **w/PA** | **w/o PA** | **w/PA** | **w/o PA** | **w/PA** | **w/o PA** |
| **MCKO** | 10 | 122 | 132 | 86 | 177 | 1 | 150 | 1 | 64 | 6 |
| **YOKO** | 624 | 727 | 809 | 844 | 228 | 50 | 195 | 50 | 210 | 90 |
| **UMDO** | 384 | 589 | 434 | 288 | 9 | 5 | 27 | 5 | 198 | 46 |
| **UMAO** | 498 | 670 | 460 | 416 | 13 | 21 | 112 | 0 | 244 | 57 |

With or without the proposed action, actual July and August streamflows in the Umatilla River fall well below FWS- and ODFW-recommended flow levels for anadromous fish passage and rearing habitat, and below more current estimates of flows required to sustain habitat-forming processes and function. In the lower Umatilla River, low streamflow translates into reduced velocity, width and depth of flow, isolation of pool and riffle habitat, and increased warming. Increased competition for space among species and vulnerability to disease and predation are likely consequences of reduced flow levels. Cool water refugia resulting from irrigation return flows or springs become critical to sustaining rearing life stages. For the June through September period, ODFW- and FWS-estimated stream flow requirements for passage ranged from a minimum of 80 cfs to a maximum of 250 cfs. More recent estimates place the range of flows from 250 cfs to 300 cfs for the same period (CTUIR 1999).

Under the proposed action, when spring and fall target flows are applicable, the flows are within the minimal ranges recommended for passage by FWS in 1973, and the ODFW in 1988. When target flows are applicable, stream velocities provide sufficient migration flows and the width and depth of flow increase, thereby increasing the habitat available for juvenile rearing, and adult and smolt migration. The most recent report, the TMDL study for the basin, indicates that temperature improvements are related in part to flow improvements in the lower Umatilla River (ODEQ 2001). Based on these reports, NOAA Fisheries concludes that the instream flow schedule for the Umatilla River during the period October through mid-June is the minimum flow necessary to support all life stages of listed MCR steelhead, but does not provide for channel maintenance flows necessary for habitat development and maintenance.

#### 2.2.1.1 Effects of Phase I and II Exchange Operations

Phase I and II allow target flows to be met in the lower Umatilla River. Phase I augments instream flows for the lower three miles of the Umatilla River when flows approach or fall below seasonal target flows at Three Mile Dam. WEID reduces the diversion of Umatilla River water in May and June and from August through October by up to 140 cfs at the Three Mile Diversion Dam allowing flow to remain in the channel to the Columbia River. The purpose of Phase II is to provide instream flows from McKay Creek to the Columbia River in the spring and fall. HID and SID forgo live flow diversions from the Umatilla River as flows approach target flows in the mid to late spring. All of SID's McKay storage is exchanged with Columbia River water, and CTUIR and ODFW control the release of McKay flows for fish. Providing water in the Umatilla River in May and June aids the outmigration of juvenile MCR steelhead, and having water in the river from August through October allows adult MCR steelhead to migrate upstream.

The operation of the Phase II pumping plant stationary fish screens includes cleaning with an air burst method. This results in turbulence capable of swamping a small fishing boat. When these air bursts are performed it is possible that migrating or rearing juveniles and migrating adults may be displaced and possibly injured by the air burst screen cleaning at the Phase II Pumping Plant. As a result, juveniles may be more vulnerable to predation. However, due to the localized nature of the air burst cleaning, it is likely that the number of individuals that may be present at the screens when they are cleaned is low.

#### 2.2.1.2 Effects of Cold Springs Dam Operations

Cold Springs reservoir stores water from the Umatilla River and the Columbia River to meet irrigation needs. The key habitat components for MCR steelhead that are directly and indirectly affected by the operation of Cold Springs Reservoir are streamflow and fish passage in the lower Umatilla River mainstem.

The Umatilla River diversion point for filling Cold Springs Reservoir is conditioned by target flows (Table 1.1) during major fill periods. The diversion facility's screen meets NOAA Fisheries' criteria (BOR 2001). This diversion is not expected to impact key habitat components. Additional water for Cold Springs storage is pumped from the Columbia River, whose screens and intake facilities meet NOAA Fisheries' criteria (BOR 2001). The filling of Cold Springs from the Columbia is a bucket-for-bucket exchange with the Umatilla River, and pumping on the Columbia is restricted by flow targets established by the 2000 FCRPS Opinion (NMFS 2000).

#### 2.2.1.3 Effects of McKay Reservoir Ongoing Operations

Of particular importance to the listed species in the action area is the allocation of stored water in McKay Reservoir for fish. Because of the structure of the dam and the bottom release point, McKay Reservoir water is cold and provides much needed temperature as well as flow improvements in the lower 37 miles of the Umatilla River. While water from the contracted and reserved pools are allocated under contracts and other agreements, the residual pool is considered "discretionary" water that can be allocated by BOR (BOR 2001). During the late summer, releases from McKay Creek reduce stream temperatures noticeably in the Umatilla River for several miles[18] below McKay Creek, making for adequate steelhead rearing conditions.

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[18] BOR 2003 states that McKay Reservoir releases cool the Umatilla River sufficiently to provide juvenile steelhead summer rearing habitat for 2.5 miles below McKay Creek. During a telephone conversation on April 21, 2004 Craig Contor, CTUIR Biologist, stated that CTUIR has found juvenile steelhead successfully rearing during the summer

For at least 2.5 miles, these temperatures generally meet the 64.4°F ODEQ water quality standard in the Umatilla River recently established for salmonid rearing and migration and consulted on with NOAA Fisheries through the Environmental Protection Agency (NOAA Fisheries 2004). The river progressively warms below this point.

The year-to-year fill procedures provide no carryover options for the residual pool for fish,[19] nor any provisions to ensure that the fish pool is filled every year. The amount of water that is available for fish–the remaining residual pool–is that amount of water that is left after all the other uses have been satisfied (BOR 2001). Given resource demands, in some years water is not available for Priority 3 releases (Table 1.5).

The proposed operation of McKay Reservoir impacts key habitat components for MCR steelhead. Release of cool water during a portion of steelhead migration times from McKay improves flow conditions and aids migration, improves velocities and water temperatures, and increases the amount of rearing space and food production in the lower Umatilla River mainstem and McKay Creek by connecting pools and riffles and increasing the width and depth of flow. Rearing and migration conditions for steelhead in the lower Umatilla River are vastly improved by McKay releases. With or without the proposed action, the lack of McKay releases for fish, coupled with on-going diversions during July and August degrades habitat conditions and increases water temperatures below the Westland Diversion (RM 27), and delays steelhead entry into the Umatilla Basin (BOR 2001, ODEQ 2001). While irrigation return flows and ground water inflows enter the Umatilla River beginning near RM 25 and improve stream flows and temperatures for short sections of the river, they are not enough to prevent dewatering, high temperatures, and reduced rearing areas–conditions which are exacerbated by the lack of riparian vegetation. These conditions are often stressful to smolts, and can impose passage barriers to adult and smolt migration, affect food production, and reduce juvenile rearing space. However, the release of water for irrigation from McKay Reservoir limits these poor flow-related habitat conditions to the lower 27 miles of the Umatilla River. Without these releases, these poor flow-related habitat conditions would extend approximately 50 miles up the Umatilla River and six miles up McKay Creek.

The maintenance of 10 cfs in McKay Creek during the winter while the reservoir is filling is likely enough flow to keep juvenile salmonids alive, but does not provide adequate depths in the existing channel to provide passage. The 10 cfs would also be insufficient to provide continuous passage for adult steelhead that may have passed the fish barrier at higher flows. If irrigation releases are stopped abruptly in the fall, juvenile steelhead may be stranded, but if releases are stopped gradually the risk of stranding would be reduced considerably. During the winter

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in the Umatilla River up to 20 miles below McKay Cr. in temperatures up to 24°C. The length of river providing summer temperatures cool enough for juvenile steelhead varies by year depending on air temperature.

[19] Presumably because all "fish water" is used every year. Also SID's water, which is now fully exchanged can be carried over for fish although the carry-over totals shown in Table 3.5 reflect very little carry over considering allocation of the flood space to the residual pool.

months, it is unlikely that juvenile steelhead would be in need of increased flows for migration, since their movement is limited due to cold temperatures during the overwintering period.

#### 2.2.1.4 Effects of McKay Creek Fish Barrier

The McKay Creek fish barrier prevents adult MCR steelhead from accessing six miles of holding and spawning habitat, from the mouth to the dam. This habitat, however, is currently degraded and in the short-term could result in reduced production if adults were attracted from other Umatilla River tributaries where productivity is higher. If adults pass the barrier, there is potential stranding from December through March due to inadequate depths in shallow riffles during low flows (10 cfs) as water is being stored in McKay Reservoir (CTUIR 2001). Juvenile steelhead pass the barrier and rear in McKay Creek, and are large individuals in good condition (CTUIR 2001). Juvenile passage is also limited from December through March due to inadequate depths in shallow riffles during 10 cfs flows. However, juvenile steelhead movement is generally minimal during the cold overwintering period regardless of flows.

#### 2.2.1.5 Effects of Irrigation Diversion Operations

The five Federal diversion structures on the lower Umatilla River divert live flows, Columbia River exchange water, and Federal water from McKay Reservoir during migration periods for listed MCR steelhead and other salmonids (BOR 2001). These diversions begin at approximately RM 37 and occur downstream to the mouth of the Umatilla River. BOR flow diversions reduce access to and the quality of rearing habitat in the lower Umatilla River (BOR 2001). However, the releases of water for irrigation from McKay Reservoir make summer juvenile steelhead rearing possible in up to 20 miles of the Umatilla River below McKay Creek.

The effects of past Federal resource use decisions to develop and divert water for irrigation purposes on the biological requirements of listed salmonids are included as part of the environmental baseline. The baseline is not properly functioning or is functioning at risk with respect to listed steelhead biological requirements in part because of these diversions. The on-going effect of Federal diversions, when added to the baseline, contributes to and will determine the future environmental condition of the action area.[20]

The severity and significance of these impacts varies according to the location of each diversion point on the river system, volumes of water diverted in relation to instream flow needs, the timing of diversion operations, and the salmonid life stage present. Accordingly, the analysis of the effects of irrigation diversion operations is discussed geographically by reach and by life stage present.

#### 2.2.1.6 River Mouth to Three Mile Dam

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[20] In the long run, the past environmental impacts are relevant in determining what measures are appropriate to protect, mitigate and enhance natural resources, which in many cases can constitute a reduction of the negative impacts attributable to a project since its construction.

This lower-most reach of the Umatilla River is approximately three miles in length. Adult steelhead and smolts use this reach primarily as a migration corridor (ODFW and CTUIR 2000), and consequently streamflow volumes and temperatures are important key habitat components. Streamflow in this reach of the Umatilla is a consequence of upstream Federal and non-federal diversions in the context of live flows, water released from McKay Reservoir, and the flow target guidelines shown in Table 1.1. As described above, the BOR modeled flows at UMAO (RM 2) under the proposed action scenario and a scenario without the proposed action. At this location, flows resulting from the two scenarios were very similar during April through June, July through August, and December through March, although the modeled flows from the proposed action were slightly lower in July through August and December through March. In July through August, the proposed action had a modeled median flow of 13 cfs, while the scenario without the proposed action had a modeled median flow of 21 cfs. From September through November, modeled median flows for the proposed action were considerably higher than modeled median flows for the scenario without the proposed action (Table 2.8).

Under the proposed action scenario and the scenario without the proposed action, factors affecting smolt and adult steelhead in this reach include passage at Three Mile Dam, potentially lethal water temperatures, and insufficient streamflows for migration (ODEQ 2001). Juveniles may be injured or delayed as they encounter diffusers in the fish ladder at Three Mile Dam (BPA 1997b). Adult steelhead entry into the Umatilla River begins in mid-August and can be delayed by the quantity and temperature of streamflow (BOR 2001). Peak migration past Three Mile Dam usually occurs between December and March, when flows are sufficient, but smolt migration from June through July is truncated in part as a result of insufficient flows (BOR 2003a, Contor 2000). Smolts are likely to be injured at the Three Mile Dam facility (BPA 1997b).

The Maxwell diversion at RM 15.5, and the WID mid-August diversion affect streamflow, water velocity, and water temperatures in the lower three miles of the Umatilla River (ODEQ 2001, BOR 2001). This water diversion contributes to the slightly lower modeled July and August median flows associated with the proposed action than median flows modeled for the scenario without the proposed action. However, the modeled median flows (13 cfs) associated with the proposed action are only 8 cfs lower than the modeled median flows (21 cfs) associated with the scenario without the proposed action. Both of these median flows are well below flows necessary for salmonids in this reach in July through August. The fact of WEID's return flows all go directly to the Columbia River, even though some of their irrigation water comes from the Umatilla River, contributes to lack of flows in this reach.

In mid-September, WID ceases diversion of water delivered from McKay Reservoir and water from McKay is available to supplement live flows in the lower three miles of the Umatilla River until natural flows, in combination with reduced diversions, are sufficient to provide adequate passage in mid-November (BOR 2001). Because flow targets are in effect, flow releases for fish migration during this period are protected to the mouth of the Umatilla River (BOR 2001).[21] Adult steelhead benefit from enhanced migration flows below Pendleton (BOR 2001). The proposed action scenario results in higher modeled streamflows at the mouth in September and October for the 10, 50, and 90% exceedance levels than the scenario without the proposed action. These proposed action flows equal those flows thought necessary to pass adult steelhead over Three Mile Dam, while flows without the proposed action would not be adequate to pass adult steelhead.

Flows in this reach are monitored by one stream gauge near the town of Umatilla (Figure 6.4, UMAO). Phase I and II water exchanges have increased streamflows in the lower three miles of the Umatilla River from mid-August through mid-September since 1993, even though target flows are not officially applicable until September 15 (BOR 2001). Water is released from the unallotted residual water pool from McKay Reservoir to supplement flows and since 1997 by exchange of contracted and reserved water from McKay (BOR 2001).

#### 2.2.1.7 Three Mile Dam to Furnish Diversion Dam

Under current streamflow and habitat conditions, adult steelhead use this reach primarily as a migration corridor with migration beginning in mid-August and smolt out-migration through June (BOR 2001). Steelhead and other salmonid juveniles have been observed using this river reach for rearing (ODFW and CTUIR 2000). The key habitat components in this river reach affected by the proposed action include streamflow and water velocity, water temperature, cover/shelter, substrate, space, food and passage. The effects of the proposed action on these essential features of critical habitat are to limit listed steelhead access to suitable migration flows and rearing habitat.

As described above, the BOR modeled flows at UMDO (RM 24) under the proposed action scenario and a scenario without the proposed action. At this location, flows resulting from the two scenarios were very similar during April through June, July through August, and December through March. From September through November, modeled median flows for the proposed action were higher than modeled median flows for the scenario without the proposed action (Table 2.8). During July through September, the modeled flow for the proposed action are 0 cfs at the 90% exceedance level downstream from Westland Dam (RM 28) and the modeled flow for the scenario without the proposed action is 5 cfs, which is inadequate to support salmonids (BOR 2003a).

Flows in this reach are monitored at four gages: UBBO (RM 9), MAXO (RM 15.5),UMDO (RM 24 at Interstate 84), and UMUO (RM 28). At mid-August entry time for listed MCR steelhead, target flows for this reach are not in effect. Increases in daily discharges during September starting in 1997 reflect Phase II water exchange efforts to improve instream flows (BOR 2001). Storage releases from McKay Reservoir also increase flows through this reach

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[21] A primary objective for flow releases after WID turns off is to maintain juvenile coho rearing habitat, and facilitate adult coho migration in October.

from mid-September until mid-November (BOR 2001). Water exchange operations at the Feed Canal diversion help maintain adequate flows for adult migration (November to June) since diversions do not occur unless flows exceed the 250/300 cfs targets by at least 80 cfs (BOR 2001).

The Westland Irrigation District (WID) and Maxwell diversions are in this river reach, and their Federal McKay and live flow diversions deplete streamflow and contribute to water temperature increases. However, modeled median flows during July and August for the proposed action are slightly greater for the proposed action (9 cfs) than for the scenario without the proposed action (5 cfs). WID diversions occur year-round utilizing stored McKay water and live flow rights.

ODFW and CTUIR begin trapping salmonid smolts at Westland juvenile facility and transporting them downstream when river flows recede to 150 cfs at UMDO. If 150 cfs cannot be maintained at UMDO, through natural and/or McKay Reservoir releases, trap and haul operations generally begin at the Westland Dam juvenile collection facility. On average, trap and haul operations begin by June 10 with few steelhead involved (BOR 2001). Target flows assure that there are adequate passage conditions in this reach from mid-November through June.

#### 2.2.1.8 Furnish Dam to McKay Creek

Streamflow in this reach is monitored by the YOKO gage at Yoakum (RM 38). All McKay Reservoir water releases pass through this reach during parts of the steelhead migration period. Daily average flows in this reach during adult steelhead migration (mid-August to May) rarely drop below 200 cfs. Lowest daily average flows occur during September through October, and before 1996, dropped below 100 cfs (USGS 1990- 2000).

During late summer, releases from McKay Reservoir reduce stream temperatures below 64°F in the Umatilla River for at least 2.5 miles below McKay Creek. This provides adequate steelhead rearing conditions (BOR 2003a).

Based on a review of instream flow data for the reach in comparison to recommended values (CTUIR 1999, FWS 1981) NOAA Fisheries considers the flow volumes, velocities and stream temperatures in this reach sufficient for passage and minimally necessary to support access to rearing areas in this reach. According to the BOR modeling effort, July through August median proposed action flows at the YOKO gaging station are considerably greater than median flows for the scenario without the proposed action, and modeled December through March median flows associated with the proposed action are lower than those without the proposed action (Table 2.8). The higher flows from July through August are due to the delivery of storage water for irrigation, and lower flows from December through March are due to storing water in McKay Reservoir.

#### 2.2.1.9 McKay Creek Mouth to McKay Dam

The six-mile reach of McKay Creek from the mouth to the dam is historical spawning and rearing habitat for steelhead (BOR 2001, CTUIR 2001). Past and present storage and release operations impair fish production in this reach by adversely modifying flow-related habitat conditions, and this is why the BOR constructed the fish barrier in 1995 (BOR 2001). Flow conditions from November through March have been improved from 0 cfs to 10 cfs since the fish barrier was installed. McKay Dam has blocked access to 108 miles of steelhead spawning and rearing habitat.

Flows in this reach are measured by the MCKO gage near Pendleton and streamflows above McKay Reservoir are measured at the MYKO gage near Pilot Rock. Median flows were modeled for both the proposed action and the scenario without the proposed action at MCKO and modeled median flows for the proposed action were 10 cfs from December through March, while modeled median flows without the proposed action were 122 cfs from December through March, so the proposed action degrades key habitat components considerably during this time period. Modeled median flows for the proposed action during the remainder of the year are considerably greater than median flows without the proposed action (Table 2.8) (BOR 2003a). Streamflows below McKay Dam fluctuate greatly depending on flood water releases, irrigation releases and other operations from McKay Reservoir (BOR 2001). Cold water reservoir releases are attractive to juvenile and adult steelhead. These releases can cause steelhead to pass the fish barrier during operational down times, and delay them from reaching higher quality spawning habitats in other tributaries with more adequate depths for passage. Maintaining a minimum winter flow in McKay Creek of 10 cfs reduces the potential for stranding and/or mortality of individuals associated with the pre-2000 zero winter flows (BOR 2001). However, due to the high width/depth ratio of McKay Creek, the depths associated with shallow riffles when 10 cfs is being released from the dam are inadequate to provide passage for all MCR steelhead life stages (CTUIR 2001). However, juvenile steelhead movement is generally minimal during the cold overwintering period regardless of flows. In addition, the lack of spring flow spikes may delay juvenile outmigration from McKay Creek.

Fluctuation of flows related to Project operations (particularly within McKay Creek) is identified as a possible concern for juvenile steelhead and the food web they depend on (BOR 2001). Significant fluctuations in the flows on a weekly, daily, or even hourly basis (particularly in McKay Creek) may cause cyclic dewatering and re-watering of near shore habitats, riffles and pools, which reduces biotic productivity and strands salmonid fry (BOR 2001).

#### 2.2.1.10 Effects of Interrelated and Interdependent Actions

This analysis also takes into account the direct and indirect effects on the key habitat components of actions that are interrelated or interdependent with the proposed action. “Interrelated actions” are those that are part of a larger action and depend on the larger action for their justification. “Interdependent actions” are those that have no independent utility apart from the action under consideration.

### Interrelated Actions

Routine maintenance activities, preparation and maintenance of canals for water exchanges, and end of season irrigation use at the diversion dams and canals are known to affect steelhead in the Umatilla River (BOR 2001). Juvenile steelhead and other fish can reside in the canals between the head gates and the screens, thus potentially causing them to be harassed when canals are dewatered for water exchange operations, some maintenance activities, or for the end of the irrigation season. Juvenile steelhead can also reside in McKay Creek near the fish barrier and be harassed when the barrier is cleaned. Because of these fish concerns, coordination occurs between ODFW and the irrigation districts so that canal head gates are shut down over a period of time, which allows fish to return to the river before the complete closure of the head gates. Fish bypass drains are left open as well to allow fish a return route to the river during a shut down process. Ramping down procedures effectively motivate fish to leave the canal, so fish salvage efforts of stranded fish are rarely needed (BOR 2001).

The hydraulic function of fish passage and screening facilities at Federal dams and canals in the Umatilla Basin is maintained through periodic removal of accumulated gravel and sediment (BOR 2001). The effect of these operations on key habitat is to temporarily impair water quality (BOR 2001). To minimize the impact of these activities, annual instream work occurs within the ODFW-approved work window (July 15 and October 15) or as approved by the ODFW District fish biologist (BOR 2001).

### Interdependent Actions

Operation of WEID's private pumping plant at Umatilla RM 0.5 is an interdependent activity. Use of the water from the pumping plant depends on the use of a Federal canal as a conveyance facility (BOR 2001). This facility diverts up to 90 cfs of water from the John Day Dam backwater pool at RM 0.5 on the Umatilla River into the Federal WEID Canal. WEID uses this facility when their peak water demand exceeds the amount of water available for exchange, normally within the months of July-September, but not necessarily on a continuous basis. This action may reduce attraction flows at the Umatilla River mouth that were provided by the exchange flows and McKay water releases from reaching the Columbia River and could delay steelhead migration into the basin by reducing flows at the mouth of the Umatilla River in late summer. The operation of the pumping plant could also create false attraction flows that disorient steelhead into the backwater channel leading to the pump station (BOR 2001). All of these effects would be amplified in a drought year situation (BOR 2001).

Water conservation activities by Federal irrigation districts in the Umatilla Basin are another interdependent activity (BOR 2001). Recent water conservation practices by irrigation districts in the Umatilla Basin have reduced the magnitude of irrigation return flows into the lower Umatilla River. Continuation of additional water conservation practices in districts upstream from WEID[22] in the future is likely to decrease the amount of return flows available for WEID to divert or exchange at Three Mile Dam. This could potentially increase WEID's reliance upon its

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[22] WEID's diversion is the lowest on the Umatilla River, and therefore a considerable amount of water is derived from the irrigation return flow from upstream water users (BOR 2001).

private pumping facility, and could potentially increase the demand for water from the residual pool of McKay Reservoir to meet the irrigation demands or to replace lost instream flows for fish (BOR 2001).

### 2.2.2 Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 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." These activities within the action area also have the potential to adversely affect the listed species and critical habitat. Future Federal actions, including the ongoing operation of hydropower systems, hatcheries, fisheries, and land management activities will be reviewed through separate section 7 consultation processes. Federal actions that have already undergone section 7 consultations have been added to the description of the environmental baseline in the action area.

Economic diversification has contributed to population growth and movement primarily in Morrow County. From April 1, 2000 to July 1, 2001, the population of Morrow County increased by 3.1%, while the state population increased 1.5%. However, the population of Umatilla County increased by only 0.3%, and the population of Union County decreased by 0.8%. Increasing population trends will result in greater overall and localized demands for electricity, water, and buildable land in the action area; will affect water quality directly and indirectly; and will increase the need for transportation, communication, and other infrastructure. The impacts associated with these economic and population demands will probably affect habitat features such as water quality and quantity, which are important to the survival and recovery of the listed species. The overall effect will likely be negative, unless carefully planned for and mitigated.

Agriculture plays a major role in the basin. Irrigation water withdrawal from the Umatilla River and its tributaries at non-federal facilities is a prominent activity in the basin and will continue to occur. Water withdrawal greatly reduces water quantity and quality in the lower Umatilla River limiting adequate summer rearing conditions to spring based refugia, and resulting in habitat conditions insufficient to support migrating adult steelhead. In addition to affecting water quantity and quality, flow diversions also affect other key habitat components, including water temperature, passage, substrate, sediment transport, food production and space.

ODFW has an active hatchery program in the basin including the release of steelhead, chinook, and coho juveniles. Umatilla Basin wild steelhead are used as brood stock which reduces genetic effects. However, there is still artificial selection that may result in genetic impacts when hatchery adults spawn with wild adults. There is likely competition between juvenile hatchery steelhead and salmon and wild steelhead.

There are, of course, numerous non-federal activities that have occurred in the action area in the past, which have contributed to both the adverse and positive effects of the environmental baseline. This step of the analysis for application of the ESA section 7(a)(2) standards requires the consideration of which of those past activities are "reasonably certain to occur" in the future within the action area.

First of all, any of these actions that involve Federal approval, funding, or other involvement are not considered "cumulative effects" for this analysis (see ESA definition, above). This Federal involvement will trigger ESA section 7(a)(2) consultation in the future. Once the consultation on those actions is completed the effects may be considered part of the environmental baseline, consistent with the ESA regulatory definition of "effects of the action" (50 CFR 402.02). Thus, for example, state efforts to improve water quality in compliance with the Federal Clean Water Act would not be considered because of the involvement of the EPA, until separate ESA consultations are completed. Other examples include irrigation water withdrawals involving the U.S. Forest Service (right-of-way permits for irrigation canals) or agricultural practices that receive Federal funding through the U.S. Department of Agriculture.

Next, actions that do not involve Federal activities must meet the "reasonably certain to occur" test for NOAA Fisheries to consider their effects in this Opinion. NOAA Fisheries finds that currently few, if any, of the future adverse or beneficial State, tribal or private actions qualify for consideration in this analysis as "cumulative effects."

## 2.3 Conclusions

This section presents NOAA Fisheries' biological opinion regarding whether the aggregate effects of the factors analyzed under the environmental baseline (section 2.1.3), effects of the proposed action (section 2.2.1), and the cumulative effects (section 2.2.3) in the action area, when veiwed against the current rangewide status of the species (section 2.1.2), are likely to jeopardize the continued existence of MCR steelhead, SRB steelhead, UCR steelhead, SR spring/summer chinook salmon, SR fall chinook salmon, UCR spring-run chinook salmon, and SR sockeye salmon. To "jeopardize the continued existence of" means 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 (CFR 402.02).

### 2.3.1 Species Conclusion

After reviewing the current status of the SRB steelhead, UCR steelhead, SR spring/summer chinook salmon, SR fall chinook salmon, UCR spring-run chinook salmon, and SR sockeye salmon, the environmental baseline for the action area, the effects of the proposed actions, and cumulative effects in the action area, it is NOAA Fisheries' opinion that the ongoing operation and maintenance of the Umatilla and Umatilla Basin Projects is not likely to jeopardize the continued existence of SRB steelhead, UCR steelhead, SR spring/summer chinook salmon, SR fall chinook salmon, UCR spring-run chinook salmon, and SR sockeye salmon. Effects on these species is limited to the air burst cleaning of the screens at the Phase II pumping plant which occurs every four hours from May to October and once per month from November to April. In order for individuals of these species to be affected, they would need to be in the vicinity of the screens during the periodic air bursts.

As determined in section 2.1.2 and Appendix A, the status of MCR steelhead is characterized by low abundance despite recent encouraging adult returns that surpassed the 2002 interim targets. Based on this status, population growth rates would need to substantially improve for them to survive with an adequate potential for recovery. The environmental baseline conditions that have resulted from the past operation and maintenance of the Umatilla Basin Project will be maintained and continue as effects of the proposed action. The project has benefitted MCR steelhead by generally improving flows in the lower Umatilla River when compared to the without the proposed action scenario. However, negative effects of the project include the injury and delay of juveniles in the Three Mile Dam fish ladder, blockage of adult access to McKay Creek, and reduced flows in McKay Creek. When these factors are considered together, NOAA Fisheries has determined that any adverse effects from BOR's operation and maintenance of the Umatilla Basin Project are unlikely to be of a magnitude, duration, or extent that would reduce the long-term survival of MCR steelhead. After reviewing the best available scientific and commercial information available regarding the current status of MCR steelhead, the environmental baseline for the action area, the effects of the proposed actions, and cumulative effects in the action area, NOAA Fisheries concludes that the ongoing operation and maintenance of the Umatilla and Umatilla Basin Projects is not likely to jeopardize the continued existence of MCR steelhead.

**Table 2.9** Summary of Effects of Proposed Action on Listed MCR Steelhead Life Stages

| Action | Spawning and Incubation | Juvenile Rearing | Juvenile Migration | Adult Migration |
|---|---|---|---|---|
| Phase I and II Exchange Operations | No spawning or incubation occurs in this segment of the Columbia River so there is no effect. | Minor effect to rearing habitat from the removal of exchange water from the Columbia River. Rearing juveniles may be displaced and possibly injured by the air burst screen cleaning at the Phase II Pumping Plant. | Minor effect to migratory habitat from the removal of exchange water from the Columbia River. Migrating juveniles may be displaced and possibly injured by the air burst screen cleaning at the Phase II Pumping Plant. | Minor effect to migratory habitat from the removal of exchange water from the Columbia River. Adults may be displaced and possibly injured by the air burst screen cleaning at the Phase II Pumping Plant. |
| Cold Springs Dam Operations | No spawning or incubation occurs in the Umatilla River where Feed Canal diverts water for Cold Springs Dam so there is no effect. | Small risk that rearing juveniles may be injured on Feed Canal fish screens even though they meet NOAA Fisheries' criteria. | Small risk that migrating juveniles may be injured on Feed Canal fish screens even though they meet NOAA Fisheries' criteria. | Fish ladder present so migrating adults are able to pass the diversion. |

| Action | Spawning and Incubation | Juvenile Rearing | Juvenile Migration | Adult Migration |
|---|---|---|---|---|
| McKay Reservoir Ongoing Operations | No spawning or incubation occurs in the Umatilla River below McKay Creek. However, the occasional adult making it past the fish barrier[23] on McKay Creek may be stranded by shallow depths in existing channel during 10 cfs releases. | The release of McKay Reservoir water for WID and fish migration significantly improves summer rearing habitat in the Umatilla River for up to 20 miles. When irrigation releases are stopped in the fall fish may be stranded if releases are stopped abruptly. A more gradual release would likely allow most juveniles to avoid stranding by retreating from off-channel areas and edge habitat as flows decrease. 10 cfs in McKay Creek from November to March does not provide adequate depths in existing channel for passage but appears adequate for survival[24]. However, juvenile steelhead movement is minimal during cold overwintering period. | Late spring releases from McKay Reservoir aids the outmigration of smolts. When irrigation releases are stopped in the fall fish may be stranded if releases are stopped abruptly. A more gradual release would likely allow most juveniles to avoid stranding by retreating from off-channel areas and edge habitat as flows decrease. 10 cfs in McKay Creek from November to March does not provide adequate depths in existing channel for passage but appears adequate for survival. However, juvenile steelhead movement is minimal during cold overwintering period. | Adult passage is generally improved in the late summer and fall by exchange flows. |

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[23] In 2000, a few adult salmon and redds were observed in McKay Creek. Increased efforts in keeping the barrier free of debris during high water has decreased the frequency of barrier failure (CTUIR 2001).

[24] Fish were sampled by CTUIR during 10 cfs flows and were in good condition (CTUIR 2001).

| Action | Spawning and Incubation | Juvenile Rearing | Juvenile Migration | Adult Migration |
|---|---|---|---|---|
| McKay Creek Fish Barrier | Prevents spawning and incubation from occurring in McKay Creek. This habitat, however, is currently degraded and in the short-term could result in reduced production if adults were attracted from other Umatilla River tributaries where productivity is higher. | Juveniles can pass the barrier and do rear in McKay Creek. | Juveniles freely pass barrier. | Prevents adult steelhead from accessing 6 miles of spawning habitat. This habitat, however, is currently degraded and in the short-term could result in reduced production if adults were attracted from other Umatilla River tributaries where productivity is higher. |
| Irrigation Diversion Operations | No spawning occurs in the Umatilla River below McKay Creek, so there is no effect. | BOR model indicates irrigation diversions on the Umatilla River slightly reduce the amount of water (from 5 cfs to 0 cfs) available below the Westland Dam during the summer, but flows are inadequate with or without the project to support summer rearing below the Westland Dam. | Flows aiding the outmigration of steelhead smolts are reduced by diversions. Juveniles can be injured or delayed by diffusers in Three Mile Dam fish ladder. Small risk that migrating juveniles may be injured on Feed Canal fish screens even though they meet NOAA Fisheries' criteria. | The irrigation diversions on the Umatilla River slightly reduce the amount of water available below the Westland Dam during the summer, but flows are inadequate with or without the project to support adult passage below the Westland Dam. |
| Interrelated and Interdependent Actions | No spawning or incubating fish are affected. | Juveniles disturbed during cleaning of fish barrier. Juveniles in canal between head gates and screens disturbed when canals dewatered. Water quality also impaired during removal of gravel and sediment from project. | Juveniles disturbed during cleaning of fish barrier. Juveniles in canal between head gates and screens disturbed when canals dewatered. Water quality also impaired during removal of gravel and sediment from project. | Water quality impaired during removal of gravel and sediment from project. Attraction flows are altered by WEID pumping plant. |

### 2.3.2 Critical Habitat Conclusion

As discussed in the first paragraph of section 2, critical habitat in the action area is limited to the mainstem Columbia River from the mouth of the Umatilla River upstream to the Phase II Pumping Plant. After reviewing the current condition of the critical habitat, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects in the action area, it is NOAA Fisheries' opinion that the ongoing operation and maintenance of the Umatilla and Umatilla Basin Projects is not likely to destroy or adversely modify designated critical habitat.

## 2.4 Conservation Recommendations

Conservation recommendations are defined as "discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information" (50 CFR 402.02). 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. The conservation recommendations listed below are consistent with these obligations, and therefore should be implemented by the BOR.

1. The BOR should lead an interagency effort to coordinate and develop a habitat restoration plan for lower McKay Creek with the goal of increasing habitat complexity for providing cover, pools, and adequate depths for MCR steelhead. Habitat restoration on McKay Creek provides an excellent opportunity for a cooperative effort between BOR, private landowners, the City of Pendleton, CTUIR, and ODFW. There are a variety of methods available to achieve this objective, but the approach should include the following elements: In-channel work to provide greater low flow depths, placement of LWD to provide cover and encourage pool development, and riparian restoration. Subsequent project-specific consultations may be required to implement specific fish habitat enhancement projects, depending on the scope of effects.

2. In conjunction with CTUIR and ODFW, the BOR should provide adult steelhead passage at the McKay Creek adult passage barrier once habitat restoration benefits in McKay Creek have been realized (five to seven years) and it is apparent that McKay Creek can provide productive habitat for all MCR life stages, including spawning adults. Passage should be provided at the range of flows that may be encountered by adults entering McKay Creek, either by removing the entire barrier or a portion of the barrier. The BOR should coordinate with NOAA Fisheries on specific barrier removal plans.

3. Prior to reestablishing adult fish passage into McKay Creek, the BOR, in conjunction with CTUIR and ODFW, should evaluate the need for and opportunities to provide enhanced instream flow conditions in McKay Creek for all life stages of MCR steelhead. This assessment could also be included in Phase III feasibility studies for the lower Umatilla River.

4. During the feasibility studies for Phase III, the BOR should coordinate with CTUIR, ODFW, and irrigation districts to plan, implement, and monitor the effects of a variety of alternative flow releases in July and August to provide information that will help establish flow levels during this period in preparation for the implementation of Phase III.

5. The BOR should explore opportunities to increase the storage capacity of McKay Reservoir to insure that adequate water for fish flows are available.

6. The BOR should evaluate the merits and feasibility of providing passage for MCR steelhead at McKay Dam. Such evaluation should consider passage feasibility and habitat productivity.

7. The BOR should assess the status and trends of MCR steelhead in the basin, using spawning survey results, adult return data, outmigrating smolt data, and results from trap and haul operations.

8. The BOR should install guages to track the delivery of specific quantities of Project water delivered to WID lands through the TWSC.

For NOAA Fisheries to be kept informed of actions minimizing or avoiding adverse effects, or those that benefit listed species or critical habitat, NOAA Fisheries requests notification of the achievement of any conservation recommendations when the action agency submits its monitoring report describing action under this Opinion or when the project is completed.

## 2.5 Reinitiation of Consultation

As provided in 50 CFR 402.16, reinitiation of formal consultation is required if: (1) The amount or extent of taking specified in the Incidental Take Statement is exceeded, or is expected to be exceeded[25]; (2) new information reveals effects of the action may affect listed species in a way not previously considered; (3) the action is modified in a way that causes an effect on listed species that was not previously considered; (4) a new species is listed or critical habitat is designated that may be affected by the action; or (5) Phase III is implemented. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease, pending conclusion of the reinitiated consultation. This Opinion, and its incidental take statement, expire on the signature date 10 calendar years hence.

## 2.6 Incidental Take Statement

The ESA at section 9 [16 USC 1538] prohibits take of endangered species. The prohibition of take is extended to threatened anadromous salmonids by section 4(d) rule [50 CFR 223.203].

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[25] Incidental take of 23,906 juveniles is authorized for work on fish passage facilities. It was assumed that up to 5% of lethal take could occur during work isolation. Therefore, if lethal take of 1,200 juvenile steelhead resulting from fish rescue, salvage, and relocation activities is exeeded then reinitiation of consultation is necessary.

Take is defined by the statute as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” [16 USC 1532(19)] Harm is defined by regulation as “an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavior patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering.” [50 CFR 222.102] Harass is defined as “an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering.” [50 CFR 17.3] Incidental take is defined as “takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant.” [50 CFR 402.02] The ESA at section 7(o)(2) removes the prohibition from any incidental taking that is in compliance with the terms and conditions specified in a section 7(b)(4) incidental take statement [16 USC 1536].

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 to implement the reasonable and prudent measures.

### 2.6.1 Amount or Extent of Take

The proposed action is reasonably certain to result in incidental take of the listed species. NOAA Fisheries is reasonably certain the incidental take described here will occur because: (1) The listed species are known to occur in the action area; (2) the proposed action is likely to cause impacts to key habitat components significant enough to impair feeding, breeding, migrating, or sheltering for the listed species; (3) the possibility exists for juveniles to be stranded during canal shutdown and juveniles to be injured on fish screens; (4) the possibility exists for handling MCR steelhead during the work isolation process, which will result in incidental take to individuals during the construction period; and (5) individuals may be disturbed during monitoring. Despite the use of best scientific and commercial data available, NOAA Fisheries cannot quantify a specific amount of incidental take, except for work isolation, of individual fish or incubating eggs for the action. Instead, the extent of take is anticipated to be limited to McKay Creek during low flows associated with winter water storage, the Three Mile Dam fish ladder, the immediate area associated with the screens at the Phase II pumping plant on the Columbia River, and the immediate areas associated with fish ladders, juvenile fish screens, canals at project diversions, the WEID pumping plant, and the McKay Creek adult fish barrier. If the proposed action results in take beyond these areas, the BOR would need to reinitiate consultation.

In addition, NOAA Fisheries anticipates incidental take of up to 23,906 juvenile individuals[26] associated with the future construction of fish passage improvements at all Umatilla River

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[26] Take was calculated based on the assumption that juvenile MCR steelhead density averages 0.17 individuals/ft$^2$, and the total area associated with the five Federal projects is 140,621 ft$^2$.

diversion structures as described in this incidental take statement. The authorized take includes only take caused by the proposed action within the action area as defined in this Opinion.

### 2.6.2 Reasonable and Prudent Measures

Reasonable and prudent measures (RPMs) are non-discretionary measures to minimize take, that may or may not already be part of the description of the proposed action. They must be implemented as binding conditions for the exemption in section 7(o)(2) to apply. The BOR has the continuing duty to regulate the activities covered in this incidental take statement. If the BOR fails to require the applicants to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, or fails to retain the oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. NOAA Fisheries believes that activities carried out in a manner consistent with these reasonable and prudent measures, except those otherwise identified, will not necessitate further site-specific consultation. Activities which do not comply with all relevant reasonable and prudent measures will require further consultation.

NOAA Fisheries believes that the following reasonable and prudent measures are necessary and appropriate to minimize take of listed fish resulting from implementation of the action.

The BOR shall:

1. Avoid or minimize incidental take from dewatering McKay Creek from November through April by maintaining a minimum flow in McKay Creek.

2. Avoid or minimize incidental take from delivering water at Federal diversions.

3. Develop and implement a comprehensive monitoring and reporting program to ensure compliance with the measures to minimize incidental take and to report levels of incidental take.

4. Avoid or minimize incidental take from juvenile fish passage at BOR diversion structures by improving fish passage facilities at these structures.

### 2.6.3 Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the BOR must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary and are applicable to more than one category of activity. Therefore, terms and conditions listed for one type of activity are also terms and conditions of any category in which they would also minimize take of listed species or their habitats.

1. To implement reasonable and prudent measure #1 (McKay Creek minimum flows), the BOR shall:

    a. Release a minimum of 10 cfs continuously from McKay Reservoir from November 1st through April 30th in order to maintain flows in McKay Creek sufficient to provide minimal habitat levels and prevent stranding of juvenile MCR steelhead.

2. To implement reasonable and prudent measure #2 (delivering water), the BOR shall:

    a. Install and maintain gages at Federal diversions to track the delivery of specific quantities of Project water, to ensure that take associated with the delivery of water in excess of contracted amounts is minimized.

3. To implement reasonable and prudent measure #3 (monitoring), the BOR shall ensure that:

    a. Salvage notice. The following notice is included as a contract requirement for whoever implements operation and maintenance activities.

    > NOTICE. If a sick, injured or dead specimen of a threatened or endangered species is found, the finder must notify the Vancouver Field Office of NOAA Fisheries Law Enforcement at 360.418.4246. The finder must take care in handling of sick or injured specimens to ensure effective treatment, and in handling dead specimens to preserve biological material in the best possible condition for later analysis of cause of death. The finder also has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not disturbed unnecessarily.

    b. Develop and implement a monitoring program.
        i. Monitor the level of incidental take by assessing injury and mortality at all BOR diversion structures.
        ii. Assess habitat conditions in McKay Creek from November through April during flows of 10 cfs to ensure that the 10 cfs minimum release is adequate to minimize take of rearing juvenile MCR steelhead.

    c. Annual report of monitoring program results. The BOR will submit an annual report to NOAA Fisheries by December 31 that includes the dates of all monitoring, the results of diversion structure mortality assessments, McKay Creek habitat condition results, and the Federal diversion gage data. Reporting of diversion structure mortality and McKay Creek habitat conditions will continue annually until the BOR documents that passage problems have been corrected and habitat restoration needs have been identified.

d. Reinitiation contact. To reinitiate consultation, contact the Oregon State Habitat Office of NOAA Fisheries, at the address above.

4. To implement reasonable and prudent measure #4 (passage at diversions), the BOR shall:

a. For the BOR Federal structures, work with NOAA fish passage staff and BPA to correct passage problems identified during injury and mortality assessments at diversion structures.

b. Work with BPA, if necessary, to correct fish passage deficiencies in fish ladder at Three Mile Dam as identified in BPA (1997b).
    i. Operate the fish exit gates at the Three Mile Dam fish ladder fully open to improve passage conditions at Diffuser 1.
    ii. Develop methods to guide juvenile fish past or through the fish ladder at Three Mile Dam to minimize injury and delay.
    iii. Remove the non-functional I-beam in front of Diffuser 1 in the fish ladder.

c. Written planning requirements. Before beginning any work on the fish ladder the contractor will provide a copy of the written plans to the Oregon State Habitat Office of NOAA Fisheries at the following address. Plan requirements are described below.

Director, Oregon State Habitat Office
Habitat Conservation Division
National Marine Fisheries Service
**Attn: 2001/01415**
525 NE Oregon Street
Portland, OR 97232

d. Construction requirements for fish passage improvement activities.
    i. Minimum area. Confine construction impacts to the minimum area necessary to complete the project.
    ii. Timing of in-water work. Complete all work below the bankfull elevation during the ODFW-preferred, in-water work period between July 15 and October 15, unless otherwise approved in writing by NOAA Fisheries.
    iii. Cessation of work. Cease project operations under high flow conditions that may result in inundation of the project area, except for efforts to avoid or minimize resource damage.
    iv. Fish passage. Provide passage for any adult or juvenile salmonid species present in the project area during construction, unless otherwise approved in writing by NOAA Fisheries, and after construction for the life of the project. Upstream passage is not required during construction if it did not previously exist.

v. Pollution and Erosion Control Plan. Prepare and carry out a written pollution and erosion control plan to prevent pollution caused by surveying or construction operations. Submit a copy of the written plan to the BOR and to the Oregon Office of NOAA Fisheries, at the address above, before beginning work below bankfull elevation.

(1) Plan Contents. The pollution and erosion control plan will contain the pertinent elements listed below, and meet requirements of all applicable laws and regulations.

(a) The name and address of the party(s) responsible for accomplishment of the pollution and erosion control plan.

(b) Practices to prevent erosion and sedimentation associated with access roads, stream crossings, drilling sites, construction sites, borrow pit operations, haul roads, equipment and material storage sites, fueling operations, staging areas, and roads being decommissioned.

(c) Practices to confine, remove and dispose of excess concrete, cement, grout, and other mortars or bonding agents, including measures for washout facilities.

(d) A description of any regulated or hazardous products or materials that will be used for the project, including procedures for inventory, storage, handling, and monitoring.

(e) A spill containment and control plan with notification procedures, specific cleanup and disposal instructions for different products, quick response containment and cleanup measures that will be available on the site, proposed methods for disposal of spilled materials, and employee training for spill containment.

(f) Practices to prevent construction debris from dropping into any stream or waterbody, and to remove any material that does drop with a minimum disturbance to the streambed and water quality.

(2) Inspection of erosion controls. During construction, monitor instream turbidity and inspect all erosion controls daily during the rainy season and weekly during the dry season, or more often as necessary, to ensure the erosion controls are working adequately.[27]

(a) If monitoring or inspection shows that the erosion controls are ineffective, mobilize work crews immediately to make repairs, install replacements, or install additional controls as necessary.

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[27] 'Working adequately' means that project activities do not increase ambient stream turbidity by more than 10% above background 100 feet below the discharge, when measured relative to a control point immediately upstream of the turbidity causing activity.

        (b) Remove sediment from erosion controls once it has reached 1/3 of the exposed height of the control.

vi. Construction discharge water. Treat all discharge water created by construction (*e.g.*, concrete washout, pumping for work area isolation, vehicle wash water, drilling fluids) as follows.

    (1) Water quality. Design, build, and maintain facilities to collect and treat all construction discharge water, including any contaminated water produced by drilling, using the best available technology applicable to site conditions. Provide treatment to remove debris, nutrients, sediment, petroleum hydrocarbons, metals and other pollutants likely to be present.

    (2) Discharge velocity. If construction discharge water is released using an outfall or diffuser port, velocities may not exceed 4 feet per second, and the maximum size of any aperture may not exceed one inch.

    (3) Pollutants. Do not allow pollutants including green concrete, contaminated water, silt, welding slag, sandblasting abrasive, or grout cured less than 24 hours to contact any wetland or the two-year floodplain.

vii. Preconstruction activity. Complete the following actions before significant[28] alteration of the project area.

    (1) Marking. Flag the boundaries of clearing limits associated with site access and construction to prevent ground disturbance of critical riparian vegetation, wetlands and other sensitive sites beyond the flagged boundary.

    (2) Emergency erosion controls. Ensure that the following materials for emergency erosion control are onsite.

        (a) A supply of sediment control materials (*e.g.*, silt fence, straw bales).[29]

        (b) An oil-absorbing, floating boom whenever surface water is present.

    (3) Temporary erosion controls. All temporary erosion controls will be in-place and appropriately installed downslope of project activity within the riparian area until site restoration is complete.

viii. Temporary access roads and drilling pads. All temporary access roads and drilling pads will be constructed as follows.

    (1) Existing ways. Use existing roadways, travel paths, and drilling pads whenever possible, unless construction of a new way or drilling pad would result in less habitat take. When feasible, eliminate the need for an access road by walking a tracked drill or

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[28] 'Significant' means an effect can be meaningfully measured, detected or evaluated.

[29] When available, certified weed-free straw or hay bales will be used to prevent introduction of noxious weeds.

spider hoe to a survey site, or lower drilling equipment to a survey site using a crane.

(2) Steep slopes. Temporary roads or drilling pads built mid-slope or on slopes steeper than 30% are not authorized.

(3) Minimizing soil disturbance and compaction. Minimize soil disturbance and compaction whenever a new temporary road or drill pad is necessary within 150 feet[30] of a stream, waterbody or wetland by clearing vegetation to ground level and placing clean gravel over geotextile fabric, unless otherwise approved in writing by NOAA Fisheries.

(4) Temporary stream crossings.
  (a) Minimize the number of temporary stream crossings.
  (b) Design temporary road crossings as follows.
    (i) Survey and map any potential spawning habitat within 300 feet downstream of a proposed crossing.
    (ii) Do not place a stream crossing at known or suspected spawning areas, or within 300 feet upstream of such areas if spawning areas may be affected.
    (iii) Design the crossing to provide for foreseeable risks (*e.g.*, flooding and associated bedload and debris, to prevent the diversion of streamflow out of the channel and down the road if the crossing fails).
    (iv) Vehicles and machinery will cross riparian areas and streams at right angles to the main channel wherever possible.

(5) Obliteration. When the project is complete, obliterate all temporary access roads that will not be in footprint of a new bridge or other permanent structure, stabilize the soil, and revegetate the site. Abandon and restore temporary roads in wet or flooded areas by the end of the in-water work period.

ix. Heavy Equipment. Restrict use of heavy equipment as follows:

(1) Choice of equipment. When heavy equipment will be used, the equipment selected will have the least adverse effects on the environment (*e.g.*, minimally-sized, low ground pressure equipment).

(2) Vehicle and material staging. Store construction materials, and fuel, operate, maintain and store vehicles as follows.

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[30] Distances from a stream or waterbody are measured horizontally from, and perpendicular to, the bankfull elevation, the edge of the channel migration zone, or the edge of any associated wetland, whichever is greater. 'Channel migration zone' means the area defined by the lateral extent of likely movement along a stream reach as shown by evidence of active stream channel movement over the past 100 years (*e.g.*, alluvial fans or floodplains formed where the channel gradient decreases, the valley abruptly widens, or at the confluence of larger streams).

    - (a) To reduce the staging area and potential for contamination, ensure that only enough supplies and equipment to complete a specific job will be stored on-site.
    - (b) Complete vehicle staging, cleaning, maintenance, refueling, and fuel storage in a vehicle staging area placed 150 feet or more from any stream, waterbody or wetland, unless otherwise approved in writing by NOAA Fisheries.
    - (c) Inspect all vehicles operated within 150 feet of any stream, waterbody or wetland daily for fluid leaks before leaving the vehicle staging area. Repair any leaks detected in the vehicle staging area before the vehicle resumes operation. Document inspections in a record that is available for review on request by BOR or NOAA Fisheries.
    - (d) Before operations begin and as often as necessary during operation, steam clean all equipment that will be used below bankfull elevation until all visible external oil, grease, mud, and other visible contaminates are removed.
    - (e) Diaper all stationary power equipment (*e.g.*, generators, cranes, stationary drilling equipment) operated within 150 feet of any stream, waterbody or wetland to prevent leaks, unless suitable containment is provided to prevent potential spills from entering any stream or waterbody.
- x. <u>Site preparation</u>. Conserve native materials for site restoration.
  - (1) If possible, leave native materials where they are found.
  - (2) If materials are moved, damaged or destroyed, replace them with a functional equivalent during site restoration.
  - (3) Stockpile any large wood[31], native vegetation, weed-free topsoil, and native channel material displaced by construction for use during site restoration.
- xi. <u>Isolation of in-water work area</u>. If adult or juvenile fish are reasonably certain to be present, or if the work area is 300 feet upstream of spawning habitats, completely isolate the work area from the active flowing stream using inflatable bags, sandbags, sheet pilings, or similar materials, unless otherwise approved in writing by NOAA Fisheries.
- xii. <u>Capture and release</u>. Before and intermittently during pumping to isolate an in-water work area, attempt to capture and release fish from the isolated area using trapping, seining, electrofishing, or other methods as are prudent to minimize risk of injury.

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[31] For purposes of this Opinion only, 'large wood' means a tree, log, or rootwad big enough to dissipate stream energy associated with high flows, capture bedload, stabilize streambanks, influence channel characteristics, and otherwise support aquatic habitat function, given the slope and bankfull channel width of the stream in which the wood occurs. See, Oregon Department of Forestry and ODFW, *A Guide to Placing Large Wood in Streams*, May 1995 (www.odf.state.or.us/FP/RefLibrary/LargeWoodPlacemntGuide5-95.doc).

(1) The entire capture and release operation must be conducted or supervised by a fishery biologist experienced with work area isolation and competent to ensure the safe handling of all ESA-listed fish.

(2) Do not use electrofishing if water temperatures exceed 18ºC.

(3) If electrofishing equipment is used to capture fish, comply with NOAA Fisheries' electrofishing guidelines.[32]

(4) Handle ESA-listed fish with extreme care, keeping fish in water to the maximum extent possible during seining and transfer procedures to prevent the added stress of out-of-water handling.

(5) Transport fish in aerated buckets or tanks.

(6) Release fish into a safe release site as quickly as possible, and as near as possible to capture sites.

(7) Do not transfer ESA-listed fish to anyone except NOAA Fisheries personnel, unless otherwise approved in writing by NOAA Fisheries.

(8) Obtain all other Federal, state, and local permits necessary to conduct the capture and release activity.

(9) Allow NOAA Fisheries or its designated representative to accompany the capture team during the capture and release activity, and to inspect the team's capture and release records and facilities.

xiii. Earthwork. Complete earthwork (including drilling, excavation, dredging, filling and compacting) as quickly as possible.

(1) Drilling and sampling. If drilling, boring or jacking is used, the following conditions apply.

(a) Isolate drilling operations in wetted stream channels using a steel pile, sleeve or other appropriate isolation method to prevent drilling fluids from contacting water.

(b) Sampling and directional drill recovery/recycling pits, and any associated waste or spoils will be completely isolated from surface waters, off-channel habitats and wetlands. All waste or spoils must be covered if precipitation is falling or imminent. All drilling fluids and waste will be recovered and recycled or disposed to prevent entry into flowing water.

(c) If a drill boring conductor breaks and drilling fluid or waste is visible in water or a wetland, all drilling activity will cease pending written approval from NOAA Fisheries to resume drilling.

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[32] National Marine Fisheries Service, *Backpack Electrofishing Guidelines* (December 1998) (http://www.nwr.noaa.gov/1salmon/salmesa/pubs/electrog.pdf).

        (2) <u>Site stabilization</u>. Stabilize all disturbed areas, including obliteration of temporary roads, following any break in work unless construction will resume within four days.
        (3) <u>Source of materials</u>. Obtain boulders, rock, woody materials and other natural construction materials used for the project outside the riparian area.

e. <u>Implementation monitoring report required</u>. The contractor submits an implementation monitoring report to the BOR and to NOAA Fisheries, at the address below, within 120 days of completing all in-water work. The monitoring report will describe the contractor's success meeting his or her contract requirements.
    i. If the in-water work will not be completed by January 31 following the year during which it will occur, the contractor shall submit a report to the BOR and to NOAA Fisheries by January 31 saying why the in-water work was not complete.
    ii. If the monitoring report or explanation of why work was not completed is not received by the BOR and NOAA Fisheries by January 31, NOAA Fisheries may consider that a modification of the action that causes an effect on listed species not previously considered and causes the incidental take statement of the Opinion to expire.
    iii. Submit a copy of the monitoring report or explanation of why work was not completed to the Oregon State Habitat Office of NOAA Fisheries, at the address above.
    iv. <u>Implementation monitoring report contents</u>. Each monitoring report will include the following information.
        (1) <u>Project identification</u>
            (a) Contractor name, contract number, and project name.
            (b) BOR contact person.
            (c) Starting and ending dates for work completed.
            (d) Description of work completed.
        (2) <u>Ladder conditions</u>. Photos of ladder at the locations of structural changes before, during, and after project completion.
            (a) Include general views and close-ups showing details of the project and project area, including pre and post construction.
            (b) Label each photo with date, time, project name, photographer's name, and a comment about the subject.
        (3) <u>Project data</u>.
            (a) <u>Work cessation</u>. Dates work ceased due to high flows, if any.
            (b) <u>Pollution control</u>. A summary of pollution and erosion control inspections, including any erosion control failure, contaminant release, and correction effort.
        (4) <u>Site preparation</u>.

    - (a) Total cleared area – riparian and upland.
- (5) <u>Isolation of in-water work area, capture and release</u>.
    - (a) Supervisory fish biologist – name and address.
    - (b) Methods of work area isolation and take minimization.
    - (c) Stream conditions before, during and within one week after completion of work area isolation.
    - (d) Means of fish capture.
    - (e) Number of fish captured by species.
    - (f) Release site and condition of all fish released.
    - (g) Any incidence of observed injury or mortality of listed species.

## 3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

### 3.1 Statutory Requirements

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan.

Pursuant to the MSA:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (section 305(b)(2)).

- NOAA Fisheries must provide conservation recommendations for any Federal or state action that may adversely affect EFH (section 305(b)(4)(A));

- Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NOAA Fisheries EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (section 305(b)(4)(B)).

The EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA section 3). For the purpose of interpreting this definition of EFH: Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.10). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

The EFH consultation with NOAA Fisheries is required for any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action may adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects on EFH.

### 3.2 Identification of EFH

Pursuant to the MSA, the Pacific Fishery Management Council (PFMC) has designated EFH for three species of federally-managed Pacific salmon: Chinook (*Oncorhynchus tshawytscha*); coho (*O. kisutch*); and Puget Sound pink salmon (*O. gorbuscha*) (PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other waterbodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC 1999), and longstanding, naturally-impassable barriers (*i.e.*, natural waterfalls in existence for several hundred years). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the *Pacific Coast Salmon Plan* (PFMC 1999). Assessment of potential adverse effects to these species' EFH from the proposed action is based, in part, on this information.

### 3.3 Proposed Actions

The proposed action and action area are detailed above in sections 1.2 and 1.3 of this document. The action area includes habitats that have been designated as EFH for various life-history stages of chinook salmon.

### 3.4 Effects of Proposed Action on EFH

The habitat requirements for chinook have been evaluated and have been found to be the same as the habitat requirements for MCR steelhead. As described in detail in section 2.2.1 of this document, the proposed action may result in short- and long-term adverse effects on a variety of habitat parameters. These adverse effects are:

1. Inadequate water depths for juvenile chinook passage in McKay Creek while storing water in McKay Reservoir.

2. McKay Creek fish barrier prevents adult access to 6 miles of chinook spawning habitat.

3. Flows aiding the outmigration of chinook smolts in the lower Umatilla River are reduced.

4. Water quality is impaired during the removal of gravel and sediment associated with fish ladders and diversions.

5. WEID pumping plant alters attraction flows.

6. Juveniles may be injured or delayed in the Three Mile Dam fish ladder.

### 3.5 Conclusion

NOAA Fisheries concludes that the proposed action will adversely affect designated EFH for chinook salmon.

### 3.6 EFH Conservation Recommendations

Pursuant to section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations to Federal agencies regarding actions that may adversely affect EFH. NOAA Fisheries understands that the conservation measures described in the BA will be implemented by the BOR, and believes that these measures are sufficient to minimize, to the maximum extent practicable, the following EFH effects: Inadequate water depths for juvenile chinook passage in McKay Creek while storing water in McKay Reservoir, McKay Creek fish barrier prevents adult access to 6 miles of chinook spawning habitat, flows aiding the outmigration of chinook smolts in the lower Umatilla River are reduced, water quality is impaired during the removal of gravel and sediment associated with fish ladders and diversions, injury of juveniles at diversion structures, and WEID pumping plant alters attraction flows. Although, these conservation measures are not sufficient to fully address the remaining adverse effects to EFH, specific Terms and Conditions outlined in Section 2.6.3 are generally applicable to designated EFH for chinook salmon, and do address these adverse effects. Consequently, NOAA Fisheries recommends that the following terms and conditions be implemented as EFH conservation measures.

1. Term and Condition 2.a. will minimize effects from low water depths in McKay Creek while water is being stored.

2. Term and Condition 3.a. and b. will minimize injury to juveniles at diversion structures.

In addition to terms and conditions in the Opinion, NOAA Fisheries provides the following conservation recommendation to aid migration of fall-run chinook salmon.

3. The BOR should work with CTUIR and WID to provide sufficient Umatilla River attractant flow, through McKay releases in September, to minimize straying of adult Umatilla River hatchery fall chinook to other basins.

### 3.7 Statutory Response Requirement

Pursuant to the MSA (section 305(b)(4)(B)) and 50 CFR 600.920(j), Federal agencies are required to provide a detailed written response to NOAA Fisheries' EFH conservation recommendations within 30 days of receipt of these recommendations. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. In the case of a response that is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

### 3.8 Supplemental Consultation

The BOR must reinitiate EFH consultation with NOAA Fisheries if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920(l)).

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# APPENDIX A

## BIOLOGICAL REQUIREMENTS, CURRENT STATUS, AND TRENDS: SEVEN COLUMBIA RIVER BASIN EVOLUTIONARILY SIGNIFICANT UNITS

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## A.1 OVERVIEW OF STATUS OF SPECIES AND CRITICAL HABITAT

Appendix A provides a description of the species, critical habitat designations, a general life history, and a detailed discussion of population dynamics and distribution for seven Columbia River basin evolutionarily significant units (ESUs).

## A.2 SPECIES DESCRIPTIONS AND CRITICAL HABITAT DESIGNATIONS

### A.2.1 Chinook Salmon

#### A.2.1.1 Snake River Spring/Summer Chinook Salmon

The Snake River (SR) spring/summer chinook salmon ESU, listed as threatened on April 22, 1992 (57 FR 14653), includes all natural-origin populations in the Tucannon, Grande Ronde, Imnaha, and Salmon rivers. Some or all of the fish returning to several of the hatchery programs are also listed including those returning to the Tucannon River, Imnaha, and Grande Ronde hatcheries, and to the Sawtooth, Pahsimeroi, and McCall hatcheries on the Salmon River. Critical habitat was designated for SR spring/summer chinook salmon on December 28, 1993 (58 FR 68543), and was revised on October 25, 1999 (64 FR 57399).

#### A.2.1.2 Snake River Fall Chinook Salmon

The SR fall chinook salmon ESU, listed as threatened on April 22, 1992 (57 FR 14653), includes all natural-origin populations of fall chinook in the mainstem Snake River and several tributaries including the Tucannon, Grande Ronde, Salmon, and Clearwater rivers. Fall chinook from the Lyons Ferry Hatchery are included in the ESU but are not listed. Critical habitat was designated for SR fall chinook salmon on December 28, 1993 (58 FR 68543).

#### A.2.1.3 Upper Columbia River Spring-Run Chinook Salmon

The Upper Columbia River (UCR) spring-run chinook salmon ESU, listed as endangered on March 24, 1999 (64 FR 14308), includes all natural-origin, stream-type chinook salmon from river reaches above Rock Island Dam and downstream of Chief Joseph Dam, including the Wenatchee, Entiat, and Methow River basins. All chinook in the Okanogan River are apparently ocean-type and are considered part of the UCR summer- and fall-run ESU. The spring-run components of the following hatchery stocks are also listed: Chiwawa, Methow, Twisp, Chewuch, and White rivers and Nason Creek. Critical habitat was designated for UCR spring-run chinook salmon on February 16, 2000 (65 FR 7764).

## A.2.2 Steelhead

### A.2.2.1 Snake River Steelhead

The SR steelhead ESU, listed as threatened on August 18, 1997 (62 FR 43937), includes all natural-origin populations of steelhead in the Snake River basin of southeast Washington, northeast Oregon, and Idaho. None of the hatchery stocks in the Snake River basin is listed, but several are included in the ESU. Critical habitat was designated for SR steelhead on February 16, 2000 (65 FR 7764).

### A.2.2.2 Upper Columbia River Steelhead

The UCR steelhead ESU, listed as endangered on August 18, 1997 (62 FR 43937), includes all natural-origin populations of steelhead in the Columbia River basin upstream from the Yakima River, Washington, to the U.S./Canada border. The Wells Hatchery stock is included among the listed populations. Critical habitat was designated for UCR steelhead on February 16, 2000 (65 FR 7764).

### A.2.2.3 Middle Columbia River Steelhead

The Middle Columbia River (MCR) steelhead ESU, listed as threatened on March 25, 1999 (64 FR 14517), includes all natural-origin populations in the Columbia River basin above the Wind River, Washington, and the Hood River, Oregon, including the Yakima River, Washington. This ESU includes the only populations of winter inland steelhead in the United States (in the Klickitat River, Washington, and Fifteenmile Creek, Oregon). Both the Deschutes River and Umatilla River hatchery stocks are included in the ESU, but are not listed.

## A.2.3 Sockeye Salmon

### A.2.3.1 Snake River Sockeye Salmon

The SR sockeye salmon ESU, listed as endangered on November 20, 1991 (56 FR 58619), includes populations of sockeye salmon from the Snake River basin, Idaho (extant populations occur only in the Salmon River subbasin). Under NOAA Fisheries' interim policy on artificial propagation (58 FR 17573), the progeny of fish from a listed population that are propagated artificially are considered part of the listed species and are protected under ESA. Thus, although not specifically designated in the 1991 listing, SR sockeye salmon produced in the captive broodstock program are included in the listed ESU. Given the dire status of the wild population under any criteria (16 wild and 264 hatchery-produced adult sockeye returned to the Stanley basin between 1990 and 2000), NOAA Fisheries considers the captive broodstock and its progeny essential for recovery. Critical habitat was designated for SR sockeye salmon on December 28, 1993 (58 FR 68543).

## A.3 GENERAL LIFE HISTORIES

### A.3.1 Chinook Salmon

The chinook salmon is the largest of the Pacific salmon. The species' distribution historically ranged from the Ventura River in California to Point Hope, Alaska, in North America, and in northeastern Asia from Hokkaido, Japan, to the Anadyr River in Russia (Healey 1991). Additionally, chinook salmon have been reported in the Mackenzie River area of northern Canada (McPhail and Lindsey 1970). Of the Pacific salmon, chinook salmon exhibit the most diverse and complex life history strategies. Healey (1986) described 16 age categories for chinook salmon, combinations of seven total ages with three possible freshwater ages. This level of complexity is roughly comparable to that seen in sockeye salmon (*O. nerka*), although the latter species has a more extended freshwater residence period and uses different freshwater habitats (Miller and Brannon 1982, Burgner 1991). Gilbert (1912) initially described two generalized freshwater life-history types: "stream-type" chinook salmon, which reside in freshwater for a year or more following emergence, and "ocean-type" chinook salmon, which migrate to the ocean within their first year. Healey (1983, 1991) has promoted the use of broader definitions for ocean-type and stream-type to describe two distinct races of chinook salmon. Healey's approach incorporates life-history traits, geographic distribution, and genetic differentiation and provides a valuable frame of reference for comparisons of chinook salmon populations.

The generalized life history of Pacific salmon involves incubation, hatching, and emergence in freshwater; migration to the ocean; and the subsequent initiation of maturation and return to freshwater for completion of maturation and spawning. The juvenile rearing period in freshwater can be minimal or extended. Additionally, some male chinook salmon mature in freshwater, thereby not emigrating to the ocean. The timing and duration of each of these stages is related to genetic and environmental determinants and their interactions to varying degrees. Although salmon exhibit a high degree of variability in life-history traits, there is considerable debate regarding the degree to which this variability is shaped by local adaptation or results from the general plasticity of the salmonid genome (Ricker 1972, Healey 1991, Taylor 1991). More detailed descriptions of the key features of chinook salmon life history can be found in Myers *et al.* (1998) and Healey (1991).

### A.3.2 Steelhead

Steelhead can be divided into two basic run types based on the level of sexual maturity at the time of river entry and the duration of the spawning migration (Burgner *et al.* 1992). The stream-maturing type, or summer steelhead, enters freshwater in a sexually immature condition and requires several months in freshwater to mature and spawn. The ocean-maturing type, or winter steelhead, enters freshwater with well-developed gonads and spawns shortly after river entry (Barnhart 1986). Variations in migration timing exist between populations. Some river basins have both summer and winter steelhead, whereas others only have one run type.

In the Pacific Northwest, summer steelhead enter freshwater between May and October (Busby *et al.* 1996, Nickelson *et al.* 1992). During summer and fall, before spawning, they hold in cool, deep pools (Nickelson *et al.* 1992). They migrate inland toward spawning areas, overwinter in the larger rivers, resume migration to natal streams in early spring, and then spawn (Meehan and Bjornn 1991, Nickelson *et al.* 1992). Winter steelhead enter freshwater between November and April in the Pacific Northwest (Busby *et al.* 1996, Nickelson *et al.* 1992), migrate to spawning areas, and then spawn in late winter or spring. Some adults do not, however, enter coastal streams until spring, just before spawning (Meehan and Bjornn 1991). Difficult field conditions (snowmelt and high stream flows) and the remoteness of spawning grounds contribute to the relative lack of specific information on steelhead spawning.

Unlike Pacific salmon, steelhead are iteroparous, or capable of spawning more than once before death. However, it is rare for steelhead to spawn more than twice before dying, and most that do so are females (Nickelson *et al.* 1992). Iteroparity is more common among southern steelhead populations than northern populations (Busby *et al.* 1996). Multiple spawnings for steelhead range from 3% to 20% of runs in Oregon coastal streams.

Steelhead spawn in cool, clear streams with suitable gravel size, depth, and current velocity. Intermittent streams may also be used for spawning (Barnhart 1986, Everest 1973). Steelhead enter streams and arrive at spawning grounds weeks or even months before they spawn and are vulnerable to disturbance and predation. Cover, in the form of overhanging vegetation, undercut banks, submerged vegetation, submerged objects such as logs and rocks, floating debris, deep water, turbulence, and turbidity (Giger 1973), is required to reduce disturbance and predation of spawning steelhead. Summer steelhead usually spawn further upstream than winter steelhead (Withler 1966, Behnke 1992).

Depending on water temperature, steelhead eggs may incubate for 1.5 to 4 months (August 9, 1996, 61 FR 41542) before hatching. Summer rearing takes place primarily in the faster parts of pools, although young-of-the-year are abundant in glides and riffles. Winter rearing occurs more uniformly at lower densities across a wide range of fast and slow habitat types. Productive steelhead habitat is characterized by complexity, primarily in the form of large and small wood. Some older juveniles move downstream to rear in larger tributaries and mainstem rivers (Nickelson *et al.* 1992).

Juveniles rear in freshwater from one to four years, then migrate to the ocean as smolts. Winter steelhead populations generally smolt after two years in freshwater (Busby *et al.* 1996). Steelhead typically reside in marine waters for two or three years before returning to their natal stream to spawn at four or five years of age. Populations in Oregon and California have higher frequencies of age-1-ocean steelhead than populations to the north, but age-2-ocean steelhead generally remain dominant (Busby *et al.* 1996). Age structure appears to be similar to other west coast steelhead, dominated by four-year-old spawners (Busby *et al.* 1996).

Based on purse seine catches, juvenile steelhead tend to migrate directly offshore during their first summer, rather than migrating along the coastal belt as do salmon. During fall and winter, juveniles move southward and eastward (Hartt and Dell 1986). Oregon steelhead tend to be north-migrating (Nicholas and Hankin 1988, Pearcy *et al.* 1990, Pearcy 1992).

### A.3.3 Sockeye Salmon

Snake River sockeye salmon adults enter the Columbia River primarily during June and July. Arrival at Redfish Lake, which now supports the only remaining run of Snake River sockeye salmon, peaks in August, and spawning occurs primarily in October (Bjornn *et al.* 1968). Eggs hatch in the spring between 80 and 140 days after spawning. Fry remain in the gravel for 3 to 5 weeks, emerge from April through May, and move immediately into the lake. Once there, juveniles feed on plankton for one to three years before they migrate to the ocean (Bell 1986). Migrants leave Redfish Lake during late April through May (Bjornn *et al.* 1968) and travel almost 900 miles to the Pacific Ocean. Smolts reaching the ocean remain inshore or within the influence of the Columbia River plume during the early summer months. Later, they migrate through the northeast Pacific Ocean (Hart 1973, Hartt and Dell 1986). Snake River sockeye salmon usually spend two to three years in the Pacific Ocean and return in their fourth or fifth year of life. For detailed information on the Snake River sockeye salmon, see Waples *et al.* (1991a).

## A.4 POPULATION DYNAMICS AND DISTRIBUTION

The following sections provide specific information on the distribution and population structure (size, variability, and trends of the stocks or populations) of each listed ESU. Most of this information comes from observations made in terminal, freshwater areas, which may be distinct from the action area. This focus is appropriate because the species status and distribution can only be measured at this level of detail as adults return to spawn.

### A.4.1 Chinook Salmon

#### A.4.1.1 Snake River Spring/Summer Chinook Salmon

The present range of spawning and rearing habitat for naturally-spawned SR spring/summer chinook salmon is primarily limited to the Salmon, Grande Ronde, Imnaha, and Tucannon subbasins. Most SR spring/summer chinook salmon enter individual subbasins from May through September. Juvenile SR spring/summer chinook salmon emerge from spawning gravels from February through June (Peery and Bjornn 1991). Typically, after rearing in their nursery streams for about one year, smolts begin migrating seaward in April and May (Bugert *et al.* 1990, Cannamela 1992). After reaching the mouth of the Columbia River, spring/summer chinook salmon probably inhabit nearshore areas before beginning their northeast Pacific Ocean migration, which lasts two to three years. Because of their timing and ocean distribution, these stocks are subject to very little ocean harvest. For detailed information on the life history and stock status of SR spring/summer chinook salmon, see Matthews and Waples (1991a), NMFS (1991b), and 56 FR 29542 (June 27, 1991).

Bevan *et al.* (1994) estimated the number of wild adult SR spring/summer chinook salmon in the late 1800s to be more than 1.5 million fish annually. By the 1950s, the population had declined to an estimated 125,000 adults. Escapement estimates indicate that the population continued to decline through the 1970s. Returns varied through the 1980s, but have declined further in recent years. Record low returns were observed in 1994 and 1995. Dam counts were modestly higher from 1996 through 1998, but declined in 1999. For management purposes, the spring and summer chinook salmon in the Columbia River basin, including those returning to the Snake River, have been managed as separate stocks. Historical databases, therefore, provide separate estimates for the spring and summer chinook salmon components. Table A-3 reports the estimated annual return of adult, natural-origin SR spring and summer chinook salmon returning to Lower Granite Dam since 1979.

NOAA Fisheries set an interim recovery level for SR spring/summer chinook salmon (31,400 adults at Ice Harbor Dam) in its proposed recovery plan (NMFS 1995). The SR spring/summer chinook salmon ESU consists of 39 local spawning populations (subpopulations) spread over a large geographic area (Lichatowich *et al.* 1993). The number of fish returning to Lower Granite Dam is, therefore, divided among these subpopulations. The relationships between these subpopulations, and particularly the degree to which individuals may intermix, are unknown. It is unlikely that all 39 are independent populations per the definition in McElhany *et al.* (2000), which requires that each be isolated such that the exchange of individuals between populations does not substantially affect population dynamics or extinction risk over a 100-year time frame. Nonetheless, monitoring the status of subpopulations provides more detailed information on the status of the species than would an aggregate measure of abundance.

**Table A-1.** Estimates of natural-origin SR spring/summer chinook salmon counted at Lower Granite Dam in recent years (CRITFC 1999).

| Year | Spring Chinook | Summer Chinook | Total |
|---|---|---|---|
| 1979 | 2,573 | 2,712 | 5,285 |
| 1980 | 3,478 | 2,688 | 6,166 |
| 1981 | 7,941 | 3,326 | 11,267 |
| 1982 | 7,117 | 3,529 | 10,646 |
| 1983 | 6,181 | 3,233 | 9,414 |
| 1984 | 3,199 | 4,200 | 7,399 |
| 1985 | 5,245 | 3,196 | 8,441 |
| 1986 | 6,895 | 3,934 | 10,829 |
| 1987 | 7,883 | 2,414 | 10,297 |
| 1988 | 8,581 | 2,263 | 10,844 |
| 1989 | 3,029 | 2,350 | 5,379 |
| 1990 | 3,216 | 3,378 | 6,594 |
| 1991 | 2,206 | 2,814 | 5,020 |
| 1992 | 11,285 | 1,148 | 12,433 |
| 1993 | 6,008 | 3,959 | 9,967 |
| 1994 | 1,416 | 305 | 1,721 |
| 1995 | 745 | 371 | 1,116 |
| 1996 | 1,358 | 2,129 | 3,487 |
| 1997 | 1,434 | 6,458 | 7,892 |
| 1998 | 5,055 | 3,371 | 8,426 |
| 1999 | 1,433 | 1,843 | 3,276 |
| | | Recovery Esc Level | 31,440 |

Seven of these subpopulations have been used as index stocks to analyze extinction risk and alternative actions that may be taken to meet survival and recovery requirements. The Snake River Salmon Recovery Team selected these subpopulations primarily because of the availability of a relatively long-term series of abundance data. The BRWG developed recovery and threshold abundance levels for the index stocks, which serve as reference points for comparisons with observed escapements (Table A-4). The threshold abundances represent levels at which uncertainties (and, thus, the likelihood of error) about processes or population enumeration are likely to be biologically significant and at which qualitative changes in processes are likely to occur. They were not developed as indicators of pseudo-extinction or as absolute indicators of critical thresholds. In any case, escapement estimates for the index stocks have generally been well below threshold levels in recent years (Table A-4).

**Table A-2.** Estimated number of natural-origin adult spawners plus recovery levels and BRWG threshold abundance levels for the seven SR spring/summer chinook salmon index stocks.

| Brood year | Bear Valley | Marsh | Sulphur | Minam | Imnaha | Poverty Flats | Johnson |
|---|---|---|---|---|---|---|---|
| 1979 | 215 | 83 | 90 | 40 | 238 | 76 | 66 |
| 1980 | 42 | 16 | 12 | 43 | 183 | 163 | 55 |
| 1981 | 151 | 115 | 43 | 50 | 453 | 187 | 102 |
| 1982 | 83 | 71 | 17 | 104 | 590 | 192 | 93 |
| 1983 | 171 | 60 | 49 | 103 | 435 | 337 | 152 |
| 1984 | 137 | 100 | 0 | 101 | 557 | 220 | 36 |
| 1985 | 295 | 196 | 62 | 625 | 641 | 341 | 178 |
| 1986 | 224 | 171 | 385 | 178 | 449 | 233 | 129 |
| 1987 | 456 | 268 | 67 | 342 | 401 | 554 | 175 |
| 1988 | 1109 | 395 | 607 | 306 | 504 | 765 | 332 |
| 1989 | 91 | 80 | 43 | 197 | 134 | 237 | 103 |
| 1990 | 185 | 101 | 170 | 146 | 84 | 518 | 141 |
| 1991 | 181 | 72 | 213 | 116 | 70 | 488 | 151 |
| 1992 | 173 | 114 | 21 | 10 | 73 | 524 | 180 |
| 1993 | 709 | 216 | 263 | 149 | 362 | 785 | 357 |
| 1994 | 33 | 9 | 0 | 16 | 52 | 189 | 50 |
| 1995 | 16 | 0 | 4 | 26 | 54 | 73 | 20 |
| 1996 | 56 | 18 | 23 | 213 | 143 | 127 | 49 |
| 1997 | 225 | 110 | 43 | 134 | 153 | 228 | 236 |
| 1998 | 372 | 164 | 140 | 118 | 90 | 348 | 119 |
| 1999 | 72 | 0 | 0 | 91 | 56 | 138 | 49 |
| **Recovery Level** | **900** | **450** | **300** | **450** | **850** | **850** | **300** |
| **BRWG Threshold** | **300** | **150** | **150** | **150** | **300** | **300** | **150** |

Spring chinook salmon index stocks: Bear Valley, Marsh, Sulphur, and Minam.
Summer-run index stocks: Poverty Flats and Johnson. Run-timing for the Imnaha stocks is intermediate. Source: ODFW (2000)

As of June 1, 2000, the preliminary final aggregate count for upriver spring chinook salmon at Bonneville Dam was 178,000, substantially higher than the 2000 forecast of 134,000.[1] This is the second highest return in 30 years (after the 1972 return of 179,300 adults). Although only a small portion of these fish is expected to be natural-origin spring chinook salmon destined for the Snake River (5,800), the aggregate estimate for natural-origin SR spring chinook salmon is substantially higher than the contributing brood year escapements (comparable returns to the

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[1] Source: June 1, 2000, e-mail from R. Bayley (NOAA Fisheries) to Stephen H. Smith (NOAA Fisheries). "Spring chinook update (end-of-season at Bonneville Dam)."

Columbia River mouth in 1995 and 1996 were 1,829 and 3,903, respectively). The 2000 forecast for the upriver summer chinook salmon stocks is 33,300, which is, again, the second highest return in over 30 years, but with only a small portion (2,000) being natural-origin fish destined for the Snake River. The return of natural-origin fish compares to brood year escapements in 1995 and 1996 of 534 and 3,046 and is generally lower than the average returns over the last five years (3,466).

The probability of meeting survival and recovery objectives for SR spring/summer chinook salmon under various future operation scenarios for the hydrosystem was analyzed through a process referred to as PATH (Plan for Analyzing and Testing Hypotheses). The scenarios analyzed focused on status quo management and options that emphasized either juvenile transportation or hydro-project drawdown. PATH also included sensitivity analyses to alternative harvest rates and habitat effects. PATH estimated the probability of survival and recovery for the seven index stocks using the recovery and escapement threshold levels as abundance indicators. The forward simulations estimated the probability of meeting the survival thresholds after 24 and 100 years.

A 70% probability of exceeding the threshold escapement levels was used to assess survival. Recovery potential was assessed by comparing the projected abundance to the recovery abundance levels after 48 years. A 50% probability of exceeding the recovery abundance levels was used to evaluate recovery by comparing the eight-year mean projected abundance. In general, the survival and recovery standards were met for operational scenarios involving drawdown, but were not met under status quo management or for the scenarios that relied on juvenile transportation (Marmorek *et al.* 1998). If the most conservative harvest rate schedule was assumed, transportation scenarios came very close to meeting the survival and recovery standards.

For the SR spring/summer chinook salmon ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period[2] ranges from 0.96 to 0.80, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to the effectiveness of fish of wild origin (Tables B-2a and B-2b in McClure *et al.* 2000b). NOAA Fisheries has also estimated median population growth rates and the risk of absolute extinction for the seven spring/summer chinook salmon index stocks,[3] using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (*i.e.*, hatchery effectiveness = 0), the risk of absolute extinction within 100 years for the wild component ranges from zero for Johnson Creek to 0.78 for the Imnaha River (Table B-5 in McClure *et al.* 2000b). At the high end, assuming that the

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[2] Estimates of median population growth rate, risk of extinction, and the likelihood of meeting recovery goals are based on population trends observed during a base period beginning in 1980 and including 1999 adult returns. Population trends are projected under the assumption that all conditions will stay the same into the future.

[3] McClure *et al.* (2000c) have calculated population trend parameters for additional SR spring/summer chinook salmon stocks.

hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness = 100%), the risk of absolute extinction within 100 years ranges from zero for Johnson Creek to 1.00 for the wild component in the Imnaha River (Table B-6 in McClure *et al.* 2000b).

### A.4.1.2 Snake River Fall Chinook Salmon

The spawning grounds between Huntington (RM 328) and Auger Falls (RM 607) were historically the most important for this species. Only limited spawning activity was reported downstream from RM 273 (Waples *et al.* 1991a), about 1 mile upstream of Oxbow Dam. Since then, irrigation and hydrosystem projects on the mainstem Snake River have blocked access to or inundated much of this habitat—causing the fish to seek out less preferable spawning grounds wherever they are available. Natural fall chinook salmon spawning now occurs primarily in the Snake River below Hells Canyon Dam and the lower reaches of the Clearwater, Grand Ronde, Salmon, and Tucannon rivers.

Adult SR fall chinook salmon enter the Columbia River in July and migrate into the Snake River from August through October. Fall chinook salmon generally spawn from October through November, and fry emerge from March through April. Downstream migration generally begins within several weeks of emergence (Becker 1970, Allen and Meekin 1973), and juveniles rear in backwaters and shallow water areas through mid-summer before smolting and migrating to the ocean—thus they exhibit an ocean-type juvenile history. Once in the ocean, they spend one to four years (though usually, three years) before beginning their spawning migration. Fall returns in the Snake River system are typically dominated by four-year-old fish. For detailed information on SR fall chinook salmon, see NMFS (1991a) and June 27, 1991, 56 FR 29542.

No reliable estimates of historical abundance are available. Because of their dependence on mainstem habitat for spawning, however, fall chinook salmon probably have been affected by the development of irrigation and hydroelectric projects to a greater extent than any other species of salmon. It has been estimated that the mean number of adult SR fall chinook salmon declined from 72,000 in the 1930s and 1940s to 29,000 during the 1950s. Despite this decline, the Snake River remained the most important natural production area for fall chinook salmon in the entire Columbia River basin through the 1950s. The number of adults counted at the uppermost Snake River mainstem dams averaged 12,720 total spawners from 1964 to 1968, 3,416 spawners from 1969 to 1974, and 610 spawners from 1975 to 1980 (Waples *et al.* 1991b).

Counts of natural-origin adult fish continued to decline through the 1980s, reaching a low of 78 individuals in 1990 (Table A-5). Since then, the return of natural-origin fish to Lower Granite Dam has varied, but has generally increased, reaching a recent year high of 797 in 1997. The 1998 return declined to 306. This was not anticipated and is of particular concern because it is close to the low threshold escapement level of 300 that indicates increased risk (BRWG 1994). The low return in 1998 may have been due to severe flooding in 1995 that affected the primary contributing brood year. The expected return of natural-origin adults to Lower Granite Dam in 1999 given the anticipated ocean and inriver fisheries is 518.

The recovery standard identified in the 1995 Proposed Recovery Plan (NMFS 1995) for SR fall chinook salmon was a population of at least 2,500 naturally-produced spawners (to be calculated as an eight-year geometric mean) in the lower Snake River and its tributaries. Before the adult counts at Lower Granite Dam can be compared to the natural spawner escapement, adults that may fall back below the dam after counting must be accounted for, as well as prespawning mortality. A preliminary estimate suggested that a Lower Granite Dam count of 4,300 would be necessary to meet the 2,500-fish escapement goal (NMFS 1995). For comparison, the geometric mean of the Lower Granite Dam counts of natural-origin fall chinook salmon over the last eight years is 481.

A further consideration regarding the status of SR fall chinook salmon is the existence of the Lyons Ferry Hatchery stock which is considered part of the ESU. Several hundred adults have returned to the Lyons Ferry Hatchery in recent years (Table A-5). More recently, supplementation efforts designed to accelerate rebuilding were initiated, beginning with smolt outplants from the 1995 brood year. The existence of the Lyons Ferry program has been an important consideration in evaluating the status of the ESU, because it reduces the short-term risk of extinction by providing a reserve of fish from the ESU. Without the hatchery program, the risk of extinction would have to be considered high because the ESU would otherwise be comprised of a few hundred individuals from a single population, in marginal habitat, with a demonstrated record of low productivity. Although the supplementation program probably contributes to the future population of natural-origin spawners, it does little to change the productivity of the system upon which a naturally-spawning population must rely. Supplementation is, therefore, not a long-term substitute for recovery. [See NMFS 1999b for further discussion of the SR fall chinook salmon supplementation program.]

Recent analyses conducted through the PATH process considered the prospects for survival and recovery given several future management options for the hydrosystem and other mortality sectors (Marmorek *et al.* 1998, Peters *et al.* 1999). That analysis indicated that the prospects of survival for SR fall chinook salmon were good, but that full recovery was relatively unlikely except under a very limited range of assumptions, or unless drawdown was implemented for at least the four lower Snake River dams operated by the U.S. Army Corps of Engineers (Corps). Consideration of the drawdown options led to a high likelihood that both survival and recovery objectives could be achieved.

**Table A-3.** Escapement and stock composition of fall chinook salmon at Lower Granite (LGR) Dam.[*]

| | | | | Stock Comp. of Escapement to LGR | | |
|---|---|---|---|---|---|---|
| | | | | | Hatchery Origin | |
| Year | LGR Dam Count | Marked Fish to Lyons Ferry Hatch. | LGR Dam Escapement | Wild | Snake R. | Non-Snake R. |
| 1975 | 1,000 | | 1,000 | 1,000 | | |
| 1976 | 470 | | 470 | 470 | | |
| 1977 | 600 | | 600 | 600 | | |
| 1978 | 640 | | 640 | 640 | | |
| 1979 | 500 | | 500 | 500 | | |
| 1980 | 450 | | 450 | 450 | | |
| 1981 | 340 | | 340 | 340 | | |
| 1982 | 720 | | 720 | 720 | | |
| 1983 | 540 | | 540 | 428 | 112 | |
| 1984 | 640 | | 640 | 324 | 310 | 6 |
| 1985 | 691 | | 691 | 438 | 241 | 12 |
| 1986 | 784 | | 784 | 449 | 325 | 10 |
| 1987 | 951 | | 951 | 253 | 644 | 54 |
| 1988 | 627 | | 627 | 368 | 201 | 58 |
| 1989 | 706 | | 706 | 295 | 206 | 205 |
| 1990 | 385 | 50 | 335 | 78 | 174 | 83 |
| 1991 | 630 | 40 | 590 | 318 | 202 | 70 |
| 1992 | 855 | 187 | 668 | 549 | 100 | 19 |
| 1993 | 1,170 | 218 | 952 | 742 | 43 | 167 |
| 1994 | 791 | 185 | 606 | 406 | 20 | 180 |
| 1995 | 1,067 | 430 | 637 | 350 | 1 | 286 |
| 1996 | 1,308 | 389 | 919 | 639 | 74 | 206 |
| 1997 | 1,451 | 444 | 1,007 | 797 | 20 | 190 |
| 1998 | 1,909 | 947 | 962 | 306 | 479 | 177 |
| 1999[**] | 3,381 | 1,519 | 1,862 | 905 | 882 | 75 |

[*] Information taken from *Revised Tables for the Biological Assessment of Impacts of Anticipated 1996-1998 Fall Season Columbia River Mainstem and Tributary Fisheries on SR Salmon Species Listed Under the Endangered Species Act*, prepared by the U.S. v. Oregon Technical Advisory Committee.

[**] Source: Memorandum from Glen Mendel (WDFW) to Cindy LeFluer (WDFW), dated March 3, 2000. "Fall chinook run reconstruction at LGR for 1999."

For the SR fall chinook salmon ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period[4] ranges from 0.94 to 0.86, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (Tables B-2a and B-2b in McClure *et al.* 2000b). NOAA Fisheries has also estimated the risk of absolute extinction for the aggregate SR fall chinook salmon population, using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (*i.e.*, hatchery effectiveness = 0), the risk of absolute extinction within 100 years is 0.40 (Table B-5 in McClure *et al.* 2000b). At the high end, assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness = 100%), the risk of absolute extinction within 100 years is 1.00 (Table B-6 in McClure *et al.* 2000b).

#### A.4.1.3 Upper Columbia River Spring-Run Chinook Salmon

The UCR spring-run chinook salmon ESU inhabits tributaries upstream from the Yakima River to Chief Joseph Dam. UCR spring-run chinook salmon have a stream-type life history. Adults return to the Wenatchee River from late March through early May, and to the Entiat and Methow rivers from late March through June. Most adults return after spending two years in the ocean, although 20% to 40% return after three years at sea. Like SR spring/summer chinook salmon, UCR spring-run chinook salmon experience very little ocean harvest. Peak spawning for all three populations occurs from August to September. Smolts typically spend one year in freshwater before migrating downstream. There are slight genetic differences between this ESU and others containing stream-type fish, but more importantly, the ESU boundary was defined using ecological differences in spawning and rearing habitat (Myers *et al.* 1998). The Grand Coulee Fish Maintenance Project (1939 through 1943) may have had a major influence on this ESU because fish from multiple populations were mixed into one relatively homogenous group and redistributed into streams throughout the upper Columbia region.

Three independent populations of spring-run chinook salmon are identified for the ESU including those that spawn in the Wenatchee, Entiat, and Methow basins (Ford *et al.* 1999). The number of natural-origin fish returning to each subbasin is shown in Table A-6. NOAA Fisheries recently proposed interim recovery abundance levels and cautionary levels (*i.e.*, interim levels still under review and subject to change). Ford *et al.* (1999) characterize cautionary levels as abundance levels that the population fell below only about 10% of the time during a historical period when it was considered to be relatively healthy. Escapements for UCR spring-run chinook salmon have been substantially below the cautionary levels in recent years, especially during 1995, indicating increasing risk to and uncertainty about the population's future status. On the other hand, preliminary returns for 1999, the primary return year for the 1995 brood, indicate that although they were low, returns were still substantially higher than the estimated cohort replacement level. Very strong 1999 jack returns suggest that survival rates for the 1996

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[4] Estimates of median population growth rate, risk of extinction, and the likelihood of meeting recovery goals are based on population trends observed during a base period beginning in 1980 and including 1996 adult returns. Population trends are projected under the assumption that all conditions will stay the same into the future.

brood will be high, as well. A total of 4,500 natural-origin UCR spring-run chinook salmon is expected to return to the mouth of the Columbia River during 2000 with a corresponding number expected to return to each subbasin (accounting for expected harvest, inter-dam loss, and prespawning mortality) at approximately its respective cautionary level (Table A-6).

Six hatchery populations are included in the listed ESU; all six are considered essential for recovery. Recent artificial production programs for fishery enhancement and hydrosystem mitigation have been a concern because a non-native (Carson Hatchery) stock was used. However, programs have been initiated to develop locally adapted brood stocks to supplement natural populations. Facilities where problems with straying and interactions with natural stock are known to occur are phasing out use of Carson stock. Captive broodstock conservation programs are under way in Nason Creek and White River (the Wenatchee basin) and in the Twisp River (Methow basin) to prevent the extinction of those spawning populations. All spring chinook salmon passing Wells Dam in 1996 and 1998 were trapped and brought into the hatchery to begin a composite-stock broodstock supplementation program for the Methow basin.

For the UCR spring chinook salmon ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period[5] ranges from 0.85 to 0.83, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (Tables B-2a and B-2b in McClure *et al.* 2000b). NOAA Fisheries has also estimated median population growth rates and the risk of absolute extinction for the three spawning populations identified by Ford *et al.* (1999), using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (*i.e.*, hatchery effectiveness = 0), the risk of absolute extinction within 100 years ranges from 0.97 for the Methow River to 1.00 for the Wenatchee and Entiat rivers (Table B-5 in McClure *et al.* 2000b). At the high end, assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness = 100%), the risk of extinction within 100 years is 1.00 for all three spawning populations (Table B-6 in McClure *et al.* 2000b).

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[5] Estimates of median population growth rate, risk of extinction, and the likelihood of meeting recovery goals are based on population trends observed during a base period beginning in 1980 and including 1998 adult returns. Population trends are projected under the assumption that all conditions will stay the same into the future.

**Table A-4.** Estimates of the number of natural-origin fish returning to subbasins for each independent population of UCR spring-run chinook salmon and preliminary interim recovery abundance and cautionary levels.

| Year | Wenatchee River* | Entiat River | Methow River |
|---|---|---|---|
| 1979 | 1,154 | 241 | 554 |
| 1980 | 1,752 | 337 | 443 |
| 1981 | 1,740 | 302 | 408 |
| 1982 | 1,984 | 343 | 453 |
| 1983 | 3,610 | 296 | 747 |
| 1984 | 2,550 | 205 | 890 |
| 1985 | 4,939 | 297 | 1,035 |
| 1986 | 2,908 | 256 | 778 |
| 1987 | 2,003 | 120 | 1,497 |
| 1988 | 1,832 | 156 | 1,455 |
| 1989 | 1,503 | 54 | 1,217 |
| 1990 | 1,043 | 223 | 1,194 |
| 1991 | 604 | 62 | 586 |
| 1992 | 1,206 | 88 | 1,719 |
| 1993 | 1,127 | 265 | 1,496 |
| 1994 | 308 | 74 | 331 |
| 1995 | 50 | 6 | 33 |
| 1996 | 201 | 28 | 126 |
| 1997 | 422 | 69 | 247 |
| 1998 | 218 | 52 | 125 |
| 1999 | 119 | 64 | 73 |
| **Recovery Abundance** | **3,750** | **500** | **2,000** |
| **Cautionary Abundance** | **1,200** | **150** | **750** |

Source: Cooney (2000)

* Estimates for the Wenatchee River exclude Icicle Creek/Leavenworth NFH.

NOAA Fisheries has also used population risk assessments for UCR spring chinook salmon and steelhead ESUs from the draft quantitative analysis report (QAR; Cooney 2000). Risk assessments described in that report were based on Monte Carlo simulations with simple spawner/spawner models that incorporate estimated smolt carrying capacity. Population dynamics were simulated for three separate spawning populations in the UCR spring chinook salmon ESU, the Wenatchee, Entiat, and Methow populations. The QAR assessments showed extinction risks for UCR spring chinook salmon of 50% for the Methow, 98% for the Wenatchee, and 99% for the Entiat spawning populations. These estimates are based on the assumption that the median return rate for the 1980 brood year to the 1994 brood year series will continue into the future.

### A.4.2 Steelhead

#### A.4.2.1 Snake River Steelhead

The longest consistent indicator of steelhead abundance in the Snake River basin is derived from counts of natural-origin steelhead at the uppermost dam on the lower Snake River. According to these estimates, the abundance of natural-origin summer steelhead at the uppermost dam on the Snake River has declined from a four-year average of 58,300 in 1964 to a four-year average of 8,300 ending in 1998. In general, steelhead abundance declined sharply in the early 1970s, rebuilt modestly from the mid-1970s through the 1980s, and declined again during the 1990s (Figure A-1).

These broad-scale trends in the abundance of steelhead were reviewed through the PATH process. The PATH report indicated that the initial, substantial decline coincided with the declining trend in downstream passage survival through the Federal hydrosystem. The more recent decline in abundance, observed over the last decade or more, does not coincide with declining passage survival, but can be at least partially be accounted for by a shift in climatic regimes that has affected ocean survival (Marmorek 1998).

The abundance of A-run versus B-run components of Snake River basin steelhead can be distinguished in data collected since 1985. Both components have declined through the 1990s, but the decline of B-run steelhead has been more significant. The four-year average counts at Lower Granite Dam declined from 18,700 to 7,400 beginning in 1985 for A-run steelhead and from 5,100 to 900 for B-run steelhead. Counts over the last five or six years have been stable for A-run steelhead and without apparent trend (Figure A-2). Counts for B-run steelhead have been low and highly variable, but also without apparent trend (Figure A-3).

Comparison of recent dam counts with escapement objectives provides perspective regarding the status of the ESU. The management objective for SR steelhead stated in the Columbia River Fisheries Management Plan was to return 30,000 natural/wild steelhead to Lower Granite Dam. The All Species Review (TAC 1997) further clarified that this objective was subdivided into 20,000 A-run and 10,000 B-run steelhead. Idaho has reevaluated these escapement objectives using estimates of juvenile production capacity. This alternative methodology led to revised estimates of 22,000 for A-run and 31,400 for B-run steelhead (pers. comm., S. Keifer, IDFG. with P. Dygert, NOAA Fisheries).

The state of Idaho has conducted redd count surveys in all of the major subbasins since 1990. Although the surveys are not intended to quantify adult escapement, they can be used as indicators of relative trends. The sum of redd counts in natural-origin B-run production subbasins declined from 467 in 1990 to 59 in 1998 (Figure A-4). The declines are evident in all four of the primary B-run production areas. Index counts in the natural-origin A-run production areas have not been conducted with enough consistency to permit similar characterization.

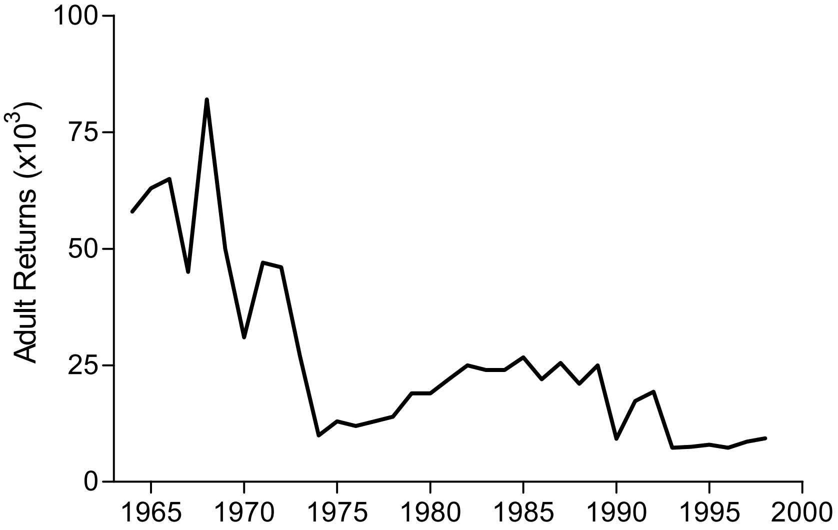
Idaho has also conducted surveys for juvenile abundance in index areas throughout the Snake River basin since 1985. Parr densities of A-run steelhead have declined from an average of about 75% of carrying capacity in 1985 to an average of about 35% in recent years through 1995 (Figure A-5). Further declines were observed in 1996 and 1997. Parr densities of B-run steelhead have been low, but relatively stable since 1985, averaging 10% to 15% of carrying capacity through 1995. Parr densities in B-run tributaries declined further in 1996 and 1997 to 11% and 8%, respectively.

The available data indicate that B-run steelhead are much more depressed than A-run steelhead. In evaluating the status of the SR basin steelhead ESU it is pertinent to consider whether B-run steelhead represent a significant portion of the ESU. This is particularly relevant for two reasons:

1. The Tribes have proposed to manage the SR basin steelhead ESU as a whole without distinguishing between components

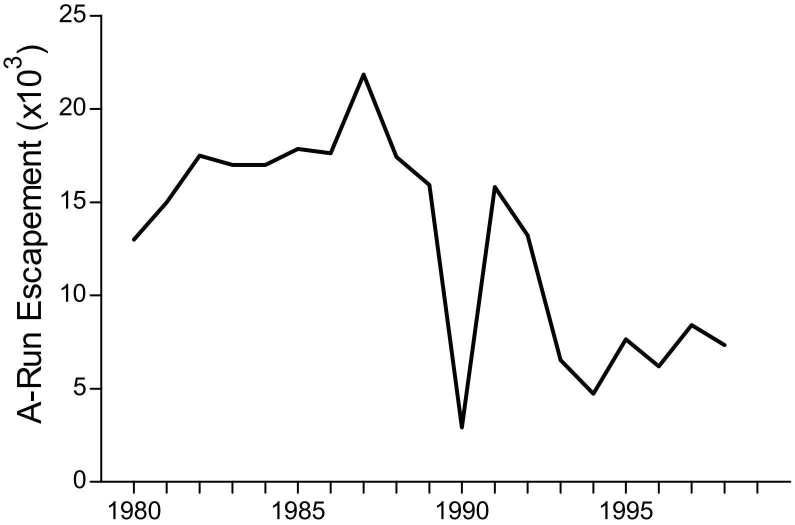
2. This management scenario is inconsistent with NOAA Fisheries' authority to manage for components of an ESU.

**Figure A-1.** Adult returns of wild summer steelhead to the uppermost dam on the Snake River.



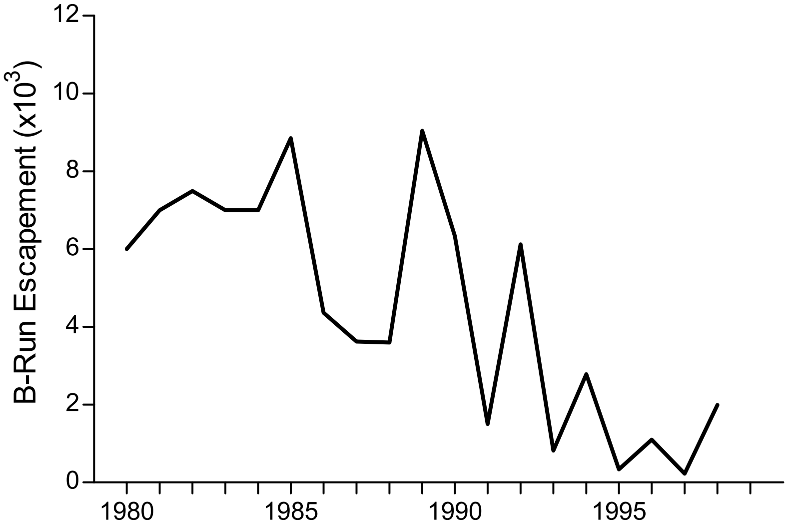
Source: Escapement through 1995 from TAC (1997); escapement for 1996–1998 from pers. comm. G. Mauser (IDFG).

**Figure A-2.** Escapement of A-run Snake River steelhead to the uppermost dam.



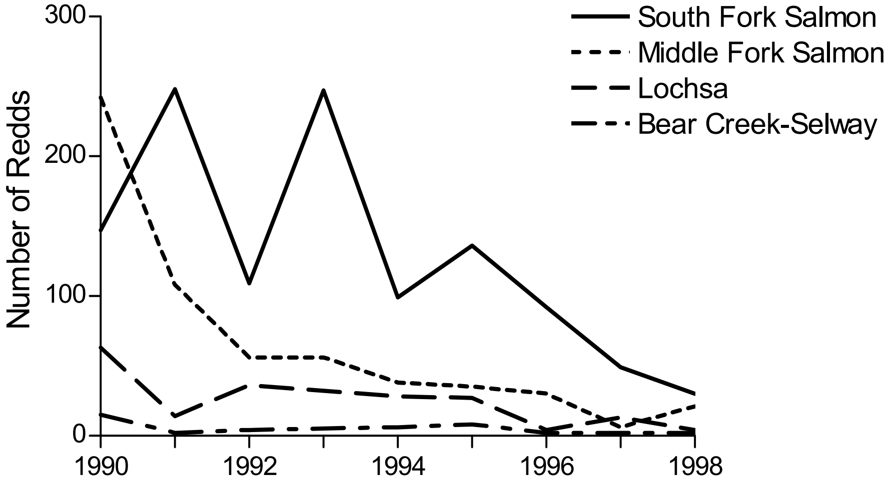
Source: Data for 1980 through 1984 from Figures 1 and 2 of Section 8 in TAC (1997). Data for 1985 through 1998 from Table 2 of Section 8 (TAC 1997) and pers. comm. G. Mauser, IDFG.

**Figure A-3.** Escapement of B-run Snake River steelhead to the uppermost dam.



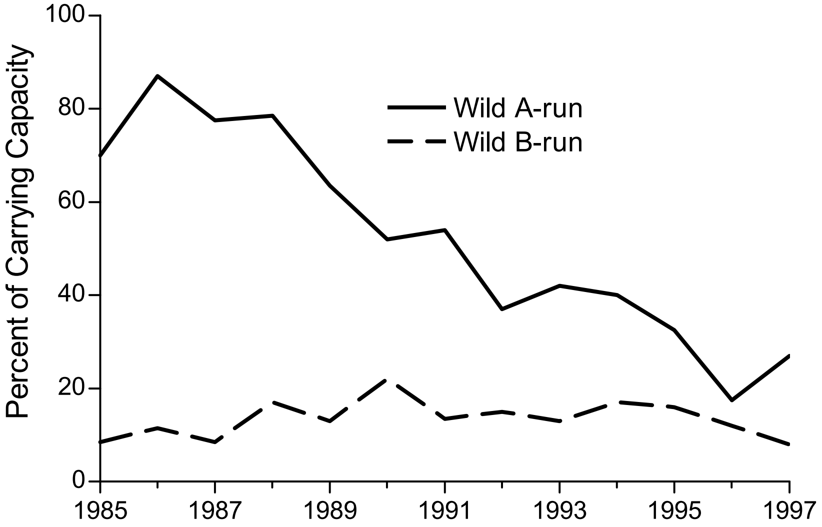
Source: Data for 1980 through 1984 from Figures 1 and 2 of Section 8 in TAC (1997). Data for 1985 through 1998 from Table 2 of Section 8 (TAC 1997) and pers. comm. G. Mauser, IDFG.

**Figure A-4.** Redd counts for wild Snake River (B-run) steelhead in the South Fork and Middle Fork Salmon, Lochsa, and Bear Creek-Selway index areas.



Note: Data for the Lochsa exclude Fish Creek and Crooked Fork.
Sources: Memo from T. Holubetz (IDFG), “1997 Steelhead Redd Counts,” dated May 16, 1997, and IDFG (unpubl. data).

**Figure A-5.** Percent of estimated carrying capacity for juvenile (age-1+ and -2+) wild A- and B-run steelhead in Idaho streams.



Source: Data for 1985 through 1996 from Hall-Griswold and Petrosky (1998); data for 1997 from IDFG (unpublished).

The Snake River historically supported more than 55% of total natural-origin production of steelhead in the Columbia basin. It now has approximately 63% of the basin's natural production potential (Mealy 1997). B-run steelhead occupy four major subbasins, including two on the Clearwater River (Lochsa and Selway) and two on the Salmon River (Middle Fork and South Fork Salmon), areas that are for the most part not occupied by A-run steelhead. Some natural B-run steelhead are also produced in parts of the mainstem Clearwater and its major tributaries. There are alternative escapement objectives of 10,000 Columbia River Fisheries Management Plan and 31,400 (Idaho) for B-run steelhead. B-run steelhead, therefore, represent at least 1/3 and as much as 3/5 of the production capacity of the ESU.

B-run steelhead are distinguished from the A-run component by their unique life history characteristics. B-run steelhead were traditionally distinguished as larger and older fish with a later run timing, returning primarily to the South Fork Salmon, Middle Fork Salmon, Selway, and Lochsa rivers. The recent review by Technical Advisory Committee indicated that different populations of steelhead do have different size structures, with populations dominated by larger fish (*i.e.*, greater than 77.5 cm) occurring in the traditionally defined B-run basins (TAC 1999). Larger fish occur in other populations throughout the basin, but at much lower rates. Evidence suggests that fish returning to the Middle Fork Salmon and Little Salmon have a more equal distribution of large and small fish.

B-run steelhead also are generally older. A-run steelhead are predominately 1-ocean fish, whereas most B-run steelhead generally spend two or more years in the ocean before spawning.

The differences in ocean age are primarily responsible for the differences in the size of A- and B-run steelhead. However, B-run steelhead are also thought to be larger at any given age than A-run fish. This may be due, at least in part, to the fact that B-run steelhead leave the ocean later in the year than A-run steelhead and thus have an extra month or more of ocean residence when growth rates are thought to be greatest.

Historically, a distinctly bimodal pattern of freshwater entry could be used to distinguish A-run and B-run fish. A-run steelhead were presumed to cross Bonneville Dam from June to late August, whereas B-run steelhead entered from late August to October. The TAC reviewed the available information on timing and confirmed that most large fish still have a later timing at Bonneville; 70% of the larger fish crossed the dam after August 26, the traditional cutoff date for separating A- and B-run fish (TAC 1999). However, the timing of the early part of the A-run has shifted somewhat later, thereby reducing the distinction that was so apparent in the 1960s and 1970s. The timing of the larger, natural-origin, B-run fish has not changed.

As pointed out above, the geographic distribution of B-run steelhead is restricted to particular watersheds within the Snake River basin (areas of the mainstem Clearwater, Selway, and Lochsa rivers and the South and Middle Forks of the Salmon River). No recent genetic data are available for steelhead populations in the South and Middle Forks of the Salmon River. The Selway and Lochsa River populations from the Middle Fork Clearwater appear to be very similar to each other genetically, and naturally-produced rainbow trout from the North Fork Clearwater River (above Dworshak Reservoir) clearly show an ancestral genetic similarity to Dworshak NFH steelhead. The existing genetic data, the restricted geographic distribution of B-run steelhead in the Snake (Columbia) River basin, and the unique life history attributes of these fish (*i.e.* larger, older adults with a later distribution of run timing compared to A-run steelhead in other portions of the Columbia River basin) clearly support the conservation of B-run steelhead as a biologically significant component of the Snake River ESU.

NOAA Fisheries also considers the status of the component populations as an indicator of the status of the ESU. For this purpose, a population is defined as a group of fish of the same species spawning in a particular lake or stream (or portion thereof) at a particular season, which to a substantial degree does not interbreed with fish from any other group spawning in a different place or in the same place during a different season. Because populations as defined here are relatively isolated, it is biologically meaningful to evaluate the risk of extinction of one population independently from any other. Some ESUs may consist of only one population, whereas others will consist of many. The background and guidelines related to the assessment of the status of populations are described in a recent draft report discussing the concept of viable salmonid populations (McElhany *et al.* 2000).

The task of identifying populations within an ESU requires making judgements based on the available information, including the geography, ecology, and genetics of the ESU. Although NOAA Fisheries has not compiled and formally reviewed all the available information for this purpose, it is reasonable to conclude that, at a minimum, each of the major subbasins in the ESU represents a population within the context of this discussion. A-run populations would, therefore, include at least the tributaries to the lower Clearwater, the upper Salmon River and its tributaries, the lower Salmon River and its tributaries, the Grand Ronde, Imnaha, and possibly the Snake mainstem tributaries below Hells Canyon Dam. B-run populations would be identified in the Middle Fork and South Fork Salmon rivers, the Lochsa and Selway rivers (major tributaries of the upper Clearwater), and possibly in the mainstem Clearwater River, as well. These basins are, for the most part, large geographical areas, and there probably is additional population structure within at least some of these basins. However, because that hypothesis has not been confirmed, NOAA Fisheries assumes that there are at least five populations of A-run steelhead and five populations of B-run steelhead in the SR basin steelhead ESU. Escapement objectives for A- and B-run production areas in Idaho, based on estimates of smolt production capacity, are shown in Table A-9.

**Table A-5.** Adult steelhead escapement objectives based on estimates of 70% smolt production capacity.

| **A-Run Production Areas** | | **B-Run Production Areas** | |
|---|---|---|---|
| Upper Salmon | 13,570 | Middle Fork Salmon | 9,800 |
| Lower Salmon | 6,300 | South Fork Salmon | 5,100 |
| Clearwater | 2,100 | Lochsa | 5,000 |
| Grand Ronde | (1) | Selway | 7,500 |
| Imnaha | (1) | Clearwater | 4,000 |
| **Total** | **21,970** | **Total** | **31,400** |

Note: comparable estimates are not available for populations in Oregon and Washington subbasins.

Hatchery populations, if genetically similar to their natural-origin counterparts, provide a hedge against extinction of the ESU or the gene pool. The Imnaha and Oxbow hatcheries produce A-run stocks that are currently included in the SR basin steelhead ESU. The Pahsimeroi and Wallowa hatchery stocks may also be appropriate and available for use in developing supplementation programs. In its recent biological opinion on Columbia basin hatchery operations, NOAA Fisheries required that this program begin to transition to a local-origin broodstock to provide a source for future supplementation efforts in the lower Salmon River (NMFS 1999a). Although other stocks provide more immediate opportunities to initiate supplementation programs within some subbasins, it may also be necessary and desirable to develop additional broodstocks that can be used for supplementation in other natural production areas. Despite uncertainties related to the likelihood that supplementation programs can accelerate the recovery of naturally-spawning populations, these hatchery stocks provide a safeguard against the further decline of natural-origin populations.

The Dworshak NFH is unique in the Snake River basin because it produces a B-run hatchery stock. The Dworshak stock was developed from natural-origin steelhead within the North Fork Clearwater River, was largely free of introductions from other areas, and was, therefore, included in the ESU, although not as part of the listed population. However, past hatchery practices and possibly changes in flow and temperature conditions related to Dworshak Dam have led to substantial divergence in spawn timing of the hatchery stock compared to what was observed historically in the North Fork Clearwater River and compared to natural-origin populations in other parts of the Clearwater basin. Because the spawn timing of the hatchery stock is now much earlier than it was historically (Figure A-6), the success of supplementation efforts using these stocks may be limited. In fact, past supplementation efforts in the South Fork Clearwater River using Dworshak NFH stock have been largely unsuccessful, although improvements in out-planting practices have the potential to yield different results. In addition, the unique genetic character of Dworshak NFH steelhead noted above will limit the degree to which the stock can be used for supplementation in other parts of the Clearwater subbasin and particularly in the Salmon River B-run basins. Supplementation efforts in those areas, if undertaken, will more likely have to rely on the future development of local broodstocks. Supplementation opportunities in many of the B-run production areas will be limited in any case because of logistical difficulties in getting to and working in these high mountain wilderness areas. Because opportunities to accelerate the recovery of B-run steelhead through supplementation, even if successful, are expected to be limited, it is essential to maximize the escapement of natural-origin steelhead in the near term.

Finally, the conclusions and recommendations of the Technical Advisory Committee's All Species Review are pertinent to this review of the status of Snake River steelhead. Considering information available through 1996, the 1997 All Species Review stated:

> Regardless of assessment methods for A and B steelhead, it is apparent that the primary goal of enhancing the upriver summer steelhead run is not being achieved. The status of upriver summer steelhead, particularly natural-origin fish, has become a serious concern. Recent declines in all stocks, across all measures of abundance, are disturbing.
>
> There has been no progress toward rebuilding upriver runs since 1987. Throughout the Columbia River basin, dam counts, weir counts, spawning surveys, and rearing densities indicate natural-origin steelhead abundance is declining, culminating in the proposed listing of upriver stocks in 1996. Escapements have reached critically low levels despite the relatively high productivity of natural- and hatchery-rearing environments. Improved flows and ocean conditions should increase smolt-adult survival rates for upriver summer steelhead. However, reduced returns in recent years are likely to produce fewer progeny and lead to continued low abundance.
>
> Although steelhead escapements would have increased (in some years substantially) in the absence of mainstem fisheries, data analyzed by the Technical Advisory Committee indicate that effects other than mainstem Columbia River fishery harvest are primarily responsible for the currently depressed status and the long-term health and productivity of wild steelhead populations in the Columbia River.

> Though harvest is not the primary cause of declining summer steelhead stocks, and harvest rates have been below guidelines, harvest has further reduced escapements. Before 1990, the aggregate of upriver summer steelhead in the mainstem Columbia River at times appeared to have led to the failure to achieve escapement goals at Lower Granite Dam. Wild Group B steelhead are presently more sensitive to harvest than other salmon stocks, including the rest of the steelhead run, due to their depressed status and because they are caught at higher rates in the Zone 6 fishery.
>
> Small or isolated populations are much more susceptible to stochastic events such as drought and poor ocean conditions. Harvest can further increase the susceptibility of such populations. The Columbia River Fisheries Management Plan recognizes that harvest management must be responsive to run size and escapement needs to protect these populations. The parties should ensure that Columbia River Fisheries Management Plan harvest guidelines are sufficiently protective of weak stocks and hatchery broodstock requirements.

The All Species Review included the following recommendations:

- Develop alternative harvest strategies to better achieve rebuilding and allocation objectives.
- Consider modification of steelhead harvest rate guidelines relative to stock management units and escapement needs.

For the SR steelhead ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period[6] ranges from 0.91 to 0.70, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (Tables B-2a and B-2b in McClure *et al.* 2000b). NOAA Fisheries has also estimated the risk of absolute extinction for the A- and B-runs, using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (*i.e.*, hatchery effectiveness = 0), the risk of absolute extinction within 100 years is 0.01 for A-run steelhead and 0.93 for B-run fish (Table B-5 in McClure *et al.* 2000b). At the high end, assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness = 100%), the risk of absolute extinction within 100 years is 1.00 for both runs (Table B-6 in McClure *et al.* 2000b).

### A.4.2.2 Upper Columbia River Steelhead

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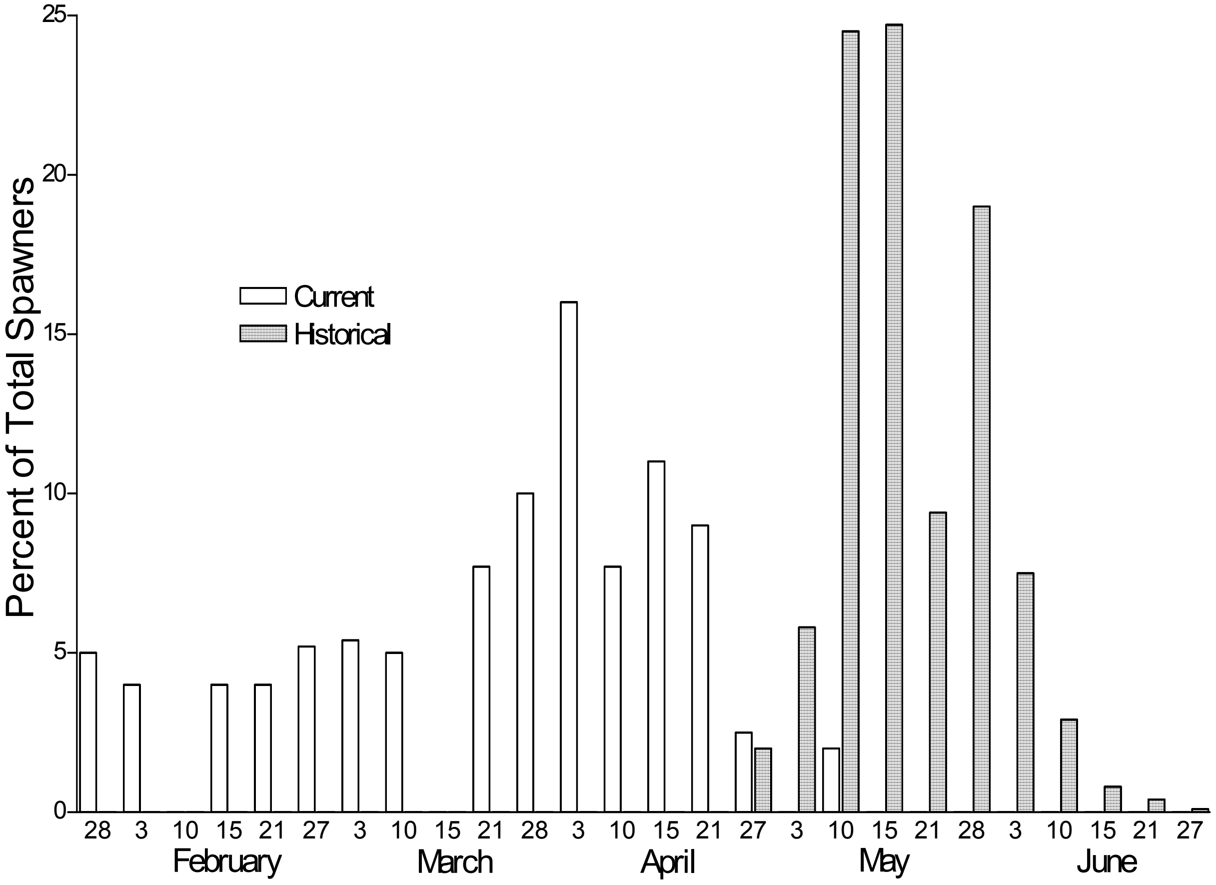
[6] Estimates of median population growth rate, risk of extinction, and the likelihood of meeting recovery goals are based on population trends observed during a base period beginning in 1980 and including 1997 adult returns. Population trends are projected under the assumption that all conditions will stay the same into the future.

UCR steelhead inhabit the Columbia River reach and its tributaries upstream of the Yakima River. This region includes several rivers that drain the east slopes of the Cascade Mountains and several that originate in Canada (only U.S. populations are included in the ESU). Dry habitat conditions in this area are less conducive to steelhead survival than in many other parts of the Columbia basin (Mullan *et al.* 1992a). Although the life history of this ESU is similar to that of other inland steelhead, smolt ages are some of the oldest on the West Coast (up to seven years old), probably due to the ubiquitous cold water temperatures (Mullan *et al.* 1992b). Adults spawn later than in most downstream populations, remaining in freshwater up to a year before spawning.

Although runs from 1933 through 1959 may have already been affected by fisheries in the lower river, dam counts suggest a pre-fishery run size of more than 5,000 adults above Rock Island Dam. The return of UCR natural-origin steelhead to Priest Rapids Dam declined from a five-year average of 2,700 beginning in 1986, to a five-year average of 900 beginning in 1994 (FPC 2000; Table A-10). The escapement goal for natural-origin fish is 4,500. Most current natural production occurs in the Wenatchee and Methow river systems, with a smaller run returning to the Entiat River. Very limited spawning also occurs in the Okanagan River basin. Most of the fish spawning in natural production areas are of hatchery origin. Indications are that natural populations in the Wenatchee, Methow, and Entiat rivers are not self-sustaining.

**Figure A-6.** Historical versus current spawn-timing of steelhead at Dworshak NFH.



This entire ESU has been subjected to heavy hatchery influence; stocks became thoroughly mixed as a result of the Grand Coulee Maintenance Project, which began in the 1940s (Fish and Hanavan 1948, Mullan *et al.* 1992a). Recently, as part of the development of the Mid-Columbia Habitat Conservation Plan (HCP), it was determined that steelhead habitat within the range of the Upper Columbia River ESU was overseeded, primarily due to the presence of Wells Hatchery fish in excess of those collected for broodstock. This would partially explain recent observations of low natural cohort replacement rates (0.3 for populations in the Wenatchee River and no greater than 0.25 for populations in the Entiat River; Bugert 1997). The problem of determining appropriate levels of hatchery output to prevent negative effects on natural production is a subject of analysis and review in the Mid-Columbia Quantitative Analytical Report (Cooney 2000). In the meantime, given these uncertainties, efforts are under way to diversify broodstocks used for supplementation and to minimize the differences between hatchery and natural-origin fish (as well as other concerns associated with supplementation). The best use for the Wells Hatchery program in the recovery process is yet to be defined and should be integrated with harvest activities and recovery measures to optimize the prospects for recovery of the species.

Due to data limitations, the QAR steelhead assessments in Cooney (2000) were limited to two aggregate spawning groups—the Wenatchee/Entiat composite and the above-Wells populations. Wild production of steelhead above Wells Dam was assumed to be limited to the Methow system. Assuming a relative effectiveness of hatchery spawners of 1.0, the risk of absolute extinction within 100 years for UCR steelhead is 100%. The QAR also assumed hatchery effectiveness values of 0.25 and 0.75. A hatchery effectiveness of 0.25 resulted in projected risks of extinction of 35% for the Wenatchee/Entiat and 28% for the Methow populations. At a hatchery effectiveness of 0.75, risks of 100% were projected for both populations.

For the UCR steelhead ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period[7] ranges from 0.94 to 0.66, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (Tables B-2a and B-2b in McClure *et al.* 2000b). NOAA Fisheries has also estimated the risk of absolute extinction for the aggregate UCR steelhead population, using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (*i.e.*, hatchery effectiveness = 0), the risk of absolute extinction within 100 years is 0.25 (Table B-5 in McClure *et al.* 2000b). Assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness = 100%), the risk of absolute extinction within 100 years is 1.00 (Table B-6 in McClure *et al.* 2000b).

Because of data limitations, the QAR steelhead assessments in Cooney (2000) were limited to two aggregate spawning groups—the Wenatchee/Entiat composite and the above-Wells populations. Wild production of steelhead above Wells Dam was assumed to be limited to the Methow system. Assuming a relative effectiveness of hatchery spawners of 1.0, the risk of absolute extinction within 100 years for UCR steelhead is 100%. The QAR also assumed hatchery effectiveness values of 0.25 and 0.75. A hatchery effectiveness of 0.25 resulted in projected risks of extinction of 35% for the Wenatchee/Entiat and 28% for the Methow populations. At a hatchery effectiveness of 0.75, risks of 100% were projected for both populations.

### A.4.2.3 Middle Columbia River Steelhead

Life history information for MCR steelhead indicates that most fish smolt at two years of age and spend one to two years in salt water (*i.e.*, 1-ocean and 2-ocean fish, respectively). After re-entering freshwater, they may remain up to a year before spawning (Howell *et al.* 1985). Within

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[7] Estimates of median population growth rate, risk of extinction, and the likelihood of meeting recovery goals are based on population trends observed during a base period beginning in 1980 and including 1996 adult returns. Population trends are projected under the assumption that all conditions will stay the same into the future.

the ESU, the Klickitat River is unusual in that it produces both summer and winter steelhead, and the summer steelhead are dominated by 2-ocean steelhead (most other rivers in this region produce about equal numbers of both 1- and 2-ocean steelhead).

Escapement to the Yakima, Umatilla, and Deschutes subbasins have shown overall upward trends, although all tributary counts in the Deschutes River are downward, and the Yakima River is recovering from extremely low abundance in the early 1980s. The John Day River probably represents the largest native, natural-spawning stock in the ESU, and the combined spawner surveys for the John Day River have been declining at a rate of about 15% per year since 1985. However, estimates based on dam counts show an overall increase in steelhead abundance, with a relatively stable naturally-produced component. NOAA Fisheries, in proposing this ESU for listing as threatened under the ESA, cited low returns to the Yakima River, poor abundance estimates for Klickitat River and Fifteenmile Creek winter steelhead, and an overall decline for naturally-producing stocks within the ESU.

Hatchery fish are widespread and stray to spawn naturally throughout the region. Recent estimates of the proportion of natural spawners of hatchery origin range from low (Yakima, Walla Walla, and John Day rivers) to moderate (Umatilla and Deschutes rivers). Most hatchery production in this ESU is derived primarily from within-basin stocks. One recent area of concern is the increase in the number of Snake River hatchery (and possibly wild) steelhead that stray and spawn naturally within the Deschutes River basin. Studies have been proposed to evaluate hatchery programs within the Snake River basin that experience high rates of straying into the Deschutes River and to make needed changes to minimize such straying to rivers within the MCR steelhead ESU.

The ESU is in the intermontane region and includes some of the driest areas of the Pacific Northwest, generally receiving less than 40 cm of rainfall annually (Jackson 1993). Vegetation is of the shrub-steppe province, reflecting the dry climate and harsh temperature extremes. Factors contributing to the decline of MCR steelhead include agricultural practices, especially grazing and water diversions/withdrawals. In addition, hydrosystem development has affected the ESU through loss of habitat above tributary hydro projects and through mortalities associated with migration through the Columbia River hydrosystem.

**Table A-6.** Adult summer steelhead counts at Priest Rapids, Rock Island, Rocky Reach, and Wells Dams (FPC 2000).

| | **Priest Rapids** | | **Rock Island** | **Rocky Reach** | **Wells** |
|---|---|---|---|---|---|
| **Year** | **Count** | **Wild Origin** | **Count** | **Count** | **Count** |
| 1977 | 9,812 | | 9,925 | 7,416 | 5,382 |
| 1978 | 4,545 | | 3,352 | 2,453 | 1,621 |
| 1979 | 8,409 | | 7,420 | 4,896 | 3,695 |
| 1980 | 8,524 | | 7,016 | 4,295 | 3,443 |
| 1981 | 9,004 | | 7,565 | 5,524 | 4,096 |
| 1982 | 11,159 | | 10,150 | 6,241 | 8,418 |
| 1983 | 31,809 | | 29,666 | 19,698 | 19,525 |
| 1984 | 26,076 | | 24,803 | 17,228 | 16,627 |
| 1985 | 34,701 | | 31,995 | 22,690 | 19,757 |
| 1986 | 22,382 | 2,342 | 22,867 | 15,193 | 13,234 |
| 1987 | 14,265 | 4,058 | 12,706 | 7,172 | 5,195 |
| 1988 | 10,208 | 2,670 | 9,358 | 5,678 | 4,415 |
| 1989 | 10,667 | 2,685 | 9,351 | 6,119 | 4,608 |
| 1990 | 7,830 | 1,585 | 6,936 | 5,014 | 3,819 |
| 1991 | 14,027 | 2,799 | 11,018 | 7,741 | 7,715 |
| 1992 | 14,208 | 1,618 | 12,398 | 7,457 | 7,120 |
| 1993 | 5,455 | 890 | 4,591 | 2,815 | 2,400 |
| 1994 | 6,707 | 855 | 5,618 | 2,823 | 2,138 |
| 1995 | 4,373 | 993 | 4,070 | 1,719 | 946 |
| 1996 | 8,376 | 843 | 7,305 | 5,774 | 4,127 |
| 1997 | 8,948 | 785 | 7,726 | 7,726 | 4,107 |
| 1998 | 5,837 | — | 4,962 | 4,442 | 2,668 |
| 1999 | 8,456* | 1,428* | 6,361 | 4,815 | 3,557 |

* Priest Rapids counts for 1999 from Brown (1999).

For the MCR steelhead ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period[8] ranges from 0.88 to 0.75, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared with that of fish of wild origin (Tables B-2a and B-2b in McClure *et al.* 2000b). NOAA Fisheries has also estimated the risk of absolute extinction for four of the subbasin populations, using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (*i.e.*, hatchery effectiveness = 0), the risk of absolute extinction within 100 years ranges from zero for the Yakima River summer run to 1.00 for the Umatilla River and Deschutes River summer runs (Table B-5 in McClure *et al.* 2000b). Assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness = 100%), the risk of absolute extinction within 100 years ranges from zero for the Yakima River summer run to 1.00 for the Deschutes River summer run (Table B-6 in McClure *et al.* 2000b).

### A.4.3 Sockeye Salmon

#### A.4.3.1 Snake River Sockeye Salmon

Historically, Snake River sockeye salmon were produced in the Salmon River subbasin in Alturas, Pettit, Redfish, and Stanley lakes and in the South Fork Salmon River subbasin in Warm Lake. Sockeye salmon may have been present in one or two other Stanley basin lakes (Bjornn *et al.* 1968). Elsewhere in the Snake River basin, sockeye salmon were produced in Big Payette Lake on the North Fork Payette River and in Wallowa Lake on the Wallowa River (Evermann 1895, Toner 1960, Bjornn *et al.* 1968, Fulton 1970).

The largest single sockeye salmon spawning area was in the headwaters of the Payette River, where 75,000 were taken one year by a single fishing operation in Big Payette Lake. However, access to production areas in the Payette basin was eliminated by construction of Black Canyon Dam in 1924. During the 1980s, returns to headwaters of the Grand Ronde River in Oregon (Wallowa Lake) were estimated to have been at least 24,000 and 30,000 sockeye salmon (Cramer 1990), but access to the Grand Ronde was eliminated by construction of a dam on the outlet to Wallowa Lake in 1929. Access to spawning areas in the upper Snake River basin was eliminated in 1967 when fish were no longer trapped and transported around the Hells Canyon Dam complex. All of these dams were constructed without fish passage facilities.

There are no reliable estimates of the number of sockeye salmon spawning in Redfish Lake at the turn of the century. However, beginning in 1910, access to all lakes in the Stanley basin was seriously reduced by the construction of Sunbeam Dam, 20 miles downstream from Redfish Lake Creek on the mainstem Salmon River. The original adult fishway, constructed of wood, was ineffective at passing fish over the dam. It was replaced with a concrete structure in 1920,

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[8] Estimates of median population growth rate, risk of extinction, and the likelihood of meeting recovery goals are based on population trends observed during a base period that varies between subbasin populations. Population trends are projected under the assumption that all conditions will stay the same into the future.

but sockeye salmon access was impeded until the dam was partially removed in 1934. Even after fish passage was restored at Sunbeam Dam, sockeye salmon were unable to use spawning areas in two of the lakes in the Stanley basin. Welsh (1991) reported fish eradication projects in Pettit Lake (treated with toxaphene in 1960) and Stanley Lake (treated with Fish-Tox, a mixture of rotenone and toxaphene, in 1954). Agricultural water diversions cut off access to most of the lakes. Bjornn *et al.* (1968) stated that, during the 1950s and 1960s, Redfish Lake was probably the only lake in Idaho that was still used by sockeye salmon each year for spawning and rearing, and, at the time of listing under ESA, sockeye salmon were produced naturally only in Redfish Lake.

Escapement to the Snake River has declined dramatically in the last several decades. Adult counts at Ice Harbor Dam declined from 3,170 in 1965 to zero in 1990 (ODFW and WDFW 1998). The Idaho Department of Fish and Game counted adults at a weir in Redfish Lake Creek during 1954 through 1966; adult counts dropped from 4,361 in 1955 to fewer than 500 after 1957 (Bjornn *et al.* 1968). A total of 16 wild sockeye salmon returned to Redfish Lake between 1991 and 1999 (Table A-13). During 1999, seven hatchery-produced, age-3 adults returned to the Sawtooth Hatchery. Three of these adults were released to spawn naturally, and four were taken into the IDFG captive broodstock program. In 2000, 257 hatchery-produced, age-4 sockeye salmon returned to the Stanley basin (weirs at the Sawtooth Hatchery and Redfish Lake Creek). Adults numbering 243 were handled and redistributed to Redfish (120), Alturas (52), and Pettit (28) lakes, with the remaining 43 adults incorporated into the IDFG captive broodstock program at Eagle Hatchery.

Low numbers of adult Snake River sockeye salmon preclude a CRI- or QAR-type quantitative analysis of the status of this ESU. However, because only16 wild and 264 hatchery-produced adult sockeye returned to the Stanley basin between 1990 and 2000, NOAA Fisheries considers the status of this ESU to be dire under any criteria.

**Table A-7.** Returns of Snake River sockeye salmon to Lower Granite Dam and to the weir at Redfish Lake Creek. The 2000 return is the total number of adults returning to the Stanley basin (weirs at the Sawtooth Hatchery and Redfish Lake Creek).

| Year | LGR Dam Count | Adults at Weirs |
|---|---|---|
| 1986 | 15 | 29 |
| 1987 | 29 | 16 |
| 1988 | 23 | 4 |
| 1989 | 2 | 1 |
| 1990 | 0 | 0 |
| 1991 | 8 | 4 |
| 1992 | 15 | 1 |
| 1993 | 12 | 8 |
| 1994 | 5 | 1 |
| 1995 | 3 | 0 |
| 1996 | 3 | 1 |
| 1997 | 11 | 0 |
| 1998 | 2 | 1 |
| 1999 | 14 | 7 |
| 2000 | 282 | 257 |

Sources: Lower Granite Dam counts from FPC (2000); Redfish Lake Creek/Stanley basin counts from StreamNet (2000).

## A.5 EXTINCTION ANALYSIS

Analyses were performed to evaluate the possibility of future extinction and/or decline for individual stocks of listed salmonids (Tables A-14 and A-15). This evaluation was performed using the [Dennis Extinction Analysis model]. Table A-14 incorporated the percent spawners that were hatchery but assumed that hatchery fish do <u>not</u> reproduce, whereas Table A-15 used the same analysis but assumed that hatchery fish produce the same number of offspring as wild born fish.

**Table A-8.** Results of Dennis Extinction Analysis for individual stocks. Two thresholds (1fish/generation, 90% decline). This analysis incorporated the % spawners that were hatchery but assumed that hatchery fish do not reproduce. NA indicates that no hatchery data were available, that the data failed the sigma^2 > 0 test, or that the data are index counts and are not appropriate for population size estimates.

| | | | | | | | | Extinction | | | 90% decline | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Species** | **ESU** | **Stream** | **pop size est** | **μ** | **σ2** | **λ** | **24-year Risk Metric** | **4- year Risk Metric** | **100-year Risk Metric** | **24-year Risk Metric** | **4-year Risk Metric** | **100-year Risk Metric** | **NA Comments** |
| **Chinook** | **U. Columbia Spr** | Methow River | 324 | -0.141 | 0.264 | 0.868 | 0.24 | 0.71 | 0.97 | 0.67 | 0.90 | 0.99 | |
| | | Entiat | 159 | -0.138 | 0.031 | 0.871 | 0.03 | 0.92 | 1.00 | 0.88 | 1.00 | 1.00 | |
| | | Wenatchee | 745 | -0.216 | 0.022 | 0.806 | 0.03 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| **Chinook** | **Snake R. Spr/Sum** | Bear Creek | 736 | 0.017 | 0.146 | 1.017 | 0.00 | 0.00 | 0.03 | 0.07 | 0.12 | 0.15 | |
| | | Imnaha River | 657 | -0.078 | 0.041 | 0.925 | 0.00 | 0.03 | 0.78 | 0.33 | 0.85 | 1.00 | |
| | | Johnson Creek | 457 | 0.010 | 0.048 | 1.010 | 0.00 | 0.00 | 0.00 | 0.01 | 0.03 | 0.07 | |
| | | Marsh Creek | 291 | -0.013 | 0.127 | 0.987 | 0.00 | 0.04 | 0.19 | 0.13 | 0.25 | 0.39 | |
| | | Minam River | 338 | -0.005 | 0.156 | 0.995 | 0.00 | 0.04 | 0.17 | 0.13 | 0.23 | 0.33 | |
| | | Poverty Creek | 1051 | 0.006 | 0.080 | 1.006 | 0.00 | 0.00 | 0.01 | 0.04 | 0.09 | 0.16 | |
| | | Sulphur Creek | 207 | 0.039 | 0.411 | 1.040 | 0.05 | 0.12 | 0.21 | 0.15 | 0.17 | 0.17 | |
| **Chinook** | **Snake R. Basin Fall** | Snake River Basin | 1505 | -0.064 | 0.051 | 0.938 | 0.00 | 0.00 | 0.40 | 0.24 | 0.69 | 0.96 | |
| **Steelhead** | **Mid Columbia** | Beaver Creek Sum | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | No hatchery data |
| | | Deschutes R Sum | 9157 | -0.146 | 0.004 | 0.864 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| | | Mill Ck Sum | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | No hatchery data |
| | | Shitike Ck Sum | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | No hatchery data |
| | | Warm Springs Nfh Sum | 1031 | -0.098 | 0.050 | 0.907 | 0.00 | 0.09 | 0.92 | 0.52 | 0.94 | 1.00 | |

| Table A-8 continued. | | | | | | | Extinction | | | 90% decline | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Species | ESU | Stream | pop size est | μ | σ2 | λ | 24 year Risk Metric | 48 year Risk Metric | 100 year Risk Metric | 24 year Risk Metric | 48 year Risk Metric | 100 year Risk Metric | NA Comments |
| | | Eightmile Ck Win | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | No hatchery data |
| | | Ramsey Ck Win | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | No hatchery data |
| | | Fifteen Mile Ck Win | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | No hatchery data |
| | | Touchet R Sum | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | Not enough data |
| | | Umtilla R Sum | 5867 | -0.111 | 0.003 | 0.895 | 0.00 | 0.00 | 1.00 | 0.91 | 1.00 | 1.00 | var plot not very linear |
| | | Yakima R Sum | 5213 | 0.044 | 0.017 | 1.045 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| **Steelhead** | **Upper Columbia** | Upper Columbia River | 2137 | -0.061 | 0.040 | 0.941 | 0.00 | 0.00 | 0.25 | 0.19 | 0.67 | 0.97 | |
| **Steelhead** | **Snake R. Basin** | Snake River Sthead A-run | 33603 | -0.078 | 0.011 | 0.925 | 0.00 | 0.00 | 0.01 | 0.20 | 0.97 | 1.00 | |

**Table A-9.** Results of Dennis Extinction Analysis for individual stocks. Two thresholds (1fish/generation, 90% decline). This analysis incorporated the % spawners that were hatchery and assumed that hatchery fish produce the same number of offspring as wild born fish. NA indicates that no hatchery data were available, that the data failed the sigma^2 > 0 test, or that data are index counts which are inappropriate for a population size estimate.

| | | | | | | | Extinction | | | 90% decline | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Species | ESU | Stream | pop size est | μ | σ2 | λ | 24 year Risk Metric | 48 year Risk Metric | 100 year Risk Metric | 24 year Risk Metric | 48 year Risk Metric | 100 year Risk Metric | NA Comments |
| **Chinook** | **U. Columbia Spr** | Methow River | 433 | -0.172 | 0.214 | 0.842 | 0.25 | 0.82 | 1.00 | 0.79 | 0.97 | 1.00 | |
| | | Entiat | 173 | -0.222 | 0.041 | 0.801 | 0.60 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| | | Wenatchee | 805 | -0.231 | 0.025 | 0.794 | 0.08 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | var plot not very linear |
| **Chinook** | **Snake R. Spr/Sum** | Bear Creek | 736 | 0.017 | 0.146 | 1.017 | 0.00 | 0.00 | 0.03 | 0.07 | 0.12 | 0.15 | |
| | | Imnaha River | 1175 | -0.137 | 0.030 | 0.872 | 0.00 | 0.37 | 1.00 | 0.88 | 1.00 | 1.00 | |
| | | Johnson Creek | 457 | 0.010 | 0.048 | 1.010 | 0.00 | 0.00 | 0.00 | 0.01 | 0.03 | 0.07 | |
| | | Marsh Creek | 291 | -0.013 | 0.127 | 0.987 | 0.00 | 0.04 | 0.19 | 0.13 | 0.25 | 0.39 | |
| | | Minam River | 582 | -0.082 | 0.167 | 0.921 | 0.02 | 0.27 | 0.77 | 0.43 | 0.72 | 0.93 | |
| | | Poverty Creek | 1055 | -0.011 | 0.097 | 0.989 | 0.00 | 0.00 | 0.05 | 0.09 | 0.21 | 0.35 | |
| | | Sulphur Creek | 207 | 0.039 | 0.411 | 1.040 | 0.05 | 0.12 | 0.21 | 0.15 | 0.17 | 0.17 | |
| **Chinook** | **Snake R. Basin Fall** | Snake River Basin | 2199 | -0.152 | 0.012 | 0.859 | 0.00 | 0.31 | 1.00 | 0.99 | 1.00 | 1.00 | var plot not very linear |
| **Steelhead** | **Mid Columbia** | Beaver Creek Sum | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | No hatchery data |
| | | Deschutes R Sum | 70500 | -0.291 | 0.017 | 0.748 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| | | Mill Ck Sum | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | No hatchery data |
| | | Shitike Ck Sum | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | No hatchery data |

Table A-9 continued

| Species | ESU | Stream | pop size est | μ | σ2 | λ | Extinction<br>24 year Risk Metric | 48 year Risk Metric | 100 year Risk Metric | 90% decline<br>24 year Risk Metric | 48 year Risk Metric | 100 year Risk Metric | NA Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Warm Springs Nfh Sum | 1031 | -0.098 | 0.050 | 0.907 | 0.00 | 0.09 | 0.92 | 0.52 | 0.94 | 1.00 | |
| | | Eightmile Ck Win | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | No hatchery data |
| | | Ramsey Ck Win | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | No hatchery data |
| | | Fifteen Mile Ck Win | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | No hatchery data |
| | | Touchet R Sum | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | Not enough data |
| | | Umtilla R Sum | 9809 | -0.101 | 0.005 | 0.904 | 0.00 | 0.00 | 0.91 | 0.64 | 1.00 | 1.00 | var plot not very linear |
| | | Yakima R Sum | 5561 | 0.008 | 0.012 | 1.008 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| **Steelhead** | **Upper Columbia** | Upper Columbia River | 7708 | -0.413 | 0.035 | 0.662 | 0.87 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| **Steelhead** | **Snake R. Basin** | Snake River Sthead A-run | 299161 | -0.331 | 0.000 | 0.718 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | var plot not very linear |
| | | Snake River Sthead B-run | 100455 | -0.320 | 0.023 | 0.726 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |

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