Northeast Oregon Hatchery Program Grande Ronde – Imnaha Spring Chinook Hatchery Project

Biological Assessment

May 2004

Prepared for:
U.S. Department of Energy
Bonneville Power Administration
and
Nez Perce Tribe

Under Master Contract No. 589 with:
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Field Surveys:

Fisheries and Aquatic Environment Surveys:

Fisheries surveys were conducted by Patty Michak on July 17th, 18th and 19th, 2002. An additional survey was conducted by Patty Michak and Becky Holloway on September 25th, 2002. All surveyors are widely experienced in the fisheries field, and Patty Michak has greater than 20 years of experience.

Wildlife and Plant Surveys:

Floral and faunal surveys of the project sites were conducted on July 17th, 18th and 19th, 2002. Surveys were conducted by Laura Scott. Ms. Scott is proficient in planning and conducting field and office studies of wildlife and plant communities and reviewing projects for the potential presence of, or documented habitat for, federal or state-listed threatened, endangered or sensitive species of plants using a variety of survey protocols. Past efforts include the evaluation of potential adverse impacts on plant communities or listed plant species resulting from specific development proposals. Field surveys led by Ms. Scott have been conducted in conjunction with, or under the direction of, the U.S. Forest Service, U.S. Bureau of Land Management (BLM), and the Washington State Department of Natural Resources; while others have been conducted for individuals requiring ESA Section 7 consultation. Project tasks typically include the preparation of technical reports containing site inventory information, analysis of project impacts on plant communities and listed species, and recommendations for minimizing adverse effects. She previously led threatened and endangered plant species efforts within the Washington State Department of Transportation Environmental Affairs Office.

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1. BACKGROUND

The Snake River spring/summer Chinook salmon native to the Grande Ronde and Imnaha Rivers of northeast Oregon are listed as threatened and are protected under the Endangered Species Act (ESA). Adequate, contemporary hatchery facilities are needed to successfully mitigate for and aid in the recovery of these fish stocks. The Northeast Oregon Hatchery (NEOH) Project Spring Chinook Master Plan (Master Plan, Ashe et al. 2000), explains how existing hatchery facilities do not have adequate space or the best available technical and scientific advancements of fish culture. The National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries), U.S. Fish and Wildlife Service (USFWS) and local fishery and hatchery managers recognize that changes are needed to increase the success of recovery efforts and to halt the decline of spring/summer Chinook runs.

The Master Plan was prepared to determine programmatic and physical needs required to meet the hatchery production program. It depicts the program's shift in focus to conserve and recover Snake River spring/summer Chinook in the Imnaha River and Grande Ronde River (including the Wallowa River, Lostine River, and Catherine Creek, Figure 1.1-1) and explains how the existing hatchery facilities have become over-extended and unable to meet current production and Lower Snake River Compensation Plan (LSRCP) mitigation goals or the conservation and recovery objectives for listed species. The Master Plan also describes how the hatchery production program could be met if existing hatchery facilities were updated, modified, and augmented with certain new facilities. In October 2000, the Northwest Power Planning Council (NWPPC, now Northwest Power and Conservation Council - NWPCC) accepted the Master Plan in its Fish and Wildlife Program and recommended that Bonneville Power Administration (BPA) authorize funds to proceed with implementation. BPA, pursuant to its responsibilities under the Northwest Power Act and the Biological Opinions on the Federal Columbia River Power System, met with Northeast Oregon fishery co-managers to study the feasibility and strategize the implementation of the Master Plan.

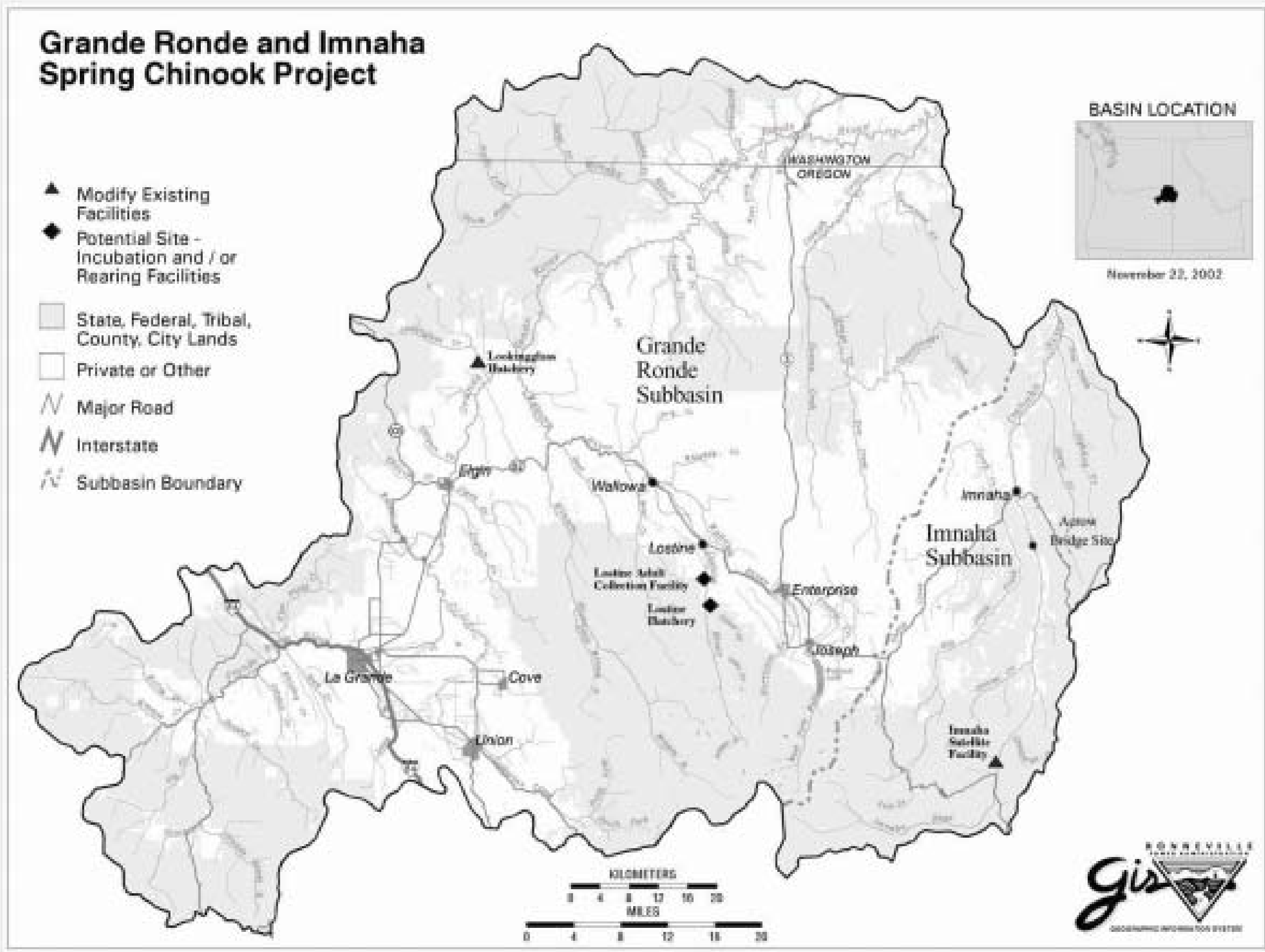


Figure 1.1-1. Grande Ronde & Imnaha Spring Chinook Project Vicinity Map.

The current NEOH Program/Grande Ronde – Imnaha Spring Chinook Hatchery Project, the subject of this Biological Assessment (BA), was developed from the Master Plan and proposes actions to modify and modernize existing hatchery facilities and build an auxiliary hatchery facility in northeast Oregon to mitigate and aid in the conservation and recovery of threatened Snake River spring/summer Chinook native to the Grande Ronde and Imnaha River Basins. This BA is being submitted in compliance with Section 7 of the ESA, as administered by the USFWS and NOAA Fisheries. An endangered species listing for this project was received from the USFWS on August 16, 2002 (FWS ref # 1-7-02-SP-926; 2002a, b) and reconfirmed in writing on June 11, 2003. A species list for anadromous salmonids was received from NOAA Fisheries on August 15, 2002 and verbally reconfirmed on May 22, 2003 and April 15, 2004 (E. Murray, NOAA Fisheries, pers comm.). Copies of these species lists may be found in Appendix A. The information obtained from the Services indicated that the following species may be present in the vicinity of the identified project areas:

NAME	SCIENTIFIC NAME	FEDERAL STATUS
Canada lynx	*Lynx canadensis*	Threatened
Bald eagle	*Haliaeetus leucocephalus*	Threatened
Yellow-billed cuckoo	*Coccyzus americanus*	Candidate
Columbia River bull trout	*Salvelinus confluentus*	Threatened
Snake River Chinook salmon (spring, summer and fall)	*Oncorhynchus tshawytscha*	Threatened
Snake River steelhead	*Oncorhynchus mykiss*	Threatened
Columbia spotted frog	*Rana luteiventris*	Candidate
Slender moonwort	*Botrychium lineare*	Candidate
Macfarlane’s four O’Clock	*Mirabilis macfarlanei*	Threatened
Spalding's catchfly	*Silene spaldingii*	Threatened
Howell’s spectacular thelypody	*Thelypodium howellii* spp. *spectabilis*	Threatened

In November 2002, the USFWS (2002c) proposed critical habitat for bull trout within the Columbia River distinct population segment (DPS). Discussion of proposed bull trout critical habitat, as well as critical habitat for Snake River fall and spring/summer Chinook is presented in Section 4.2.

1.1 Survey Methodologies

A field review of the project vicinity was conducted on July 17th, 18th and 19th, 2002 and again on September 25, 2002 by biologists from FishPro and Nisqually Environmental. The purpose of the site visits was to determine the status or occurrence of listed species habitat in the area and to evaluate the potential impacts of the project on listed species or their habitat.

In preparation for floral surveys, pertinent literature was reviewed, including information received from the Oregon Natural Heritage Program (ONHP 2002) database (Appendix A). The ONHP reported 19 records of rare, threatened and endangered plant and animal occurrences within a two-mile (mi) radius of the various project locations. Over half of these occurrences are comprised of species that are not federally listed. However, U.S. Forest Service Region 6 Sensitive (S) or Watch (W) species do occur within the project vicinity and are discussed in detail within the Biological Evaluation prepared for the project. Life histories, as well as element occurrence records (EOs) maintained by the ONHP, were reviewed for all target species listed above. Information relative to known occurrences in Oregon, suitable habitat types, elevation ranges and habitat observations made within the project vicinity were used to determine those species having the highest potential of occurring within the project area. Where appropriate, an absence of typical habitat types located within the immediate project vicinity was noted and no further analysis was completed for those species.

Floral surveys of the project sites were conducted on July 17th, 18th and 19th, 2002. Prior to on-site surveys, the Wallowa-Whitman National Forest (WWNF) botanist was contacted with regard to known species occurrence, habitat requirements and potential vulnerability of sensitive plant species to project related activities (S. Geer, Wallowa Mountain Zone Botanist (acting), U.S. Forest Service [USFS], pers comm., 6/26/02, 7/10/02). The project area was evaluated in light of proposed project plans, and areas of major ground disturbing activities were surveyed for target plant species. Survey methods utilized for the plant inventory followed the rare plant inventory guidelines for federally listed, proposed and candidate plants (USFWS 2001a) and guidelines for endangered, threatened and sensitive plant surveys prepared by the USFS.

These protocols provide a set of standards and guidelines for conducting rare plant surveys; maintaining a high degree of accuracy and practicality. The USFS methodology provides several levels of survey intensity, including "Cursory," "General," "Intuitive Controlled" and "Complete," among others (Lind 2000), and was used to establish survey routes. For the purposes of this project, a combination of "Limited Focus" and "Intuitive Controlled" survey methods were used to ensure that unique or specialized habitats such as wetlands and riparian areas were thoroughly evaluated. Given the tendency for prolonged dormancy in some species and the fact that some plants do not consistently flower in consecutive years (USFWS 2001a), the results of this survey may only be able to ascertain the presence or absence of suitable habitat and will not in each case include definitive conclusions. A list of species that were observed within the survey areas is provided in Appendix C.

Local wildlife and fisheries authorities were contacted for site/area specific information on listed species. All sites were visually evaluated for existing habitat conditions and potential for species presence. Significant habitat features such as wetlands and riparian areas and subsequent shading habitat, nests, roosting and perching trees, feeding areas, cover, structure, substrate, quality of habitat, etc., were assessed. Specific aquatic characteristics including the presence of riffles, glides and pools were noted at all sites. An estimate of occurrence and level of use for all listed wildlife and aquatic species was made for the project area. Existing literature and scientific data were also evaluated to determine species distribution, habitat requirements and other pertinent biological information. Photographs of the immediate project vicinity for each project component are included in Appendix B.

1.2 Previous Communications

Other activities to reverse declines of Snake River spring/summer Chinook salmon in the Grande Ronde and Imnaha subbasins have been initiated in association with recovery efforts in Northeast Oregon. Spring/summer Chinook salmon juveniles have been captured for broodstock by the Oregon Department of Fish and Wildlife (ODFW) from the upper Grande Ronde River, Catherine Creek, and the Lostine River since 1995. This activity required a Section 10 ESA permit, which was issued on August 7, 1995 (Permit No. 973). An application for a subsequent permit was prepared by ODFW on May 6, 1996 (Carmichael 1996). This application, entitled, *Application for A Permit for Scientific Purposes and to Enhance the Propagation or Survival of*

Endangered Grande Ronde River Basin Spring Chinook Salmon Oncorhynchus tshawytscha *under the Endangered Species Act of 1973*, included an evaluation of the potential effects of this activity on the listed spring/summer Chinook salmon. The permit application was approved by the National Marine Fisheries Service (NMFS, now NOAA Fisheries) on August 14, 1996 (Permit No. 1,011).

The Bureau of Indian Affairs (BIA) consulted with NMFS on April 13, 1998 and submitted: *Application for a Permit to Enhance the Propagation or Survival of Endangered Grande Ronde River Subbasin (Lostine River Component) Spring Chinook Salmon* Oncorhynchus tshawytscha *under the Endangered Species Act of 1973.*

BIA consulted with NMFS on February 28, 1997 and January 23, 1998 and submitted requests for permit extensions for permit #847, issued June 28, 1996: *Application for a Permit for Scientific Research and to Enhance the Propagation or Survival of Imnaha River Chinook Salmon* Oncorhynchus tshawytscha *under the Endangered Species Act of 1973*. Authorization to modify Permit No. 847 (modification No. 4) was granted on June 28, 1996 and includes water quality parameters. One of the conditions specified in modification No. 4 was the requirement for submission of a comprehensive annual report on the preceding year's hatchery and research activities and the specific collections and releases proposed for the forthcoming year.

The NMFS has issued an ESA Biological Opinion (BO)(NMFS 1999) and Section 10 (a)(1)(A) Permit (No. 383) pursuant to conducting scientific research and collection of Imnaha and Grande Ronde River spring/summer Chinook salmon. Collection and research is pursuant to the enhancement and propagation of listed Snake River spring/summer Chinook salmon. NEOH project activities evaluated in the BO issued by NMFS include: adult weir and trap operation, collection and spawning of summer Chinook adults, egg incubation, and rearing and release of subsequent progeny into the Grande Ronde and Imnaha river subbasins. Of primary concern is the requirement to take special measures to avoid adverse impacts from artificial propagation and to preserve the genetic and life history characteristics of the listed species.

A BO on Artificial Propagation in the Columbia River Basin, including analysis of the effects of the Lookingglass Hatchery, was issued in 1995 for 1995 - 1998 hatchery operations in the Columbia Basin. On March 29, 1999, NMFS issued a BO on artificial propagation in the Columbia River Basin. This BO covered only calendar year 1999. NMFS has not completed a consultation on artificial production in the Columbia Basin since the 1999 BO expired (J. Krakker, USFWS, pers comm., 1/2/03).

A National Pollutant Discharge Elimination System (NPDES) permit (Type 300-J), administered under the authority of the Oregon Department of Environmental Quality (ODEQ), currently permits effluent discharge for production at the existing Lookingglass Hatchery. This permit expires on 9/30/07 and would likely be modified to include production at proposed facilities. Although there was formerly a NPDES permit in place for the Imnaha Satellite Facility, under current regulations, the facility is exempt from NPDES permit requirements (B. Lund, Lookingglass Hatchery Manager, pers comm., 7/24/03) and will continue to be exempt under the proposed program. A Hatchery and Genetic Management Plan (HGMP) template was prepared for this project as part of the NEOH Spring Chinook Master Plan (Ashe et al. 2000). Individual HGMPs have recently been developed for the Upper Grande Ronde and Catherine Creek program, the Lookingglass Hatchery and the Lostine River program (S. Grassel, NPT, pers comm., 5/19/04).

2. DESCRIPTION OF PROPOSED ACTION

2.1 Project Location and Action Area

2.1.1 Grande Ronde River Subbasin

The Grande Ronde subbasin, including the Lostine River and Lookingglass Creek, encompasses an area of about 4,000 square mi in northeast Oregon and southeastern Washington (Figure 2.1-1). The Grande Ronde River is a tributary to the Snake River and joins the Snake at river mile (RM) 169.

2.1.2 Imnaha River Subbasin

The Imnaha River subbasin is located in the extreme northeast corner of Oregon and drains an area of approximately 980 square mi (Figure 2.1-2). The mainstem is formed by the juncture of the North and South Forks (RM 63.5) and flows northerly for approximately 63.5 mi to its confluence with the Snake River at RM 191.7 (Nez Perce Tribe [NPT] 2001).

The terrestrial action area for the purpose of this BA has been defined using the furthest extent of potential effect from proposed project actions that modify the pre-project environmental conditions as they relate to federally listed terrestrial species, giving consideration to all life-stage and habitat requirements of the species potentially present in the project vicinity. USFWS guidance indicates that noise associated with construction activity may disturb bald eagles and other species up to one mi away. The terrestrial action area for the proposed project, therefore, includes that area within a one-mi radius at each of the proposed project sites.

The aquatic action area has been defined using the furthest extent of potential effect from proposed project actions that may modify the pre-project instream flow direction and/or condition as they relate to federally listed aquatic species. Instream work has implied effects. However, magnitude and extent of effects are based on volume, gradient and velocity of instream flow. Therefore, defining the extent of the aquatic action area based on effects is largely unpredictable. Based on our understanding of the proposed project and construction methods, the aquatic action area has been defined as the Imnaha and Lostine Rivers within ½ mi downstream and 500 feet (ft) upstream of the proposed project locations. Because no instream work or work within the riparian zone is proposed for Lookingglass Creek, it is not included in the aquatic action area. Project construction activities on the Imnaha River would occur within the USFS-designated Riparian Habitat Conservation Area (RHCA), defined as within 300 ft from the edge of the active stream channel of the Imnaha River.

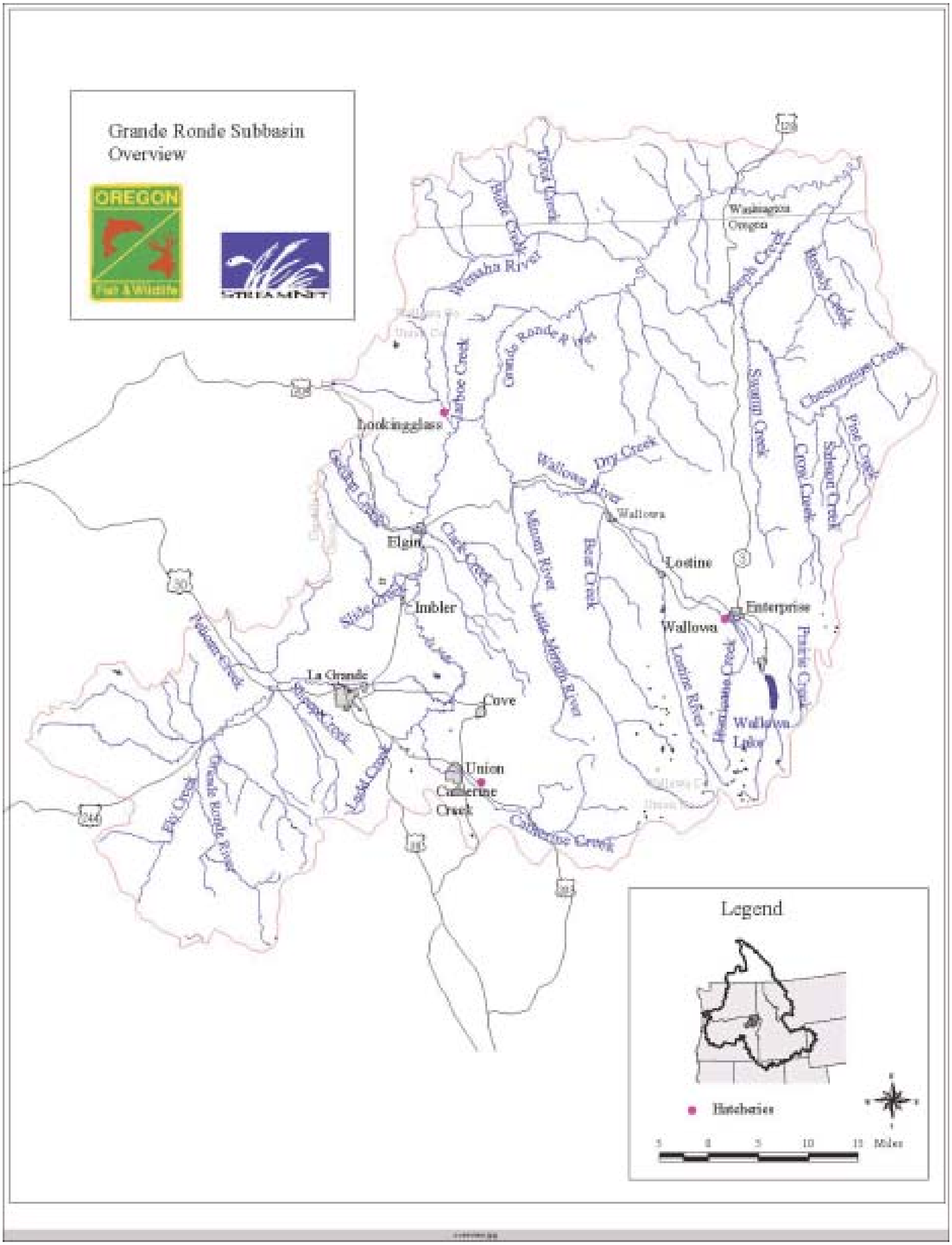


Figure 2.1-1. Location and Features of the Grande Ronde River Subbasin.

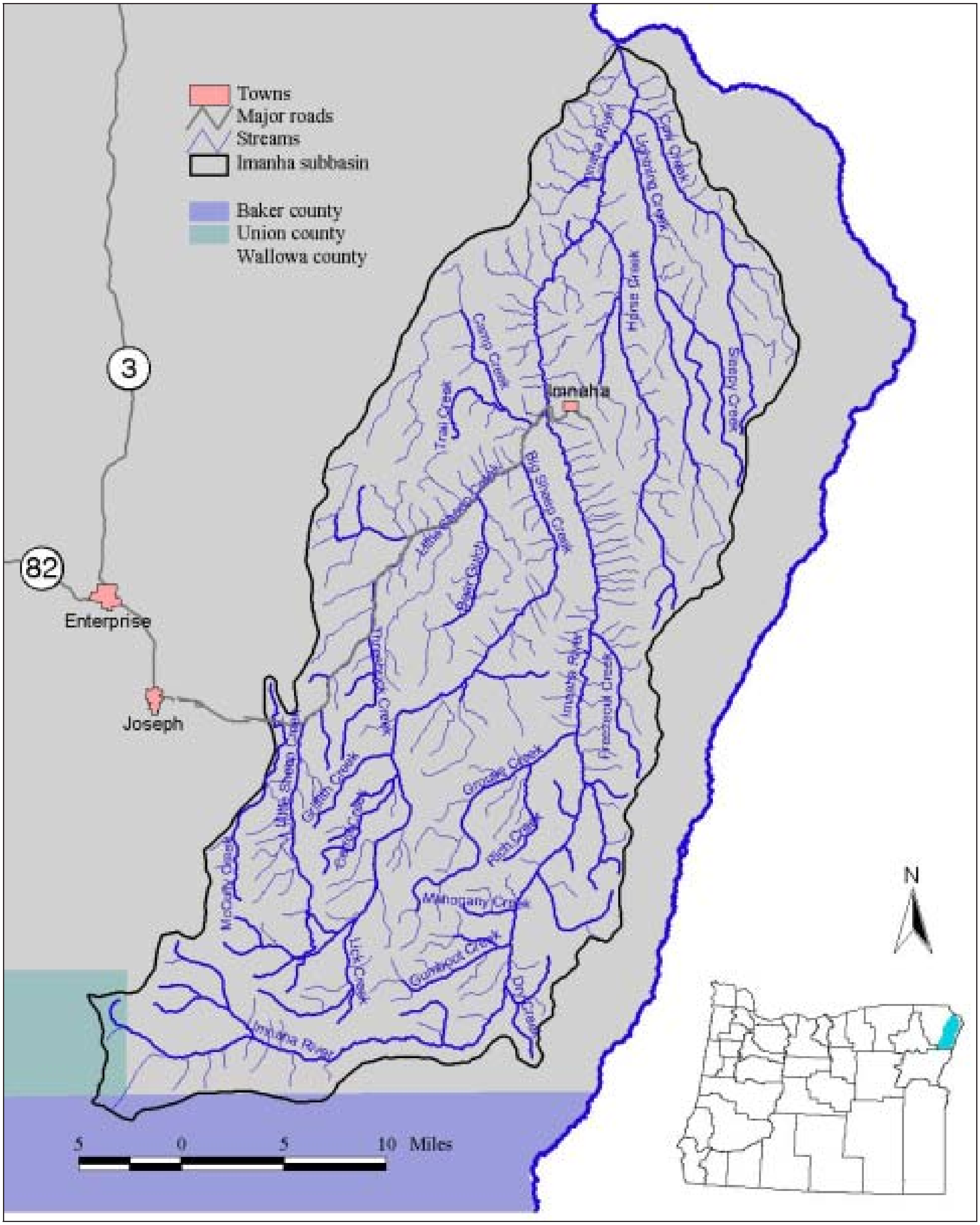


Figure 2.1-2. Location and Major Features of the Imnaha Subbasin.

2.2 Project Description

The project is being proposed to modify and modernize existing hatchery facilities and construct auxiliary hatchery facilities where needed to aid native spring/summer Chinook conservation and recovery in northeast Oregon. Four sites (see Figure 1.1-1) and facilities are involved, including the existing Lookingglass Hatchery and Imnaha Satellite Facility; and the proposed Lostine River Adult Collection Facility and Lostine River Hatchery.

Facilities would be designed and constructed to achieve components of the Natural Rearing and Enhancement Systems (NATURES) (Maynard et al. 1996) criteria (e.g., low density rearing, lighting, baffles to alter flow, volitional release, in-water structures) to the extent feasible. Instream structures would meet applicable NOAA Fisheries and USFWS design requirements. Construction would be staged to accommodate existing operations and reduce impacts on fish production at each facility. Instream work would be performed in compliance with applicable regulations and permits. Instream work would include the placement of temporary cofferdams or other temporary water diversions appropriately placed to route water around work areas. Portable pumps would be used to help keep work areas dry. Pump discharge would be routed through a settling basin prior to discharge back into the river. Instream work would only occur during ODFW's instream work window, identified as July 15 through August 15 for both the Lostine River and the Imnaha River, or as otherwise specified by the appropriate regulatory agency(s). No instream work is proposed in Lookingglass Creek as part of this project.

Project design and construction would meet all other environmental requirements and would incorporate industry standard best management practices (BMPs) such as erosion control, waste management, dust control, weed management, fire prevention, and work hour and noise considerations. The project would comply with the Federal Clean Water Act's (CWA) NPDES requirements and would incorporate sensitive site design measures such as retaining riparian vegetation, landscaping with native plants, and shielding facility lighting. Design would also comply with USFS regulations for wild and scenic rivers.

The following sections summarize the components proposed at each site and their functions. Details on each component are in the *Northeast Oregon Hatchery Project – Imnaha and Grande Ronde Spring Chinook Preliminary Design Report* (MWH et al. 2001) and the *Draft Northeast Oregon Hatchery Project –Step Two Submittal Revised Preliminary Design Report* (FishPro/HDR 2004) available on request from BPA. Selected preliminary design drawings are presented in Appendix D.

2.2.1 Lookingglass Hatchery (operated year round)

The Lookingglass Hatchery is an existing facility that has been in operation since 1982. It is operated and maintained year-round. Proposed modifications to the facility are relatively minor and limited to upgrades to the electrical supply system. Improvements to the surface water treatment facility, including a new ultraviolet system with new housing piping were previously consulted on and are not considered part of this project. However, upgrades to the electrical component of the treatment facility are considered part of the Proposed Action. Existing and proposed facility components are illustrated in Figure 2.2-1. No additional water withdrawals are proposed for this project beyond those already authorized. Electrical upgrades would occur within one season, from approximately April through November. All proposed improvements would occur within the existing, developed area and in areas already altered by past use as a wood products mill, gravel pit and a hatchery. No in-stream work is proposed at this location. Additional detail on proposed modifications is provided in Table 2.2-1.

Table 2.2-1. Proposed Lookingglass Hatchery modifications.

• Upgrade electrical power supply, including stand-by generator replacement and new standby generator at the intake, as shown in Figure 2.2-1.
• Upgrades to the hatchhouse electrical supply, alarm and instrumentation system, and upgrades to Well T-2 instrumentation.
• Improvements to the hatchhouse; new early rearing troughs, formalin distribution system, boiler/chiller system modifications, and revised piping.

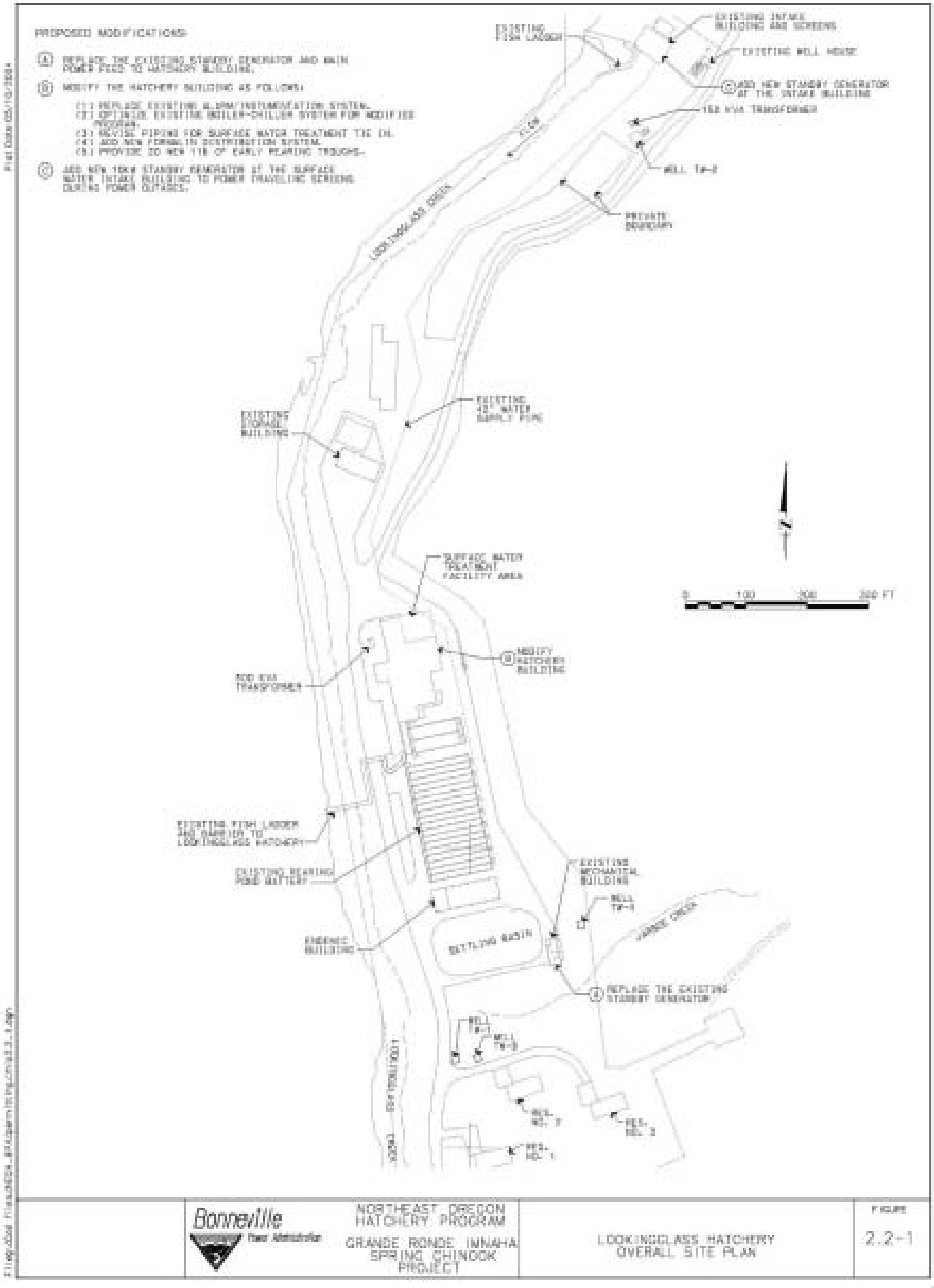


Figure 2.2-1. Lookingglass Hatchery Existing and Proposed Site Plan.

2.2.2 Proposed Lostine River Adult Collection Facility (operated April – August)

Fisheries managers formerly used a portable picket weir on the Lostine River near its confluence with the Wallowa River to collect adult spring/summer Chinook for hatchery spawning. A picket weir is a fish barrier constructed from fixed picket panels installed at the beginning of the trapping season and removed at the completion of trapping activities. The picket barrier panels were installed in a fixed position and required considerable labor to keep the barrier panels clean and the barrier operational. The portable weir did not allow safe operation at the higher river flows (>800 cubic ft per second [cfs]) typical during early spring to early July when many adult Chinook are migrating upstream. Currently, fisheries managers use a modified Chiwawa weir with panels that can be raised and lowered as needed. The new weir, although better functioning during higher flows with more efficient collection of broodstock, is still unable to capture the complete run of Chinook therefore restricting the number and genetic variety of adults collected. A new collection facility is proposed approximately one mi south of the town of Lostine, downstream of historic spring/summer Chinook spawning areas. The new facility would be designed to operate effectively during higher flows (800 – 1,200 cfs), while the existing downstream weir would continue to be used during lower flow periods.

The proposed Lostine Adult Collection Facility is located on property operated as a private trout farm. An existing fish ladder and irrigation diversion complex are located at this site. The fish ladder is comprised of five concrete sills that span the width of the river channel. The irrigation diversion is located on the east bank, directly opposite the proposed new ladder exit. Two small outbuildings, small gravel access area and private trout holding ponds are located in the vicinity of the proposed ladder. The proposed adult collection facility would operate from April through August 1 of each year. The existing Chiwawa weir would continue to be used in times of low flow (mid July through October 1). Fish that are trapped for broodstock would then be hauled by tank truck upstream approximately 4 mi to the proposed Lostine River Hatchery for spawning. At the end of adult collection period, the trap box would be removed and the proposed structure would function only as a ladder to facilitate fish passage. No water withdrawals from either the Lostine River or from groundwater wells are required for this facility.

Proposed modifications to the site are presented in Table 2.2-2 and Figure 2.2-2. The proposed ladder would improve fish passage over a wider range of river flow conditions as compared to the existing ladder. During periods of low flow, instream water in excess of that required for diversion by irrigators would be routed through the new fish ladder to improve fish passage during lower flows. Flow-monitoring equipment would be installed at the new fish ladder.

Table 2.2-2. Proposed components of the Lostine Adult Collection Facility.

• Removal of portions of the existing fish ladder • Installation of a hydraulic velocity barrier and a new pool and weir-type fish ladder (west bank), trap and hopper for adult collection and fish passage • Power line installation • Construction of a flood proofing levee on west bank, upstream of fish ladder release channel • Placement of channel protection (large rocks) in front of hydraulic barrier • Replacement of existing bridge with Acrow bridge that currently spans the Imnaha River at Marks Ranch, including abutments that will be located outside of the normal high water mark • Riparian modifications (within 200 feet of the river): clearing, grading and filling riparian areas for equipment staging, ladder access, loading and parking

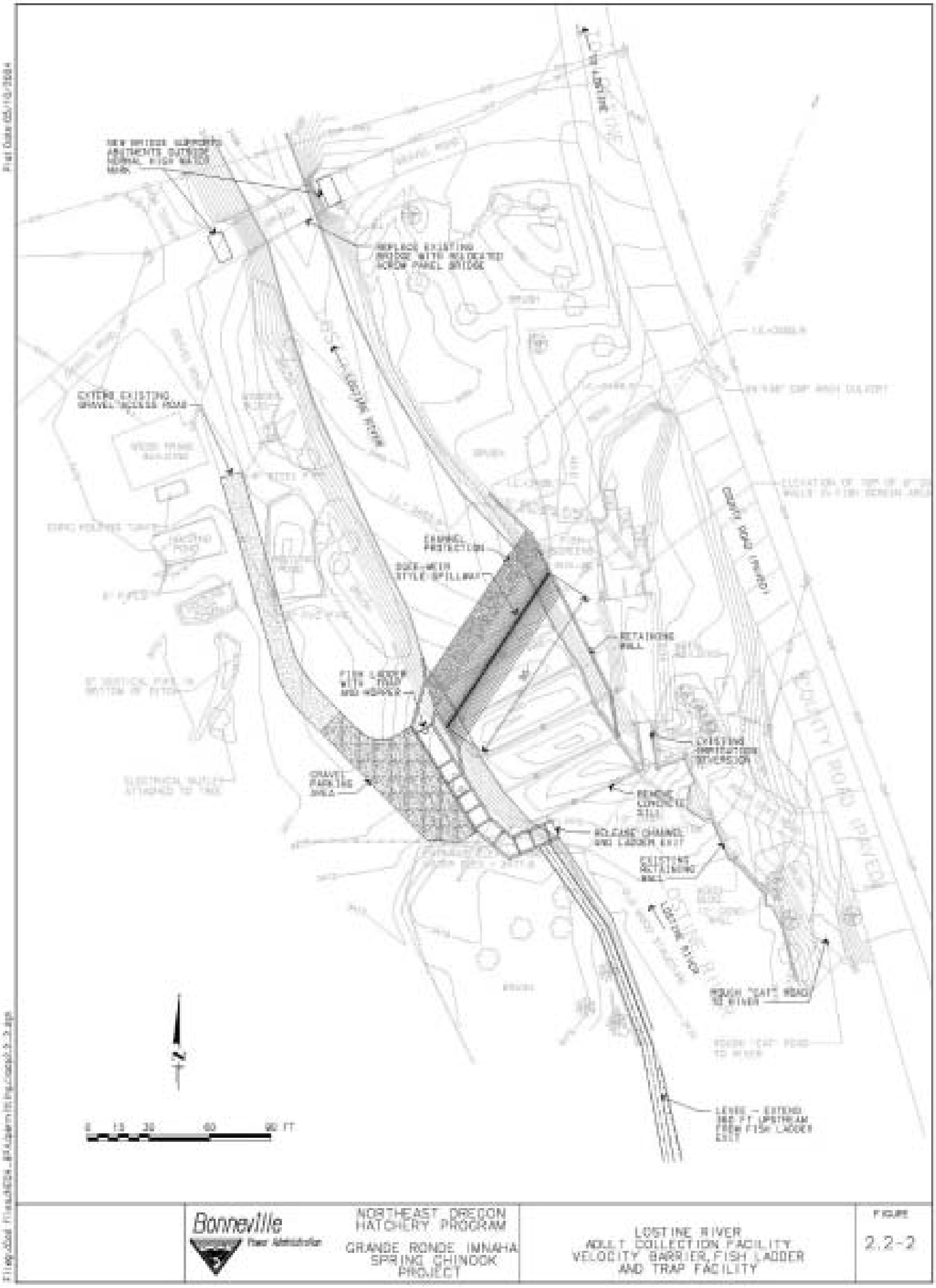


Figure 2.2-2. Lostine Adult Collection Facility Proposed Site Plan.

All instream work would take place in one construction season during ODFW's instream work window for the Lostine River (July 15 – August 15). Levee construction and other activities would be completed through August and September, with revegetation occurring the following year.

The existing ladder's most downstream concrete sill would be dismantled using a backhoe-mounted jackhammer, followed by removal with an excavator. The remaining sills would be kept in place and allowed to fill with river bedload over time. Installation of the flow velocity barrier would require construction of concrete abutment walls (outside of ordinary high water) and the removal of up to 20 ft of the bank, including associated riparian vegetation. Abutments along the east bank would require excavation of approximately 3,000 – 6,000 square ft of material. A flood-proofing levee is proposed for the west bank of the river to stabilize the bank and protect the site from damage during high flow conditions. The levee would be constructed using fill and riprap along approximately 360 ft of the river channel upstream of the fish ladder exit. A temporary road may be required for equipment access along the west bank during construction of the levee. Construction of the levee would isolate small, intermittent spring-fed side channels that occur on the west bank of the river. French drains would be incorporated into the levee structure to convey side channel flows and spring water originating in the upland portions of the site back to the Lostine River.

A permanent gravel road would be constructed to provide access to the ladder and trap structure. Parking and turn-around space is also required to accommodate the fish hauling vehicles utilizing the collection facility. Approximately 8,000 – 10,000 square ft would be cleared and graded on the west bank for permanent access to the fish ladder for Chinook collection and transport, and for construction access and staging. Areas temporarily disturbed by construction would be revegetated with native species early the following growing season for the best plant growth and survival. The permanent access road, loading and turn-around areas would be constructed using open cells backfilled with soil and planted with native grass. This would result in a more natural setting and would allow for better stormwater infiltration over paved areas. A temporary construction access road would also be installed from Lostine River Road to the Lostine River, just upstream of the existing irrigation diversion. The existing bridge would be replaced with the Acrow panel bridge that currently crosses that Imnaha River at approximately RM 26 in the lower Imnaha subbasin. New electrical service would be provided from the existing powerline on the Lostine River Road. The power line would run across the replaced bridge to a pad mounted transformer adjacent to the existing small hatchery building. The existing above-ground powerline feeding the private trout farm would be removed and included in the new service.

2.2.3 Proposed Lostine River Hatchery (operated year round)

Lostine River spring/summer Chinook eggs are currently incubated at the Lookingglass Hatchery. Smolts are reared and acclimated at a temporary facility along the Lostine River near the location of the proposed hatchery. These facilities consist of two aboveground rearing units, a portable pump and piping. This temporary facility does not provide sufficient rearing capacity, or acceptable NATURES densities. The proposed Lostine River Hatchery would be a full scale, multi-function facility, with permanent staff and on-site housing, designed to culture Lostine River Chinook from spawning through to final rearing (Figure 2.2-3). The Lostine River Hatchery would also hold and spawn all Imnaha broodstock, and incubate eggs to the eyed stage.

Upon reaching the eyed stage, half of the Imnaha eggs would be transferred to Lookingglass for final rearing. The remaining half of Imnaha eggs would continue to be held at the Lostine facility for final rearing. In March, the age 1+ Imnaha juveniles would then be transferred from Lookingglass and Lostine Hatcheries to the Imnaha Satellite Facility for acclimation and release.

Construction of the proposed Lostine River Hatchery would occur on an approximately 6-acre site located near the Lostine River Acres residential community, approximately 4 mi upstream (south) of the proposed Lostine Adult Collection Facility. The proposed Lostine River Hatchery would operate year-round. Infrastructure requirements are outlined in Table 2.2-3 and depicted in Figure 2.2-3. Three new groundwater wells would provide 2.9 cfs for facility operations (1,300 gallons per minute [gpm]).

The surface water intake structure (Figure 2.2-4) located approximately ½ mi south of the hatchery site, just upstream of the County Bridge, would supply up to 17.8 cfs to the facility. The intake will include a weir structure to control the water surface elevation to ensure that the screens are submerged, a fish ladder for passage, sluiceway for periodic downstream sediment removal past the weir, a log boom to protect the screen panels and a compressor building to house the air receiver and compressor. The air system will be utilized to provide air burst cleaning to the screen panels and to inflate the pneumatically-controlled weir (maintaining weir height). The compressor building will provide noise attenuation for the compressor unit, minimizing noise impacts.

To provide adequate fish habitat and passage a minimum river depth of 0.8 ft would be maintained. Approximately 10 cfs is required (R2 Resources 1998) to achieve this depth, but to ensure passage a 20% buffer would be added and a minimum flow of 12 cfs would be maintained. The normal flow strategy would be used when less than 50 percent of instream flow is utilized by the hatchery and when the 12 cfs minimum flow is achieved. An effluent pumpback system and/or low flow strategy would be employed to ensure that a minimum of 50% of the total flow remains in the Lostine River through the diversion reach; or a minimum of 12 cfs, whichever standard results in higher flow through the diversion reach. Flows would be measured at the hatchery headbox and compared to real-time surface water data from the USGS gage (#13330000) near Lostine, Oregon. This gage is located above all but one of the irrigation diversions. Flows would be returned to the base of the fish ladder. Table 4.2-19, presented later in this document, summarizes the percentage of water years on record when pumpback would be employed to: 1) maintain a minimum of 50% of the total flow within the diversion reach; and 2) maintain a minimum of 12 cfs in the diversion reach, as well as the average and maximum amount of water that would be returned to the intake via the pumpback station.

Site development activities are expected to begin in the spring or summer months following project approvals. Primary buildings would be constructed through late January, with foundation and exterior work occurring early on and interior work done in the winter months. Severe weather conditions may occasionally stop outdoor work activities. Major groundwork and construction of raceways, incubation and spawning building and holding ponds, cleaning waste ponds, and related structures and piping would occur from April through November of the following year. Though normal work hours would be 8 a.m. to 5 p.m. five days a week, 12-hour work days six days a week would be needed during crucial instream work window periods (July 15- August 15) to accomplish necessary work while minimizing impacts to aquatic species.

Table 2.2-3. Proposed components of the Lostine River Hatchery.

- Surface water supply intake approximately one-half mile upstream of proposed hatchery, upstream of where the Lostine River Road crosses the Lostine River. The intake would include fish screen panels and baffles, log boom and about 20 ft. of cobble bank protection, and a de-icing well water supply.
- Installation of a pneumatically-controlled weir (inflatable air bladder) to raise the surface water elevation to provide sufficient flow to the intake; cobble/rock lining protection downstream of the weir structure;
- Construction of a vertical slot fish ladder to provide upstream fish passage at the intake. This ladder would be designed to accommodate both adult and juvenile fish passage as appropriate to meet NOAA guidelines;
- Sluiceway to periodically allow sediment to pass below the weir structure;
- Construction of a 12 foot wide (maximum width) gravel access road for permanent access and temporary construction staging and access;
- Construction of an air receiver and compression building (above ordinary high water), and
- Installation of a buried 24-inch (in) pipeline from the intake to the hatchery site along the Lostine River Road and Granger Road, the existing access to the hatchery site.
- Buried 12-in. pipelines from three existing groundwater supply wells to provide required pathogen-free water for egg incubation and smolt rearing. Small buildings would be placed at each well site to protect the wellhead, pumps, and other equipment. Groundwater wells would also provide potable water to staff residences.
- Buried 6-in. de-icing pipeline to deliver groundwater, when necessary, to the intake during periods of instream icing.
- Water overflow system from the rearing facilities (raceways) including surface water strainers, headbox, and valve vaults. Flow would be directed to either the hatchery outfall pipeline/volitional release pipeline, or the effluent return pump station.
- Adult fish holding and spawning rooms, including six holding ponds and isolation tanks.
- Egg incubation and early rearing building for both Lostine and Imnaha stocks, and a wet room for fish sampling.
- Ten rearing raceways (two banks of five) (outdoor, rectangular concrete ponds) for use by Lostine and Imnaha stocks. One bank of raceways will have second pass capability (upper bank to lower bank) and one raceway per bank will have segregation rearing options.
- Effluent pump station and 18-in. buried pipeline to return hatchery water back upstream to the base of the fish ladder; station will likely contain a triplex pump/ manifold arrangement with an emergency power back-up pump.
- Operations building with office space, bunkhouse for temporary and seasonal personnel, shop and garage parking for three vehicles, electrical room, and generator room.
- Single family residence and an existing, remodeled single family residence for permanent hatchery personnel.
- Cleaning waste basin for smolt raceways cleaning wastes. A sump pump would be installed in the cleaning basin to drain it so that the waste would be periodically removed and trucked to an appropriate off-site disposal facility.
- Concrete outfall/release line downstream of the hatchery with riprap protection. Water from the hatchery's final rearing raceways and cleaning basin would be conveyed via a buried 24-in. pipe and released into a side channel to the river through the partially submerged outfall. Smolts would also be released via the pipe and outfall. The outfall's small valve opening would prevent adult fish from entering the pipe.
- New septic system to serve residences, operations building and incubation and early rearing building.
- Upgraded 3-phase electrical power supply (480V) to the hatchery, conveyed along about three mi of PacifiCorp's existing easement. A transformer would be installed at the site's main operations building. A diesel generator would provide emergency backup power.
- Paving Granger Road from the Lostine River Road to the hatchery, when construction is completed.

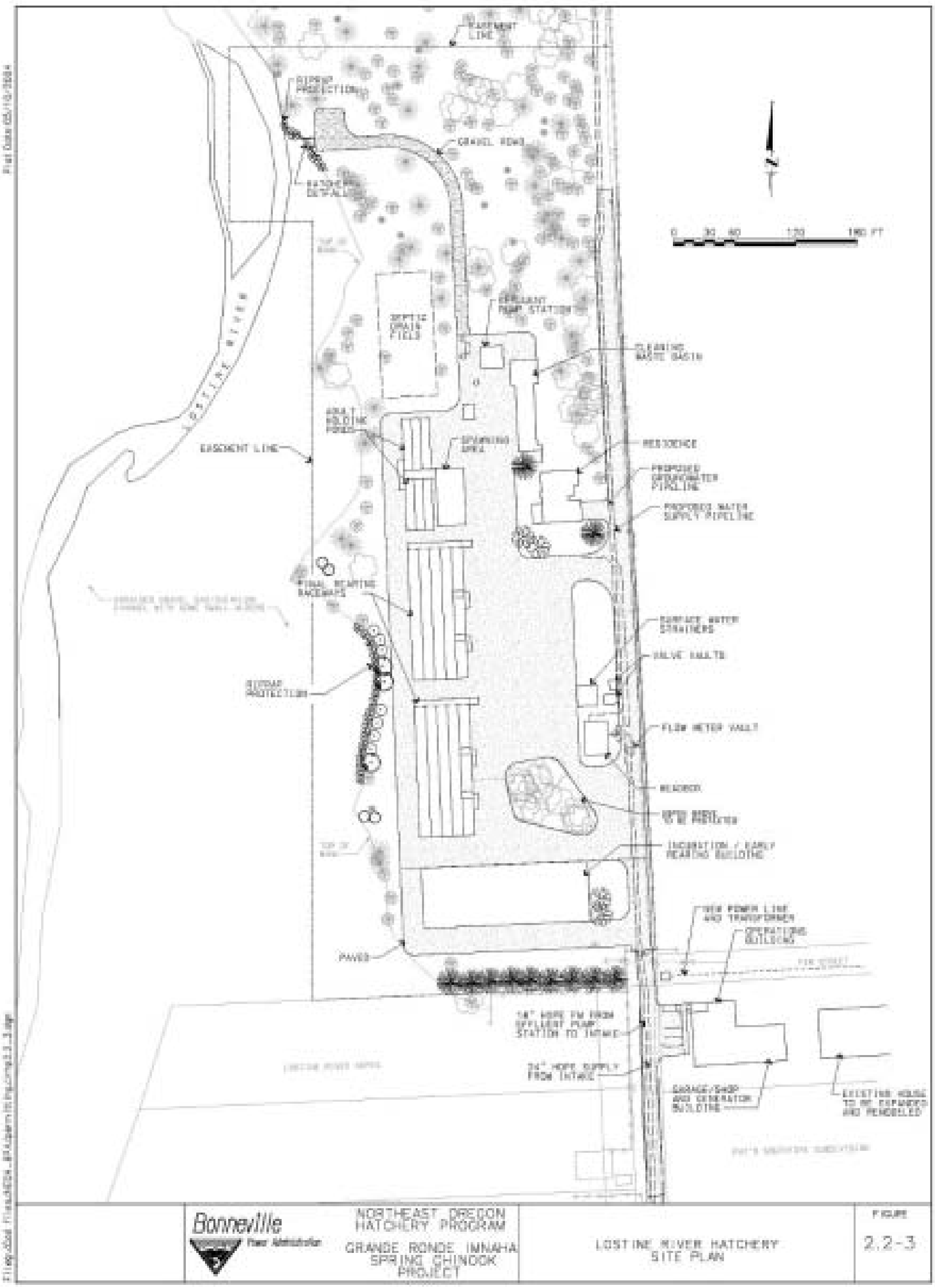


Figure 2.2-3. Lostine River Hatchery Proposed Site Plan.

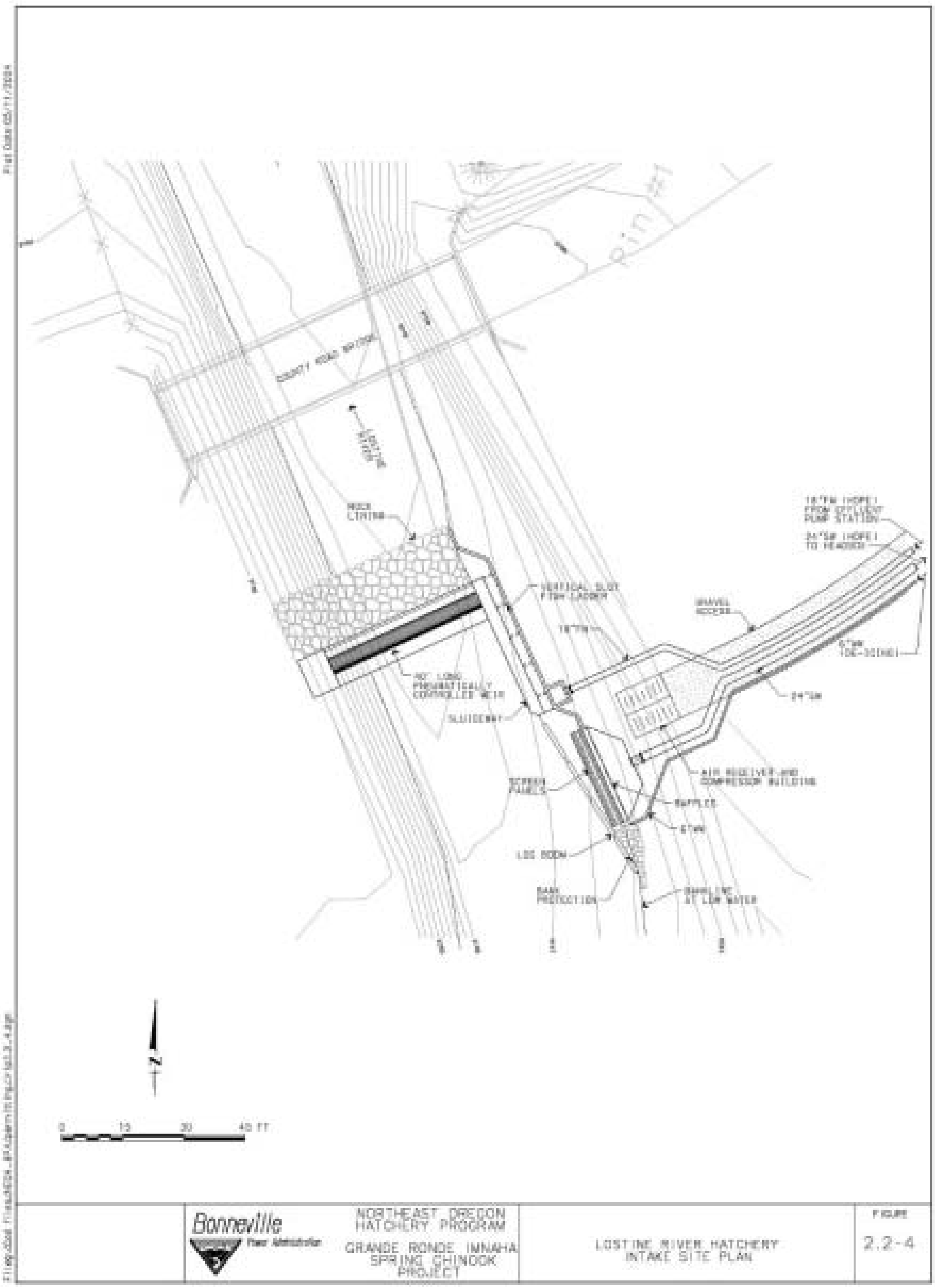


Figure 2.2-4. Lostine River Hatchery Intake Site Plan.

All instream work would be completed between July 15 and August 15, and would require two instream construction seasons to complete. The proposed surface water intake and fish ladder (Figure 2.2-4) would be cast-in-place concrete structures located on the east bank of the river. Installation of the intake, fish ladder, sluiceway and conveyance pipeline would result in the removal of approximately 100 ft of the riverbank and associated riparian vegetation. Construction of the compressor building and access road (12 ft wide) will remove approximately 0.06 acres of riparian vegetation. One or two mature black cottonwoods (*Populus balsamifera*), and several saplings and shrubs would be removed. River cobbles would be placed instream at the intake structure to stabilize the river channel and minimize sedimentation. Large cobbles would be utilized to stabilize the weir and substrate. The buried 24-in. gravity pipeline which would convey surface water from the intake to the hatchery site would be installed within the County road and Granger Road rights-of-ways. Several trees (approximately 10) that occur immediately adjacent to the roadway would be removed during installation of the pipeline.

Construction of the proposed facilities at the hatchery site would result in approximately 1.9 acres of new impervious surface at the currently undeveloped site. The site would be graded and filled with 5,000 to 6,000 cubic yards (cy) of rock from a nearby quarry to level the site in preparation for facility construction and to provide flood protection for the hatchery facility. Numerous large trees, primarily grand fir (*Abies grandis*), Englemann spruce (*Picea englemannii*), and black cottonwood, would be removed as a result. A small number of diseased trees, snags and downed wood would also be removed from this area. Temporary erosion and sedimentation during construction is expected to be minimal due to the relatively flat nature of the site. The majority of upland construction activity would occur away from the river channel and would be managed through the use of erosion control devices, preservation of as much riparian vegetation as possible and revegetation of the site immediately following construction.

Construction and subsequent maintenance of the hatchery outfall structure would require the installation of a gravel access road approximately 290 ft long and 15 ft wide with a parking/turnaround area at the outfall. Trees and the dense woody understory would be removed from this corridor. Excavation of approximately 150 cy of bank material and removal of associated woody riparian vegetation, including a limited number of trees, would occur at the outfall location. Approximately 35 cy of basin cobbles would be placed around the outfall to stabilize the structure and prevent erosion and sedimentation.

Bank armouring with riprap is proposed for the existing meander side channel, where it approaches the raceways, to protect the hatchery facility from high water events that may cause bank erosion. In-channel habitat would be slightly altered, but original meanders would be maintained and riprap placement is not anticipated to affect river configuration. Vegetation at this location is sparse and is comprised predominantly of common and weedy species.

A separate bank protection project is being completed at the location of the most northern production well for flood protection and erosion control. This portion of the bank is prone to erosion and maintenance to the bank stabilization features may occur in the future to prevent further bank sloughing. Only weedy herbaceous vegetation is present at this location.

2.2.4 Acrow Panel Bridge Site in the Lower Imnaha Subbasin

The Acrow panel bridge proposed for use at the Lostine Adult Collection Facility currently spans the lower Imnaha River at RM 26 (Figure 2.2-5). The bridge currently provides access to 10 acres of agricultural land, referred to as Marks Ranch, on the western side of the Imnaha River in Section 11, Township 1S, Range 48E. Site topography is relatively flat and the river channel at this location is well-defined. At the bridge site, the river is relatively narrow and flat with several pools and riffles and a moderate amount of riparian cover along the banks. Small (1-3 in.), medium (4-8 in.) and some large (12-18+ in.) cobbles occur in the river near the bridge.

The existing bridge and associated abutments at this location will be removed via crane during ODFW’s instream work window (July 15 through August 15). The panel bridge will then be transported for use at the Lostine Adult Collection Facility. Riparian vegetation removal at this location will be minor, and the site will be revegetated with native species when removal activities are complete.

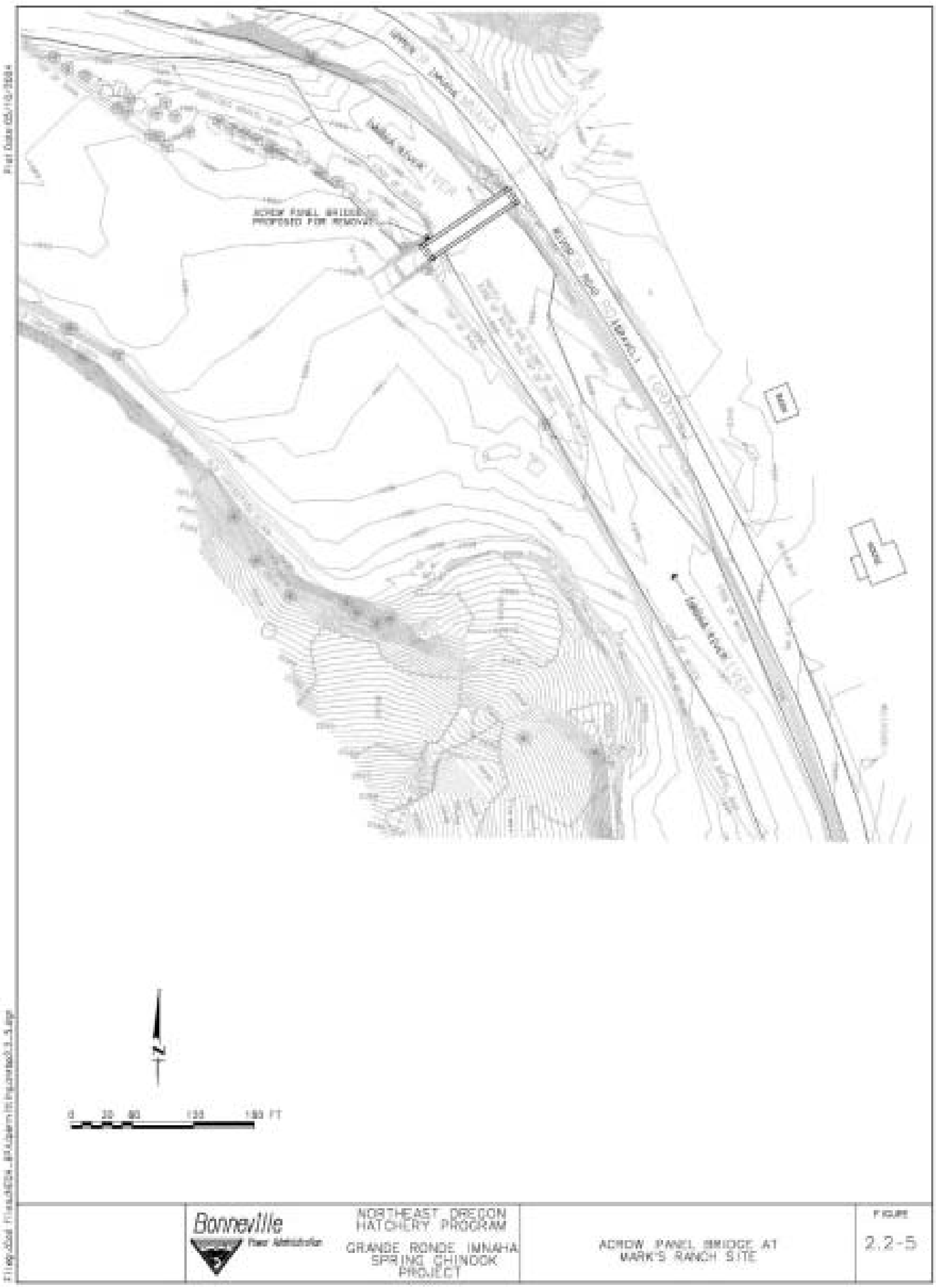


Figure 2.2-5. Acrow Panel Bridge Location at Marks Ranch.

2.2.5 Imnaha Satellite Facility (fish on station March – September)

The Imnaha Satellite Facility is an existing rearing facility completed in 1988 and is located on approximately 4 acres of USFS land in the upper Imnaha subbasin near RM 46. The site is bounded by the Imnaha River and Forest Service road 3955. The USFWS owns the facility and holds a USFS special use permit for the facility. The facility is operated by ODFW and is used to collect and hold Imnaha spring/summer Chinook adults and to acclimate smolts prior to release. The facility has deficiencies that limit its effectiveness to collect and hold adult fish safely and efficiently, and acclimate smolts at preferred densities. The Imnaha Satellite Facility is proposed to be in operation from March through September. One full-time operator would be at the facility when in operation. All construction would take place within the existing site area (Figure 2.2-6). Table 2.2-4 describes the components that are proposed for this site.

Table 2.2-4. Proposed improvements to the Imnaha Satellite Facility.

- Replacement of existing weir with new hydraulically operated weir that operates safely and effectively at higher river flows;
- Addition of auxiliary water supply pipeline and diffuser box that discharges at the base of the fish ladder to supplement attraction flow at the fish ladder entrance. The auxiliary pipe would be located behind the existing fish ladder wall;
- Modify septic drainfield to replace drainfield area disturbed by construction;
- Add extended fish crowder to adult trapping and holding area. Improvements to the holding area include new jump panels and a new spray bar system;
- Modifications to water intake structure to provide additional flows for acclimation and to improve adult attraction to the fish ladder and 24-in. conveyance pipeline. Improvements to the existing intake would include a better debris and fish screen;
- Addition of rock sluiceway where sand and silt would settle out of the river water before it flows into the acclimation ponds; and
- New juvenile Chinook acclimation pond to provide more space for rearing fish at acceptable densities.

Modifications to the intake structure will allow for an additional 11.3 cfs of river water (for a total of 20.3 cfs) to be diverted from the Imnaha River for acclimation of smolts and adult holding and collection during peak usage periods. Up to 100 gpm of ground water would be pumped from a new well for domestic use and use in the adult holding spray systems. Surface water is not proposed for the spray system due to the potential for fine sediments to clog the sprinkler heads.

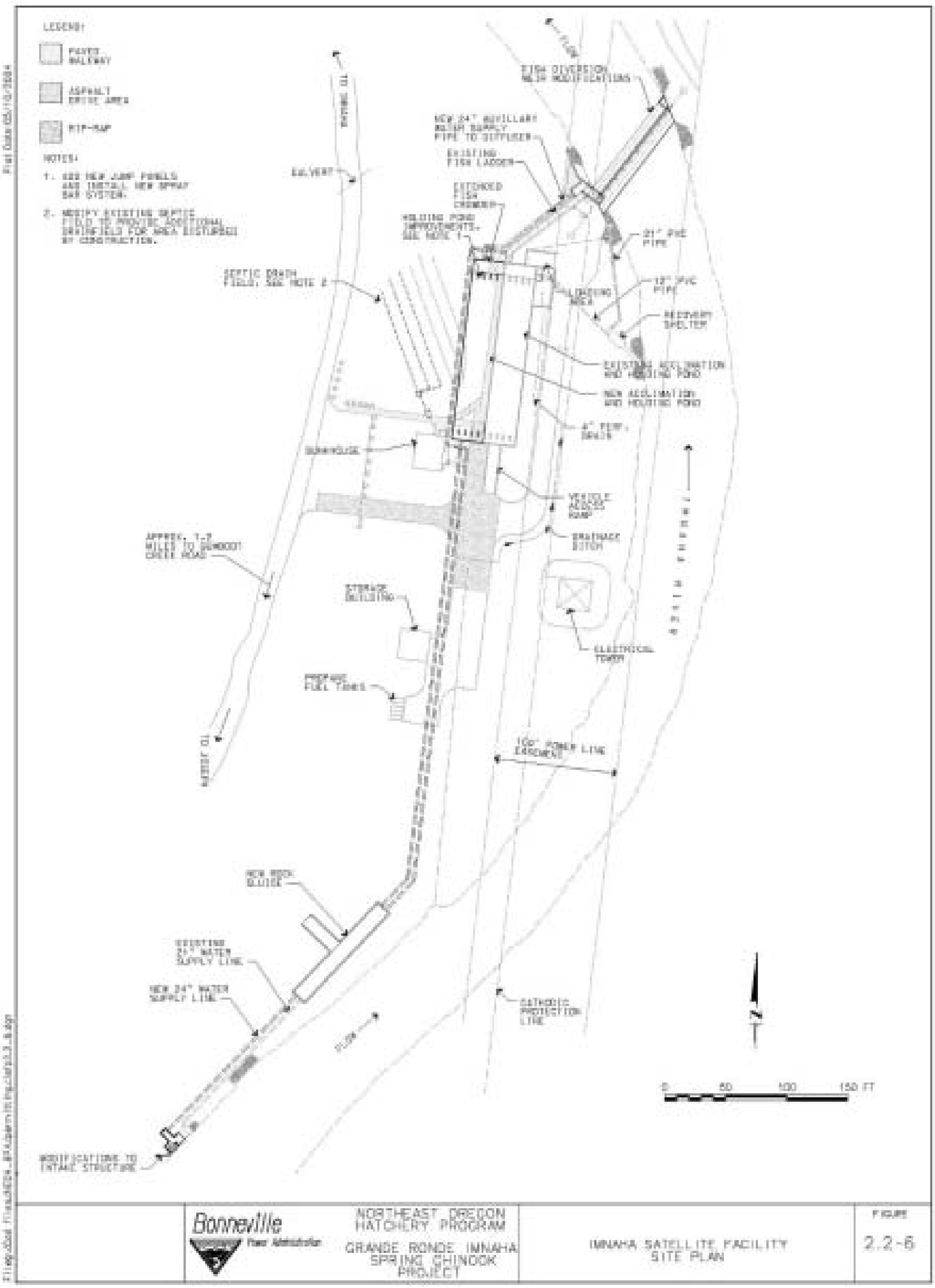


Figure 2.2-6. Imnaha Satellite Facility Existing and Proposed Site Plan.

Construction would occur from late April to early November due to the remote location and high snowfalls at the site. The new acclimation pond, sluiceway, modifications to the adult holding facility, and other miscellaneous site improvements would be constructed from June through November. All instream work would occur from July 15 to August 15, ODFW's recommended instream work window for the Imnaha. The existing acclimation facility would operate from March 15 through April 15; adult collection and spawning would occur from June through September. All construction activities would be planned to maintain facility operations during these periods. However, installation of the new hydraulically operated weir and the addition of the auxiliary pipe and diffuser box at the fish ladder entrance would require that migrating fish be temporarily trapped below the site for broodstock collection or for release above the site.

Modifications at the intake structure would occur immediately next to the existing intake. Construction would disturb approximately 30 ft by 30 ft of bed and bank upstream of the existing intake. About 100 cy of riprap would be used to stabilize the bank around the expanded intake. Impacts to riparian vegetation are not anticipated at this location because the existing intake area, which is disturbed and devoid of vegetation, appears to be large enough to accomplish the necessary improvements.

A new 24-in. water supply pipeline would be installed from the new intake to the hatchery facility. Approximately 650 ft of pipe would be buried next to the existing water supply pipeline beneath the existing gravel road.

A portable picket-style weir has been used to direct fish to the existing ladder. The picket style weir does not direct fish effectively to the ladder because the ladder entrance is too far downstream for fish to locate it easily. The poorly placed ladder entrance causes some fish to drop back downstream, where they may spawn. Picket installation during high flows is difficult and hazardous and a portion of the run can be missed when the weir cannot be installed. This can result in a broodstock shortage and a broodstock that does not represent the entire run-timing. Construction of the proposed weir would alleviate some of the collection difficulties of the existing weir. The new weir would require expanded concrete abutments on both sides of the river. Construction impacts would occur within the area of the existing weir and concrete sill.

An auxiliary water supply line at the fish ladder entrance would be installed to increase attraction to the fish ladder. Additional attraction water should alleviate most of the problems that fish currently have locating the ladder entrance.

Site development activities would add a small amount of new impervious surface to the site (0.12 acres). Temporary erosion and sedimentation would be managed through the use of runoff control devices such as silt fences and hay bales and other appropriate BMPs.

3. EXISTING ENVIRONMENTAL (BASELINE) CONDITIONS

3.1 Grande Ronde Subbasin

The Grande Ronde subbasin is located in the southwest portion of the Blue Mountains ecological province. At one time grasslands, dominated by bluebunch wheatgrass, sheep fescue and giant wild rye, occupied an extensive area in eastern Oregon. Many native grass communities in the Grande Ronde subbasin have been lost due to burning, over-grazing, mowing, plowing and irrigation (Nowak and Eddy 2001). Communities remaining include Idaho fescue-bluebunch wheatgrass (*Festuca idahoensis-Agropyron spicatum)* and bluebunch wheatgrass-Sandberg's bluegrass (*Agropyron spicatum-Poa sandbergii*). The Grande Ronde subbasin also includes a portion of the 146,000-acre Zumwalt Prairie, the largest Palouse prairie remaining in North America (Nowak and Eddy 2001).

As elevation increases in the subbasin, grasslands intermingle with shrub/scrub plants, eventually grading into coniferous forests in the Blue and Wallowa mountains (Nowak and Eddy 2001). Forest associations also change with increasing elevation, with low elevation ponderosa pine (*Pinus ponderosa*) associations grading into Douglas-fir (*Pseudotsuga menziesii*), grand fir, subalpine fir (*Abies lasiocarpa*), and mountain hemlock (*Tsuga mertensiana*) associations where conditions are appropriate (Nowak and Eddy 2001).

Special habitats within the project area include caves, cliffs, talus slopes, rock outcrops, wet meadows, scabs, and aspen stands. Although they may occur infrequently, these habitats play an important role in the enrichment of biological diversity. Many of these habitats are often fragile environments and little or nothing can be done to replace them (WWNF 2002a). Diverse wetland communities are found in various locations throughout the subbasin. These communities range from low elevation emergent wetlands to high elevation grass and sedge meadows, and riverine deciduous riparian communities dominated by black cottonwood and willows (*Salix* spp). Black hawthorn (*Crataegus douglasii*), mountain alder (*Alnus incana*), and Rocky Mountain maple (*Acer glabrum*) are also common in riparian areas and seeps (Nowak and Eddy 2001).

Numerous wildlife species reside or are seasonally present in the Grande Ronde subbasin. Wildlife species expected to occur in the subbasin are those associated with the primary habitat types present, including riparian areas; wetlands, seeps and springs; shrub and early seral habitats; shrub/deciduous forest types; and conifer forest typical of the Blue and Wallowa Mountains. Although some areas within the subbasin support relatively intact habitats, many areas have been seriously degraded as a result of development and agricultural conversion, especially within valleys (Nowak and Eddy 2001). The riparian habitats found at each of the proposed project sites provide important travel, dispersal, cover, resting, and foraging corridors.

The Grande Ronde River historically supported diverse and healthy runs of spring/summer Chinook. The race was widely distributed throughout the basin in at least twenty-one tributaries (Nowak and Eddy 2001). Escapement of naturally produced Chinook salmon to the Grande Ronde River was estimated at 12,200 fish in 1957 (ODFW et al. 1990). Redd counts indicate that large runs of spring/summer Chinook returned until the early 1970s (ODFW et al. 1990). Redd count surveys conducted by the ODFW, the NPT, the Confederated Tribes of the Umatilla Indian Reservation, and the USFS have documented a decline in escapement from historic levels. The overall downward trend experienced by this population indicates that the Grande Ronde spring/summer Chinook salmon stock, including the Lookingglass and Lostine stocks, is at risk of extirpation if no action is taken. However, returns from 2000-2002 have significantly increased from returns of the 1990s. This increase may be attributed to a variety of factors including ocean rearing conditions, juvenile emigration freshwater conditions, harvest management, and, potentially, habitat improvements, species protections and supplementation associated with existing programs. Recent redd count data is shown in Table 3.1-1.

Table 3.1-1. Number of spring/summer Chinook salmon redds observed in the Grande Ronde River Basin and tributaries, 1988-2002.

	Year														
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Redds Observed	969	227	296	198	558	688	149	80	306	301	253	180	502	868	884

Source: Nowak and Eddy (2001); Pat Keniry, ODFW, pers comm. 4/7/03

Two additional fish species of importance within the Grande Ronde subbasin are steelhead and bull trout; both are listed as threatened under the ESA. From 1988-2000, redd counts showed a steady decline in summer steelhead spawning in all reaches of the Grande Ronde River. Although historic bull trout abundance is unknown, most Grande Ronde bull trout populations are considered at “moderate risk of extinction” (Buchanan et al. 1997), although Lostine River populations are considered relatively healthy (B. Smith, ODFW, pers comm., 10/16/02). The majority of bull trout spawning and juvenile rearing takes place in the tributaries and headwaters areas of the subbasin where cooler temperatures support the species. A complete discussion of Chinook, steelhead and bull trout occurrence and trends follows in Section 4.2, Fish Species.

Grande Ronde Subbasin Watersheds

The Grande Ronde subbasin has sustained heavy impacts from grazing, residential and agricultural development, road construction and fire. The subbasin drains much of the extreme northeastern corner of Oregon and approximately 341 square miles (mi$^{2)}$ of southeastern Washington. The Grande Ronde River flows generally northeast 212 mi from its origin to join the Snake River at RM 169, about 20 mi upstream of Asotin, Washington. The subbasin is divided into three watershed areas: the Upper Grande Ronde, Lower Grande Ronde and the Wallowa watershed.

The Upper Grande Ronde watershed includes the Grande Ronde River and its tributaries, including Lookingglass Creek, from the headwaters to the confluence with the Wallowa River. Lookingglass Creek peak discharge typically occurs in late March through early June following snow melt, while base flows occur September through February (Table 3.1-2).

Table 3.1-2. Lookingglass Creek mean monthly streamflow (cfs) statistics near Lookingglass, Oregon U.S. Geological Survey (USGS) Gage No. 13324300, located near the outfall structure for Lookingglass Hatchery

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean Monthly Streamflows [1]	87.0	132	193	333	371	166	68.1	53.5	52.5	53.6	71.6	82.0

[1] Source: USGS Waterdata website (http://waterdata.usgs.gov/or/nwis); water years 1982-2002.

The Lostine River is located in the Wallowa watershed. It originates in the wilderness areas in the Wallowa Mountains. Its watershed covers an area of 92 square mi, 74 percent of which is in the WWNF. The river flows 25 mi in a northerly direction to its confluence with the Wallowa River, several mi north of the town of Lostine, Oregon. The Lostine River is listed on the 303d list for sedimentation, habitat modifications and flow modification (Nowak and Eddy 2001). As with Lookingglass Creek, Lostine River peak discharge typically occurs during a six-week period in May and June following snow melt (Table 3.1-3), and base flows occur from September to February.

Table 3.1-3. Lostine River mean monthly streamflow statistics (cfs) near Lostine, Oregon USGS Gage No. 13330000.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean Monthly Streamflows [1]	53.2	54.7	64.5	173.6	473.8	742.0	391.6	91.1	49.8	49.4	66.3	58.0

[1] Source: USGS Waterdata website (http://waterdata.usgs.gov/or/nwis); water years 1912-1915; 1925-2002.

Based on the close proximity of the gage stations to the proposed Lostine River facilities, it is estimated that flows at the facility locations are similar to those at the gage stations. The proposed Lostine Adult Collection Facility would be located approximately 2 mi north of the USGS gauging station at the Lostine Reservoir, south of the town of Lostine. The river channel is relatively narrow and incised in the area and does not serve as habitat for spawning salmonids. The proposed Lostine River Hatchery would be located approximately 2-3 mi south of the USGS gage station.

3.1.1 Lookingglass Hatchery

Section 19, Township 2N, Range 40E

The Lookingglass Hatchery is located on an approximately 11-acre site, two mi upstream of the confluence of Lookingglass Creek and the Grande Ronde River and approximately 16 mi north of Elgin, Oregon. The hatchery is situated on a small terrace within a relatively steep valley at approximately 2,565 ft in elevation. In the vicinity of the hatchery the creek is narrow and contains a moderate amount of riparian cover. Large boulders are found intermittently within the creek, creating pools and riffles, and stream course shifts. A deep pool occurs at the existing intake structure. Excellent spawning habitat for many salmonids occurs upstream of the hatchery (B. Lund, Lookingglass Hatchery Manager, pers comm., 7/17/02).

Surrounding, steeply sloping hills are locally dominated by grassy vegetation with scattered shrub thickets and intermittent tree cover. Remaining areas are forested with mixed conifer stands of Douglas-fir and ponderosa pine. Small areas of cliffs and talus slopes are present in the vicinity. Elk, deer, cougar, bear, eagles, osprey, bats and frogs have all been noted in the immediate project vicinity (B. Lund, Lookingglass Hatchery Manager, pers comm., 7/17/02).

No proposed, listed endangered or threatened, or candidate plant species were observed during the field survey. Wetlands at the site are limited to a narrow fringe at the ordinary high water mark (OHWM) of Lookingglass Creek. This riparian wetland fringe is dominated by willows, red-osier dogwood (*Cornus sericea*), reed canarygrass (*Phalaris arundinacea*), horsetail, small-fruited bulrush (*Scirpus microcarpus*) and spikerush (*Eleocharis* spp.). Further upslope, the riparian zone is characterized by a somewhat drier vegetation community, dominated by mock orange (*Philadelphus lewisii*), Rocky Mountain maple, mountain alder, ocean-spray (*Holodiscus* *discolor*), and mallow ninebark (*Physocarpus malvaceus*). Other prevalent plant species in the vegetation community found on-site are ponderosa pine, Douglas-fir, grand fir and western larch in the overstory. Blue elderberry (*Sambucus cerulea*), serviceberry (*Amelanchier alnifolia*), snowberry (*Symphoricarpos albus*), black hawthorn, and thimbleberry (*Rubus parviflorus*) are common in the shrub understory, while buckwheat (*Eriogonum* spp.), bracken fern (*Pteridium aquilinum*), yarrow (*Achillea millefolium*) and various native and introduced grasses and forbs characterize the herbaceous layer. Weedy, non-native species noted at the Lookingglass Hatchery site include diffuse knapweed (*Centaurea diffusa*), common mullein (*Verbascum thapsus*), sulfur cinquefoil (*Potentilla recta*), prickly lettuce (*Lactuca serriola*), St. John's-wort (*Hypericum perforatum*), and Canada thistle (*Cirsium arvense*), among numerous others.

3.1.2 Proposed Lostine Adult Collection Facility

Section 22, Township 1S, Range 43E

The proposed Lostine Adult Collection Facility is located in the lower Lostine River drainage, approximately one mi south of the town of Lostine on private land used as a trout farm and residence. Elevation at the site is approximately 3,470 ft. An existing fish ladder and irrigation diversion complex are located at this site. The fish ladder is comprised of five concrete sills that span the width of the river channel. The diversion is located on the east bank. This section of the Lostine River is relatively narrow and constricted. The river channel appears stable with an approximate 1 to 2 percent slope upstream and 3 to 4 percent slope downstream of the fish ladder. The channel is characterized by medium to large sized cobbles and serves as a migrational corridor for salmonids and potentially serves as a rearing and holding area for juvenile salmonids. Small seasonal side channels enter the creek on the left bank. These channels may provide rearing habitat for juvenile salmonids.

The site has moderate to heavy riparian vegetation cover. The riparian zone in this river reach is primarily characterized by deciduous species, with conifers dominant in some areas. The riparian vegetation communities throughout this area have been previously impacted by agriculture, irrigation withdrawals, livestock grazing, residential development, road construction and bank stabilization. The riverbanks and immediate upland areas contain a mix of open river rock and native vegetation. Two small outbuildings, a small gravel access area and trout holding ponds are located on the site in the vicinity of the proposed facility.

Dominant trees along the river margin include ponderosa pine, black cottonwood and quaking aspen. Numerous small channels, seeps, springs and ponds occur on the subject property. Some of the ponds are used as holding ponds for the trout farm. Although a formal wetland delineation has not been conducted, observations of plant community dominants and standing and flowing water in portions of the property indicate the presence of a wetland area on the west side of the river at this location. The wetland is dominated by willows with a diverse emergent (herbaceous) understory. Dominant plant species within the wetland areas include small-fruited bulrush, several sedges including sawbeak sedge (*Carex stipata*), rushes including dagger-leaf rush (*Juncus ensifolius*), forget-me-not (*Myosotis laxa*), monkey-flower (*Mimulus guttatus*), western Jacob's-ladder (*Polemonium occidentale*), and grasses such as meadow foxtail (*Alopecurus pratense*) and manna-grass (*Glyceria* spp.).

No proposed, listed endangered or threatened, or candidate plant species were observed during the field survey. Plants species dominant in the drier portions of the site, or along the river banks, include mountain alder, chokecherry (*Prunus virginiana*), water birch (*Betula* *occidentalis*), red-osier dogwood, virgin's-bower (*Clematis ligusticifolia*), wild rose (*Rosa* spp.), snowberry, blue elderberry, and spreading dogbane (*Apocynum androsaemifolium*). Common herbaceous species include star-flowered false solomon's seal (*Maianthemum stellatum*), stinging-nettle (*Urtica dioica*), orchard grass (*Dactylis glomerata*), reed canarygrass, timothy (*Phleum pratense*), fescue (*Festuca* spp.), and numerous other native and introduced grasses and forbs. The Nez Perce Biocontrol Center conducted a survey for invasive and non-native plant species at the Lostine River sites. Weedy, non-native species noted on the proposed adult collection facility site include Canada thistle, white campion (*Silene alba*), teasel (*Dipsacus fullonum*), cheatgrass (*Bromus tectorum*), hairy vetch (*Vicia cillosa*) and western salsify (*Tragopogon dubius*). Diffuse knapweed was noted adjacent to the site in low densities and common mullein was found throughout the area (Nez Perce Biocontrol Center 2001).

3.1.3 Proposed Lostine River Hatchery

Section 3, Township 2S, Range 43E

The proposed Lostine River Hatchery site is located on private land near the Lostine River Acres residential community on approximately 6 acres. The site is situated in the Lostine River drainage at approximately 3,700 ft in elevation. The Lostine River, located on the west side of the property, is wide with a gradient of approximately 1 percent and several braided channels. Dry side channels indicate the river currently tends to move towards the east. Quality gravels and cobbles that are conducive to Chinook spawning occur adjacent to and upstream from the proposed hatchery location. The substrate in the area of the proposed intake structure is characterized by fines, medium (6-10 in.) cobbles, and large (1-2 ft) boulders. There is limited overstory cover on the east bank while the west bank is relatively devoid of overhanging vegetation.

The braided channels provide conditions conducive to wide bands of riparian vegetation dispersed throughout the exposed cobble areas of the riverbed and banks. Woody debris from high flow events is scattered throughout the riverbed and side banks. Vegetation communities are slightly different at the intake site, primary hatchery facility location, outfall access road and structure, and production well sites. However, no proposed, listed endangered or threatened, or candidate plant species were observed at any of these sites during the field survey.

At the intake site, located approximately 0.5 RM upstream of the main hatchery site, the river is narrower, with a steeper gradient. Large boulders and associated pools are located near the intake site and cobbles/gravels suitable for spawning Chinook are located immediately downstream of the proposed intake site. The area is characterized by a mixed conifer community that includes ponderosa pine, Douglas-fir, and grand fir. The understory is fairly open and is vegetated by oceanspray, Rocky Mountain maple, western juniper (*Juniperus occidentalis*), serviceberry, mock orange, creeping Oregon grape (*Mahonia repens*), and huckleberry (*Vaccinium* spp.). Characteristic forbs and grasses include meadowrue (*Thalictrum occidentale*), star-flowered false solomon's seal, heartleaf arnica (*Arnica cordifolia*), nodding onion (*Allium cernuum*), yarrow, pine grass (*Calamgrostis rubescens*) and orchard grass. Weedy, invasive species identified at the intake site include salsify, dandelion (*Taraxacum officinale*), diffuse knapweed, prickly lettuce and cheatgrass.

The proposed hatchery site has been intensively grazed by horses in past years. Scattered groups of trees occur throughout this area. Trees that occur in the central portion of the site include grand fir, Englemann spruce, black cottonwood, and quaking aspen. Two aspen stands were noted at the proposed hatchery site. One is centrally located, just south and west of the proposed raceways. The other occurs adjacent to Granger Road immediately north of the proposed new residence. Other species commonly occurring in this area include snowberry, mock orange, yarrow, common mullein, salsify, prickly lettuce, dandelion, white campion, phacelia (*Phacelia heterophylla*), timothy, bromes (*Bromus* spp.) and other introduced grasses. Additional weed species noted on the proposed hatchery site include diffuse knapweed, cheatgrass, teasel and Canada thistle (Nez Perce Biocontrol Center 2001).

The outfall structure and associated access road are proposed in the least altered plant community within the project boundaries. This forested area is dominated by Englemann spruce, grand fir and black cottonwood. Mountain alder, Rocky Mountain maple, snowberry, gooseberry and currant (*Ribes* spp.), red-osier dogwood, blue elderberry, wild rose, and blackcap (*Rubus leucodermis*), cow parsnip (*Heracleum lanatum*), stinging nettle, large-leaved avens (*Geum macrophyllum*), bedstraw (*Galium* spp.) and lady fern (*Athyrium filix-femina*) are prevalent in the understory.

Wetland habitat at this site occurs in association with meanders and side channels of the Lostine River, and small ephemeral and perennial streams feeding the mainstem river. A wetland plant community occurs at the proposed outfall side channel location, dominated by mountain alder, water birch, and red-osier dogwoods in the overstory, and manna-grass, sawbeak sedge, monkey flower, lady fern, horsetail, forget-me-not, and white bog orchid (*Habenaria dilatata*) in the understory. The production wells also occur in generally wet plant communities in close proximity to the mainstem river. A small feeder stream occurs at the primary production well location. The plant community here is dominated by grand fir, Englemann spruce, mountain alder, hawthorn and water birch in the overstory, with lady fern, horsetail, and cow parsnip in the understory. The plant communities at the other two well sites have a larger weedy component, especially the north well location.

3.2 Imnaha River Subbasin

The Imnaha subbasin contains vast expanses of relatively unaltered land. The uppermost part of the subbasin is above the tree line and contains alpine communities (Bryson et al. 2001). Below the tree line, the watershed contains a mixture of subalpine communities that grade into forested and grassland stands at lower elevations. Most forested habitats in the subbasin are classified as northeastern Oregon mixed conifer forests (Bryson et al. 2001). Forested communities are more predominant in upstream and eastern portions of the subbasin, whereas grassland communities are more predominant in downstream and western portions of the subbasin (Bryson et al. 2001).

Forested communities cover approximately 42 percent of the subbasin, mostly in the upper elevations (Bryson et al. 2001). At high elevations, subalpine fir, lodgepole pine (*Pinus contorta*), and Engelmann spruce dominate forested stands (Bryson et al. 2001; WWNF 1998). These high elevation forest communities are found in the headwater areas at the southern end of the subbasin and along parts of the eastern boundary of the subbasin. Grand fir, Douglas-fir, and ponderosa pine dominate low elevation forest communities (WWNF 1998). Ponderosa pine communities in the subbasin are most common on warm, low elevation sites where they often grade into grassland communities (Bryson et al. 2001).

Grasslands cover approximately 43 percent of the subbasin (Bryson et al. 2001). Most high elevation grasslands in the subbasin belong to the green fescue-Hood's sedge (*Festuca* *viridula/Carex hoodii*) association. These grassland communities occur in the headwaters region of the subbasin (Bryson et al. 2001). Grasslands at lower elevations belong to a variety of bunchgrass associations with dominants including bluebunch wheatgrass, Idaho fescue, Sandberg's bluegrass, and Kentucky bluegrass (*Poa pratensis*) (Bryson et al. 2001). These grasslands belong to the northeastern Oregon canyon grasslands vegetation type. They are found along the steep canyons of the subbasin and generally throughout the northern and western sections of the subbasin (Bryson et al. 2001).

Most wetland habitats in the subbasin are riparian wetlands along streams. Common plants within these riparian communities include willows, hawthorn (*Crataegus columbiana*), alder, Rocky Mountain maple, cottonwood and scattered ponderosa pine, sedges, and horsetail (*Equisetum* spp.). The quality and quantity of wetland habitat compared to historical ranges has been altered in parts of the subbasin by grazing, road construction, and timber harvest (Bryson et al. 2001).

A list of wildlife species developed by the USFS and others indicates that the Imnaha subbasin is inhabited by approximately 12 amphibian species, 19 reptile species, 239 bird species, and 69 mammal species (Bryson et al. 2001; WWNF 1998). Some of these species, including many of the birds, only reside in the area during their migration. Although there are exceptions, most of the wildlife species of the Imnaha subbasin are thought to have healthy and stable populations (Bryson et al. 2001). The overall rugged nature of the watershed and the juxtaposition of steep and flat topography result in fairly limited and defined travel corridors for many wildlife species (WWNF 1998). Benches, plateaus, and major drainages provide the primary travel corridors. Although trails provide access, benches within the subbasin are generally devoid of roads so human use is relatively low (WWNF 1998).

The Imnaha River subbasin once supported healthy runs of spring/summer Chinook salmon as an estimated 6,700 adults returned to the subbasin annually (U.S. Army Corps of Engineers [USACE] 1975). Returns to the Imnaha River subbasin have declined dramatically during the past three decades. The highest recorded escapement of spring/summer Chinook salmon to the Imnaha River was estimated at 3,459 adults in 1957; but in the late 1990s, returns of natural origin fish had declined to levels below 150 individuals (ODFW 1998). However, recent redd counts have shown an increase in spawners (see Table 3.2-1). This increase may be attributed to a variety of factors including ocean rearing conditions, juvenile emigration freshwater conditions, harvest management, and, potentially, habitat improvements, species protections and supplementation associated with existing programs. Redd counts in the Imnaha River from 1964-2003 are shown in Table 3.2-1.

Table 3.2-1. Estimate of total spring/summer Chinook salmon redds in the Imnaha River Subbasin, 1964 to 2003[1,2,3].

Year	Redd Count	Year	Redd Count	Year	Redd Count
1964	496	1977	241	1990	54
1965	391	1978	715	1991	99
1966	561	1979	85	1992	118
1967	447	1980	66	1993	384
1968	507	1981	162	1994	36
1969	556	1982	225	1995	32
1970	474	1983	178	1996	125
1971	738	1984	506	1997	216
1972	626	1985	245	1998	146
1973	909	1986	207	1999	119
1974	464	1987	156	2000	261
1975	281	1988	208	2001	635
1976	280	1989	74	2002	1111
				2003	727

[1]Source: Williams et al. 1998
[2]Source: Pat Keniry, ODFW, unpublished data (pers comm., 4/7/03)
[3]Source: Jim Harbeck, NPT, unpublished data (pers comm., 5/20/04)

As with the Grande Ronde subbasin, both steelhead and bull trout are found within the Imnaha subbasin. Steady declines in redd counts and individual abundance have been recorded for steelhead within the Imnaha River (NPT 2001). The bull trout population within the Imnaha River is considered one of the healthiest in northeast Oregon (B. Smith, ODFW, pers comm., 10/16/02). A complete discussion of listed species occurrence and population estimates is provided Section 4.2, Fish Species.

Imnaha River peak discharge typically occurs during a six-week period in May and June following snowmelt, and base flows occur from September to February. The historic Gumboot Creek gage was used for monthly flows at the Imnaha Satellite Facility (Table 3.2-2).

Table 3.2-2. Imnaha River mean monthly streamflow (cfs) above Gumboot Creek, Oregon. USGS Gage No. 13291000

	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov
Mean monthly streamflows [1]	92.0	341.0	804.0	859.0	453.0	150.0	87.1	82.6	84.4

[1] Source: USGS Waterdata website (http://waterdata.usgs.gov/or/nwis); gage located above Gumboot Creek, upstream of facility; water years 1944-1953

Specific site descriptions for the existing Imnaha Satellite Facility and for the Acrow bridge removal site at Marks Ranch are presented below.

3.2.1 Acrow Bridge Site at Marks Ranch

Section ~11, Township 1S, Range 48E

An Acrow panel bridge provides access to a site (Marks Ranch) that was formerly proposed as part of the NEOH project. The bridge provides access from the Imnaha River Road (gravel), which follows the east riverbank. This bridge is proposed to be removed and used to replace the existing bridge at the Lostine Adult Collection Facility location.

The Marks Ranch site is located within the lower Imnaha subbasin (~RM 26), at an elevation of approximately 1,995 ft. The adjacent upland site topography is relatively flat and the river channel at this location is well-defined. In the vicinity of the bridge, the aquatic environment is characterized by riffles with small and medium cobble. Within the immediate vicinity of the bridge, no proposed, listed endangered or threatened, or candidate plant species were observed during the field survey.

A narrow fringe of riparian vegetation is found along the river corridor. Common species in this area include water birch, black cottonwood, willows, hawthorn, mountain alder, wild rose, snowberry, common mullein, horsetail and white campion. Ponderosa pine and black cottonwood are the primary overstory species found on the east side of the river. Vegetation along the abandoned irrigation ditch that occurs along the southwest slope of the site is similar in nature to the riparian vegetation common throughout the area. Dominant woody species include water birch, hawthorn, red-osier dogwood, mock orange, mallow ninebark, rose, chokecherry and plum (*Prunus* spp.). No significant springs, seeps or wetland areas were noted in the project area, except for the very narrow perimeter of the river channel.

3.2.2 Imnaha Satellite Facility

Section 30, Township 4S, Range 48E

The existing Imnaha Satellite Facility (circa 1988) is on approximately 4 acres of USFS land in the upper Imnaha subbasin (~ RM 46). The site is bounded by the Imnaha River and USFS road 3955 and is situated at an elevation of approximately 3,760 ft. Adjacent to the Imnaha Satellite Facility, the river is relatively narrow and not steeply graded. Small to large cobbles and gravels occur within the existing diversion reach from the intake to the outfall structure. This reach is relatively shallow and provides quality habitat for spawning and juvenile rearing. The existing intake structure is subject to heavy bedloading as materials pile up during runoff and storm events.

The entire site and all areas within 300 ft. of the river are included in a USFS-designated RHCA. The site contains the existing hatchery facility, maintained lawns, and small areas of native, riparian vegetation. The subject property is characterized as a landscaped and maintained administrative site. The only area on-site area having wetland characteristics is the narrow fringe at the river’s edge. No significant springs, seeps or other wetland types were noted within the project boundaries. No proposed, listed endangered or threatened, or candidate plant species were observed during the field survey.

The central portion of the site is comprised of maintained lawns with approximately seven planted conifers, including ponderosa pine, Douglas-fir, and lodgepole pine. Areas of more typical forest vegetation occur north of the existing fish ladder and south of the existing intake structure. The plant community north of the fish ladder is characterized by Douglas-fir, grand fir, mountain maple, snowberry, thimbleberry, serviceberry, blackcap, currant, horsetail, trillium (*Trillium ovatum*), star-flowered false solomon’s seal, twisted stalk (*Streptopus amplexifolius*), queen’s cup (*Clintonia uniflora*), mountain sweet-cicely, heartleaf arnica and violet (*Viola* spp.). The area south of the existing intake structure maintains a relatively typical mixed conifer forest and riparian zone. Dominant species in this vicinity include grand fir, black hawthorn, mountain alder, red-osier dogwood, snowberry, serviceberry, creeping Oregon grape, horsetail, redstem ceanothus (*Ceanothus sanguineus*), pine grass and pinedrops (*Pterospora andromedea*). Vegetation immediately surrounding the existing intake is comprised of non-native weedy species, including black medic, prickly lettuce, common bugloss, and clovers.

Non-native weeds found during a weed survey included sulfur cinquefoil, common bugloss, prickly lettuce, common mullein and white campion (Nez Perce Biocontrol Center 2001). St. John's-wort and bull thistle were also found in areas adjacent to the facility. Weed control methods are currently being implemented at the existing hatchery facility, including hand-pulling and mowing to keep weed seed production to a minimum (Nez Perce Biocontrol Center 2001).

4. SPECIES OCCURRENCE AND POTENTIAL IMPACTS

4.1 Terrestrial Species

4.1.1 Canada Lynx Occurrence

The Canada lynx (*Lynx canadensis*) was federally listed as threatened in the coterminous 48 states in 2000 (USFWS 2000a). No critical habitat has been designated for the threatened population of Canada lynx in the contiguous United States. Although designation of critical habitat has been determined to be prudent, it has been deferred in favor of other higher priority work by the USFWS (USFWS 2000b).

The range of the Canada lynx is determined by the location and extent of boreal forest habitat (USFWS 2000a), but extends from the classic boreal forest zone south into the boreal/hardwood forest ecotone in the eastern United States and the subalpine forest of the western United States. In the west, the majority of lynx occurrences are generally associated with moist Douglas-fir and western spruce/fir forests between 4,920 and 6,560 ft in elevation (USFWS 2000a). These habitats are found in the Rocky Mountains of Montana, Idaho, eastern Washington, and Utah; and the Wallowa Mountains, Blue Mountains and Cascade Mountains of Washington and Oregon. In the southern portion of the range in the contiguous United States, lynx populations appear to be naturally limited by the availability of snowshoe hares, as suggested by large home range size, high kitten mortality due to starvation, and greater reliance on alternate prey (Ruediger et al. 2000).

Lynx are historically known from nine counties in Oregon. However, some of these records are likely to have been dispersing transient individuals based on the time frames when collected and locations in atypical habitat (USFWS 2000a). Lynx have probably occurred intermittently in Oregon. The historic or current presence of a resident lynx population in Oregon cannot be substantiated from available data (USFWS 2000a). Primary lynx habitat on the WWNF generally occurs within subalpine fir and lodgepole pine plant associations, while secondary habitat consists of cool, moist grand fir plant associations (WWNF 2001a). Lynx habitat on the WWNF is further defined by areas that maintain an average snow depth greater than 24-inches. This criterion is generally met at 4,500 to 5,000 ft in elevation (WWNF 2001a). In addition, the primary lynx prey (snowshoe hare) does not inhabit lower elevations in sufficient numbers (WWNF 2001a). Core lynx habitat and lynx travel corridors mapped by the WWNF in the Grande Ronde and Imnaha subbasins are illustrated in Figure 4.1-1. Lynx habitat on the WWNF was identified using the criteria in the Lynx Conservation Assessment and Strategy document (Ruediger et al. 2000), the Forest's geographic information systems (GIS) vegetative database, and site-specific knowledge of USFS personnel (WWNF 2001a).

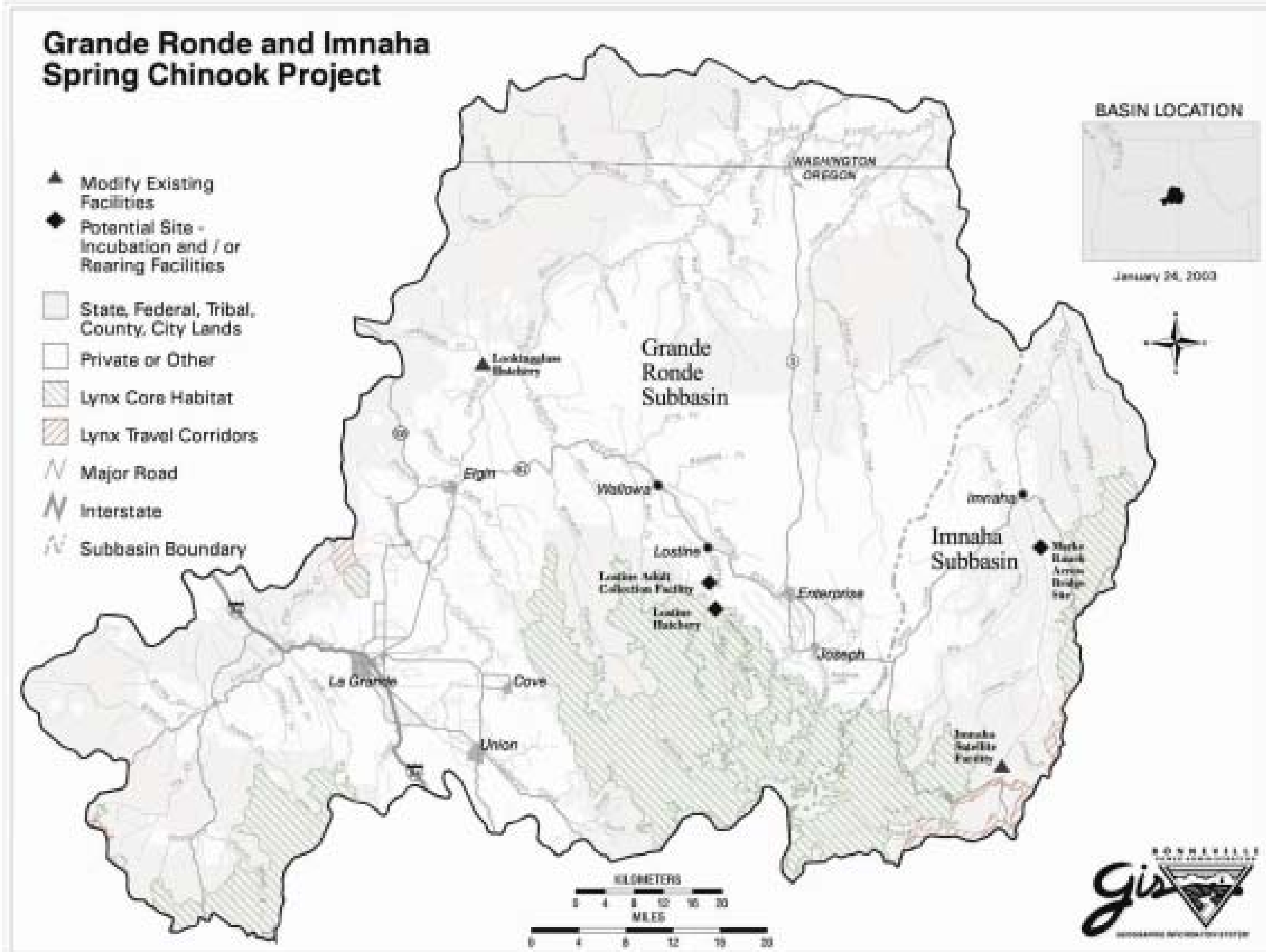


Figure 4.1-1. Core Lynx Habitat & Travel Corridors in the Grande Ronde & Imnaha Subbasins.

The lynx is a medium-sized cat with long legs; large, well-furred paws; long tufts on the ears; and a short, black-tipped tail. The lynx's long legs and large feet make it highly adapted for hunting in deep snow (USFWS 2000a). Snowshoe hares are the primary prey of lynx, comprising between 35 and 97 percent of the diet throughout the range of the lynx (USFWS 2000b). Other prey species include red squirrel, grouse, flying squirrel, ground squirrel, porcupine, beaver, mice, voles, shrews, fish, and ungulates as carrion or occasionally as prey. Southern populations of lynx may prey on a wider diversity of species than northern populations as a result of lower average hare densities and differences in small mammal communities (Ruediger et al. 2000; Ruggiero et al. 1999, 1994; USFWS 2000b). In areas characterized by patchy distribution of lynx habitat, lynx may prey opportunistically on other species that occur in adjacent habitats, potentially including white-tailed jackrabbit, black-tailed jackrabbit, sage grouse, and Columbian sharp-tailed grouse (USFWS 2000b).

The size of lynx home ranges varies by the animal's gender, abundance of prey, season, and the density of lynx populations. However, home ranges at the southern extent of the species' range are generally large compared to those in the northern portion of the range in Canada (Ruggiero et al. 1999). Lynx have been observed (via snow tracking) to avoid large openings during daily movements within the home range (Ruggiero et al. 1999; USFWS 2000b). Lynx populations are known to be subject to boom and bust cycles, corresponding with fluctuations in snowshoe hare populations. When prey is abundant lynx may wander hundreds of mi to establish new populations. Records of lynx trapped or killed have occurred in places as far away as north-central Utah and northern Nevada. These records probably indicate wandering males and not self-sustaining populations. Because lynx tend to be found in areas that have remained relatively free of human encroachment, they, along with the wolverine, marten and fisher, are being used as indicators of ecosystem diversity and overall health.

Lynx require stands with structural diversity and large woody debris for denning, and connectivity to early seral foraging areas. Primary denning areas include large hollow logs, windfall or upturned roots, or brush piles in dense thickets (WWNF 1998). The age of the forest stand does not appear to be as important for denning habitat as the amount of downed, woody debris available (USFWS 2000b), and early successional forests may be utilized where windthrow and snags are present (Ruggiero et al. 1999). An understory structure that provides security and thermal cover for kittens appears to be the critical habitat component for maternal den sites (Ruggiero et al. 1999). Denning habitat must also occur in or near foraging habitat to be functional. Breeding occurs in late March to early April with young born in late May or early June in the north (USFWS 2000b).

Lynx records available for the WWNF are presented in Table 4.1-1. Reported sightings are not confirmed evidence of lynx presence, as they can be difficult to distinguish from bobcats when sighted at a distance (WWNF 2001a). Hair-snag surveys for Canada lynx were conducted in the Grande Ronde subbasin in 1999 and 2000. The WWNF conducted a lynx survey in the summer of 1999, using the lynx hair pad techniques from the National Forest and Weaver methods. Animal hair was collected from 38 of 224 hair pads that were placed across the WWNF (WWNF 2001a). None of the collected hairs were determined to be lynx. Surveys using the USFWS method were completed on the Wallowa Mountain zone from September through October, 1999-2001. Sampling was conducted in the Lostine subbasin as part of this survey. Results from these surveys did not document lynx use of this area or other areas on the forest (WWNF 2002a). In addition, snow track surveys conducted between 1991-1994 in the Lostine subbasin failed to detect lynx (WWNF 2002a). The ONHP, however, reports a lynx trapping event in 1970 and 1971 within approximately one mi of the proposed Lostine River Hatchery intake location (ONHP 2001; 2002).

Table 4.1-1. Available lynx records for the WWNF[1].

Year	Lynx Evidence	General Location
1909-1922	81 Lynx bounties paid	Union County
1901-1953	17 Lynx bounties paid	Wallowa County
1920	Trapped and confirmed	Minam River
1927	Trapped and confirmed	Minam River
1927	Trapped and confirmed	Town of Granite
1964	Shot and confirmed	Imnaha River
1990	Sighting	Tipton Summit
1991	Sighting	Grande Ronde River
1991	Sighting	Thomason Meadows
1992	Sighting	Thomason Meadows
1992	Sighting	Halfway
1992	Tracks	Bourne
1993	Sighting	La Grande Watershed
1993	Sighting	Hat Point
1997	Sighting	Tollgate
1998	Sighting	Wolf & Anthony Creeks
2000	Sighting	Tollgate area

[1] Source: WWNF (2001a)

The lynx was historically found within the Imnaha subbasin, although populations probably always occurred at a low density as this area is on the fringe of the lynx range (WWNF 1998). Two occurrences of lynx have been reported to the ONHP in the Imnaha subbasin (Bryson et al. 2001). However, no lynx reports have been confirmed for many years and winter track counts and timber sale surveys conducted by the USFS found no evidence of lynx in the subbasin (WWNF 1998). Suitable lynx habitat, comprised of a forested mosaic that contains old forest habitat with denning sites and connectivity to early seral habitat with an adequate prey base, does occur in the basin (Bryson et al. 2001). Mapped primary and secondary lynx habitat is located within approximately one to two air mi of the Imnaha River sites. The Hells Canyon National Recreation Area (HCNRA) is believed to contain only marginal habitat for lynx, due to its low elevation and naturally fragmented habitats (WWNF 1998). However, the HCNRA could potentially serve as travel corridor habitat between the Wallowas and the Rocky Mountains in Idaho. Retention of cover on ridges, saddles, and riparian areas is important in site-specific project planning to maintain suitable travel corridors.

Potential Canada Lynx Impacts

All of the proposed project sites are well below the 4,500 ft elevation generally thought of as the minimum for providing suitable lynx habitat. Lynx habitat, characterized as large tracts of densely stocked, mixed conifer forest with large numbers of downed logs for den sites, is absent from the Lookingglass Hatchery, the Lostine Adult Collection Facility and the Acrow Bridge-

Marks Ranch sites. However, due to their location along riparian corridors they may potentially serve as dispersal habitat. Of the project locations, the Lostine River Hatchery site and the Imnaha Satellite Facility are the most likely to provide lynx habitat components as they are nearer to the 4,500 ft minimum elevation and are within closer proximity to relatively undisturbed, large forested stands. The Lostine River Hatchery site is in close proximity to core lynx habitat, while the Imnaha Satellite Facility is near an identified lynx travel corridor. Please refer to Figure 4.1-1.

The Lostine River Hatchery site is located within a developed residential area, is well below 4,500 ft in elevation and is not likely to provide primary lynx habitat. Denning is not likely to occur in the immediate vicinity based on the existing level of human presence and use resulting from roads, surrounding residential development, and agriculture in the vicinity. The Lostine River subbasin provides a large amount of "security areas," since approximately 49 percent of the watershed is protected as wilderness (WWNF 2002a). The Eagle Cap Wilderness area boundary is less than ½ mi from the proposed hatchery site and this area is believed to provide fairly good potential lynx habitat (WWNF 1998). However, displacement of individuals is not likely to occur as a result of the proposed project, as ample adequate habitat is present in the nearby protected area.

The Imnaha Satellite Facility is currently developed as a hatchery and proposed improvements would not expand the existing developed area or substantially increase the level of human disturbance activities over existing conditions. Although operation and maintenance activities at the site may prevent lynx from using surrounding habitats, hatchery operations are most prevalent during daylight hours when lynx are less active. Anecdotal reports indicate that lynx are not necessarily displaced by moderate levels of human activity such as those associated with snowmobile traffic and ski area activities (Ruediger et al. 2000). Denning is not likely to occur in the immediate vicinity based on the existing level of disturbance at the Satellite Facility, the existing roadway corridor, and the lack of suitable primary habitat at this location. The Satellite Facility is closed for operation from October to end of February. The area would be available for potential lynx use during these winter months, but since the facility would not operate in winter months, operations would not affect lynx.

Indirect effects resulting from noise disturbance would be restricted to the localized vicinity of each site and existing travel corridors. In the case of the Imnaha Satellite Facility, these noise disturbances are existing. Travel along existing roads that move through lynx habitat has also been consulted on (W. Weatherford, North Zone Wildlife Biologist, USFS, pers comm., 7/19/02).

Effect Determination
Based on the information above, the proposed project will have no effect on Canada lynx.

4.1.2 Bald Eagle Occurrence

The bald eagle (*Haliaeetus leucocephalus*) was listed as endangered in the lower 48 states (except in Michigan, Minnesota, Oregon, Washington and Wisconsin where it was designated as threatened) on February 14, 1978. Their status was downlisted to threatened throughout its range in the conterminous United States on July 12, 1995 (USFWS 1997). On July 6, 1999, the

USFWS proposed to delist the bald eagle (USFWS 1999a). A final determination on the proposal has not been made to date. Delisting, if determined to be appropriate, would occur in conjunction with a minimum 5-year monitoring period to ensure recovery goals continue to be met and that relisting is not warranted.

Breeding populations of bald eagles are present in Washington, Oregon and Idaho. According to recent surveys, bald eagle populations are recovering since the banning of certain pesticides and the listing. Regional and statewide recovery goals for nesting bald eagles were met in 1992 and have continued to be met since then (WWNF 2002b). Within the WWNF, bald eagles can occur throughout the year as both wintering and nesting populations.

Wintering areas are defined as sites where five or more eagles have been documented present during winter (USFWS 1997). The wintering period for bald eagles is from November 1 to March 1. Wintering populations tend to congregate around food sources such as spawning salmon or large concentrations of waterfowl. Eagles require perch trees for day use. Wintering eagles may roost communally at night near major foraging areas, and roost trees may be used in successive years (Idaho State University 2002). Night roosts are selected in uneven-aged, multi-layered forests to provide protection from weather, and are typically in stands having trees of larger diameter (older) than those trees typical of the surrounding area (ODFW 1996; Rodrick and Milner 1991). Roost trees in the Grande Ronde subbasin are primarily cottonwoods in agricultural areas or large conifers in forested areas and near ponds and lakes. Loss and degradation of deciduous riparian habitats may severely limit opportunities for roosting and nesting by bald eagles in the Grande Ronde subbasin (Nowak and Eddy 2001). Eagles can become highly stressed during the winter as food becomes scarce, and adverse climatic conditions result in increased energy demands. Human activities can add an additional stress when it disrupts feeding eagles or causes them to expend energy avoiding humans (Stalmaster and Newman 1978).

Habitat of the bald eagle can vary from range to range, but generally nesting birds are found in mature, forest ecosystems where there are streams, open water, and abundant fish species. In northeast Oregon, nesting territories are adjacent to either reservoirs or large rivers (WWNF 2002a). Nesting bald eagles begin courtship and nest building activities in January and occupy a site until the young are fully fledged in mid-August. Nest trees are chosen for location and structure. The nests must be sufficiently close to water and reliable food sources. Nest trees are usually a dominant or co-dominant in the overstory and may have a broken or dead top with a limb structure to support the nest. Nests are typically within 20 ft of the top of the tree, where stout branches create flight windows for the bird's large wingspan. A nesting territory may contain more than one nest, and is also likely to have additional snags and trees with exposed lateral limbs or dead tops that are used as perches, roosts, and defense stations (Rodrick and Milner 1991).

The USFWS listing notes the potential presence of bald eagles within the project vicinity (Appendix A). Bald eagles are primarily present in the Grande Ronde subbasin during the winter, although nests have been documented in both Union and Wallowa Counties (Nowak and Eddy 2001). In 1999, there were three active and successful nests in Wallowa County (WWNF 2002b). There are documented bald eagle winter roosts or nest sites along the Wallowa River, more than five mi from the proposed Lostine River facilities (WWNF 2002a). In addition, the

ONHP notes the presence of a winter roost site on the Lostine River, within one mi of the proposed Lostine Hatchery site, where up to nine eagles were observed in 1990 (ONHP 2002). Bald eagles are likely to forage or roost along the entire Lostine River corridor, and may utilize the trout holding ponds at the proposed Lostine Adult Collection Facility site as a foraging area. However, no bald eagle nest sites are known to occur in the vicinity of any of the proposed project sites in the Lostine subbasin (ONHP 2002; W. Weatherford, North Zone Wildlife Biologist, USFS, pers comm., 7/16/02).

Annual monitoring for bald eagles has occurred on the WWNF since 1979. Primary use is along the Snake River corridor, where bald eagle winter roosts and nest sites are documented (WWNF 2002b). Winter counts along the Snake River and Hells Canyon Reservoir revealed three bald eagles in 1989 to 16 individuals in 1994 (WWNF 1998), with the general trend continuing to increase. However, there are no known bald eagle nest sites or communal winter roost sites within the Imnaha subbasin (ONHP 2002; W. Weatherford, North Zone Wildlife Biologist, USFS, pers comm., 7/16/02; WWNF 1998).

Potential Bald Eagle Impacts

Proposed improvements at the Lookingglass Hatchery would not result in direct impacts to the riparian zone or other native habitats. Construction activities would occur outside of the bald eagle wintering period, so disturbance to any wintering eagles potentially using the area for foraging would be avoided. No bald eagle nesting territories have been documented in the vicinity of the site (ONHP 2002).

At the Lostine Adult Collection Facility, jackhammer use and subsequent equipment operation would produce noise that is likely to disturb wildlife within a mi of the site. The high noise level activities are most likely to occur in July, during the instream work window. Noise impacts to wintering bald eagles that may use the area for foraging would be avoided by this construction timing, and no nesting territories are documented near the site. Removal of large, dominant trees (black cottonwood and ponderosa pine) may limit opportunities for bald eagle roosting in the immediate vicinity. Removal of potential perch trees would occur on both sides of the river, including along 300 ft of the west bank and about 20-50 ft of the east bank. However, the majority of existing canopy trees would remain in place on the east bank.

Operation of construction equipment at the proposed Lostine River Hatchery site would produce noise levels that are likely to disturb any wintering bald eagles potentially foraging within this section of the river. Temporary displacement of some individuals may occur. Construction of main buildings would occur between September and January. However, foundation and exterior work would occur early on and quieter interior work would be completed later during the bald eagle wintering period. Noise impacts to wintering bald eagles that may utilize the area would be minimized by this construction phasing, and no nesting territories are documented near the site. Operational noise from the compressor unit at the intake location will be minimized by placing the compressor within a building. The compressor will activate periodically throughout the day (maximum cycles estimated at 6-8 per day) but the unit is small and will be well muffled inside the building. Disturbance from noise at the intake location is not anticipated.

Removal of trees at the Lostine River Hatchery site is not anticipated to adversely affect bald eagle roosting, as the majority of tree removal would be conducted away from the mainstem river channel where perching is most likely to occur. At the intake location removal of 1-2 large trees adjacent to the river may be required. This would reduce perch habitat, but trees of similar size are present immediately adjacent to area where trees would be removed.

During dismantling of the existing Acrow panel bridge at the Marks Ranch site high, increased noise levels would result from concrete saw cutting to dismantle the old bridge abutments. The highest noise level activities would primarily occur during one week between July 15 and August 15, during the instream work window. Noise impacts to wintering bald eagles that may use the area for transient foraging would be avoided by this timing, and no winter roosting or nesting territories are documented near the site. Additionally, it is anticipated that the saw cutting activities will require no more than one day to complete.

No winter roosting or nesting territories have been documented in the vicinity of the Imnaha Satellite Facility. Any use of the area by bald eagles would most likely consist of transient foraging individuals during the wintering period. Construction at this site would occur from late April to early November, with the majority of work being conducted between June and August. This construction-timing window avoids the majority of the bald eagle wintering period.

Effect Determination
The proposed project may affect, but is not likely to adversely affect, bald eagles, based primarily on the amount of potential disturbance and habitat alteration (tree removal) at the Lostine River sites.

4.1.3 Yellow-billed Cuckoo Occurrence

The yellow-billed cuckoo (*Coccyzus americanus*) western continental U.S. DPS has been identified as a candidate for listing by the USFWS (2001b). The yellow-billed cuckoo is a long, slender bird with a gray-brown back and white underparts. The primary wing feathers, which are most noticeable in flight, are red-brown. This bird has a long, black tail with large white spots at the tips of the undertail feathers. Its name results from the yellow lower mandible on the slightly curved bill.

The yellow-billed cuckoo breeds from interior California, east to northern Utah, Minnesota, and New Brunswick, and south to southern Baja California, Mexico, and Gulf Coast (Idaho State University 2002). While the yellow-billed cuckoo is still relatively common east of the Rocky Mountains, it is estimated that more than 90 percent of the bird's riparian habitat in the west has been lost or degraded (USFWS 2001b). In Oregon, this species formerly utilized riparian forests along the Columbia River as far west as Sauvie Island near Portland for breeding (Csuti et al. 2001). Yellow-billed cuckoos arrive in eastern Oregon in mid-May, where they breed and nest before leaving for wintering grounds by the end of September (Csuti et al. 2001). Yellow-billed cuckoos build untidy nests in trees or shrubs, but occasionally use nests of other species. The female incubates 2-6 eggs (commonly 3-5) for about 14 days, and both parents tend the young (Idaho State University 2002). Yellow-billed cuckoos winter in southern Central America and South America (Idaho State University 2002).

Yellow-billed cuckoos are generally found in open woodlands, especially where undergrowth is thick, and in parks, and deciduous riparian woodlands (Idaho State University 2002). Along the rivers of eastern Oregon, they are typically associated with riparian forests composed of black cottonwood and willows. They typically nest in willows, but are reported to feed among black cottonwoods (Csuti et al. 2001). Yellow-billed cuckoos feed mainly on caterpillars, but will also eat other insects, some fruits, and occasionally small lizards and frogs (Idaho State University 2002).

No regularly occupied breeding locations have been documented for the yellow-billed cuckoo within Oregon (Csuti et al. 2001). However, potential breeding habitat occurs for the yellow-billed cuckoo on private lands within the Lostine subbasin (WWNF 2002a). Portions of the Imnaha subbasin with relatively unaltered riparian habitat are also likely to provide potentially suitable breeding habitat for this species. At the existing location of the Acrow bridge at Marks Ranch, riparian vegetation has been greatly altered, and is not likely to provide suitable habitat for the yellow-billed cuckoo. The Imnaha Satellite Facility is located in a portion of the subbasin where riparian communities are dominated by mixed coniferous forest typical in mid- to low elevations of the basin, rather than the deciduous forested riparian communities preferred by the cuckoo. As such, this site is unlikely to provide suitable yellow-billed cuckoo habitat.

Potential Yellow-billed Cuckoo Impacts
The forested riparian communities in the project area, especially at the Lostine Adult Collection Facility site and the Lostine River Hatchery site, provide potentially suitable breeding and feeding habitat for the yellow-billed cuckoo. Potentially suitable habitat in the vicinity of the Lostine Adult Collection Facility may be affected along the river channel from clearing, filling, and placement of riprap. Construction and subsequent maintenance of the hatchery outfall structure at the Lostine River Hatchery site requires the installation of a gravel access road about 290 ft long and 15 ft wide with a parking/turn around area at the outfall. Trees and the dense woody understory would be removed from this corridor. Any potentially suitable habitat in this area would be impacted by construction of the proposed outfall and access road and by any subsequent invasion of non-native, invasive species. Potential impacts at both sites would be very localized.

Effect Determination
Impacts to yellow-billed cuckoo individuals may occur as a result of disturbance to potentially suitable habitat, but significant impacts to breeding populations that may occur in the project region are not expected.

4.1.4 Columbia Spotted Frog Occurrence

The Columbia spotted frog (*Rana luteiventris*) is listed as a candidate for threatened listing by the USFWS (2001b) and is included on the Regional Forester's sensitive species list (USFS 2002). In 1996, the systematics of the "Western Spotted Frog" (*Rana pretiosa*) underwent a revision resulting in the recognition of two "sibling" species, the Columbia Spotted Frog (*Rana luteiventris*) and the Oregon Spotted Frog (*R. pretiosa*). Although the two species are nearly identical morphologically, researchers in Canada split the species based on results of laboratory studies that indicated significant genetic differences (Leonard et al. 1993). The two species occupy different ranges (allopatric ranges) and may be reliably identified based upon their location.

The Columbia spotted frog is a medium-sized frog up to 3.5 in (90mm) long. Their dorsal ground color ranges from olive green to brown with spots having irregular borders and light-colored centers. The ventral ground color is light cream or white but the abdomen and legs are bright salmon or yellow (young frogs lack this coloration). Tadpoles are generally brownish-green dorsally with gold flecks; ventrally, they have a silvery color and their intestines are visible (Blaustein et al. 1995).

The range of the Columbia spotted frog extends from extreme southeastern Alaska, south through western Alberta to Oregon and Washington, and east to northern Wyoming, northern Utah, and central Nevada (Idaho State University 2002). Extensive surveys conducted throughout eastern Oregon since 1996 have led to increases in the number of known spotted frog sites, however all known populations appear to be functionally isolated (USFWS 2001b).

The Columbia spotted frog occurs within Wallowa County. Recent surveys found twelve locations within the county, all of which are at lower elevations and on private lands (WWNF 2002a). Surveys have not been completed in the Lostine subbasin.

Spotted frogs are highly aquatic and are generally found in or near a perennial water body such as springs, ponds, lakes or sluggish streams (Csuti et al. 2001). This species is most often associated with wetland plant communities dominated by sedges, rushes and grasses (Leonard et al. 1993). Columbia spotted frogs are inactive in the winter in the north. Breeding occurs from March to April in lower elevations such as the Columbia basin, and from May to June in the higher elevations. The timing of breeding is related to ice melt on lakes, ponds and marshes. The egg masses of Columbia spotted frogs are generally easy to find and recognize. The eggs are deposited in spherical clusters of up to 1,300 eggs that are allowed to float freely. Egg masses are usually laid in the shallows of a permanent water source (Idaho State University 2002), generally associated with depositional (mucky) areas and the same site may be reused in subsequent years. During the summer these frogs can be found some distance from breeding sites, but still associated with moist vegetation (Idaho State University 2002). Columbia spotted frogs are opportunistic foragers. They eat a wide variety of insects, as well as different mollusks, crustaceans, and arachnids. Larvae eat algae, organic debris, plant tissue, and minute water-borne organisms (Idaho State University 2002).

Potential Columbia Spotted Frog Impacts

The small side channels, springs, wetlands and ponds that are found on the proposed Lostine Adult Collection Facility site likely provide suitable habitat for the Columbia spotted frog. Impacts to this potential habitat stem from wetland clearing, grading and filling and from potential changes to the existing hydrologic regime in these areas subsequent to construction of the west bank levee. Suitable habitat for Columbia spotted frog may also be present in portions of the meander side channel located within the proposed Lostine River Hatchery site. Localized impacts may result from construction and stabilization of the outfall structure, which would require excavation of approximately 150 cy of bank material and placement of approximately 35 cy of basin cobbles for stabilization. However, adequate suitable habitat is available in the vicinity and any individuals present are likely to disperse to adjacent habitat. None of the other project locations is likely to provide suitable spotted frog habitat.

Effect Determination
The proposed project may impact individuals or small areas of suitable habitat, but would not likely pose significant threats to populations of the Columbia spotted frog.

4.1.5 Slender Moonwort Occurrence

Slender moonwort (*Botrychium lineare*) is a candidate for listing by the USFWS (2002b) and is included on the Regional Forester's sensitive species list (USFS 1999). *Botrychium* species have a somewhat succulent appearance, and resemble small ferns (Potash 1991). This species is a small, perennial herb with a single, pale green frond which stands 3-8 in. tall. The single frond consists of a fertile and sterile segment, which shares a common stalk (Lackschewitz 1991). The sterile segment is once-pinnate (with segments, or pinnae borne on each side of a elongated central axis) with 4-6 widely spaced pairs of pinnae which are linear shaped or sometimes bifid with linear lobes (Lind 2000). The fertile segment is 1-2 times as long as the sterile segment and has a single major axis with short branches which bear grape-like sporangia that contain thousands of spores (MNHP 2001). *B. lineare* is distinguished from others in the genus by the extremely narrow (strictly linear) pinnae and a narrow, thin-textured (vs. fleshy and broad) axis on the sterile frond segment (Lind 2000). Spores germinate underground and develop into minute, subterranean, non-photosynthetic gametophytes. Spores are produced in late June and July (USFWS 2000f; WWNF 2001b), and the frond probably matures in August (Lind 2000).

B. lineare is widespread, but has very spotty distribution. It is currently known from nine populations in Colorado, Oregon, Montana, and Washington (USFWS 2002b). In addition to these known populations, there are also four historic population sites in California, Colorado, Idaho, Montana, and two in Quebec and New Brunswick, Canada. These historic populations have not been observed for at least 20 years and may be extirpated (USFWS 2001b). This species is known to occur in northeast Oregon on the WWNF and on private land in the Lostine River drainage (WWNF 2001b; Lind 2000). Of the two existing sites in northeastern Oregon, one occurs in the Hurricane Creek drainage in the Eagle Cap Wilderness and the other is found on a private inholding in the Lostine River drainage (USFWS 2000f). The species seems to be a habitat generalist and is often found in disturbed habitats along roadsides (USFWS 2002b). However, potential habitat has been characterized as moist, grass/forb meadows, grassy slopes, streamside edges and openings of lodgepole pine, at moderate to high elevations (Lind 2000). Habitat in Colorado and Oregon is comprised of montane meadows with strawberry (*Fragaria* spp.) being a strong associate at the WWNF sites (Lind 2000). The elevation for both of the northeast Oregon populations is approximately 5,300 ft (USFWS 2000f).

Potential Slender Moonwort Impacts
The proposed Lostine Adult Collection Facility and the Lostine River Hatchery sites, both within the Lostine River drainage, are situated well below the 5,300 ft elevation of known slender moonwort populations in the subbasin. Elevation aside, other potential habitat characteristics are present at many of the proposed project sites. However, no *Botrychium* species were observed during the field survey. Based on the lack of field sightings and the location of all of the sites well below the known elevation band in Oregon, the proposed project would not likely contribute to a trend towards federal listing or cause a loss of viability of populations or the species.

Effect Determination
Implementation of the proposed project as described may impact individuals or small areas of suitable habitat, but would not likely pose significant threats to populations of slender moonwort.

4.1.6 Macfarlane's Four O'Clock Occurrence

Macfarlane's four-O'Clock was originally listed as endangered in 1979. Since that time, additional populations have been discovered and some populations on federal lands are being actively managed and monitored (USFWS 2000c). As a result of ongoing recovery efforts and the discovery of additional populations, the species was downlisted to threatened in March, 1996 (USFWS 1996).

Macfarlane's four-O'Clock is a perennial member of the four-O'Clock family (Nyctaginaceae), with a stout, deep-seated taproot (USFWS 1996), forming large clumps as much as 39 in. tall and 2 to 4 ft in diameter (Mosely 1989). The stems are freely branched and swollen at the nodes. The shiny, nearly-sessile leaves are opposite and somewhat succulent (Eastman 1990). Lower leaves are broadly ovate and rounded at the tips, and are two to three in. long, while the upper leaves are pointed and become progressively smaller (USFWS 1996; Eastman 1990). The inflorescence is a four- to seven-flowered cluster subtended by an involucre. The funnel-form flowers are striking due to their large size, up to 1 in. long and 1 in. wide, and showy magenta color (USFWS 1996). Flowering occurs from early May to early June, with mid-May usually being the peak flowering period. When in bloom, this species is very conspicuous in its open, grassy habitat (USFS 1991) and no other member of the regional flora resembles Macfarlane's four-O'Clock (Mosely 1989). The fruits are elliptical in shape and circular in cross-section, with a wrinkled surface and are approximately one-third of an in. long (Eastman 1990). They are obscurely ten-ribbed.

Macfarlane's four-O'Clock is narrowly endemic to portions of the Snake, Salmon and Imnaha River canyons in Wallowa County in northeast Oregon and adjacent Idaho County in Idaho (USFWS 2000c). The species global range is approximately 28.5 mi by 17.5 mi in area (ICDC 2003). Currently, Macfarlane's four-O'Clock is known from three disjunct areas occurring along 6 mi of Hells Canyon on the banks and canyonland slopes above the Snake River in Idaho County, Idaho and Wallowa County, Oregon; along 18 mi of banks and canyonland slopes above the Salmon River in Idaho County, Idaho; and along 3 mi of canyonland slopes above the Imnaha River in Wallowa County, Oregon. The Imnaha unit was discovered in 1983 and comprises approximately 800 plants on 70 acres of habitat located in the vicinity of Fence Creek and Buck Creek (USFWS 1996). Within the Imnaha unit, approximately 300 plants (37 percent) are located on private lands. The remaining 500 plants occur on 60 acres of Wallowa/Whitman National Forest lands above Fence Creek. Known populations of Macfarlane's four-O'Clock in the Imnaha subbasin occur downstream of the town of Imnaha (USFWS 2000c).

Macfarlane's four-O'Clock is found on talus slopes in low to mid-elevation canyon grassland habitats where the climate is regionally warm and dry (USFWS 1996; USFWS 2000c). It generally occurs as scattered plants on steep (50 percent) slopes of gravelly to loamy and sandy soils, often having southeast to western exposures (USFWS 2000c; USFWS 1996). Talus rock typically underlies the soil in which the plants are rooted. Plants are found between approximately 1,000 and 3,000 ft in elevation (USFWS 2000c). Macfarlane's four-O'Clock is typically found in bunchgrass communities dominated by bluebunch wheatgrass (USFWS 2000c; USFS 1991). Sites are dry and generally open, although scattered shrubs may be present (USFWS 2000c). Associated grass species include sand dropseed (*Sporobolus cryptandrus*), red threeawn (*Aristida longiseta*) and Sandberg's bluegrass. Additional species that may be found in this habitat include yarrow, soft brome (*B. mollis*), cheatgrass, hackberry (*Celtis reticulata*), rabbitbrush (*Chrysothamnus nauseosus*) and smooth sumac (*Rhus glabra*) (USFWS 2000c). Studies conducted in Oregon have reportedly noted that suitable but unoccupied habitat for Macfarlane's four-O'Clock tended to have a greater density of exotic, invasive species than adjacent occupied habitat (USFWS 2000c).

Potential Macfarlane's Four O'Clock Impacts
The Acrow bridge site at Marks Ranch is located within habitat that is potentially suitable for Macfarlane's four-O'Clock. The site is situated at an elevation of approximately 1,995 ft and has areas of open, dry grassland communities in adjacent uplands. However, the presence and density of exotic, invasive species and long-term livestock grazing on this property may have seriously degraded any potential habitat in the vicinity. Although it is unlikely that Macfarlane's four-O'Clock occurs in this area, upslope areas of the river canyon may provide suitable occupied or unoccupied habitat. However, these areas would remain unaffected by the proposed project.

Effect Determination
The proposed project may affect, but is not likely to adversely affect Macfarlane's four-O'Clock.

4.1.7 Spalding's Catchfly Occurrence

Spalding's catchfly (*Silene spaldingii*) was proposed for listing as a threatened species on December 3, 1999 (USFWS 2000d), with the final rule published on October 10, 2001 (USFWS 2001c). Critical habitat designation was also determined to be prudent for this species on April 24, 2000, although final critical habitat determination will not be made until it is feasible, based on USFWS workload priorities and budgetary capabilities (USFWS 2000e).

Spalding's catchfly is an herbaceous perennial plant with a simple or branched rootcrown and stems that are 8 to 24 in. tall. There are 4 to 7 pairs of sessile, broadly lance-shaped leaves that are 2 to 3 in. long below and gradually reduced in size upward. The light green foliage and stem are lightly to densely covered with sticky hairs (USFWS 2000d). There are few to many flowers in a leafy, somewhat open spirally arranged inflorescence. The cream-colored flowers are arranged in a spiral at the top of the stem. The tubular calyx is approximately ½ in. long, and has 10 distinct veins running its length. The flower consists of 5 petals, each with a long narrow "claw" that is largely concealed by the calyx tube and a very short "blade," or flared portion at the summit of the claw. The fruit is a capsule that is 0.5-0.7 in. long and filled with numerous tiny seeds. Spalding's catchfly flowers in mid- to late July, with some individuals still flowering by early September.

This species can be distinguished from other perennial *Silene* by its very sticky foliage and by its petals that are entire or only shallowly lobed, although it may be confused with *S. scouleri*. When flowers are present, the very short petal blades (flared portion of petal) of *S. spaldingii* are diagnostic (Lichthardt and Gray 2002). Individuals are often covered with wind blown debris.

The foliage is an unusual pale green, which tends to contrast well with the background color of the surrounding dried grasses. Spalding's catchfly is currently known from a total of 52 populations (USFWS 2001c). Seven populations occur in west-central Idaho (Idaho, Lewis, and Nez Perce Counties), 7 in northeastern Oregon (Wallowa County), 9 in western Montana (Flathead, Lake, Lincoln and Sanders Counties), 28 in eastern Washington (Asotin, Lincoln, Spokane and Whitman Counties), and 1 in adjacent British Columbia, Canada (USFWS 2001c).

This species is primarily restricted to mesic grasslands (prairie or steppe vegetation) that make up the Palouse region in southeastern Washington, northwestern Montana, and adjacent portions of Idaho and Oregon (Lorain 1991). Known sites in northeastern Oregon occur on glacial moraines or remnant Palouse grasslands (USFS 1991). Habitat consists primarily of open grasslands with a minor shrub component, on deep soils in the valley and foothill zones. It apparently does not occur at sites where the native vegetation has been displaced by aggressive weeds, although it may tolerate light to moderate grazing (ICDC 2003). Spalding's catchfly is found most commonly in Daubenmire's (1970) Idaho fescue/snowberry association (Lorain 1991). These sites are typically dominated by Idaho fescue and have sparse cover of snowberry. In Oregon, it is known to be associated with the Idaho fescue-junegrass (*Koeleria cristata*) plant community (USFS 1991). The elevation range is from 1,500 to 5,100 ft (USFWS 2001c), although known sites in Oregon range from 1,200 to 4,500 ft in elevation (USFS).

Potential Spalding's Catchfly Impacts
The Lookingglass Hatchery and the Marks Ranch sites are located within areas of potentially suitable habitat, including the appropriate elevational range for Spalding's catchfly. The sites are in proximity to areas that are dominated by grassy vegetation with scattered shrub thickets and intermittent tree cover. All proposed improvements at Lookingglass Hatchery would occur within the existing, developed area of the site and in areas already dedicated to hatchery operations. Surrounding hillsides in areas of limited shrub and tree cover are the areas most likely to provide potential suitable habitat. As such, impacts to Spalding's catchfly are unlikely at this site. Similarly, the areas upslope of the Marks Ranch site are the most likely to provide required habitat conditions for Spalding's catchfly. The riparian habitat bridge site at Marks Ranch is characterized by a dominance of exotic, invasive species and a history of livestock grazing.

Effect Determination
The proposed project may affect, but is not likely to adversely affect Spalding's catchfly.

4.1.8 Howell's Spectacular Thelypody Occurrence

Howell's spectacular thelypody (*Thelypodium howellii* spp. *spectabilis*) is listed as threatened by the USFWS (1999b). It is an herbaceous biennial that grows to over 30 in. tall (Eastman 1990). Branches arise from near the base of the stem. The basal leaves are approximately 2 in. long with wavy edges and are arranged in a rosette (USFWS 1999b). Stem leaves are narrowly lance shaped with smooth edges and lobes directed backwards clasping the stem (Eastman 1990). Flowers appear in loose spikes at the ends of the stems. Each flower has four purple or lavender petals approximately 0.75 in. in length, each of which is borne on a short (0.25 in.) stalk and has wavy, white, membranous margins (USFWS 1999b; Eastman 1990). Fruits are long, slender pods (siliques) typical of the mustard family (USFWS 1999b). Flowering occurs in June and July (Eastman 1990).

This species is currently known from 11 sites ranging in size from 0.03 acres to 41.4 acres in the Baker-Powder River valley in Baker and Union counties, Oregon (USFWS 1999b). The entire extant range of this taxon lies within a 13-mi radius of Haines, Oregon. Total occupied habitat for this species is approximately 100 acres (USFWS 1999b). The region is bordered on the west by the Elkhorn Mountains and on the east by the Wallowa Mountains. Howell's spectacular thelypody occurs in moist, alkaline meadow habitats in valley bottoms, at approximately 3,000 ft to 3,500 ft in elevation (USFWS 1999b). Suitable habitat is usually found in and around woody shrubs that dominate knolls and along the edge of the wet meadow habitat between knolls. Associated species include greasewood (*Sarcobatus vermiculatus*), alkali saltgrass (*Distichlis stricta*), giant wild rye (*Elymus cinereus*), alkali cordgrass (*Spartina gracilis*), and alkali bluegrass (*Poa juncifolia*). This species may be dependent on periodic flooding since it appears to rapidly colonize areas adjacent to streams that have flooded (USFWS 1999b).

Potential Howell's Spectacular Thelypody Impacts
All of the proposed project locations are well outside of the extant range of Howell's spectacular thelypody. Additionally, no suitable alkaline meadow habitat occurs within the immediate vicinity of any of the sites. The proposed project would not affect this species based on a lack of suitable habitat within the project action area. No additional analysis will be presented for this species.

Effect Determination
The proposed project would have no effect on Howell's spectacular thelypody.

4.2 Fish Species Occurrence and Impacts

** Potential impacts to fish species are discussed following the individual species occurrence discussions.*

4.2.1 Occurrence

Bull Trout

Grande Ronde River Subbasin

The Lostine River and Lookingglass Creek are located within the Grande Ronde River subbasin. Three facilities, including the Lookingglass Hatchery, the proposed Lostine Adult Collection Facility, and the proposed Lostine River Hatchery site, are discussed in this section.

Bull trout presently occur throughout the Grande Ronde subbasin in areas where water quality and habitat are suitable to the species (Figure 4.2-1). Grande Ronde bull trout populations are considered at "moderate risk of extinction" (Buchanan et al 1997). Due to population declines, Grande Ronde River bull trout were listed as threatened under the ESA in 1998, as part of the larger Columbia River Basin DPS. Bull trout are currently listed as a species of critical concern in Oregon.

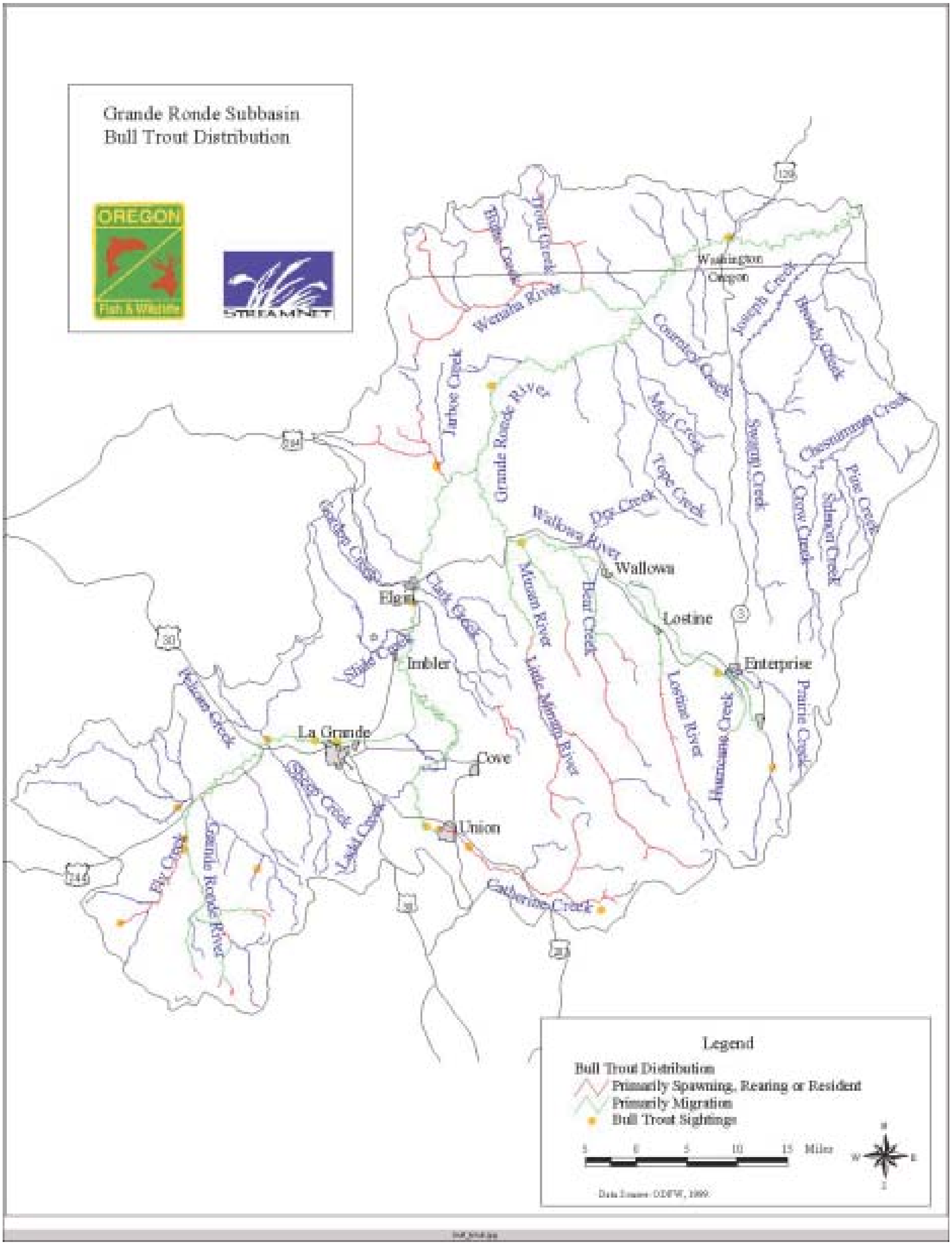


Figure 4.2-1. Bull Trout Distribution in the Grande Ronde River Subbasin.

The majority of bull trout spawning and juvenile rearing takes place in the tributaries and headwater areas of the subbasin where cooler water temperatures support the species. Bull trout are able to move throughout the Grande Ronde during fall, winter and spring. Summer water temperatures in mainstem reaches may seasonally limit use of those systems (Nowak and Eddy 2001). ODFW tagging studies (2001) in the Grande Ronde subbasin indicated that adult post-spawner movement downstream from headwater spawning tributaries was relatively rapid, and none stayed in spawning areas for more than two weeks. Juvenile downstream migration patterns observed in the Grande Ronde River are composed of a spring run from February through August, and a fall run from September to January (M. Hanson, ODFW bull trout coordinator, pers comm., 10/1/02).

Bull trout exhibit both resident and fluvial life histories within the Grande Ronde subbasin. Resident populations such as that in the Little Minam River, are often isolated above barrier waterfalls. Resident and fluvial fish can occur in the same population, with fluvial forms generally attaining larger sizes than resident fish. Fluvial bull trout are components of the Catherine Creek, Lookingglass, Wenaha, Minam, and Lostine populations (Buchanan et al. 1997; Hemmingsen et al. 2001).

The status of Lookingglass Creek bull trout populations was considered “of special concern” by some researchers (Ratliff and Howell 1992), but has been downgraded to a “moderate risk” of extinction (Buchanan et al. 1997). Although no population estimates have been made in the Lookingglass Creek drainage, presence/absence surveys and spawning ground surveys indicate that bull trout abundance is low (Buchanan et al. 1997). High water temperatures occur within the diversion reach at the hatchery location during low flow periods and may limit bull trout usage at those times (B. Lund, Lookingglass Hatchery manager, pers comm., 7/17/02). Although bull trout have been caught throughout the year at the Lookingglass Hatchery trap, there are definite peaks in catch rates in the spring (adults migrating upstream to spawning grounds) and late fall (outmigrating) and a minimum in July (ODFW 1995). Bull trout spawn in early fall (beginning in September) in headwaters of Lookingglass Creek and primarily use the area of the creek near the hatchery as a migratory corridor.

Some bull trout that occur in the portions of Lookingglass Creek near the hatchery may experience temporary delays in migration due to instream barriers (P. Sankovich, ODFW, pers comm., 10/1/02). However, total dewatering does not occur and when necessary, during the late summer, flow into the hatchery is reduced to provide sufficient flow in the creek to provide for bull trout passage, while still providing an acceptable environment for fish in the hatchery (J. Zakel, ODFW, pers comm., 4/14/03). Table 4.2-1 presents the timing of all bull trout life stages within Lookingglass Creek near the hatchery.

Table 4.2-1. Bull trout use and timing in Lookingglass Creek near the Lookingglass Hatchery.

Species	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
Bull trout												
Adult immigration[1]												
Spawning[2]												
Incubation[2]												
Emergence[2]												
Juvenile rearing (subadults)												
Juvenile emigration												

[1] Upstream immigration to cooler waters from June through August; downstream migrations October through November;
[2] September bull trout spawning (and subsequent incubation/emergence) does not occur near the Lookingglass Hatchery – spawners are upstream in headwaters; resident bull trout may be present year round upstream of the facility.

Bull trout timing and use of the Lostine River in the vicinities of the proposed facilities is shown in Table 4.2-2. Lostine River bull trout are mostly fluvial (migrating between tributaries and larger river systems), and are considered to be at "moderate risk" of extinction (Ratliff and Howell 1992). Bull trout migrate up the river from June through August, and are in upstream tributaries in late August when temperatures in the lower river exceed their tolerable limit. Although data regarding bull trout abundance is limited, redd count spawning data and trap records do provide some information regarding species use in the system. Spawning begins in September with most occurring upstream of Silver Creek, a tributary to the Lostine that is upstream of the proposed facilities (USFWS 2002c). Spawning has been documented, however, in the lower portions of the Lostine, and is discussed below.

Stream surveys conducted in 1992 indicated a low abundance of adult bull trout in the Lostine (ODFW 1995; Bellerud et al. 1997). More recent spawning surveys have been conducted by the USFWS, in cooperation with the NPT and ODFW, on index areas for selected Grande Ronde streams from 1999 to 2003, including the Lostine River (G. Sausen, USFWS, personal comm., 3/23/04). It should be cautioned that these spawning surveys are not an estimate of escapement, and that redds were believed by experienced surveyors to be those of bull trout based on timing, size of gravels/cobbles, and size of redds compared to Chinook (G. Sausen, USFWS, pers comm., 4/13/04). As a result of these surveys, bull trout spawning areas on the Lostine River have been established and include Shady Falls to French Camp, French Camp to Bowman, Walla Walla to Williamson, Pole Bridge to 6 Mile Bridge, Lundquist Bridge to OC Ranch, and OC Ranch to Westside Ditch. The proposed Lostine River Hatchery is wholly located within the Lundquist Bridge to OC spawning area and the bridge is located approximately 600 feet downstream of the proposed intake location. In 2003, surveyors observed three bull trout redds in the Lundquist to OC survey area (2.8 mi section) for an average of 1.1 redds per mi. In addition, 20 large fluvial bull trout were observed during 2003 surveys of the section, often holding in deep pools. Further downstream, at the junction of the forked split in the Lostine adjacent to the existing acclimation raceways, one bull trout redd was observed and this area likely represents the lower distribution of spawning (G. Sausen, USFWS, pers comm., March 23, 2004). Bull trout are not known to spawn in the vicinity of the proposed Lostine Adult Collection Facility (P. Sankovich, USFWS, pers comm., 4/13/04). The 2003 survey data for the Lostine was the highest total for five consecutive survey years, although more spawning data (10-15 consecutive years of data) is needed to establish population trends and to determine if bull trout populations are indeed healthy in the Lostine.

With the exception of some limited spawning in the lower Lostine, bull trout are mostly upstream of RM 10 during the warm months of the summer; however, at times adults are known to hold in the area of the proposed Lostine River Hatchery during summer months. Subadults will generally be higher upstream, seeking cooler water temperatures in the summer (P. Sankovich, ODFW, pers comm., 10/1/02). Adults migrate downstream in late fall following spawning, and are usually out of the upper Lostine by the end of October (P. Sankovich, USFWS, pers comm., 4/13/04). Some adults may overwinter throughout the Lostine, although tagging studies have suggested high ratios of mortality of those that do so (M. Hanson, ODFW, pers comm., 10/1/02).

Data from the Lostine River screw trap indicates most bull trout juveniles (those less than 7.8 in. in length) are trapped from April through June. Occasionally, bull trout juveniles are also trapped from October through December (E. Van Dyke, ODFW, pers comm., 4/11/03).

Table 4.2-2. Bull trout use and timing in the Lostine River near the proposed Lostine Adult Collection Facility and the Lostine River Hatchery.

Species / Event	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
Bull trout												
Adult immigration/emigration[1]						■	■	■		■	■	
Adult holding[2]	■	■	■	■	■	■	■	■	■	■	■	■
Spawning[3]									■	■		
Incubation and emergence[3]	■	■	■	■					■	■	■	■
Juvenile rearing (subadults)	■	■	■	■	■	■	■	■	■	■	■	■
Juvenile emigration				■	■	■				■	■	■

[1] Upstream and downstream migrations;
[2] Adults may overwinter throughout the Lostine, however, severe mortalities are likely if there is much freezing; resident bull trout may be present year round upstream of the facility
[3] G. Sausen, USFWS, pers comm., 3/23/04

Proposed Critical Habitat Designation

In November 2002, the USFWS proposed critical habitat designations for the Klamath River and the Columbia River DPS of bull trout. Critical habitat designations identify, to the extent known, and using the best scientific data available, habitat areas that provide at least one of the physical or biological features essential to the conservation of the species (USFWS 2002c). Within the Columbia River DPS, of which all project sites are included, proposed critical habitat in Oregon is approximately 3,391 mi of streams and tributaries, of which 49 percent of lands are federally owned, four percent are tribal lands, one percent are local/state lands and 46 percent are private lands.

Within the Columbia River DPS, the Grande Ronde Unit (Unit 10) extends across Union, Wallowa, and Umatilla counties in northeastern Oregon, and Asotin, Columbia, and Garfield counties in southeastern Washington. Approximately 640 mi of stream in the Grande Ronde River basin is proposed for critical habitat designation. The unit includes the Grande Ronde River from its headwaters to the confluence with the Snake River and a number of its tributaries, the largest being the Wallowa River. Within the Grande Ronde Unit, critical habitat subunits (CHSU) are proposed at several tributaries including Lookingglass Creek and the Lostine River.

Within Lookingglass Creek, proposed critical habitat is designated from its confluence with the Grande Ronde River upstream (15.0 mi) to a barrier falls and extending up Little Lookingglass Creek to the confluence with Buzzard Creek (5.8 mi), up Mottet Creek for 3.6 mi, and up Summer Creek for 0.3 mi. Lookingglass Hatchery is located within this CHSU. The Lookingglass Creek system supports a local bull trout population, and bull trout spawn and rear throughout the identified stream reaches (USFWS 2002c). However, bull trout do not spawn in the immediate vicinity of the hatchery. They migrate past Lookingglass Hatchery in late spring to early summer on their way to spawning grounds. Generally, spawning takes place upstream of the facility in the headwaters in early fall (September). Adults outmigrate from Lookingglass Creek to the Grande Ronde River mainstem in early winter when icing begins (B. Lund, pers comm., 4/16/03). Lower portions of Lookingglass Creek also provide probable foraging habitat for fluvial fish and a migratory connection to the Grande Ronde River (USFWS 2002c).

Proposed critical habitat within the Lostine River is designated from its confluence with the Wallowa River upstream for 24.9 mi to the mouth of the East Lostine River, and extending up Silver Creek 0.3 mi to Hunter Falls and up Lake Creek for a distance of 0.7 mi. The proposed Lostine River facilities are located within this proposed CHSU. Bull trout spawn and rear in upper portions of the Lostine River, primarily upstream of Silver Creek (upstream of proposed facilities), and in both Silver Creek and Lake Creek (Buchanan et al. 1997). The Lostine River downstream of Silver Creek is utilized as foraging, migrating and overwintering habitat. Fluvial bull trout have been observed in the lower Lostine River and are believed to travel down into the Wallowa and Grande Ronde Rivers, and potentially all the way to the Snake River (USFWS 2002c).

Imnaha River Subbasin

Imnaha River bull trout populations are within the threatened Columbia River DPS. Historical information regarding Imnaha River bull trout populations is limited. Unlike other salmonids, it is doubtful that bull trout occupied all accessible streams at any one time (USFS 2000) due to their current patchy distribution in even pristine, “stronghold” habitat types (Rieman and McIntyre 1995).

Both resident and fluvial forms of bull trout occur in the Imnaha subbasin. As with Grande Ronde bull trout, waterfall barriers usually isolate resident forms. Generally, most individuals that occur above Imnaha Falls (RM 73) are considered residents, while those occurring below the falls are considered fluvial (Figure 4.2-2; USFS 2000).

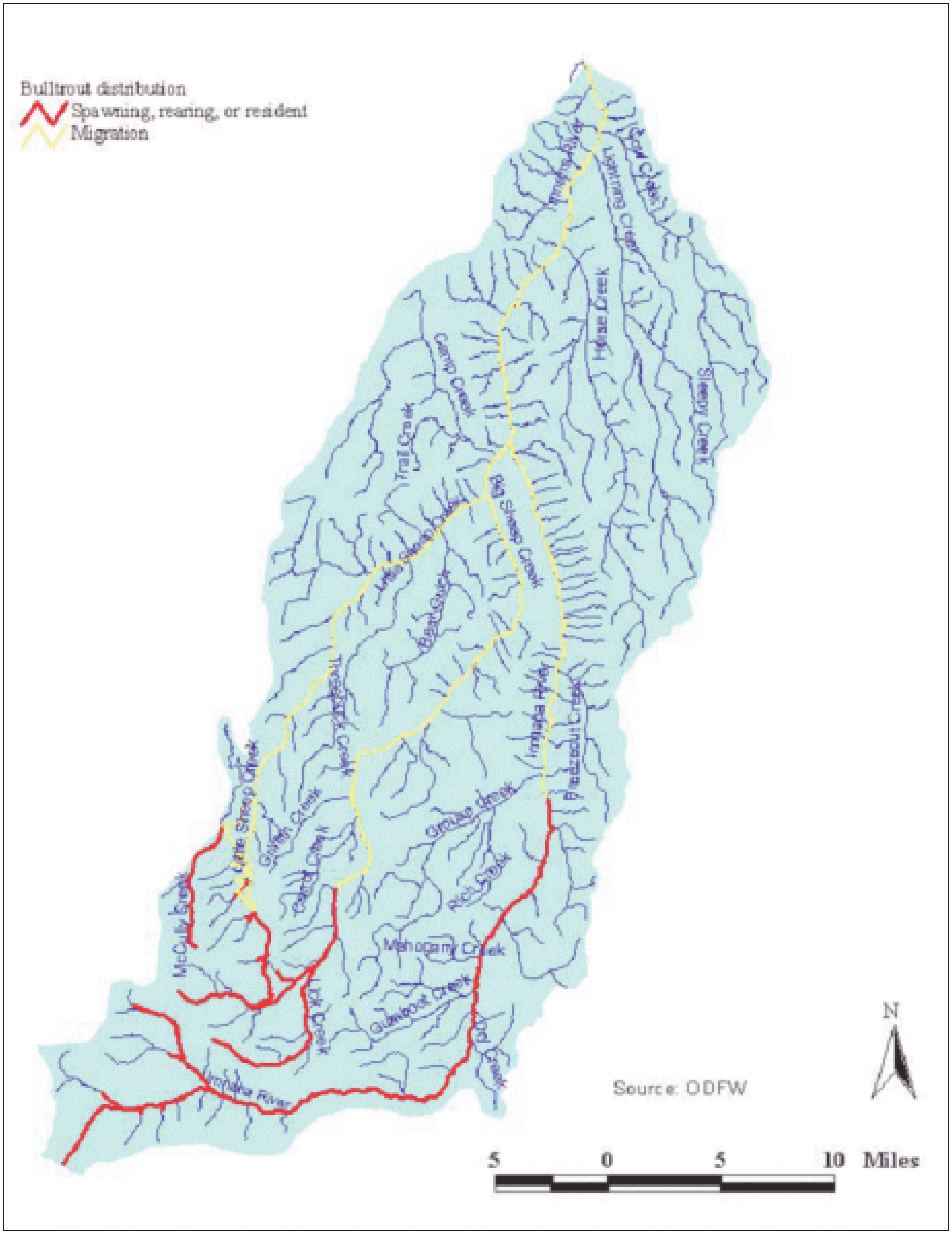


Figure 4.2-2. Bull Trout Rearing, Spawning and Migration Corridors in the Imnaha Subbasin.

In the Imnaha River, bull trout populations are considered at "low risk" of extinction (Buchanan et al. 1997). Bull trout timing and use within the Imnaha River is presented in Table 4.2-3. Fluvial bull trout migrate upstream past the Imnaha Satellite Facility in June through August to escape summer warm waters in favor of cooler spawning grounds. By September, most bull trout are upstream of the Imnaha Satellite Facility at unknown spawning sites near the headwaters where they often stage off the mouth of tributaries and wait for temperatures to drop to 44-48°F (M. Hanson, ODFW, pers comm., 10/1/02). Spawning occurs upstream of the Imnaha Satellite Facility in late summer or early fall (late August – early October; G. Sausen, USFS, pers comm., 10/16/02). They outmigrate from their spawning areas in late September through November and travel downstream, most likely overwintering in portions of the Imnaha, Grande Ronde and Snake rivers. Juveniles likely rear in the headwaters in which they were spawned. Subadults, approximately 2-3 years of age, migrate out of the areas in which they were spawned in late fall and move to overwintering sites, possibly within the Snake River (P. Sankovich, ODFW, pers comm., 10/1/02).

Table 4.2-3. Bull trout use and timing in the Imnaha River in the vicinity of the Imnaha Satellite Facility and the Acrow bridge site at Marks Ranch.

Species / Event	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
Bull trout												
Adult[1]						■	■	■		■	■	
Juvenile rearing	■	■	■	■	■	■	■	■	■	■	■	■

[1] Upstream and downstream migrations (not a spawning location); resident bull trout may be present year round upstream of the Facility

<u>Proposed Critical Habitat Designation</u>

The Imnaha/Snake River Basin populations (within the Columbia Basin DPS) comprise critical habitat Unit 11 of the proposed critical habitat for bull trout (USFWS 2002c). The Imnaha/Snake Unit extends across Wallowa, Baker, and Union counties in northeastern Oregon and Adams and Idaho counties in western Idaho. The unit contains approximately 90 mi of proposed critical habitat and consists of two CHSUs: the Imnaha River basin and the Snake River basin from the Imnaha confluence upstream to Hells Canyon Dam. Five bull trout local populations are identified in the Imnaha River CHSU: (1) mainstem Imnaha; (2) Big Sheep Creek above the Wallowa Valley Irrigation Canal (WVIC); (3) Big Sheep Creek below the WVIC; (4) Little Sheep Creek; and (5) McCully Creek. The Draft Recovery Plan (USFWS 2002c) identifies all five existing local populations as necessary for recovery, and the proposed critical habitat reflects that need. Approximately 49 percent of the unit is located on private land and 51 percent is on federal land. The CHSU in which the project components would occur is the Imnaha River from its confluence with the Snake River at RM 191.9 upstream approximately 71.6 mi to the confluence of the North Fork Imnaha and South Fork Imnaha rivers. Bull trout occur year-round upstream of approximately RM 40. In fall, winter and spring, fluvial bull trout utilize the Imnaha River below this location for feeding, migration, and overwintering (Buchanan et al. 1997).

Chinook

Spring/Summer Chinook

Grande Ronde Subbasin

The Grande Ronde River historically supported diverse and healthy runs of spring/summer Chinook. The race was widely distributed throughout the basin in at least 21 tributaries (Nowak and Eddy 2001, Figure 4.2-3). Escapement of naturally produced Chinook salmon to the Grande Ronde River was estimated at 12,200 fish in 1957 (ODFW et al. 1990). Redd counts indicate that large runs of spring/summer Chinook returned until the early 1970s (ODFW et al. 1990). The major spring/summer Chinook salmon production areas within the Grande Ronde subbasin were the Minam, Wenaha, Wallowa, Lostine and upper Grande Ronde rivers. Declining adult returns from the early 1980s and early 1990s resulted in the 1992 federal ESA listing of the Snake River evolutionarily significant unit (ESU) as threatened. The Grande Ronde River stock is a part of that ESU.

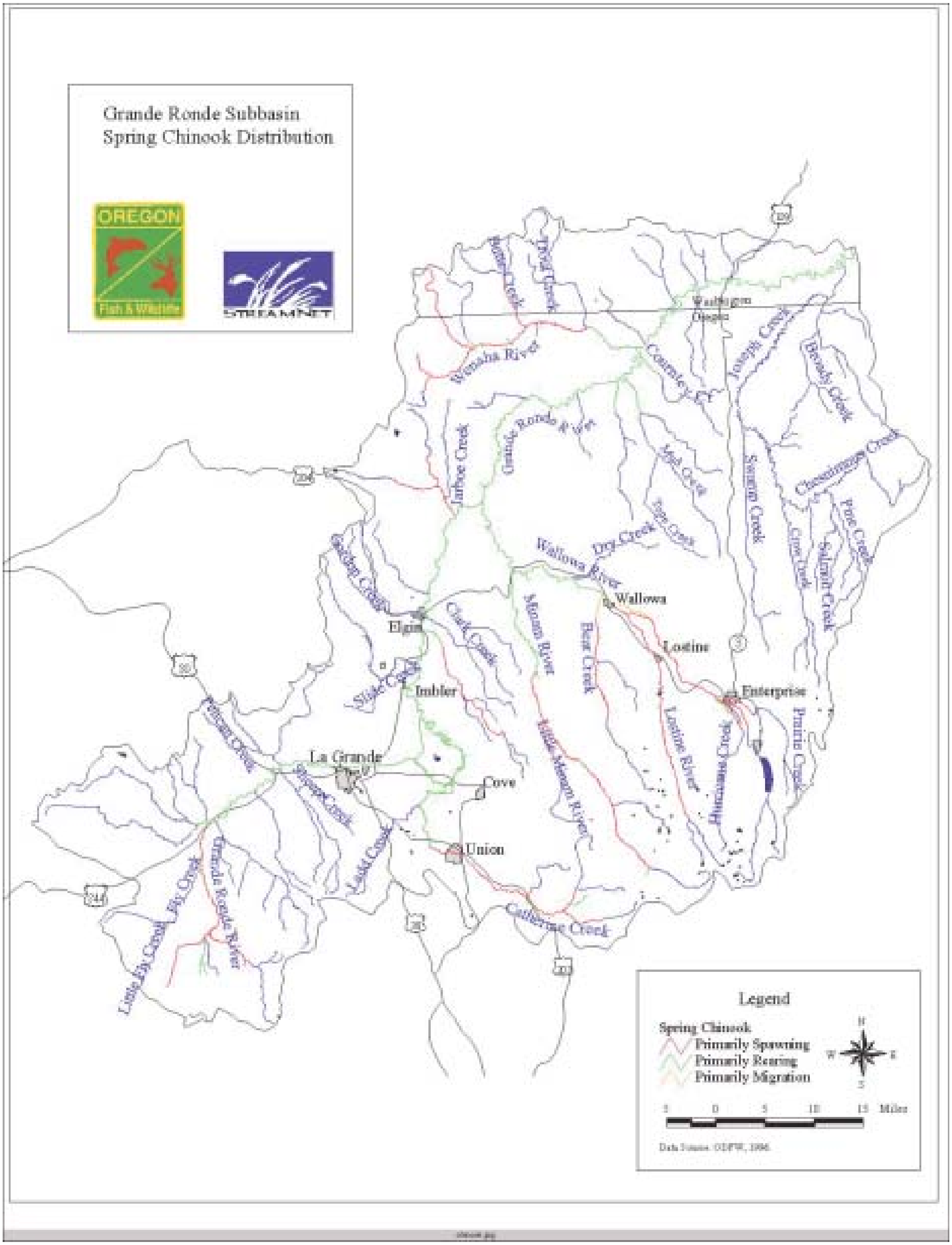


Figure 4.2-3. Spring/Summer Chinook Distribution in the Grande Ronde River Subbasin.

Historically, abundant water flows accommodated adult migration year-round in the Lostine River and Hurricane and Bear creeks. Beginning in the early 1900s, water diversions for irrigation, coupled with low flows, dewatered lower reaches of the Lostine River from mid-to-late July through September. Adult Chinook salmon could not enter these dry sections in most years. Neeley et al. (1994) suggest that a major component of the historic run of salmon was eliminated in these three streams with the development of the irrigation system. Redd count surveys have documented a decline in escapement from historic levels. Recent redd count data is shown in Table 4.2-4.

Table 4.2-4. Number of spring/summer Chinook salmon redds observed in the Grande Ronde River and tributaries, 1998-2002.

	Year														
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Redds Observed	969	227	296	198	558	688	149	80	306	298	253	180	502	868	884

Sources: Nowak and Eddy (2001); Pat Keniry, ODFW, unpublished data pers comm., 4/7/03

Presently, spring/summer Chinook salmon are thought to utilize at least some portion of 50 streams in the subbasin. Escapement levels through the 1990s indicated that Grande Ronde spring/summer Chinook salmon were in immediate danger of extirpation. Escapement levels of natural Chinook through the early 1990s were fewer than 1,000 fish (Sims 1994). Smolt to adult return ratios (SARs) were below 1.0 percent for the brood years of 1990-1998 (Carmichael et al. 1998a). However, an upward trend in observed redds has been seen in past three seasons (Table 4.2-4) and some Grande Ronde populations have had relatively high returns of natural fish (Keniry 2001, 2002, 2003).

Grande Ronde spring/summer Chinook enter the Columbia River from March through June (Neeley et al. 1994) and pass through the lower Snake River primarily during April through mid-July (Thompson and Haas 1960; Bjornn et al. 1992). High water temperatures greatly restrict summer use of the Grande Ronde. In the 1990s, high mainstem temperatures blocked upstream migration of adult fish during much of the summer and probably prevented juveniles from rearing from mid-July through August (Grande Ronde Model Watershed Program 1994). These conditions have persisted in most recent years (R. Zollman, NPT, pers comm., 9/25/02). Adult returns to the subbasin are typically continuous, with the first fish arriving in early May, peak returns in June and July, and the last fish arriving in October (Hesse and Harbeck 2004). Spawning usually occurs in August and September with fry emergence between March and early June (Hurato 1993). Juveniles that remain in the subbasin for one year generally begin their emigration in June through October. Smoltification occurs the following spring. Adults usually remain at sea for 1 to 4 years and return to spawn between ages 3 and 6 (Nowak and Eddy 2001).

Critical habitat was designated for the Snake River spring/summer Chinook salmon in 1993, and includes the Grande Ronde subbasin (FR Vol. 57, No.247).

Some biologists believe the late-run spring/summer Chinook described by Thompson and Haas (1960) as spawning in late September through October have been extirpated from much of the Grande Ronde River. Ken Witty, ODFW District Biologist 1964-1991, conducted multiple surveys of the Wallowa and Grande Ronde rivers from 1964-66, during which time he located only one redd (Witty, pers comm. as cited in NEOH Core Team 2003). He concluded that the September-October spawners were extirpated. In the last five years, however, Chinook redds have been observed in the lower section of the Lostine River in late-September and early-October and these fish are referred to as a "remnant late-run" in the Master Plan (NEOH Core Team 2003; Ashe et al. 2000). These populations occur downstream of the proposed project sites.

Within Lookingglass Creek, spring/summer Chinook enter in the later part of May and generally spawn from mid-August to September. Fry emerge from March to May and juveniles tend to remain for rearing in areas relatively close to where they hatched. Catherine Creek, from which Lookingglass Hatchery collects a portion of its broodstock, differs slightly in spawn timing as some individuals have been observed spawning in late July (R. Zollman, NPT, pers comm., 10/16/02). Timing and use by all life stages of spring/summer Chinook in Lookingglass Creek is presented in Table 4.2-5.

Table 4.2-5. Spring/summer Chinook use and timing in Lookingglass Creek in the vicinity of Lookingglass Hatchery.

Species / Event	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
Snake River Spring/Summer Chinook												
Adult immigration					■	■	■					
Adult holding					■	■	■	■				
Spawning								■	■			
Incubation	■	■						■	■	■	■	■
Emergence			■	■	■							
Rearing	■	■	■	■	■	■	■	■	■	■	■	■
Juvenile emigration				■	■	■						

A summary of timing and use by all life stages of spring/summer Chinook in the Lostine River is presented in Table 4.2-6.

Table 4.2-6. Spring/summer Chinook use and timing in the Lostine River in the vicinity of the proposed Lostine Adult Collection Facility and the Lostine River Hatchery.

Species / Event	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
Snake River Spring/Summer Chinook												
Adult immigration						■	■					
Adult holding						■	■	■				
Spawning							▐	■	■			
Incubation	■	■						■	■	■	■	■
Emergence			■	■	■							
Rearing	■	■	■	■	■	■	■	■	■	■	■	■
Juvenile Emigration				■	■	■						

Lostine spring/summer Chinook returning adults generally enter the river beginning in the first week of June and generally spawn in mid-August to late September. Earlier spawning may occur as spawned-out carcasses have been observed as early as mid-July (R. Zollman, NPT, pers comm., 9/25/02). Fry emerge from March to May, depending on water temperature variability that occurs in association with springs and thermal infusion areas. Generally, fry tend to remain near emergence sites, but may move downriver in June or July according to river conditions. Both Chinook adults and juveniles are known to use the area of the proposed Lostine River Hatchery during summer months. Spring/summer Chinook spawners have increased in current years within the Lostine River. As stated previously, redd counts from the past five years have revealed a remnant late-run spring/summer Chinook component in the lower Lostine River (Table 4.2-7). These fish generally spawn from late September through early October.

Table 4.2-7. Lostine spring/summer Chinook redd counts from various survey years.

	Year										
	1957	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Redds Observed	893	16	11	27	49	35	57	64	131	209	194

Sources: ODFW (2001); Pat Keniry, ODFW unpublished data (pers comm., 4/7/03); Jim Harbeck, NPT, unpublished data (pers comm., 5/20/04)

Imnaha River Subbasin

The Imnaha River subbasin once supported healthy runs of spring/summer Chinook salmon. Returns to the Imnaha River subbasin have declined dramatically during the past three decades. Peak escapement of spring/summer Chinook salmon to the Imnaha River was estimated at 3,459 adults in 1957; returns of natural origin fish in the early-to-late 1990s declined to levels below 150 individuals (ODFW 1998). However, recent redd counts have shown an increase in spawners, although the percentages of those that were wild spawners was not cited in documents.

Progeny-to-parent ratios for the natural spawning population in the Imnaha River have been well below 1.0 (replacement) since 1983 and have been as poor as 0.2 (Carmichael et al. 1998b). According to Mundy and Witty (1998), the spring/summer Chinook spawning stock is expected to decline by 62 percent each generation (every five years). The declining trend of the 1990s threatened potential extirpation of this stock. Based on 1990s escapement data, ODFW performed population modeling on the stock and determined that, without a supplementation program, the natural population would continue to decline and would become extinct between 2030-2050 (ODFW 1998). The potential for extinction was made more severe by the fact that the Imnaha spring/summer Chinook appear to be a genetically distinct population (Waples et al. 1993). It is unclear if recent increases in return rates are directly due to supplementation, but levels are still extremely low compared with historic returns.

A summary of timing and use of the Imnaha River by spring/summer Chinook is shown in Table 4.2-8.

Table 4.2-8. Spring/summer Chinook use and timing in the Imnaha River in the vicinity of the Imnaha Satellite Facility and the Acrow bridge site at Marks Ranch.

Species / Event	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
Snake River Spring/Summer Chinook												
Adult immigration				■	■	■	■					
Adult holding					■	■	■	■				
Spawning								■	■			
Incubation	■	■						■	■	■	■	■
Emergence			■	■	■							
Rearing	■	■	■	■	■	■	■	■	■	■	■	■
Juvenile Emigration				■	■	■						

As shown in Table 4.2-8, adult spring/summer Chinook begin entering the Imnaha in late-April. Peak entry occurs in mid-to-late June (R. Zollman, NPT, pers comm., 10/16/02; Ashe et al. 2000). Peak spawning for spring/summer Chinook is in the late summer, occurring usually in late August to early September (Ashe et al. 2000; NMFS 2001a). Estimates of redd counts in the Imnaha River from 1964-2003 are shown in Table 4.2-9.

Table 4.2-9. Estimate of total spring/summer Chinook salmon redds in the Imnaha River Subbasin, 1964 to 2003[1,2,3].

Year	Redd Count	Year	Redd Count	Year	Redd Count
1964	496	1977	241	1990	54
1965	391	1978	715	1991	99
1966	561	1979	85	1992	118
1967	447	1980	66	1993	384
1968	507	1981	162	1994	36
1969	556	1982	225	1995	32
1970	474	1983	178	1996	125
1971	738	1984	506	1997	216
1972	626	1985	245	1998	146
1973	909	1986	207	1999	119
1974	464	1987	156	2000	261
1975	281	1988	208	2001	635
1976	280	1989	74	2002	1111
				2003	727

[1]Source: Williams et al. 1998
[2]Source: Pat Keniry, ODFW, unpublished data (pers comm., 4/7/03)
[3]Source: Jim Harbeck, NPT, unpublished data (pers comm., 5/20/04)

Spawning distributions within the mainstem Imnaha are depicted in Figure 4.2-4. Data show that spring/summer Chinook most commonly spawn between Summit Creek (~ RM 42) and the Blue Hole (RM 59.6). In addition to this stretch, mainstem Chinook spawning has been documented as far downstream as Freezeout Creek (RM 29.4). The mainstem Imnaha, from Summit Creek to the North/South Fork confluence, violates State temperature standards for bull trout and is on the Oregon Department of Environmental Quality's 303d list (Bryson et al. 2001). Fewer fish spawn in primary tributaries, including the South Fork Imnaha, Big Sheep Creek and Lick Creek. Juvenile Chinook use portions of the mainstem for rearing, but are also present in lower Cow, lower Lightning, lower Horse, Big Sheep, and Lick creeks (Gaumer 1968; Huntington 1993), and are suspected to use the lower reaches of Skookum (RM 53.7), Gumboot (RM 46.8), Mahogany (RM 45.0), Crazyman (RM 42.8), Summit (RM 37.5), Grouse (RM 34.7), and Freezeout creeks (RM 29.4) (Mundy and Witty 1998).

Parr and presmolts move throughout the upper, middle and lower Imnaha, Big Sheep Creek and Snake River from September through winter and spring (Ashe et al. 2000). Gaumer (1968) documented some movement of fry and small parr into the lower Imnaha and lower Big Sheep Creek during spring months, however determined that the peak movement of parr into lower Big Sheep Creek occurred in November, while peak movement into the lower Imnaha occurred during October and November. During summer months, irrigation water withdrawals throughout portions of the Imnaha River subbasin may contribute to higher water temperatures in the lower Imnaha River due to a reduction in flow volume. These increased temperatures likely limit the use of the lower Imnaha from July into September (Ashe et al. 2000).

Surveys along the mainstem Imnaha River were conducted to determine the cause and type of fish habitat problems within the river (Grande Ronde Model Watershed Program 1994). It was determined that the typical dynamics of the river may preclude substantial use of the area by spring/summer Chinook. A general lack of woody debris and related pool habitat may be partially attributable to the high hydraulic forces along the river. These conditions persist and continue to limit the amount of habitat available for spring/summer Chinook in the basin (R. Zollman, NPT, pers comm., 9/25/02). Additionally, high summer water temperatures in the river below Freezeout Creek may restrict the upstream migration period and prevent extended summer use of the lower 30 mi of the river by juvenile Chinook (Schwartzberg et al. 2001).

Fall Chinook Occurrence

<u>Grande Ronde Subbasin</u>

Although fall Chinook salmon are indigenous to the Grande Ronde subbasin, including all of the lower portion of the river system, only remnant populations occur in the lower Grande Ronde River from the mouth to just above the Wenaha River, primarily in Washington. These populations occur downstream of the proposed project sites. Grande Ronde fall Chinook salmon are part of the Snake River ESU and were federally listed as threatened under the ESA in 1992.

Although life history information for Grande Ronde River fall Chinook is extremely limited, life histories for Snake River fall Chinook may be comparable. Generally, fish from the Snake River populations spawn in mid-November. Fry emerge in early to late May and leave the Snake River in late June to early July (ODFW 2001). Table 4.2-10 presents estimated timing information for Grande Ronde River fall Chinook.

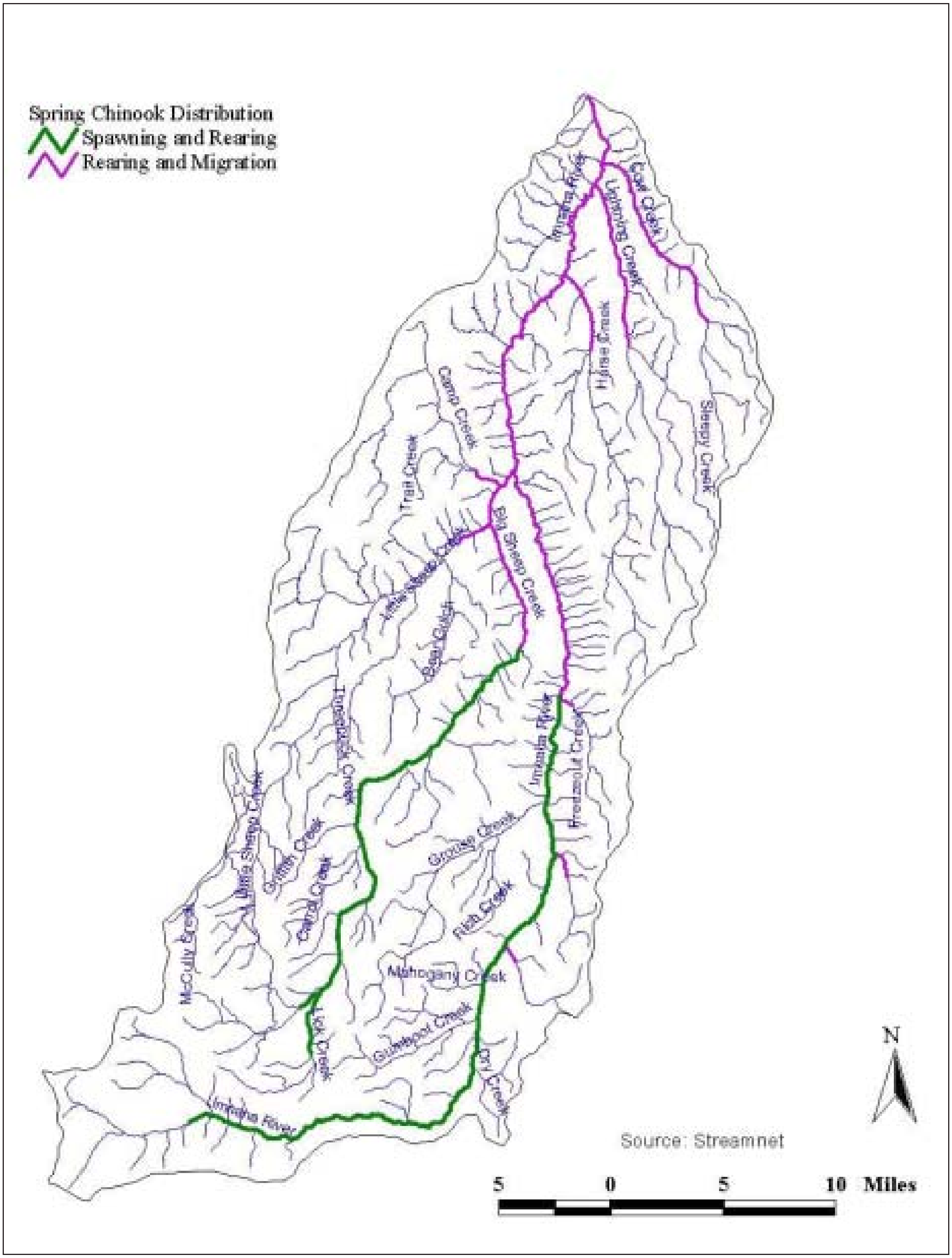


Figure 4.2-4. Spawning and Rearing Locations of Imnaha Spring/Summer Chinook.

Table 4.2-10. Estimated fall Chinook use and timing in the Grande Ronde subbasin.

Species / Event	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
Snake River Fall Chinook[1]												
Adult immigration									■	■		
Adult holding									■	■	■	
Spawning											■	■
Incubation	■	■	■									
Emergence				■	■	■						
Rearing	■	■	■	■	■	■	■	■	■	■	■	■
Juvenile Emigration			■	■								

[1] Known occurrences in lower basin, but likely extirpated from waters in the immediate vicinity of project sites

Imnaha Subbasin

Although fall Chinook salmon are present in the lower reaches of the Imnaha subbasin, their abundance is significantly less than historic levels. Anecdotal accounts suggest that fall Chinook may have used the lower 19.5 mi of the Imnaha mainstem for spawning, and generally did not occur above the town of Imnaha (Chapman 1940 as referenced in Bryson et al. 2001). Others contend that fall Chinook spawning occurred as far upstream as the confluence of Freezeout Creek (RM 29.4; Mundy and Witty 1998 as referenced in Bryson et al. 2001).

Documented occurrence of fall Chinook spawners within the lower Imnaha has been shown through redd surveys since 1964. No occurrence of fall Chinook spawning above Fence Creek (RM 14.3) has been observed in recent decades (Bryson et al. 2001). Due to the low escapement, the contribution of natural spawning to annual recruitment has not been demonstrated (Chapman and Witty 1993). If fall Chinook do occur within the Imnaha River, their timing is likely similar to that presented in Table 4.2-10.

Steelhead

Grande Ronde River Subbasin

Production of native summer steelhead within the Grande Ronde River has historically been high. Prior to the construction of the four lower Snake River dams, estimated run sizes exceeded 15,000 spawners (USACE 1975; Nowak and Eddy 2001). Populations of summer steelhead appear to have a cyclical pattern in terms of population abundance and productivity (Nowak and Eddy 2001). Surveys suggest a decline in spawning in the subbasin between 1968 and 1979. Populations rebounded in the 1980s, until 1988 to 2000, when redd count surveys showed a steady decline in summer steelhead spawning in all reaches of the Grande Ronde River (Table 4.2-11). Due to this decline, the Grande Ronde River stock of summer steelhead, included in the Snake River ESU, was federally listed as threatened in 1997.

Table 4.2-11. Steelhead spawning survey data (spawners per mile) in segments of the Grande Ronde River.

	Year												
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Grande Ronde River segment													
Lower	13.8	1.7	1.0	a	7.9	1.4	1.4	1.7	1.4	2.3	2.3	a	2.7
Middle	2.7	2.2	2.7	a	8.6	2.2	1.6	2.7	2.2	1.1	4.3	2.2	1.1
Upper	13.8	4.9	7.4	a	8.5	7.8	7.0	6.4	9.6	15.7	16.0	5.7	4.9

a: No surveys conducted in year
Source: Nowak and Eddy, 2001.

Presently, summer steelhead are distributed throughout the accessible portions of the Grande Ronde subbasin (Figure 4.2-5). Summer steelhead are known to occupy 238 streams in the subbasin. They use approximately 33 percent of the total stream length available for spawning and rearing. On average, summer steelhead rear for two years in the Grande Ronde River system before migrating to the ocean. Most smolt migration occurs from April through June (Smith 1975; Nowak and Eddy 2001). A smaller smolt migration occurs in the fall, when juveniles are thought to migrate to lower stream reaches to avoid freezing conditions in the upper tributaries. Upstream areas may be repopulated the following spring. Juveniles may also move upstream to find cool water sanctuaries during the summer (ODFW 1993).

Generally, adult summer steelhead spend one to three years in the ocean before returning to freshwater to spawn. Grande Ronde River adult summer steelhead pass Bonneville Dam during July and John Day Dam primarily from August through October. They migrate through the lower Snake River during two periods: a fall movement that peaks in mid- to late-September and a spring movement that peaks during March and April. Some adult summer steelhead enter the lower Grande Ronde River as early as July, but most adults enter from September through March (ODFW 1993). Adults likely overwinter in the lower Grande Ronde and move into upstream spawning areas March through mid-June, with peak movement in May (P. Sankovich, ODFW, pers comm., 10/8/02). Peak spawning takes place from late April through June. Fry emerge from June through August. It is estimated that approximately 1-2 percent of steelhead in the basin spawn for a second time, reconditioning themselves in the river system (R. Zollman, NPT, pers comm., 10/16/02; ODFW 1995).

Within Lookingglass Creek, steelhead adults migrate upstream during late winter/early spring when flows increase due to spring runoff. Juveniles are supported throughout the river, as evidenced by ODFW trap data, and emigrate in spring (P. Sankovich, ODFW, pers comm., 10/1/02). Timing and use of Lookingglass Creek by steelhead is presented in Table 4.2-12.

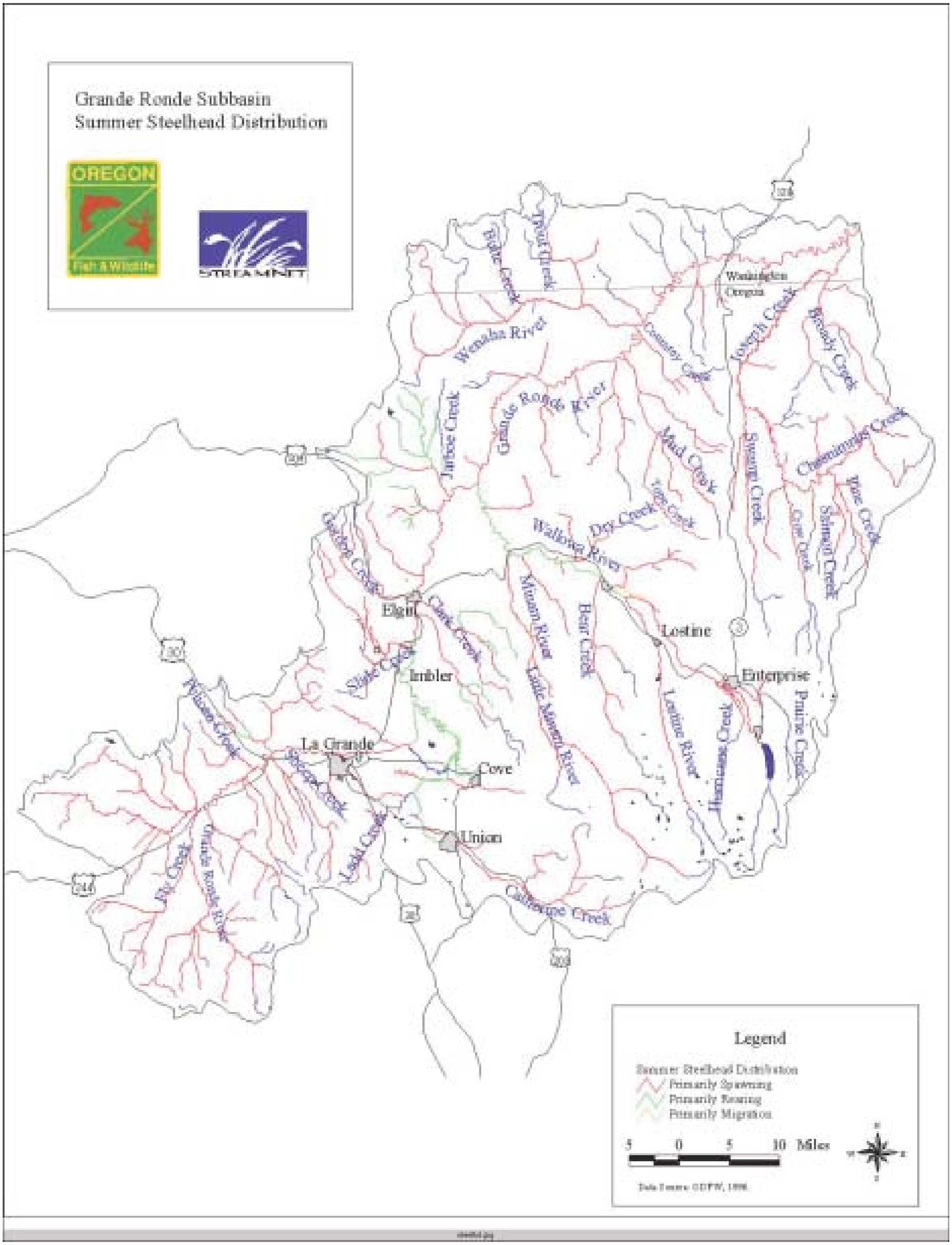


Figure 4.2-5. Summer Steelhead Distribution in the Grande Ronde River Subbasin.

Table 4.2-12. Steelhead timing and use of Lookingglass Creek in the vicinity of the Lookingglass Hatchery.

Species / Event	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
Steelhead												
Adult Immigration			■	■								
Adult Holding			■	■	■							
Spawning				■	■	■						
Incubation				■	■	■	■					
Emergence						■	■	■				
Rearing	■	■	■	■	■	■	■	■	■	■	■	■
Juvenile emigration			■	■	■							

A summary of use and timing of the Lostine River by steelhead is shown in Table 4.2-13. As shown in the table, Lostine River steelhead spawners begin to ascend upstream to headwaters in early spring (March – April). In late April or early May, adults begin to move up tributaries to spawn (R. Zollman, NPT, pers comm., 9/25/02) and generally complete spawning by July. Rearing juveniles may move upstream and downstream within tributaries for up to 2 years. Smolt emigration occurs after 2 years of rearing throughout the Lostine, usually in late March through May, once again coinciding with increased flow due to spring runoff (P. Sankovich, ODFW, pers comm., 10/1/02).

Table 4.2-13. Steelhead timing and use of the Lostine River in the vicinity of the proposed Lostine Adult Collection Facility and the Lostine River Hatchery.

Species / Event	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
Steelhead												
Adult Immigration			■	■								
Adult Holding			■	■	■							
Spawning				■	■	■						
Incubation				■	■	■	■					
Emergence						■	■	■				
Rearing	■	■	■	■	■	■	■	■	■	■	■	■
Juvenile emigration			■	■	■							

For the Grande Ronde subbasin, summer steelhead artificial production takes place at the Wallowa Hatchery, Irrigon Hatchery and the Big Canyon acclimation facility in Oregon and at the Lyons Ferry Hatchery and Cottonwood acclimation facility in Washington. The Wenaha and Minam rivers and Joseph Creek are wild fish management areas for summer steelhead in the subbasin and receive no hatchery supplementation (Nowak and Eddy 2001). Grande Ronde steelhead broodstock was founded from fish collected at one of the Snake River dams and probably included fish from throughout the Snake River basin (ODFW 1995).

Critical habitat was designated for steelhead trout effective March 17, 2000 (FR Vol.65, No.32). In February 2000 NMFS redefined the adjacent riparian zones for all 19 salmon and steelhead Evolutionarily Significant Units (ESUs) (FR Vol. 65 No. 32). The adjacent riparian area has been redefined to include: the area adjacent to a stream that provides shade, sediment, transport, nutrient or chemical regulation, streambank stability, and input of large woody debris or organic matter.

Imnaha River Subbasin

Summer steelhead population distribution in the Imnaha subbasin is currently similar to historic conditions. Although actual historic escapement data do not exist, it is estimated that prior to the construction of the four lower Snake River dams, up to 4,000 summer steelhead returned to the Imnaha subbasin on an annual basis (USACE 1975). In the absence of historic distribution data, it is difficult to determine which streams were inhabited by summer steelhead. However, the lack of residual rainbow trout above Imnaha Falls (RM 73) suggests that steelhead were likely restricted to all accessible areas downstream from this probable migration barrier (Mundy and Witty 1998, as referenced in Bryson et al. 2001).

Annual steelhead spawning surveys in the Imnaha are limited (USFS 1998a; 1998b). Current escapement estimates are based on data collected in Camp Creek, a tributary to Big Sheep Creek. Annual escapement of wild/naturally spawning fish has declined over the past three decades with recent estimates ranging from 300 to 1,000 adults (Bryson et al. 2001).

Currently, Imnaha steelhead maintain widespread distribution throughout most of the subbasin, and generally occur in all tributaries that do not have vertical falls near their mouths (Mundy and Witty 1998 as referenced in Bryson et al. 2001). Approximately 397.6 RM of summer steelhead spawning and rearing habitat have been identified in the Imnaha subbasin (Figure 4.2-6; USFS 1998a; 1998b).

Table 4.2-14 presents a summary of timing and use of the Imnaha River by steelhead. Imnaha steelhead overwinter in the Snake River and move upstream within the Imnaha during spring runoff conditions (March – April), when flows are at their peak. Spawning occurs in late spring and most spawning likely occurs in all tributaries of the Imnaha that do not have vertical falls near their mouths (Mundy and Witty 1998). Juvenile emigrations are also driven by increased flows in spring, but juveniles may move up and down tributaries of the Imnaha at any time of the year, with pulses occurring in late summer. There is not a significant number of steelhead that overwinter in the Imnaha (P. Sankovich, ODFW, pers comm., 10/1/02).

Table 4.2-14. Steelhead use and timing in the Imnaha River in the vicinity of the Imnaha Satellite Facility and the Acrow bridge site at Marks Ranch.

Species / Event	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
Steelhead												
Snake River Adult												
Snake River Juvenile												

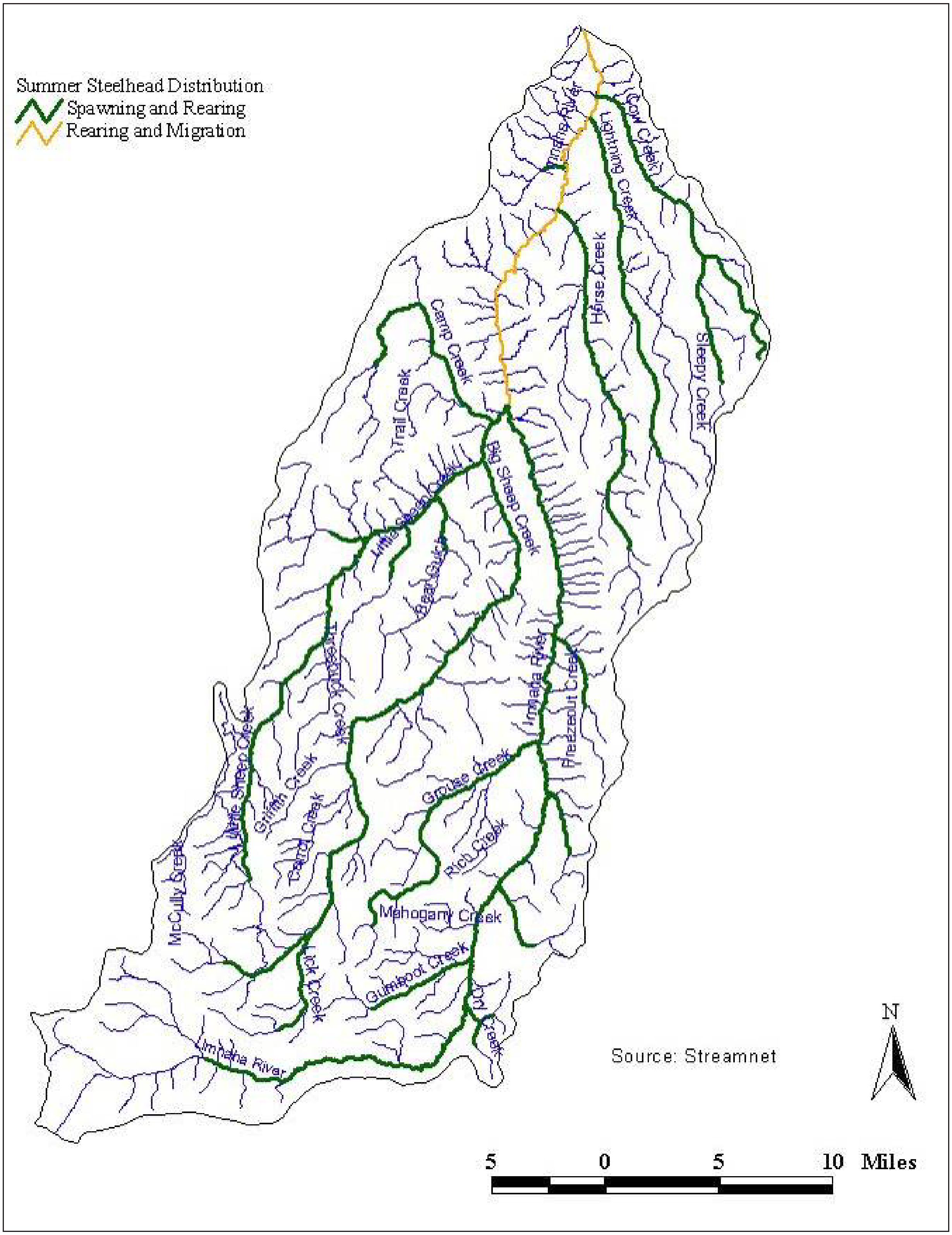


Figure 4.2-6. Summer Steelhead Spawning and Rearing Areas in the Imnaha Subbasin. (Due to Scale [1:100,000], Not all Streams Containing Steelhead are Shown [Streamnet data]).

4.2.2 Construction and Operational Impacts on Listed Fish Species

Impacts due to construction and operation at each facility site are discussed below. Additional discussion of construction and operational impacts on listed fish species for all project sites is presented in Appendices E (bull trout), F (Chinook), and G (steelhead). The appendices directly discuss the NOAA Fisheries Matrix of Pathways and Indicators (NMFS 1996a). These matrices are a set of guidelines designed to facilitate and standardize the determination of effects of projects/actions on listed anadromous salmonids. The NOAA Fisheries matrix, along with a similar USFWS matrix (1998) for bull trout, was developed for freshwater environments. Since numerical criteria for watershed functionality (e.g., <12% fines in gravel = properly functioning sediment conditions) are currently unavailable for most parameters, this evaluation was qualitative rather than quantitative in nature.

Lookingglass Hatchery

To assist in the analysis of impacts from Lookingglass Creek Hatchery improvements, Table 4.2-15 depicts when salmonid species would be present in the system in relation to project timing.

Site Clearing, Facility Modification, Facility Construction and Ground Disturbance

As presented in Section 2.2.1, proposed actions at the site are limited to upgrades and modifications within the existing site boundary that has been developed as a hatchery. The modifications presented in 2.2.1 will not increase the amount of impervious surface area at the site. Minor ground disturbance would occur on site for the installation of an upgraded electrical supply line from the mechanical building to the hatchhouse. Existing asphalt roadway would be cut and ditched to install the power line. The roadway would be resurfaced upon completion.

Channel Alterations

No instream construction is proposed.

Operation of Water Intake and Outfall Structures

Existing intake and discharge structures at Lookingglass Hatchery would not be modified for this project.

Table 4.2-15. Project timing and aquatic species presence near the Lookingglass Hatchery.

Species / Event	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
Project Work Phase												
1. Upland Work				■	■	■	■	■	■	■	■	
2. Inwater work[1]												
3. Lookingglass Operation	■	■	■	■	■	■	■	■	■	■	■	■
Snake River Spring/Summer Chinook												
Adult immigration				■	■	■	■					
Adult holding					■	■	■	■				
Spawning								■	■			
Incubation	■	■						■	■	■	■	■
Emergence	■	■	■	■								
Rearing[2]	■	■	■	■	■	■	■	■	■	■	■	■
Juvenile emigration				■	■	■						
Snake River Fall Chinook[3]												
Adult immigration									■	■		
Adult holding									■	■	■	
Spawning											■	■
Incubation	■	■	■									
Emergence			■	■	■							
Rearing	■	■	■	■	■	■	■	■	■	■	■	■
Juvenile emigration			■	■								
Steelhead												
Adult Immigration			■	■								
Adult Holding			■	■	■							
Spawning				■	■	■						
Incubation				■	■	■	■					
Emergence						■	■	■				
Rearing	■	■	■	■	■	■	■	■	■	■	■	■
Juvenile emigration			■	■	■							
Bull trout												
Adult immigration[4]						■	■	■		■	■	
Juvenile rearing (subadults)	■	■	■	■	■	■	■	■	■	■	■	■
Juvenile emigration				■	■	■						

[1] No inwater work is proposed at this site
[2] Juvenile rearing use may be restricted from mid-July through August due to high water temperatures
[3] Fall Chinook occur in low numbers in the lower reaches of the system, but are likely extirpated in the vicinity of project sites
[4] Upstream and downstream migrations; Bull trout spawning does not occur near the Lookingglass Hatchery; resident bull trout may be present year round upstream of the facility

Water Gains and Losses

In a 2001 draft publication written by members of NOAA Fisheries' Habitat Conservation Division, "Protocol for Estimating Tributary Streamflow to Protect Salmon Listed under the

Endangered Species Act," (NMFS 2001b) mean monthly flow is used to generate "an annual flow schedule that mirrors the life stage needs of migrating, spawning, holding and rearing salmonids." For consistency with this protocol mean monthly flow is used to estimate impacts due to water diversions.

The permitted surface water diversion for Lookingglass Hatchery is shown in Table 4.2-16. Water management practices and fish production changes proposed for this program could potentially reduce the surface water demand from Lookingglass Creek. Proposed fish production changes include 250,000 Lostine stock (approximately 11,523 pounds) and 245,000 Imnaha stock (approximately 11,292 pounds) to be reared at the proposed Lostine facility. When the new production facilities are brought on line water needs at Lookingglass hatchery (based on the revised fish production program presented in the NEOH Project Step 2 Submittal, April 2004) may be reduced. A preliminary water budget for the facility (developed by the NEOH project Core Team) is presented in Table 4.2-16.

Table 4.2-16. Maximum surface water usage and preliminary water budget at Lookingglass Hatchery, and Lookingglass Creek mean monthly streamflow (cfs) (operated year round).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum Flow used	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0
Preliminary Water Budget (post project facility construction)	18.0	18.3	30.6	16.5	18.4	33.0	33.0	33.1	33.4	30.0	30.0	30.0
Mean Monthly Streamflows [1]	87.6	135	198	329	365	161	67.9	53.7	52.6	53.5	72.3	83.2

[1] Source: Gage No. 13324300, near Lookingglass, Oregon. USGS Waterdata website (http://waterdata.usgs.gov/or/nwis)

Water Quality

Minimal ground disturbance will occur with this project. Sedimentation into Lookingglass Creek is highly unlikely due to the limited amount of activity and the considerable distance of the action area to the creek.

No modifications to the existing Lookingglass Hatchery effluent treatment system are proposed. The proposed fish production program may reduce the amount of waste products generated at the facility if all proposed production program changes are implemented as less pounds of fish would be reared at the facility. Based on the currently permitted program and the proposed program a reduction of approximately 22,000 pounds could occur. Discharges of chemical and organic pollutants currently meet or exceed federal and state water quality standards and guidelines, and satisfy existing NPDES permit requirements. This condition would persist with implementation of the proposed program.

Operation of Fish Traps, Ladders and Weirs

No changes to the operation of fish traps, ladders or weirs is proposed by this project. Existing passage issues for salmonid species within Lookingglass Creek are not addressed as part of this project.

Proposed Lostine Adult Collection Facility

To assist in the analysis of impacts due to the Lostine River facilities, Table 4.2-17 shows when salmonid species would be present in the river in relation to project timing.

Table 4.2-17. Construction and operation timing and aquatic species presence near the Lostine Adult Collection Facility and the proposed Lostine River Hatchery sites.

Species / Event	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
Project Phase												
1a. Upland Construction Work – Lostine Adult Collection								■	■			
1b. Upland Construction Work – Lostine River Hatchery[1]	■	■	■	■	■	■	■	■	■	■	■	■
2. In-Water Construction Work							■	■				
3. Adult Collection Operation				■	■	■	■	■	■			
4. Lostine Hatchery Operation	■	■	■	■	■	■	■	■	■	■	■	■
Snake River Spring/Summer Chinook												
Adult immigration				■	■	■	■	■				
Adult holding				■	■	■	■	■				
Spawning								■	■			
Incubation	■	■						■	■	■	■	■
Emergence			■	■	■							
Rearing[2]	■	■	■	■	■	■	■	■	■	■	■	■
Juvenile Emigration				■	■	■						
Snake River Fall Chinook[3]												
Adult immigration									■	■		
Adult holding									■	■	■	
Spawning											■	■
Incubation	■	■	■									
Emergence			■	■								
Rearing	■	■	■	■	■	■	■	■	■	■	■	■
Juvenile Emigration			■	■								
Steelhead												
Adult Immigration			■	■								
Adult Holding			■	■	■							
Spawning				■	■	■						
Incubation				■	■	■	■					
Emergence						■	■	■				
Rearing	■	■	■	■	■	■	■	■	■	■	■	■
Juvenile emigration			■	■	■							

Bull trout												
Adult immigration[4]						■	■	■		■	■	
Adult holding[4]	■	■	■	■	■	■	■	■	■	■	■	■
Spawning[4]												
Incubation												
Emergence												
Juvenile rearing (subadults)	■	■	■	■	■	■	■	■	■	■	■	■
Juvenile emigration				■	■	■				■	■	■

[1]Primary buildings would be constructed from September – early January; major groundwork from April to November
[2] Juvenile rearing use may be restricted from mid-July through August due to high water temperatures
[3] Fall Chinook occur in low numbers in the lower reaches of the system, but are likely extirpated in the vicinity of project sites
[4] Upstream and downstream migrations. September bull trout spawning does not occur in the vicinity of the Lostine River facilities; resident bull trout may be present year-round upstream of the facility

Site Clearing, Facility Modification, Facility Construction and Ground Disturbance

Upland site disturbances may result from activities associated with bank disturbance, as discussed in the Channel Alterations section that follows. The construction of a floodproofing levee and fish ladder, including the use of fill and riprap would disturb upland soils and result in the removal or disturbance of approximately 360 linear ft of riparian vegetation on the left (west) bank of the proposed Lostine Adult Collection Facility site. Existing side channels that occur west of the proposed levee site would be French-drained under the levee for continued discharge into the Lostine. A temporary access road to the levee site would be required for construction equipment, impacting approximately 4,000 square feet (ft^2) of upland and wetland vegetation as previously discussed in “Existing Conditions.” Equipment operated instream or adjacent to the river would use synthetic hydraulic oil as recommended by NOAA Fisheries.

Construction activities may result in a temporary increase in sediment and runoff to the Lostine. However, the increase would be temporary and would not alter the channel configuration. Sediment that is not dispersed downstream will settle out and may cause increased impacts until a high flow event occurs and disperses and transport the sediment. To minimize sediment from entering the river implementation of BMPs (silt fencing, straw bales, plastic sheeting on exposed soils, etc.) would occur.

Channel Alterations

Most of the construction work would take place within the stream channel and adjacent stream banks. Instream work that would result in alterations to the existing channel includes the following:

- Removal of portions of the existing fish ladder
- Installation of a hydraulic velocity barrier and a new pool and weir-type fish ladder, trap and hopper for adult collection and fish passage
- Construction of a flood proofing levee along west bank
- Placement of channel protection (large rocks) in front of hydraulic barrier
- Replacement of existing bridge, including abutments

All instream work would take place in one construction season during ODFW's instream work window, identified as July 15 – August 15 (designed to allow steelhead emergence to be complete before in-water work begins).

Installation of the new fish ladder and associated trap would require the placement of a cofferdam using plastic liner tarps, ecology blocks and washed gravels and associated dewatering structures to isolate the construction area. The total estimated length of cofferdam required at this site is approximately 550 to 600 ft long by 10 to 15 ft wide depending on the stage of the river during construction. Portable pumps would maintain a dry work area. Pump discharge would be routed through an upland sediment basin prior to discharge into the Lostine downstream of construction site. Installation of the new ladder would occur on the west bank of the Lostine behind an existing riprap bank. Excavation of 8,000 – 10,000 square ft of the west riverbank would be necessary to install the new fish ladder.

Upon completion of the new ladder the cofferdam would be removed and the dismantling of the existing ladder's most downstream concrete sill and construction of the velocity barrier would be completed. River water would be temporarily diverted through the new fish ladder by cofferdamming at the upstream exit of the ladder to allow for this construction. The new fish ladder would be designed to handle above-average flows for the month of July to ensure that the entire flow can be routed through the ladder. Irrigation diversions upstream and downstream of the site would be maintained during construction.

Removal of the most downstream concrete sill would be accomplished with a backhoe-mounted jackhammer, followed by removal of debris with an excavator. Jackhammer use would produce noise and inwater vibration that may disrupt fish behavior or displace species both upstream and downstream of the area. The remaining sills would be kept in place and allowed to fill naturally with river bedload over time.

Installation of the flow velocity barrier would require the construction of concrete walls and the removal of up to 20 ft of the bank, including a small amount of existing riparian vegetation. The impact of riparian vegetation removal on shading habitat is expected to be minimal because the majority of canopy trees would remain in place and much of the area to be disturbed has been previously riprapped. Installation of the velocity barrier and levee would have minimal impact on river hydraulics, both upstream and downstream from the site. The proposed levee and velocity barrier would not affect the overall river hydrograph.

As previously discussed, a floodproofing levee, composed of fill and riprap, would be constructed on the west bank of the river, to protect the bank and site from damage during high flows and to minimize the sedimentation effects of bank erosion. Construction of the levee would isolate small side channels returning to the Lostine in this area. French drains would convey water to the Lostine River, but approximately 600 square ft of seasonal, intermittent refuge habitat for juvenile salmonids, including that for spring/summer Chinook and potentially bull trout, would be lost. The minor amount of habitat loss is not anticipated to impact the populations of listed species within the watershed.

During the construction period cofferdam placement and diversion of the river through the new fish ladder would result in a temporary reduction of available fish habitat. Diversion of flow is not expected to affect water temperatures. Cofferdamming activities have a temporary effect on sedimentation but subsequent flows would have the ability to scour away light deposits. Adult steelhead overwinter in the Snake and lower Grande Ronde and migrate up the Lostine in March and April, while juveniles emigrate in late spring (P. Sankovich, ODFW, pers comm., 10/1/02). While most adult steelhead would therefore not be impacted, kelts that may be migrating downstream following spawning may be affected by construction activities. Rearing juvenile steelhead move up and down the Lostine River all year, with pulses occurring in spring outside of the construction window. Both adult and juvenile Chinook utilize the Lostine during summer months when instream work would occur. Adult bull trout do not spawn in the immediate area; however adults do migrate upstream from June through August, during the proposed instream work window. Bull trout smolt emigration occurs in late spring (April through June) and late fall (October through December), and would not be impacted by instream construction. Delays to Chinook and adult bull trout passage may occur both upstream and downstream of the site due to the presence of the cofferdam and rerouting of river flow. Construction areas would be monitored daily, by visual inspection, to ensure that salmonid passage is not prevented.

Operation of Water Intake and Outfall Structures

No intake or outfall structures are proposed for the Lostine Adult Collection Facility.

Water Gains and Losses and Water Quality

Water losses and gains would remain the same as the existing conditions after installation of the new fish ladder, levee and flow velocity barrier. However, during periods of low flow (September, near the end of operation), all river water in excess of that required by irrigators would be diverted through the fish ladder (the Ogee weir crest would control the water surface elevation and allow for continued diversion of irrigation water). This could potentially impact species within this reach, including late-run spring/summer Chinook, as usable habitat would be altered for a short river segment, approximately 75 ft.

No anesthesia or chemical therapeutants would be utilized in the trapping operations. Sediment and debris build-up in the fish ladder would be removed and disposed of at appropriate upland locations.

Operation of Fish Traps, Ladders and Weirs

Construction of the ladder facility is anticipated to improve passage conditions compared to existing conditions. The ladder and weir would be visually inspected daily during the trapping season for fish passage delay, or debris accumulation. During the first year after construction periodic visual inspections of the ladder would be made to verify that the new structure is not causing migrational delays to any species. Behavior may be altered as some fish may be delayed in seeking the ladder entrance, however, attraction flow should minimize disruption of upstream movement by allowing fish sufficient flow and depth for migration. Passage of adults would be improved using the new ladder system as opposed to the existing system that operates ineffectively in periods of low flow. Juveniles, if they are present at this time, will seek the main flow of the river and will pass downstream through the ladder. Some temporary delay may occur as fish encounter the ladder structure but it is anticipated that flows would sweep them through the ladder for continued migration.

The Lostine Adult Collection Facility would be in operation during times of high flow, April through August 1, and the trap would be checked daily. The existing Chiwawa style weir, located approximately seven mi downstream of the facility, would continue to be used in times of low flow (mid-July through October 1). The usage times of these structures therefore overlap by a period of two weeks. Monitoring by trap operators during this period would be critical to avoid double handling of fish, first at the Chiwawa weir, then at the upstream Adult Collection Facility. Fish collected at the facility would be transported by tanker truck approximately four mi upstream to the proposed Lostine River Hatchery.

The fish ladder, trap and hopper at the Adult Collection Facility would be equipped so that managers may collect returning hatchery adults on an as-needed basis. The take rate within the Lostine River is based on a sliding scale, based on the number of returning adults in that season. The exit from the ladder would be far enough upstream to prevent the majority of adults from dropping back over the velocity barrier, requiring them to pass through the collection system/ladder again. The removable trapping structure would be constructed with bars on the upstream side that would allow small fish (less than 1 -inch wide) to swim volitionally through the ladder and move upstream from the barrier. Fish larger than 1 inch in size, including non-targeted salmonids and residents, would be released from the traps and allowed to continue upstream within 24 hours of trapping. At the end of adult collection, the trapping equipment would be removed and the structure would function only as a ladder for fish passage.

Trapping, holding, weighing, measuring and tagging trapped fish could result in some mortalities, but occurrences are anticipated to be isolated and not expected to impact populations within the river. A Monitoring and Evaluation (M&E) Plan has been prepared for the project (Hesse and Harbeck 2004). Associated consultation with the Independent Scientific Review Panel (ISRP) is a requirement for funding with BPA. The ISRP recently completed review of the M&E Plan and comments were positive (See Chapter 5). M&E programs are also included within the program's existing Section 10 permits.

A potential risk of the velocity barrier is a change in the habitat utilization of spawning salmonids. The velocity barrier has the potential to impede or delay spawning migrations of bull trout and Chinook and potentially cause fish to spawn below the site. There is limited available spawning habitat downstream; most of the prime spawning habitat is located upstream. However, the velocity barrier is anticipated to enhance fish passage for all species over a wider range of river flow conditions compared to existing conditions. To minimize outmigrant effects, the flow velocity barrier would maintain a pool depth of 3 ft and river flow would pass through the ladder. Daily monitoring of the barrier during trapping is a mitigation measure to protect fish species. Additionally, cleaning of the barrier and checking downstream areas for congregating adults would be necessary. Close monitoring of spawning distribution above and below the barrier through redd counts would be included in the NPT's on-going annual spawning surveys. Adjustments to adult collection strategies would occur if a change in adult distribution becomes a problem (BIA 1998).

Reasonable and prudent measures to minimize harassment to species, in particular bull trout, at all NEOH facilities will include minimal handling and observation of fish condition. During the course of collection, if bull trout appear to be delayed in migration, or injured or dead bull trout appear in the trap, operators will immediately notify the Snake River Basin Office of the USFWS to review the need for modification to reasonable and prudent measures.

Lostine River Hatchery

Site Clearing, Facility Modification, Facility Construction and Ground Disturbance

Construction and grading activities would disturb the ground and add approximately 1.9 acres of impervious surfaces to the main hatchery site, which may lead to increased or rerouted runoff and sediment carried into the river. Construction of the compressor building and access road at the intake location would disturb approximately 0.06 acres of upland and riparian vegetation. Installation of the water supply pipeline, effluent return pipeline and de-icing pipeline (all buried) would disturb upland vegetation and would likely require the removal of several trees. Disturbed areas would be revegetated once the pipes are installed. Most upland construction activity would occur away from the river channel and would be managed by the use of erosion control devices, removal of the least amount of vegetation possible and revegetation of the site immediately following construction.

Some activities may temporarily affect fish behavior and individual distribution during the construction phase. These affects are anticipated to be minimal and short-lived.

Channel Alterations

The Lostine River channel would be affected by the installation and placement of the following facility components:

- Pneumatically-controlled weir diversion structure and downstream protection (the pneumatically-controlled weir would be installed to control surface water elevation and provide adequate water depth to the intake screens)
- Intake structure with log boom, screens, baffles and pipelines (water supply, effluent return, de-icing pipelines)
- Fish ladder and sluiceway
- Hatchery outfall structure and associated bank riprap
- Riprap on side channel at hatchery facility location
- Bank protection maintenance on mainstem near the north well location

Construction and installation of in-water structures would take place over two seasons during ODFW’s instream work window, identified as July 15 – August 15. During the first season, the intake structure, east bank weir abutment and sill portion, sluiceway, fish ladder and associated pipelines would be installed. In the second instream work season, the west bank weir sill and abutments, as well as the outfall structure would be constructed.

The surface water intake, sluiceway and fish ladder would be a cast-in-place concrete structure located on the right (east) bank of the river. The intake structure would be screened to meet NOAA Fisheries screening criteria. Installation of the intake/ladder and east bank weir components would require construction of a cofferdam and the use of a dewatering system. During the first instream work window, the cobbles (approximately 22.5 ft by 15 ft area) that will protect the eastern portion of the weir sill will be placed on the river bottom within the intake/ladder cofferdam. Preliminary design details assume a cellular type of cofferdam 150-170 ft long, by approximately 12-15 ft in width would be required. A cellular cofferdam is a structure of interlocking steel sheet piling to make a self-sustaining cofferdam with separate inside and outside walls. Fish passage would be maintained in the western half of the river. Approximately 100 ft of the riverbank would be removed for the placement of the intake structure, east bank weir abutment, sluiceway and fish ladder. Bank protection in the form of large cobbles (10 ft by 15 ft) would be placed instream to stabilize the river channel around the intake and to minimize sedimentation. Upon completion of the intake, eastern weir components, and the ladder the cofferdam would be removed.

During the second instream work window, the western portion of the weir, including the abutment and the sill, and the inflatable bladder would be installed in the dry utilizing a plastic liner and ecology block cofferdam (60 ft long by 30 ft wide). Large cobbles (15 ft by 22.5 ft area) would be placed on the river bottom within this cofferdam to help stabilize the substrate and the weir.

Construction of the hatchery outfall structure would require the use of a cofferdam, estimated to be approximately 50 ft long and 12-15 ft wide. This cofferdam will likely consist of stacked ecology blocks with a plastic liner. Construction would require excavating approximately 150 cy of bank material. Approximately 35 cy of basin cobbles would be placed around the outfall to stabilize the structure and prevent erosion and sedimentation. The substrate within the side channel is slightly scoured and less than 50 percent vegetated, indicating relatively low flows. However, the maximum outfall would not exceed 20.7 cfs, which is well within the channel’s capacity (M. McMillen, MWH, pers comm., 9/25/02).

To protect the proposed hatchery from flooding events that may cause bank erosion approximately 310 ft of fill and riprap would be placed upstream and downstream within an existing meander side channel. The riprap would be placed stream-side of existing vegetation, although some herbaceous plants may be impacted. Riprap has the potential to preclude lateral movement of the channel, resulting in a decrease of the channel’s heterogeneity, decreased erosion leading to a decreased input of spawning gravels and a decrease in undercut bank habitat. However, the amount of riprap to be installed is relatively small and usable rearing habitat is of low quality in the area. Therefore, riprap placement is not anticipated to affect flow or habitat utilization.

Although the riverbank adjacent to the most northern well has been stabilized, this portion of the bank is prone to erosion and periodic maintenance to the bank protection may be necessary for flood protection and erosion control. Maintenance work would impact weedy herbaceous vegetation that does not currently function as shading habitat.

During construction, fish that inhabit the immediate area, including juvenile salmonids, may be displaced. Some mortality may occur, but is not anticipated, during dewatering activities. Juvenile bull trout would likely be farther upstream in July to avoid warm river temperatures, although both adult and juvenile bull trout are known to use this stretch of the Lostine in the summer. As discussed in the Lostine Adult Collection Facility construction section, passage of migrating bull trout and Chinook may be temporarily delayed during the July instream work window. Locally spawning Chinook generally do not enter the area until later in the summer, but juvenile Chinook are known to use this stretch of the Lostine in the summer. Summer steelhead complete spawning by July, and kelts may be impacted.

Alterations of river hydrology due to placement of instream structures may occur, but would affect minimal amounts of habitat and are not anticipated to affect flow or river geomorphology. Rerouted water flow during construction is not anticipated to affect ambient water temperatures. Long-term impacts are unlikely, but may include behavioral modifications and changes in the distribution of individual fish due to changes in upstream and downstream hydrology.

The amount of riparian vegetation to be removed at the intake, outfall and side-channel floodproofing sites would be limited to the least extent possible. Riparian vegetation at the side channel floodproofing location is limited to low-growing shrubs and herbaceous vegetation, which do not provide significant shading benefits. A limited number of trees may be removed from the intake and outfall location. Reduction in shading or overhanging vegetation is anticipated to be minimal. Fish would likely relocate to areas adjacent to the project site that have suitable riparian vegetation cover.

Operation of Water Intake and Outfall Structures

Proposed intake and outfall structures would be fixtures within the Lostine River for at least the 20 to 25 year duration of this project. Impacts due to construction of these structures were discussed in the *Channel Alterations* section above. This section will discuss operational impacts of these structures.

Intake and outfall structures at the Lostine River Hatchery would operate year-round. To minimize potential impacts, the proposed intake structure would be screened, meeting NOAA Fisheries juvenile salmonid screening criteria (NMFS 1996b).

Operational scouring at the hatchery outfall is not expected to be significant. River rocks occur under a thin layer of sediment and would provide a naturally-occurring non-erosive substrate at the outfall. To minimize potential impacts to listed species at the outfall, it would be equipped with 1” bar racks to prevent returning adults that may cue into the hatchery discharge from entering the pipe. It is anticipated that the velocity of the discharge would be too high for juveniles to enter the outfall pipe (M. McMillen, MWH, pers comm., 10/10/02).

Water Gains and Losses

The Lostine River Hatchery would operate year-round. Surface water requirements for the facility are shown in Table 4.2-18. Not included within the facility’s water budget is the flow required for operation of the fish ladder. Approximately 5 cfs is required for sufficient attraction flow. This flow would be diverted from the river through the ladder for 60 feet.

Diversion of surface water from the intake to the outfall structure would take place over a linear distance of about 3,200 ft. For an average year, there appears to be adequate flow in the Lostine River to accommodate hatchery demands, while leaving no less than 65 percent of the flow in the river. However, during dry and/or cold years, water demand of the hatchery may be 50 or 60 percent of the total flow in the river at the lowest flow periods.

Table 4.2-18. Surface water low flow and normal flow strategies, mean monthly streamflow, and historic low flows (cfs) for the Lostine River Hatchery.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Low flow[1] strategy	15.0	15.0	14.2	7.5	0.7	0.0	15.0	15.0	15.0	15.0	15.0	15.0
Normal flow strategy[2]	15.0	15.0	15.0	7.5	2.8	2.8	17.8	17.8	17.8	15.0	15.0	15.0
Mean Monthly Streamflows [3]	49.8	47.5	55.3	162	513	788	383	86.2	50.2	56.4	64.3	58.7
Historic Low Flow (year)[4]	15.0 (‘37)	14.8 (‘37)	16.3 (’55)	35.7 (’75)	203 (’77)	332 (’26)	59.7 (’77)	30.6 (’31)	23.0 (’31)	22.8 (’88)	14.7 (’36)	15.3 (’36)

[1]Low flow strategy: minimum water required to maintain fish during low river stages. This strategy would be employed when facility use exceeds 50% of instream flow (due to lower than average instream water availability) or when facility needs reduce instream flow to less than 12 cfs in extreme drought years.
[2]Normal flow strategy: provides an improved rearing/holding environment through higher turnover rates during normal instream flow years.
[3] Source: USGS Waterdata website (http://waterdata.usgs.gov/or/nwis). USGS Gage No. 13330000 on the Lostine River near Lostine, Oregon. Water years 1912- 2002.
[4] Year of occurrence

To provide adequate fish habitat and passage a minimum river depth of 0.8 ft would be maintained. Approximately 10 cfs is required (R2 Resources 1998) to achieve this depth, but to ensure passage a 20% buffer would be added and a minimum flow of 12 cfs would be maintained. The normal flow strategy would be used when less than 50 percent of instream flow is utilized by the hatchery and when the 12 cfs minimum flow is achieved. When the pumpback system is employed, redds within the diversion reach would be marked such that they could be relocated during surveys to determine if they are being dewatered as a result of hatchery operations. Hatchery water requirements could be modified to allow more water through the diversion reach and protect redds to the extent practicable.

The pumpback system and/or low flow strategy would be employed to ensure that a minimum of 50% of the total flow remains in the Lostine River through the diversion reach; or a minimum of 12 cfs, whichever standard results in higher flow through the diversion reach. Flows would be measured at the hatchery headbox and compared to real-time surface water data from the USGS gage (#13330000) near Lostine, Oregon. Table 4.2-19 summarizes the percentage of water years on record when pumpback would be employed to: 1) maintain a minimum of 50% of the total flow within the diversion reach; and 2) maintain a minimum of 12 cfs in the diversion reach, as well as the average and maximum amount of water that would be returned to the intake via the pumpback station. It should be noted that the values in Table 4.2-19 are worst-case scenarios, and pumpback calculations were performed under the assumption that no water conservation actions are employed in the hatchery. Water conservation actions may include the use of on-site groundwater to supplement flows, lowering of raceway depth or implementing water reuse between banks of raceways. Under a reuse scenario, surface water withdrawals would be approximately half of those presented in Table 4.2-18.

Table 4.2-19. Estimated frequency and pumped back volume to maintain: 1) a minimum of 50% of instream flow within the diversion reach; and 2) a minimum of 12 cfs of flow within the diversion reach.

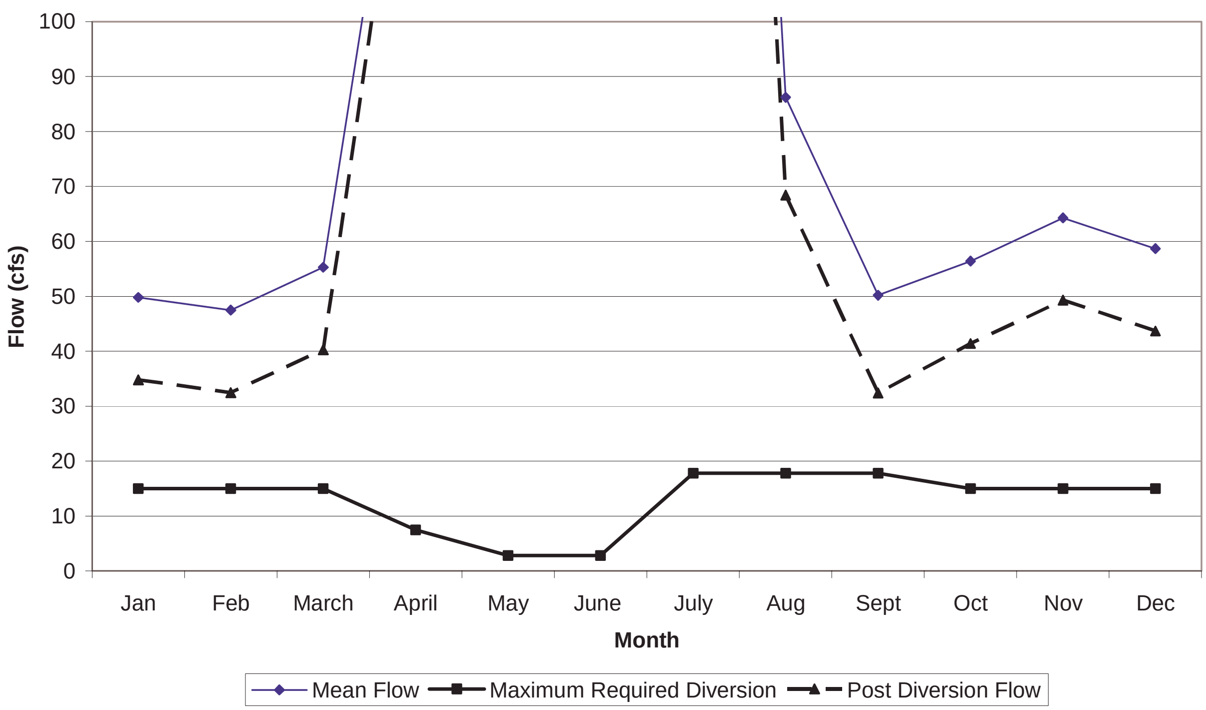
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Percentage of years on records that hatchery requirements would exceed 50% of the total Lostine River flow												
Estimated frequency of pumpback[1]	22%	27%	10%	0%	0%	0%	0%	3%	18%	14%	13%	16%
Percentage of years on record that would require pumpback to maintain a minimum of 12 cfs through the diversion reach												
Estimated frequency of pumpback	16%	17%	7%	0%	0%	0%	0%	0%	14%	8%	9%	13%
Mean pumpback required (cfs)	4.5	5.3	5.6	0	0	0	0	0	3.6	5.1	5.0	4.3
Max pumpback required[2] (cfs)	12.0	12.0	10.7	0	0	0	0	0	6.8	9.0	12.0	11.7

[1] Pumpback would be employed to maintain a minimum of 50% of total flow in the diversion reach.
[2] Note that a pumpback requirement of 12 cfs occurred in only three occasions over 79 years of data.

The prime Chinook spawning habitat occurs just downstream of the proposed hatchery, additional spawning habitat extends into the diversion reach (R. Zollman, NPT, pers comm., 9/25/02) and spawning Chinook and their redds could potentially be affected by low flows. Several bull trout redds have been observed within the diversion reach from late September to mid October (G. Sausen and P. Sankovich, USFWS, pers comm., 4/13/04) and could be impacted by low flows. Juvenile bull trout and rapid turnaround spawners may outmigrate in September, but would likely remain higher upstream until Lostine temperatures drop. Adult steelhead would be in the Snake or potentially arriving in the lower Grande Ronde during September for overwintering and would not likely be in the Lostine during that low flow period.

As shown in Table 4.2-18 and Figure 4.2-7, when average streamflows are at their lowest (January and February), recommended withdrawals of 15.0 cfs would occur. However, no Chinook, steelhead or bull trout spawning occurs at that time and juveniles, if present, would have sufficient water for rearing and migration. In September, when spring/summer Chinook spawning does occur, the average flow near the proposed hatchery location is 50.2 cfs. Recommended withdrawals of 17.8 cfs would result in minimum flows of 32.4 cfs through the bypass reach. According to the Instream Flow Incremental Methodology (IFIM) study performed at the hatchery bypass reach (R2 Resources 2002), approximately 44 percent of the maximum weighted usable area (WUA) of habitat is available for spring/summer Chinook spawning prior to any surface water withdrawals. The WUA is defined as the surface area of a stream weighted by its suitability to an aquatic organism, and can be predicted for different life stages of all salmonids in the Lostine River Hatchery project area. Maximum withdrawals of 17.8 cfs would create an approximate loss of 14-percent of available Chinook WUA habitat, leaving a total of 30 percent of the WUA for spring/summer Chinook spawning in the bypass area. This loss would occur during one month within the 3,200 ft diversion reach, of which the lower 1,400 ft is considered "good" spawning habitat by agencies participating in the IFIM field review (R2 Resources 2002). It is unlikely that the withdrawal would negatively affect the species on a watershed scale since the loss constitutes only 14 percent of a small reach of spawning habitat over two weeks. Negative impacts to adult migration are not anticipated to occur as adult Chinook can successfully migrate through and spawn in flows that maintain a minimum depth of 0.8 feet, which equates to 10 cfs (R. Zollman, NPT, pers comm., 4/12/04; R2 Resources 1998).

Figure 4.2-7. Mean Flow, maximum Required Diversion and Post-Diversion Flow for Lostine River Hatchery Site Intake to Outfall - Compressed Data



Adult bull trout and steelhead WUA would decrease slightly due to diversions during most summer months, however, no impact to migrations are anticipated as a result of withdrawals (R. Zollman, NPT, pers comm., 1/2/03). The withdrawals would negligibly impact rearing juvenile bull trout and Chinook, however, during the month of August, their WUA is actually higher at 40 cfs than at 50 cfs (R2 Resources 2002). Although this seems counter-intuitive, young juveniles prefer lower velocities and shallower depths because they require more energy to maintain their position in the water column when flows are higher. Refer to Appendices E-G for more details on WUA and water diversions as presented in the IFIM study.

Flows in the winter months are also a concern, since freezing temperatures and a lack of runoff can reduce river flows considerably. During these periods, water consumption at the hatchery can be reduced because fish activity and growth is near zero due to cold-water temperatures. In order to maintain adequate instream flows for salmonid passage within the bypass reach, the low flow strategy and effluent pump back system would be used. Freezing at this section of the Lostine River is an existing limiting factor for salmonid use during winter months. However, sections of the proposed Lostine River diversion reach are influenced by spring water and do not freeze (R. Zollman, NPT, pers comm., 9/25/02).

Based on the information presented above, flow alterations are not anticipated to adversely affect the viability of any fish population currently present, near or downstream of the Lostine River Hatchery at any time.

Water Quality

In 1991, measures for several parameters including alkalinity, ammonia, biochemical oxygen demand (BOD), nitrogen, oxygen, pH, phosphates, solids, temperature, and turbidity for the Lostine River were rated as “A” under the ODEQ rating system (ODEQ 1991). An “A” rating indicates that sampled parameter measurements are within the standards of ODEQ criteria. Effluent from the proposed facility may alter water temperature, pH, suspended solids, ammonia, organic nitrogen, total phosphorus, and chemical oxygen demand in the Lostine River’s mixing zone (Kendra 1991). Excessive amounts of discharged substances can combine with other conditions to cause adverse impacts to the aquatic environment. Through the Environmental Protection Agency’s (EPA) NPDES permit process, each state sets limits to specific discharged parameters to ensure that receiving waters are not overloaded with potentially detrimental amounts of substances that may adversely affect the environment, including plants, animals and water chemistry. Minimum monitoring requirements of the general NPDES permit for aquaculture facilities are presented in Chapter 5 – Monitoring and Evaluation.

Estimated effluent production at the facility for total suspended solids (TSS), phosphorus, ammonia, and BOD is shown in Table 4.2-20. Estimates were based on the program’s preliminary production plan (C. Beasley, FishPro/HDR, pers comm., 5/10/04).

As presented in Table 4.2-20, the estimated discharge of TSS is within the limitations of the general NPDES permit for aquaculture facilities that produce less than 300,000 pounds, administered by the ODEQ. The ODEQ does not set discharge limits for phosphorus, ammonia or BOD. However, samples taken within the Lostine River for ammonia (dissolved inorganic 0.040 mg/L), phosphorus (0.050 mg/L), and BOD (1.5 mg/L and 4 mg/L) all have received “A” ratings (ODEQ 1991). Estimated discharge of these parameters would be below values considered acceptable. By complying with acceptable values, the impact of this effluent on receiving waters and the aquatic environment is expected to be minimal.

Table 4.2-20. Waste product calculations for Lostine River Hatchery (operates year round).[1]

Month	Total Feed (lbs)[1]	Days Fed	Design Flow (gpm)[2]	Gallons per Day	Pounds per day TSS and SS[3]	Pounds per day Total Phosphorus[3]	Pounds per day Ammonia	TSS and SS mg/L	Total Phosphorus mg/L	Total Ammonia (mg/L)[3]	Total BOD[4] (mg/L)
January	1368	31	7181	10340640	13.24	0.34	1.690	0.15	0.0039	0.020	0.174
February	1585	28	7226	10405440	16.98	0.43	2.168	0.20	0.0050	0.025	0.222
March	3551	31	6732	9694080	34.36	0.87	4.387	0.42	0.0108	0.054	0.482
April	2428	30	3860	5558400	24.28	0.62	3.100	0.52	0.0133	0.067	0.593
May	1401	31	1032	1486080	13.56	0.34	1.731	1.09	0.0277	0.140	1.239
June	922	30	1301	1873440	9.22	0.23	1.177	0.59	0.0149	0.075	0.669
July	1731	31	7001	10081440	16.75	0.42	2.139	0.20	0.0050	0.025	0.226
August	4258	31	7046	10146240	41.21	1.04	5.261	0.49	0.0123	0.062	0.552
September	4794	30	7136	10275840	47.94	1.21	6.120	0.56	0.0142	0.071	0.634
October	2898	31	7181	10340640	28.05	0.71	3.580	0.33	0.0082	0.041	0.368
November	1683	30	7136	10275840	16.83	0.43	2.149	0.20	0.0050	0.025	0.222
December	1507	31	7181	10340640	14.58	0.37	1.862	0.17	0.0043	0.022	0.192

[1] Based on Draft Preliminary Production Plan – estimate only

[2] Design flow used in analysis is low flow strategy plus any groundwater use, which represents the minimum amount of surface water withdrawn for hatchery use. This strategy would result in the highest concentration of waste products. It is likely that the normal flow strategy would be used during most periods, resulting in greater dilution of effluent and a lower concentration of effluent in discharge.

[3] Calculations based on Castledine (1986) in Idaho Department of Environmental Quality (IDEQ) 1999

[4] Calculations based on Piper et al. 1992

BOD from bacteria and other microorganisms acting on organic matter can reduce oxygen levels, particularly if solid wastes are allowed to accumulate. Generally, BOD is not regulated for aquaculture facilities that produce less than 100,000 pounds of production per year. Facilities that produce less fish are not subject to BOD regulations based on proposed EPA regulations (67 FR 57871) because solids are not generally discharged, and the BOD in effluent water is considered negligible, with no substantial impact on the quality of receiving waters. As stated above, BOD measurements of 4.0 mg/L are considered acceptable according to ODEQ criteria. Predicted BOD from the hatchery based on the low flow strategy would be within these limits. Under the normal flow strategy, the predicted BOD would be well below acceptable levels.

Additionally, according to NMFS (1999), although "the level of impact [of hatchery effluent] or the exact effect on fish survival is unknown, it is assumed to be very small and is probably localized at outfall areas as effluent is rapidly diluted in the receiving streams and rivers."

During cleaning operations, effluent would be routed to a cleaning waste basin, where solid materials would settle, be collected, and then be disposed of in a local landfill or by other means of permitted disposal, such as upland application. The cleaning waste basin would be able to handle a flow of 1,000 gpm, which would allow cleaning two raceways at a time.

Discharge of residual amounts of chemicals would likely occur at the Lostine River Hatchery. Formalin and erythromycin would be used to prevent pre-spawning mortality and to control bacterial pathogens that can affect adult fish and their progeny. Formalin would be used to control fungal infections that, if left untreated, can result in pre-spawning loss. Formalin is a form of formaldehyde and breaks down quickly in water to form carbon dioxide and water molecules. Formaldehyde does not persist, bioaccumulate or biomagnify in the environment (www.dfw.state.or.us/public). Parasite-S, the U.S. Food and Drug Administration approved formalin product for aquaculture activities, requires a 10-fold dilution of discharge from finfish treatments prior to entry into natural waters. In completing the labeling requirements for Parasite-S, the Center for Veterinary Medicine analyzed environmental safety and concluded (through the preparation of an Environmental Assessment [EA] and amendments to the EA) that no environmental impacts are expected provided that treatment water is diluted 10-fold prior to discharge (100-fold dilution for egg treatments) (Western Chemical NADA 140-989, 1998). Discharge of erythromycin is anticipated to be non-detectable. Erythromycin would be administered by injection to adult salmon. Some amount of antibiotic is excreted by the fish, but the majority is absorbed into tissue. All therapeutants used would be administered according to label directions, under an Investigational New Animal Drug (INAD) permit or by veterinary prescription.

Juveniles reared at the hatchery would be fed prophylactic treatments of erythromycin for the prevention of Bacterial Kidney Disease (BKD). Discharge of drug is assumed to be non-detectable and the drug would be administered under coverage of an INAD. Chemicals used to prevent or treat fish diseases would be handled, applied, and disposed of in accordance with state and federal regulations.

Water discharged from the Lostine River Hatchery may be cooler than the receiving river water during July, August and September, since well water and chillers would be used to maintain incubation and early rearing temperatures in the hatchery below-ambient river temperatures. However, water released would mix rapidly with the river water downstream of the facility as "the temperature effects from point source discharges generally diminish downstream quickly as heat is added and removed from a waterbody through natural equilibrium processes" (EPA 2003). Diverted river water would be exposed to solar thermal gain, but would pass through the facility under constant flow. Therefore temperature changes are likely to be negligible and the facility would not introduce warmer discharge water into the Lostine River, or violate maximum temperature criteria presented in the EPA's *Region 10 Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards* (EPA 2003).

Water quality changes due to discharges at the Lostine River Hatchery may disrupt the behavior and distribution of individual fish immediately adjacent to and downstream of the outfall structure, but the overall impact is expected to be negligible.

Following fish health clearance, NPT biologists would return spawned salmon carcasses to the Lostine River for nutrient enhancement. This action is considered a benefit to increase the level of marine derived micro-nutrients essential to a healthy ecosystem (Cederholm et al. 2000).

Operation of Fish Traps, Ladders and Weirs

Upstream and downstream passage at the intake would be accommodated by a vertical slot fish ladder. This ladder would be designed to accommodate both juvenile and adult passage as appropriate to meet NOAA guidelines. The vertical slot ladder is designed to operate on 5 cfs flow supplied through river water, although it has the capacity to carry up to 15 cfs. Juveniles and adults would move through the ladder in periods of low flow, as up to 15 cfs could be directed through the ladder during those periods. The effluent pumpback system would return up to 12 cfs of intake-diverted water to the bottom of the ladder through a diffuser screen, under conditions as described in the previous **Water Gains and Losses** section. The velocity through the diffuser would be less than 1 ft per second (NOAA Fisheries juvenile screening criteria, NMFS 1996b), to prevent fish from being falsely attracted to the discharge. The proposed sluiceway adjacent to the fish ladder will be operated when necessary to pass sediment downstream of the weir. When flushing is necessary, the ladder will be gated off and passage may be temporarily delayed until flushing is complete (likely one to two hours). However, during high flow events when flushing is likely to occur, the weir would be submerged to allow passage. During spring runoff (high flood), the pneumatically-controlled weir would be submerged or level with the water surface, allowing fish to pass directly upstream or downstream over the weir.

As previously discussed, summer low flow occurs in September, when most migrating salmonids have passed the proposed Lostine River Hatchery site. Winter low flow periods, occurring primarily in February, may delay adult steelhead migration if low flow continues into March and April. However, steelhead begin to move upstream in response to higher flows, and would not likely be impacted by winter low flows. Downstream migrants, such as steelhead kelts, rapid-turnaround bull trout spawners and bull trout sub-adults, may temporarily collect at the weir as they search for passage (the fish ladder entrance). Spring/summer Chinook yearlings would move downstream in early summer, and passage is not likely to be affected.

Monitoring for passage efficiency at the new intake structure will occur in the first season of operation, and during any unusual flow scenarios (either extreme high or low flows). Monitoring of this structure is essential to assure impacts to fish species are not occurring as a result of this action. Visual observation of upstream and downstream migrants will be performed. Surveys would be performed daily in the vicinity of the intake and also in portions of the diversion reach. Corrective measures that ensure the survival of naturally reproducing adults must be immediately applied should passage problems occur with the weir. Corrective measures not specifically identified as part of the proposed action may include physical movement of migrants past the weir. Consultation with the USFWS and NOAA Fisheries would be required before physical movement occurs.

Imnaha Sites

To assist in the analysis of impacts due modifications at the Imnaha Satellite Facility and due to removal of the Acrow Panel Bridge at the Marks Ranch site, Table 4.2-21 presents system timing of salmonid species and their life stages in relation to project timing.

Table 4.2-21. Construction and operation timing and aquatic species presence in the Imnaha River near the Imnaha Satellite Facility and the Marks Ranch location.

Species / Event	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
Project Phase												
1. Upland Construction Work – Imnaha Satellite Facility only				■	■	■	■	■	■	■	■	
2. In-Water/Riparian Construction Work							■	■				
3. Satellite Operation			■	■	■	■	■	■	■	■		
Snake River Spring/Summer Chinook												
Adult immigration				■	■	■	■					
Adult holding					■	■	■	■				
Spawning								■	■			
Incubation	■	■						■	■	■	■	■
Emergence			■	■	■							
Rearing	■	■	■	■	■	■	■	■	■	■	■	■
Juvenile Emigration				■	■	■						
Snake River Fall Chinook[1]												
Adult immigration									■	■		
Adult holding									■	■	■	
Spawning											■	■
Incubation	■	■	■									
Emergence			■	■	■							
Rearing	■	■	■	■	■	■	■	■	■	■	■	■
Juvenile Emigration			■	■								
Steelhead												
Snake River Adult			■	■	■	■						
Snake River Juvenile	■	■	■	■	■	■	■	■	■	■	■	■
Bull trout												
Adult[2]						■	■	■		■	■	
Juvenile rearing	■	■	■	■	■	■	■	■	■	■	■	■

[1] Fall Chinook occur in low numbers in the lower reaches of the system, but are likely extirpated in the vicinity of project sites

[2] Upstream and downstream migrations; September bull trout spawning does not occur in the vicinity of the Imnaha River sites; resident bull trout may be present year round upstream of the facilities

Acrow Panel Bridge Site at Marks Ranch

Site Clearing, Facility Modification, Facility Construction and Ground Disturbance

Removal of the bridge would temporarily disturb riparian banks due to necessary positioning of dismantling machinery, including one skid-steer loader and a crane, both of which would traverse the river two times total (one to cross the river, one to return). The crane would lift the panels and swing the bridge to an upland pasture on the east bank of the river. Following bridge removal, the existing bridge abutments would be removed via saw cutting and lifted by crane to the east bank of the river. Once the abutments and bridge are removed, the crane would be removed from the channel via winching through an area adjacent to the east bank abutment location. The entire bridge removal would likely take place in less than one week, with panel and abutment removal occurring in one to two days, and complete dismantling, loading and transportation off site requiring another three days. Existing County roads are sufficient to transport the bridge off-site once it is removed.

No trees are anticipated to be removed during bridge dismantling, although some shading shrubs may be removed. Disturbed areas would be relatively minor and revegetation (hydroseeding and native shrub replacement where necessary) is planned following the removal of the abutments, impacts to riparian vegetation are anticipated to be minimal. Revegetation would result in a small gain of riparian vegetation. Instream shaded habitat created by the temporary bridge would be permanently lost at this location.

Channel Alterations

But for the existing Acrow bridge, there is no river crossing in the immediate vicinity of the site. Once the abutments and bridge panels are removed, construction equipment that was used on the west bank of the river would need to be returned to the east bank to access the main road (Imnaha River Road). In order to accomplish bridge and abutment removal, a skid-steer loader and crane would be driven across the riverbed to reach the other side. This activity would occur during ODFW’s instream work window of July 15 through August 15. Because instream flow is relatively low at the end of the work window and the river would be crossed in a matter of minutes, the need for dewatering is not anticipated at this location. Prior to crossing the river, biologists would observe the reach to ensure that fish are not present during this period. Fish will likely leave the area during dismantling and therefore should not be impacted during the one to two day removal period.

No measurable alterations to the channel bed are anticipated due to two single passes of construction equipment across the river. The existing abutments are slab on grade structures 20 feet long, 6 feet wide, and 1.5 feet thick. Saw cutting to remove the structures would require a professional saw cutting contractor using a 4 foot diameter blade, which would be water cooled. Plastic tarps would be placed around the slab and sandbagged to create a water tight temporary containment structure to catch blade cooling water and concrete materials, as well as to prevent sedimentation into the river. It is likely that the abutment slabs would be cut into 4 pieces, each of which would be removed via crane and hauled off to an approved upland location. Upon completion of activities, debris and particles would be removed from the containment area and the site restored with native riparian vegetation. Because work will take place in the dry with BMPs established to prevent sediment from entering waters, no changes to pH will occur as cured concrete is removed.

The majority of salmonid spawning takes place upstream of the Acrow bridge removal location and therefore spawning salmon would not likely be affected during removal activities (R. Zollman, NPT, pers comm. 9/25/02). Adult steelhead would not likely be present in the area during bridge removal and are not likely to be affected by activities. Late season bull trout migrants, both upstream and downstream, could be affected during the instream work window, depending on water temperatures during the construction year. Juvenile salmonids may potentially occur within the removal area during activities, although they are more likely to be higher upstream due to high water temperatures in August at the construction site. Interruption of spring/summer Chinook migration and delays to bull trout may occur due to removal activities, although impacts are anticipated to be limited since the activity would take place over a very short duration (likely one day) and would occur during designated instream work windows that are designed to avoid impacts to migrating species.

Water Quality

As recommended by NOAA Fisheries Engineering, construction equipment operating instream (while driving equipment across the river) or adjacent to the river would use synthetic hydraulic oil. All equipment would be free of petroleum or hydraulic fluid leaks and would be serviced outside the riparian corridor. Therefore, no adverse impacts to water quality are anticipated due to use of construction equipment.

BMPs to protect the river from sedimentation due to placement of removal equipment within the riparian zone should minimize any impacts to water quality.

Imnaha Satellite Facility

Site Clearing, Facility Modification, Facility Construction and Ground Disturbance

The construction of and modifications to facility structures would take place within the existing site boundary, with approximately 0.1 acres of added impervious surface. Construction would remove seven ornamental trees that have been planted on the existing lawn. These trees are not adjacent to the river and do not provide shading habitat. No riparian vegetation would be disturbed. The 650-ft surface water supply pipeline would be installed under a gravel road that currently covers the existing intake pipeline. Where appropriate, disturbed sites would be revegetated upon completion of construction.

Runoff from construction activities would be contained away from the river, and minor sedimentation is not anticipated to exceed the river's capacity to carry sediment downstream. Erosion during construction is expected to be short-lived and runoff control devices such as silt fences and straw bales would be implemented or other typical erosion control BMPs implemented.

Activities may alter the behavior and distribution of fish in the area, but these impacts are short-lived and are not expected to affect long-term use, passage, abundance or distribution of fish.

Channel Alterations

Proposed instream activities include:

- Expansion of the surface water intake structure and upgrades to existing screens to meet NOAA fisheries juvenile screening criteria
- Installation of a hydraulically operated weir and fish barrier
- Installation of diffuser chamber and auxiliary water supply line to supplement attraction flow in the existing ladder

The maximum surface water requirement (20.3 cfs) for the proposed facility modifications exceeds the capacity of the existing intake structure (9 cfs). Therefore, another intake is proposed to provide an additional 11.3 cfs of surface water. The existing intake screen would also be upgraded to meet NOAA Fisheries screening criteria (NMFS 1996b).

Installation of the new intake structure and upgrades to the existing screen would require the use of a cofferdam (35-45 ft long and 10 ft wide, assuming the cellular approach) and dewatering pumps. Installation would require disturbance of approximately 30 ft x 30 ft of bed and bank upstream of the existing intake. The submersible dewatering pumps would route water through the existing intake pipeline, to the existing raceway that may be utilized as an on-site sediment basin and through the outfall pipe that discharges water at the current fish ladder entrance. The construction area would be limited to the riprap portion of the banks and would not disturb riparian vegetation. Disturbed soils may create minor sedimentation in the river during cofferdam removal.

Approximately 100 cy of riprap are proposed to stabilize the intake upstream of and at the structure. Riprap would be placed stream-side of existing vegetation and is not expected to impact riparian vegetation or shading habitat. The addition of this riprap may slightly alter the hydrology of the river in the area, potentially causing modifications to habitat use. Suitable habitat for spawning and juvenile rearing occurs in surrounding areas and fish would likely relocate to areas immediately upstream or downstream of the structure.

The proposed action would replace the existing weir with a hydraulically operated weir, with modifications to the existing abutments on both sides of the weir and on the existing concrete sill. The installation of this weir would require the use of a cofferdam. Construction would take place where the existing weir and concrete sill are currently located. The cofferdam required for the weir installation is estimated at 600-850 ft long and 12-15 ft wide using a cellular approach. This method requires the sequential installation of two sections of the cofferdam. The first section would be installed on one side of the river, within which construction of one side of the weir would take place. Following completion of that portion of the weir, the cofferdam would be removed and re-installed on the other side of the river to allow construction of the remaining portion of the weir. The head wall construction for each side could be included in the weir installation for that side. The existing concrete wall on the right bank would be maintained and a new vertical wall would connect to it. Because spring/summer Chinook spawners could be present at the time of instream work, a portable picket weir would be installed slightly downstream of the weir location to direct adults into the fish ladder for collection or upstream passage. The placement of a cofferdam and the temporary picket weir within the active river channel has the potential to affect fish behavior and habitat as river hydraulics are influenced and minor sedimentation created. Impacts are anticipated to be short-lived (one season), and migrational adults will be monitored during construction for adverse impacts.

An auxiliary water supply pipeline intended to augment the attraction flow of the existing fish ladder would be installed behind an existing concrete wall, along side the ladder. Construction timing would coincide with the weir installation. Because the supply line would be installed behind the concrete wall, the existing fish ladder would operate during construction. Riprap would stabilize the pipeline entrance.

Construction would occur during ODFW's instream work window of July 15 through August 15. Construction of instream structures would temporarily delay migrant fish passage. Adult Chinook generally spawn immediately adjacent to the construction area beginning in mid-August (R. Zollman, NPT, pers comm., 10/16/02; B. Smith, ODFW, pers comm., 10/16/02), but migrants and potential early spawners, however unlikely, could be impacted during construction. Construction activities would, therefore, interrupt migration and spawning of those adult spring/summer Chinook that are not needed for broodstock and are passed upstream for natural spawning. Juveniles that may rear in the area could be impacted.

Migrating bull trout are routinely captured at the Imnaha Satellite Facility between June and September (Buchanan et al. 1997), with most individuals passing upstream of the facility by late August. Delays to migrating bull trout may therefore occur during the early stages of in-water construction activities if migrants are late to move upstream. Delays to subadult bull trout emigration are not expected because the majority of individuals move downstream during late fall, outside of the instream work window.

Adult Imnaha steelhead are early spring spawners and would not likely be impacted by in-water construction. Kelts emigrate to the ocean soon after spawning and would not be affected. Steelhead juvenile emigrants move out of the Imnaha in spring and are not likely to be affected by instream work. However, younger juveniles may move upstream and downstream within the Imnaha and its tributaries during summer and fall and could use the construction area for rearing.

Instream construction of the weir during the current ODFW window would impact the passage of adult spring/summer Chinook, potentially stressing individuals. During construction, fisheries biologists would perform daily discrete bank surveys to determine if migrants are being delayed or impacted. If adverse impacts or delays occur during construction, facility managers would consult with the regulatory agencies to develop a plan to minimize adverse impacts.

Operation of Water Intake and Outfall Structures

The expanded intake will meet NOAA Fisheries screening criteria.

Water Gains and Losses

Proposed surface water withdrawals of 9.6 cfs would be diverted from the river for juvenile acclimation and release during March and April, and 20.3 cfs would be diverted during adult collection and holding (June – September 30). Table 4.2-22 and Figure 4.2-8 present the maximum surface water withdrawals for the facility in comparison to the instream flows.

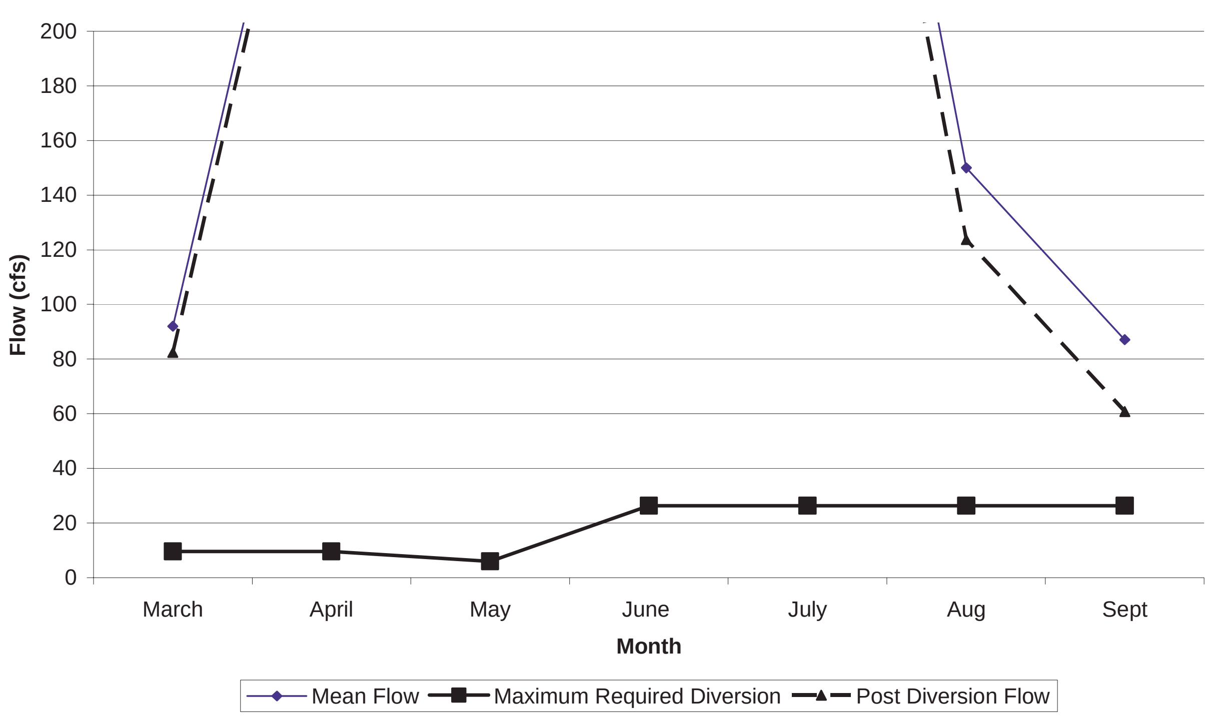
An additional 6 cfs is currently used and would continue to be required during adult collection to operate the adult recovery by-pass pipeline system. During adult collection, a second separate intake is operated at a location approximately 800 ft downstream from the existing surface water intake (130 ft upstream from the existing weir). This intake feeds a fish return channel with a maximum water right of 6 cfs and is operated only when adults are migrating. The intake diverts water into a channel with a 21-in. flow return pipe extending from the fish recovery area to a discharge location just upstream from the weir. When adult sorting occurs at the adult trapping and holding facility, fish not selected for broodstock are placed in a 12-in. PVC return tube and routed to the fish recovery area. From this area, the fish hold until recovered, then swim volitionally back to the Imnaha River and on upstream.

Table 4.2-22. Surface water requirements per usage, mean monthly stream gage flow, and historic low flows for the Imnaha Satellite Facility (cfs)[1].

	Mar	Apr	May	Jun	July	Aug	Sept
Usage							
Acclimation water	9.6	9.6					
Adult collection[2]				1.8	1.8	1.8	1.8
Attraction flow				20.3	20.3	20.3	20.3
Operation of adult bypass line[3]			6.0	6.0	6.0	6.0	6.0
Total surface water required	**9.6**	**9.6**	**6[4]**	**26.3[4]**	**26.3[4]**	**26.3[4]**	**26.3[4]**
Mean monthly streamflows	92.0	341	804	859	453	150	87.1
Historic Low Flows (year)[5]	65.1 (1952)	201 (1950)	513 (1950)	636 (1947)	236 (1949)	99.6 (1949)	64.4 (1949)

[1]Source: USGS Waterdata web site (http://waterdata.usgs.gov/or/nwis); gage located above Gumboot Creek, upstream of facility. Water Years 1944 – 1953.
[2] Adult collection flows are also utilized as attraction flow and not additive to attraction flow requirement.
[3] Adult bypass water (6 cfs) is existing usage; limited diversion reach
[4] Includes 6 cfs for adult recovery bypass line during adult collection activities.
[5] Year of occurrence

Figure 4.2-8. Mean Flow, Maximum Required Diversion and Post-Diversion Flow for Imnaha Satellite Facility Intake to Outfall - Compressed Data



Bull trout adults move upstream past the Satellite Facility in June through August. They emigrate with subadults in the fall when water temperatures in the lower Imnaha decrease. The amount of water diverted from the intake to the outfall is not expected to affect bull trout usage because low flows occur later in September when bull trout are upstream of the Satellite Facility. Additionally, water would be diverted along approximately 1,000 ft of river reach and is not expected to impact hydrographs at that time of the year and bull trout can successfully migrate through minimum depths of 0.6 feet (P. Sankovich, USFWS, pers comm., 4/13/04).

Adult steelhead migrate up the Imnaha in March through April, and juveniles emigrate later in the spring. Because instream flows during those periods are relatively high, no impacts to migrating steelhead (adult and juvenile) are anticipated due to facility withdrawals.

It is anticipated that the weir will catch 100 percent of the spring/summer Chinook run through September 30. Managers will collect a portion of the run for broodstock. All other spring/summer Chinook would be passed upstream of the trap to spawn naturally in the Imnaha River. A prime spawning area occurs just upstream of the existing facility, within the proposed diversion reach. Spawning and migrating spring/summer Chinook that are passed upstream may be impacted by low flows; however, the amount of water that will remain in the river is more than suitable to facilitate passage of Chinook. During extreme low flow years the amount of attraction water required could be reduced to help compensate for in-river conditions .

About 100 gpm of pathogen-free well water would be required for operations. An existing on-site well has been shown to produce 350 gpm during low flow periods with no river draw-down (M. McMillen, MWH, pers comm., 9/25/02, 4/16/03). Therefore, there would be no depletion of river water quantity due to groundwater use at the Imnaha Satellite Facility.

During historic low flow events (i.e.: drought conditions), as shown in Table 4.2-22, the habitat available for salmonids would be limited regardless of facility requirements. At these times, if salmonids are adversely affected by withdrawals, required flows would be adjusted to the minimum necessary to maintain facility operations. However, even during historic low flows, it appears that the remaining instream habitat would be adequate to support migrating and spawning salmonids as Chinook have been observed spawning successfully in 30 cfs (R. Zollman, pers comm., 9/25/02). Bull trout and steelhead can successfully migrate through 0.6 feet of water at 8 feet per second (fps) (P. Sankovich, USFWS, pers comm., 4/13/04), conditions that would easily be maintained within the diversion reach, even during extreme low flows at the site. Therefore, no specific evaluative programs in excess of reasonable and prudent measures to minimize impacts to species are planned to monitor passage conditions. At the Satellite, reasonable and prudent measures to minimize harassment to non-target species (i.e.: residents, bull trout, steelhead) include minimal handling (adults sent through bypass line, not physically moved past the weir) and observation of fish condition. During the course of collection, if unusual numbers of bull trout appear in the holding pond or against the weir, or unusual numbers of injured or dead bull trout appear in the holding pond or near the weir, operators will immediately notify the Snake River Basin Office of the USFWS to review the need for modification to reasonable and prudent measures.

Water Quality

Discharges of chemical and organic pollutants at the Satellite Facility currently comply with federal and state water quality standards and guidelines. This compliance would continue after modifications are made at the facility. The current and proposed production program is under the threshold limit requiring an NPDES permit. Estimated effluent production at the facility for TSS, phosphorus, ammonia, and BOD was based on the preliminary production plan and is shown in Table 4.2-23.

Table 4.2-23. Waste product calculations for Imnaha Satellite Facility (fish on-site March through September).[1]

Month	Total Feed (lbs)[1]	Days Fed	Design Flow (gpm)[2]	Gallons per Day	Pounds per day TSS and SS[3]	Pounds per day Total Phosphorus[3]	TSS and SS (mg/L)	Total Phosphorus (mg/L)	Pounds per day Ammonia	Total Ammonia (mg/L)[3]	Total BOD[4]
March	118	31	4340	6249600	1.14	0.03	0.02	0.0006	0.146	0.003	0.025
April	321	30	4340	6249600	3.21	0.08	0.06	0.0016	0.410	0.008	0.070

[1] Based on Draft Preliminary Production Plan - estimate only; Adults on station through September will NOT be fed
[2] Design flow used in analysis is 9.67 for March through mid-April when juveniles will be fed. The additional 6 cfs for the adult bypass would not be in operation at this time.
[3] Calculations based on Castledine (1986) in IDEQ 1999
[4] Calculations based on Piper et al. 1992

Juveniles would be held and acclimated in the raceways for 30 to 45 days prior to release in March and April. No cleaning of the raceways would occur during this period. Under current operating procedures, following release of fish, the raceways would be cleaned by hand and disinfected prior to use for adults. No settled waste material would be released to the Imnaha River.

Estimated discharge of TSS would comply with ODEQ's discharge limitations for the parameter. As described in the Lostine River Hatchery *Water Quality* section, the ODEQ does not set limits for phosphorus, ammonia or BOD. Additionally, according to NMFS (1999), the impact of hatchery effluent on receiving waters is expected to be very small and is likely localized at outfall areas as effluent is rapidly diluted in the receiving waters.

Chemicals used to prevent or treat fish diseases would be handled, applied, and disposed of in accordance with state and federal regulations and would be diluted in accordance with label instructions.

All diverted water would pass through the facility under constant flow; therefore solar heating would be negligible. Therefore the facility would not introduce warmer discharge water into the Imnaha River or violate maximum temperature criteria presented in the EPA's *Region 10 Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards* (EPA 2003).

Operation of Fish Traps, Ladders and Weirs

Operation of the attraction-improved fish ladder would likely benefit targeted and non-targeted spring/summer Chinook and other species through improved attraction to the ladder and less migratory delay. The current ladder entrance does not allow for sufficient attraction flow, often resulting in downstream spawning of Chinook that would normally spawn farther upstream. No additional impact to species that currently use the ladder and trap is anticipated.

When in operation, the weir would provide the flexibility to lower individual panels to allow downstream passage of steelhead kelts and bull trout. The existing picket weir does not have these capabilities. The weir would also be equipped with 1.25-inch spacing between pickets to allow passage of juvenile salmonids, particularly bull trout. When not in operation, the new weir would lie flat under the water to allow downstream passage. A section on the left abutment would also be placed at a slightly lower elevation to support both upstream and downstream fish passage by providing a deeper channel for migration there. The weir would also operate effectively during high flow, thereby allowing better fish collection than the current weir.

For targeted spring/summer Chinook, the weir would be designed to route fish to the base of the fish ladder, facilitating safer and more efficient adult collection, which is an improvement over the current situation. Although no adverse impacts to listed species are anticipated during operations due to adequate year-round flow, on-site staff would continue to visually monitor fish collection and instream structures daily, especially during periods of low flow.

4.2.3 Facility Maintenance Impacts

Hatchery maintenance, handling, tagging practices, and fish health procedures for all proposed project facilities are discussed in the following sections.

Hatchery Maintenance – All Facilities

Sanitation practices that are currently in place at Lookingglass Hatchery and the Imnaha Satellite Facility would continue. Sanitation practices would also be implemented at the Lostine River Hatchery. Standard chemicals and dosages approved for hatchery applications would be used for equipment and rearing units. Argentyne, an approved iodine disinfectant, would be used for disinfection of nets, ponds, cleaning brushes, rain gear, boots and all sampling equipment. This iodine solution binds with organic compounds and is quickly broken down by exposure to sunlight to allow rapid detoxification. Disinfection solutions would not be directly discharged into surface waters.

Hatchery-spawned carcasses would be distributed throughout spawning reaches of the Lostine and Imnaha rivers for nutrient enrichment (BIA 1998). This would benefit both the terrestrial and aquatic species in the watershed that historically have used the carcasses to some advantage.

Pond cleaning would occur at the Lostine River Hatchery. Rearing units would be cleaned by vacuuming wastes collected on the floor of the raceways. Discharge would be in compliance with state and federal regulations and meet the requirements of NPDES permits.

In the unlikely event of flooding at any of the facilities, removal of deposited sediment may be required. Precautions would be taken to limit sediment discharge to the rivers during these activities. Measures such as silt fencing and straw bales may be utilized, among other means, to prevent sediment discharge to rivers during cleaning.

Material collected in the rock sluice on the surface water pipeline at the Imnaha Satellite Facility would be removed and deposed of at an USFS designated location waste/borrow site, or other appropriate locations.

Tagging Procedures

Tagging procedures are covered in existing Section 10 permits. Tagging procedures have been refined over the years to cause minimal stress and mortalities to juvenile salmonids. To further minimize potential stress to juveniles, only experienced personnel would participate in tagging operations.

Fish Health Management

There is little evidence to suggest that diseases are routinely transmitted from hatchery to natural fish (Journal of Aquatic Animal Health 1998; Miller 1990). Fish health monitoring and disease management procedures diminish the likelihood that natural populations would be affected by hatchery-origin fish diseases (BIA 1999).

One of the most prevalent pathogens for spring/summer Chinook in the Columbia Basin is BKD caused by the pathogen *Renibacterium salmoninarum* (Rs) (Elliot and Pascho 1999). Application of the following pathogen control measures would assure any possible project impacts are reduced to a minimum level based on best known disease control measures: antibiotic injections of hatchery pre-spawning adults to reduce the vertical transmission of the pathogen; iodophor disinfection of eggs; isolation incubation (individual female eggs per tray); 100% testing of females using Enzyme Linked Immunosorbant Assay (ELISA) for quantitative detection of Rs; culling of high and moderate positive egg lots (based on the ELISA results); and prophylactic erythromycin antibiotic feeding therapy of juveniles.

The Rs pathogen is vertically transmitted (from parent to progeny) so the removal of egg lots from females that test from moderate to highly positive effectively removes a source of the bacteria from the remainder of the population. Progeny from moderate to highly infected females have an increased likelihood of developing BKD, and through their removal from the population some protection is afforded to the remaining juveniles. These measures have been demonstrated to reduce the occurrence of clinical BKD (Amandi and Lindsay 2001; Onjukka et al. 2001). Release of fish with a lower prevalence of Rs from the Imnaha Satellite Facility and the Lostine River Hatchery would minimize any impacts to the naturally produced fish, and it is anticipated that over the long-term a reduction of BKD in spring/summer Chinook may occur.

Snake River steelhead experience a natural exposure to Rs within their migratory routes. Project activities are not likely to adversely affect steelhead, and may benefit the population by reducing the overall prevalence of Rs and exposure during early life history stages when fish are most susceptible to pathogens. Bull trout populations within the Imnaha and Lostine rivers also experience a natural exposure to Rs. Information on the susceptibility of bull trout to BKD is limited (Jones and Moffitt 2001). Laboratory challenges have demonstrated that infection can be induced artificially. It is anticipated that the BKD control measures of this project, including low density rearing, would reduce the prevalence of Rs in the spring/summer Chinook population and thereby would reduce the overall prevalence in the Imnaha and Lostine rivers and the potential exposure to steelhead and bull trout.

A minimum of 60 spawned fish would be sampled for culturable viruses using ovarian fluid and caeca/kidney/spleen sample pools not to exceed five fish per pool. In addition, weekly samples of ovarian and milt fluid would be collected from up to 24 individual fish. Juveniles would also be screened throughout the rearing period for pathogens.

Measures to control fungus on pre-spawning adult salmon include the application of formalin up to three times per week. No impacts to fish in the Imnaha and Lostine rivers from this disease control measure are anticipated. Discharge of formalin would be in compliance with label directions (see *Water Quality*).

Disease management policies and protocols including the Integrated Hatchery Operations Team policies (IHOT 1995), Pacific Northwest Fish Health Protection Committee (PNWFHPC 1989) fish health model program, and state and Tribal policies would be followed to ensure protection of the natural fish populations (BIA 1998). In addition to the measures listed above, implementation of disinfection and sanitation guidelines as part of the *Lower Snake River Fish and Wildlife Compensation Plan for the Grande Ronde and Imnaha Basins Annual Operation Plan* (ODFW et al. 2002) would occur to help minimize the spread of Rs and other pathogens that may occur in the hatchery program. More detailed descriptions of pathogen control techniques can be found in the *Lower Snake River Fish and Wildlife Compensation Plan for the Grande Ronde and Imnaha Basins Annual Operation Plan* (ODFW et al. 2002), *The Grande Ronde Basin Spring/Summer Chinook Program Hatchery and Genetic Management Plan* (HGMP; ODFW 2002a); and the *Lower Snake River Compensation Plan (LSRCP) Imnaha Spring/Summer Chinook Program HGMP* (ODFW 2002b).

4.2.4 Effects Determination for Listed Aquatic Species

Impacts to aquatic species including bull trout, steelhead, and spring/summer and fall Chinook may occur as a result of project construction and operational activities. Impacts may include disruption and delays to migration of adult and juvenile salmonids due to construction activities and the placement of new instream structures. Habitat loss may occur due to new withdrawals of surface water in the Lostine and Imnaha rivers at the facilities, although loss is anticipated to be minimal and is not anticipated to adversely affect populations over the long term. Operation of fish ladders and weirs may cause stress to individuals, but would not likely pose significant threats to populations within these systems. Based on these and other impacts discussed in the previous section and within Appendices E-G, the recommended effects determination for listed salmonids due to this project is Likely to Adversely Affect.

4.2.5 Estimated Take Levels for the NEOH Project

Take Due to Construction and Facility Modification Activities

Although it is difficult to estimate the number of fish that would be encountered during construction activities, lethal take due to construction is expected to be minimal to none. Harassment may occur to those fish that are in the immediate vicinity of in-water construction activities, but these effects would be temporary and short-term. Take would be minimized due to the use of BMPs to prevent sedimentation and constructing in-water structures during the approved in-water work windows for each river system. Vigilant monitoring of instream construction would take place, especially during periods of low flow, to ensure that listed species are not negatively impacted by the activities.

Take Due to Operational Activities

Direct or incidental take of adult bull trout are expected to occur through new project activities (Table 4.2-24). Lostine Adult Collection Facility weir operations (flow velocity barrier) as well as Imnaha Satellite weir operations would occur during the migratory period for bull trout. NPT trapping data indicate that adult bull trout have been captured during most seasons of operation at the Imnaha Satellite facility. The weir/trap will be checked daily by trap tenders. Procedures for trapping adults will follow existing protocols that have been developed based on coordination with co-managers, LSRCP Annual Operation Procedures, recommendations of the IHOT, and standard fish culture practices. These guidelines would be employed during trapping operations to minimize delay and handling should bull trout be encountered.

Take of listed spring/summer Chinook salmon would occur as previously authorized under the Section 10 (a) (1) (A) Direct Take Permit for the Lostine and Imnaha river components of the project (Table 4.2-24). A maximum of 185 (78 female) endemic Lostine River spring/summer Chinook, and 320 (160 female) endemic Imnaha River spring/summer Chinook would be collected yearly for a minimum of 20-25 years, or until adult replacement rates for the naturally spawned population component suggest that the population is naturally sustainable (Ashe et al. 2000). The expected duration of the NEOH program would be dependent on mitigation for the sources of mortality resulting in the initial decline of the stock. If these factors are not addressed, the NEOH project would probably operate over a much longer time scale. The goal of the program is to achieve an annual escapement of 2,000 adult Chinook salmon in the Imnaha (ESA delisting level) and 500 in the Lostine from natural production. The ESA delisting level for the Grande Ronde is 2,500 naturally produced adults of which the Lostine River spawning aggregate is a component. The Lostine River comprises approximately 20 percent of adult spawner capacity in the Grande Ronde River (Carmichael and Boyce 1986), therefore 20 percent of the delisting level was used as the natural production goal. This objective cannot be met until SAR survival averages 4 percent (Nemeth and Kiefer 1999). Long-term objectives are to maintain a natural self-sustaining population of 3,820 in the Imnaha and 1,716 in the Lostine River. The previously established estimated SAR rate necessary to achieve this objective averages 6 percent (Nemeth and Kiefer 1999).

Assuming current survival rates, the NOAA Fisheries delisting criteria for the spring/summer Chinook populations will likely be reached in approximately 20 years (4 generations) of supplementation (Ashe et al. 2000). The long-term goal of the NEOH would likely require 25 years or more (Ashe et al. 2000). However, if survival rates increase, these goals would likely be reached over a much shorter period of time and the project could be discontinued prior to the expected 25 years needed for recovery. These facilities, though, would likely remain in place to serve the LSRCP mitigation and supplementation efforts since the LSRCP Program's purpose is to mitigate anadromous fish losses and is not directly linked to ESA.

Estimated take of juvenile Chinook salmon from the artificial production activities is described in Table 4.2-24. Predation by avian or terrestrial predators may occur at the Lostine River Hatchery and the Imnaha Satellite Facility. The level of predation that may occur is unknown. On site monitoring would be conducted and actions taken, if necessary, to deter predation. Such actions include the addition of bird wire or netting, or electric perimeter fencing for small mammals.

Take of naturally produced juvenile salmonids could occur through harassment or delayed migration from the operation of the new weirs and ladders. Juvenile Chinook emigration occurs soon after emergence in mid-April and May. Juvenile steelhead would emerge in July/August and migrate into tributaries for rearing. The majority of steelhead spawning and major tributaries occur upstream of the proposed facilities, but juvenile steelhead may encounter the weirs and ladders in search of suitable rearing habitat during their extended freshwater rearing of at least one year. Additionally, steelhead outmigrant smolts may experience delays in downstream migration. Intake structures would be equipped with screens to prevent juveniles from entering the structures.

Lethal take of juveniles is not anticipated due to operation of the weirs. The Imnaha Satellite weir would be equipped with spaces that are large enough to allow juvenile passage (1.25 inches). At the Lostine Hatchery weir, during high flows the structure would be lowered and inundated; therefore passage conditions would be similar to natural conditions. The ladder at this location would be designed to accommodate both juvenile and adult passage as appropriate to meet NOAA guidelines.

No direct or incidental take of steelhead is expected to occur (Table 4.2-24). Adult steelhead migration would be completed prior to collection operations at the Lostine Adult Collection Facility. Adult steelhead migration in the Imnaha would also be completed prior to operation of the weir at the Imnaha Satellite Facility. Pneumatically-controlled weir operation at the Lostine River Hatchery intake would not likely affect migratory behavior of steelhead since they have the ability to leap up to 11 ft (Powers and Orsborn 1985) and therefore would likely be able to clear the barrier (maximum height during operation is 3 ft) or would move through the ladder. Any adult steelhead that might be trapped at the Lostine Adult Collection Facility and the Imnaha Satellite Facility would be kelts that would be released immediately. If kelts are observed upstream of the weir at the Imnaha Satellite Facility, portions of the weir can be dropped to allow passage.

Benefits associated with the Proposed Action include improved rearing of juveniles on their natal water source. Rearing in natal streams is believed to increase a juvenile's homing success and may therefore increase adult returns, resulting in decreasing the potential for straying. Also, construction of new facilities would greatly minimize the transport time between stations, resulting in reduced stress and mortality.

The Proposed Action would allow for collection of the run across the full hydrograph, thereby potentially increasing genetic diversity. Proposed collection sites and structures would also allow more efficient collection, decreasing stress on spawners and non-target species passing through the ladders and weirs. Safer collection for both collected fish and trap operators would be accomplished under the Proposed Action.

Table 4.2-24. Estimated direct and incidental take numbers of spring/summer Chinook salmon, steelhead and bull trout for the NEOH Project (Ashe et al. 2000)[1].

Type of Take	Annual Take By Species/Age of ESA Listed Snake River Salmon, Steelhead and Bull Trout						
	Spring/Summer Chinook Salmon			Steelhead		Bull Trout	
	Natural Adult	Hatchery Adult	Juvenile	Natural Adult	Juvenile	Natural Adult	Juvenile
Collect for Transport	185[2] 320[2a]	NA	250,000[6] 490,000[6a]	NA	0	0	0
Observe or Harass	500[3a]	NA	NA	NA	Unknown	Unknown	Unknown
Capture and Handle	NA	NA	NA	30 Kelts	0	Trap and release - historically <50	0
Capture, Handle & Tag	500[3a]	10[4,5]	250,000[7] 490,000[7a]	NA	0	0	0
Lethal Take	185[3] 320[3a]	NA	0.2% of total collect and tag	NA	Unknown, not anticipated to occur	Unknown, not anticipated to occur	Unknown, not anticipated to occur
Spawning, Dead or Dying	NA	NA	NA	NA	NA	0	NA
Other Take (specify)	NA	NA	37,500[8] 73,500[8a]	NA	NA	NA	NA
Indirect Mortality	58	0	See Other Take	NA	Unknown	Unknown	Unknown
Incidental Take	NA	NA	NA	NA	Unknown	Unknown	Unknown
Incidental Mortality	NA	NA	NA	NA	Unknown	Unknown	Unknown

1 Table shows proposed production numbers involved in operations of these facilities. Production activities will be covered under separate consultation.

2 This is the maximum number of adults retained for Lostine River broodstock, and are the same fish identified under lethal take.

2a This is the maximum number of adults retained for Imnaha River broodstock, and are the same fish under the lethal take.

3 These numbers of fish are the maximum expected to be taken under the Lostine River permit. Actual numbers would vary on a yearly basis.

3a These numbers of fish are the maximum expected to be taken under the Imnaha River permit. Actual numbers would vary on a yearly basis.

4 All adults released above the weir would receive an opercule tag and a fin punch.

5 It is expected that hatchery strays from the Lostine Hatchery and the Imnaha Satellite Facility may enter the streams. These fish would be tagged and released above the weir to spawn naturally.

6 These fish would be transported from the Lostine River Hatchery to the Lostine River through acclimated release as smolts.

6a These fish would be transported from the Lostine River Hatchery to the Imnaha Satellite Facility for acclimated release to the Imnaha River.

7 All juvenile fish to be released back into the Lostine River would receive a tag and/or fin clip.

7a All juvenile fish to be released back into the Imnaha River would receive a tag and/or fin clip.

8 Approximately 15% mortality of Lostine stock from the egg to smolt stage during rearing at the Lostine and Lookingglass hatcheries expected.

8a Approximately 15% mortality of Imnaha stock from the egg to smolt stage during rearing at the Lostine and Lookingglass Hatcheries expected.

4.2.6 Essential Fish Habitat (EFH)

Evaluation of Potential Adverse Effects to EFH

All accessible habitat in the Lower Grande Ronde, Upper Grande Ronde, and the Wallowa Hydrologic Units has been designated as EFH for Chinook and coho salmon. Coho are considered extirpated from this region (Nowak and Eddy 2001). The Imnaha River Hydrologic Unit is designated EFH for Chinook. Limited short-term impacts may occur to spring/summer Chinook EFH in both the Lostine and Imnaha rivers during construction of the Lostine Adult Collection Facility and the Lostine River Hatchery, as well as during upgrades to the Imnaha Satellite Facility. The impact most likely to occur is temporary sedimentation through disturbance of substrate while constructing the intake, ladder/outfall structures and the instream weir structures. The remainder of the construction activities would take place within the upland portions of the site. Although fall Chinook are present in the lower reaches of both the Grande Ronde River and the Imnaha River basins, they are believed to be extirpated in the vicinity of the project sites. Therefore, impacts to fall Chinook habitat are unlikely.

No adverse effects to the waters of the Lostine or Imnaha rivers are anticipated. Water use for all sites would be non-consumptive. The use of chillers and well water may decrease temperatures in the immediate vicinity of the discharge, however, these changes would be negligible and no cumulative change in water temperature is anticipated. Since the facilities are flow-through facilities, impacts typically associated with solar heating or ponded water are expected to be negligible.

Water diversions at each facility are discussed in detail in the *Water Gains and Losses* subsections included in Section 4.2.2. As shown in these discussions, dewatering of potential spring/summer Chinook redds is unlikely to occur from the proposed water withdrawals required for the operation of each facility. However, existing flows would be diminished within the diversion reaches during facility operations.

Water diversion for the Lostine River Hatchery would occur year-round, including summer months, when adult Chinook would be migrating through the diversion reach. Reduced flow would affect approximately 3,200 ft of the Lostine River from the intake to the outfall. At the lowest summer flow (September – 50.2 cfs), the normal flow strategy requires 17.8 cfs for the month, which is approximately 35 percent of the historic mean monthly flow. Although diversions would occur during this period, adverse impacts to adult Chinook migration are not anticipated because most Chinook will have spawned in August. Additionally, adult Chinook can successfully migrate through and spawn in flows that maintain a minimum depth of 0.8 feet (MWH 2001; R. Zollman, NPT, pers comm., 4/12/04). Adult bull trout and steelhead can migrate though a minimum depth of 0.6 feet at a maximum velocity of 8 fps (P. Sankovich, USFWS, pers comm., 4/13/04). In the Lostine River, those depths can be maintained by 10 cfs (R2 Resources 2002). Factoring in a 20% buffer, when facility withdrawals will reduce the post-diversion instream flow below 12 cfs, effluent water would be pumped back to fish ladder to maintain a minimum of 12 cfs through the diversion reach.

Proposed additional Imnaha Satellite Facility surface water diversions would occur from March through September. Reduced flow would affect approximately 1,000 ft of the Imnaha River from the intake to the outfall at the fish ladder. During peak diversion, adult Chinook spawners would be passed through the ladder to migrate through or spawn within the diversion reach. Although diversions would occur during this period, impacts to adult migration are not anticipated as adult Chinook can successfully migrate through the anticipated flows (65 cfs based on mean monthly flows) (R. Zollman, NPT, pers comm., 1/2/03). Naturally occurring juvenile Chinook may also be present within the diversion reach during summer months. Rearing juveniles could be affected by reduced instream flow, although diversions are not anticipated to reduce flow to critical levels for rearing juvenile Chinook. At the lowest summer flow (September), the water usage requires 20.3 cfs, which is approximately 23 percent of the historic mean monthly flow during September (87.1 cfs). An additional 6 cfs would continue to be required during adult collection to operate the adult recovery by-pass pipeline system.

Captured adults would be treated with formalin to prevent pre-spawning mortality due to fungal infection. Discharge of residual formalin to the Lostine and Imnaha rivers would occur, however, treatments would be administered according to label instructions and treatment water would be diluted appropriately prior to discharge.

Measures Proposed to Minimize Effects to EFH

To minimize sedimentation in the Lostine and Imnaha rivers during construction, cofferdams would be constructed, in-water work would occur during designated instream work windows (July 15 through August 15 for both the Lostine River and the Imnaha River), and BMPs would be employed during construction and maintenance. Silt fencing and other sediment control measures would be utilized as appropriate. Exposed soils would be protected from erosion and would be revegetated as soon as feasible. Tree removal from upland areas would be limited to the fewest possible. New road construction would be limited to the Lostine River Hatchery and the Lostine Adult Collection Facility. Temporary access roads would be constructed along the west bank floodproofing levee construction site at the Lostine Adult Collection Facility. All access roads, permanent or temporary, would be constructed and managed in a manner to minimize sedimentation.

During operation of the Lostine River Hatchery the effluent pump back system would be implemented when diversions exceed 50% of instream flow, or when instream flows drop below 12 cfs in the diversion reach. During extreme low flows, the low flow strategy would be also implemented to minimize impacts to EFH.

The use of low phosphorus feeds would minimize the overall nutrient enrichment to the rivers. It is expected that these fish would consume 95-100% of the daily feed. Residual formalin from adult treatment would be diluted in accordance with the product label prior to discharge into the Lostine and Imnaha rivers.

The upland construction activities would be managed in a manner, utilizing BMP's and Conservation Measures (Chapter 7), to protect the Lostine and Imnaha rivers. Control of surface waters (if present) and disturbed soils would be implemented to prevent sediment from entering the rivers.

5. MONITORING AND EVALUATION

An M&E Plan for the NEOH production program has been written and was recently reviewed by the ISRP (Hesse and Harbeck 2004). In their review, the ISRP concluded that the M&E Plan "…is an excellent working draft of a stand-alone M&E Plan…" and stated that the authors were "among the first to bring the modern EMAP (Environmental Monitoring and Assessment Program) probabilistic sampling procedures into the Columbia Basin." The Plan proposes to monitor and evaluate the effectiveness of the project through the following actions:

1. The collection and analysis of abundance and spawning distribution/success of upstream migrant jack and adult summer Chinook salmon pre-, during, and post-supplementation of indigenous spring/summer Chinook salmon in the Imnaha and Lostine river systems;
2. The collection and analysis of information on abundance, selected life history characteristics/patterns, and spatial distribution of Imnaha and Lostine river juvenile spring/summer Chinook salmon pre-, during, and post-supplementation of indigenous spring/summer Chinook salmon;
3. The collection and analysis of baseline information of genetic characteristics/patterns of, supplementation vs. natural spring/summer Chinook salmon pre-, during, and post-supplementation;
4. Evaluate operation of adult collection and holding facility for adverse impacts to resident and/or anadromous fish populations in the Imnaha and Lostine river (includes daily discrete bank observations during periods of low flow at the Lostine; on-going daily monitoring of the bypass reach at the Imnaha Satellite during low flow);
5. Monitor smolt production in the hatchery to evaluate health status, growth rates, and condition factors to compare supplementation fish with natural fish;
6. Determine effectiveness of acclimation of hatchery summer Chinook salmon to increase the overall population of Imnaha and Lostine river summer Chinook salmon;
7. Collection of baseline information on environmental conditions in the Imnaha and Lostine rivers, with special attention to smolt emigration and adult spawning migration periods;
8. Collect data on bull trout entering the facility during summer Chinook adult collection. Data to include date of collection and size.

Construction activities would be monitored for negative environmental effects through the following actions:

- All in-water work would be in compliance with the conditions of the Joint Permit issued by the U.S. Army Corps of Engineers and the ODEQ, under the Clean Water Act (CWA).
- On-site observers would visually monitor the river for delays to upstream or downstream migrating fish.

Operations of the constructed project facilities would be monitored through the following actions:

- Water quality monitoring: temperature, dissolved oxygen, and pH; compliance with NPDES
- According to NPDES permit 300J, during normal operations the following parameters are required to be monitored weekly, at a minimum: flow, TSS, and settleable solids. Temperature is to be monitored monthly. Total phosphorus, ammonia, and pH are to be monitored quarterly.

- During cleaning operations, the following parameters are monitored in effluent: flow, TSS, settleable solids, total phosphorus, ammonia, and temperature.
- Temperature of the receiving stream is monitored monthly.
- TSS monitoring at the influent water supply is optional.
- Visual habitat monitoring of weirs will occur to verify that fish passage is successful during facility operation. Reasonable and prudent measures to minimize harassment to species, in particular bull trout, at all NEOH facilities will include minimal handling and observation of fish condition. During the course of collection, if unusual numbers of bull trout appear in traps or against weirs, or unusual numbers of injured or dead bull trout appear in traps or near weirs, operators will immediately notify the Snake River Basin Office of the USFWS to review the need for modification to reasonable and prudent measures.
- In-river flows would be monitored through gages (USGS real-time data as available) to determine when low flow strategies would be implemented at the Lostine River Hatchery. When instream flows are less than 12 cfs, the low flow or effluent pumpback strategies would be implemented.
- Weirs and ladders would be visually inspected by hatchery personnel for debris accumulation during migrational periods.

6. CUMULATIVE EFFECTS

Cumulative effects (50 CFR 402.02) include the effects of future or on-going state, tribal, local or private activities that are reasonably certain to occur in the action area considered in this Biological Assessment. Future federal actions that are unrelated to the proposed action were not considered in this section because they will require separate consultation pursuant to Section 7 of the ESA. Due to the USFS management of the Lostine and Imnaha river corridors as Wild and Scenic Rivers, development and land use activities are limited and restricted within and around the project area.

Known Non-Federal Actions in Union County

According to the City of La Grande/Union County Building Inspection Department (2003), six building permits have been requested for projects that are currently underway in the County. They include four building permits for additions to private residences, one for the construction of a private residence and one permit for alteration of a commercial property. However, none of the projects are in the immediate vicinity of the proposed facility upgrades described in this BA. These actions in conjunction with the proposed action are not anticipated to affect the continued existence of listed species.

Several on-going salmon/habitat recovery projects are listed within the Grande Ronde Model Watershed Program Report in Union County. These include the development of GIS databases for all stream/riparian data, implementation of harvest controls, non-native species management, instream flow management and water rights acquisitions, fish presence surveys and management recommendations, riparian habitat restoration and water quality monitoring studies (www.fs.fed.us/pnw/modelwatershed/docs/grmwpprojects/grmwprpt9400nomapreport.pdf). These studies, considered cumulatively with the proposed NEOH project, would not result in increased adverse impacts to the action area, and would potentially result in benefits to listed species and their habitats.

Known Non-Federal Actions in Wallowa County

According to the Wallowa County Planning Department (2003), three permits have been requested in the past year for projects located in the same township and range (section not given) as the proposed Lostine Adult Collection Facility. These projects are all modifications to existing single-family residences and include two house remodels and one porch addition. One permit was issued for the addition of a pole building in the same section as the proposed Lostine River Hatchery. Because project activities would most often involve re-models of existing facilities, no change in water diversion, fish habitat or effluent discharge are expected. Therefore, these actions in conjunction with the proposed actions would not likely affect the continued existence of threatened species.

Recreational fish harvest and poaching – Harvest is authorized and regulated by ODFW with a Section 10(a) consultation. Presently, there is no recreational harvest of spring/summer Chinook or bull trout in all tributaries, although there is a catch and release for bull trout within the Imnaha River. Only adipose fin-clipped steelhead may be taken in the Northeast zone (ODFW 2003). Within both Lookingglass Creek and the Lostine River, angling is restricted to artificial lures and flies for all species. Additionally, all angling opportunities are closed 200 ft upstream and downstream from a hatchery's intake, and other angling restrictions exist around all infrastructure of hatchery facilities. In all tributaries of the Northeast zone, all trout, salmon and steelhead that are released must be unharmed and should not be removed from the water. Also protected within this zone are margined sculpin.

Tribal harvest – In 1998, the NPT and ODFW cooperatively developed a management agreement for Imnaha River broodstock allocation and harvest of adults by setting adult escapement goals (Ashe et al. 2000). This agreement is outlined in Table 6.1-1. There is little information to describe current tribal harvest in the Lostine River. In Lookingglass Creek during 1992 and 1993, tribal members harvested 173 and 110 Rapid River (non-native) stock Chinook returning to Lookingglass Hatchery.

Table 6.1-1. NPT and ODFW harvest management guidelines.

Escapement Level	Harvest for Tribal Ceremonial Use	Harvest for Tribal Subsistence	Recreational Harvest
<300 for 2 consecutive years	*	*	No
51-700	Yes	*	No
>700	Yes	Yes	*

* Decision made on case-by-case basis

Within Wallowa County, state and federal actions include the proposed Wallowa Lake Dam project. This project proposes to rehabilitate the poorly functioning dam at Wallowa Lake and to exchange irrigation diversions to release lake water seasonally to irrigate lower valley farms. This exchange would result in increased flows, thereby increasing salmonid habitat, in both the Lostine River and Bear Creek. This project, in consideration of cumulative effects from the proposed project, would result in a beneficial effect to listed species. The Wallowa Lake Dam Rehabilitation and Water Management Act (S.1883), is the Senate version of companion legislation introduced by Walden and Smith (R-OR) in the House and Senate on December 20, 2001.

The Wallowa County/ NPT Salmon Habitat Recovery and Multi-Species Strategy (WC/NPS&MS) is currently on-going within unincorporated Wallowa County. The goal of this strategy is to assist in salmon recovery, particularly Chinook recovery, by increasing spawning, rearing, and migration habitat within the County and ultimately to aid in the recovery of all Snake River salmonids. This strategy has resulted in the development of Coordinated Resource Management Plans (CRMPs) and/or Watershed Action Plans for Bear Creek, Lostine River, Big Sheep Creek, Little Sheep Creek, and Upper Joseph Creek. Participation in WC/NPS&MS implementation includes private landowners, NPT, USFS, Soil & Water Conservation District (SWCD), NRCS, Oregon Department of Fish Wildlife, Grande Ronde Model Watershed Program (GRMWP), Oregon Department of Forestry (ODF), and Oregon State University (OSU). On-going research studies related to the WC/NPS&MS are anticipated to have beneficial impacts for listed species and critical habitats.

7. CONSERVATION MEASURES

The Conservation Measures presented below are 1) components of the Proposed Action and, 2) requirements of contractors during construction of the facilities. The following measures are intended to minimize the potential impacts to listed species and designated critical habitat:

1. Sedimentation and erosion control measures, such as silt fencing, straw bales, and covering exposed soils with plastic sheeting, jute matting or mulching to minimize erosion, shall be utilized to prevent sediments from entering waterways and wetland habitats.

2. All required work below the bankfull stage shall be completed during the in-water work window as stipulated by ODFW for the protection of salmonids.

3. As recommended by NOAA Fisheries Engineering, construction equipment operation instream or adjacent to the river would use synthetic hydraulic oil. All equipment would be free of petroleum or hydraulic fluid leaks and would be serviced outside the riparian corridor.

4. Disturbance of riparian vegetation shall be limited to the minimum amount necessary to achieve construction objectives, in order to minimize habitat alteration and limit the effects of erosion and sedimentation.

5. Clearing limits would be adequately identified on all construction drawings, and shall be fenced off with silt fences or orange construction fencing prior to the initiation of staging or construction activities. The fence shall clearly define the clearing limits, and shall protect non-project areas from vehicle intrusion.

6. Temporary sediment ponds shall be constructed as a first step in grading and should be made functional before any additional soil disturbance occurs.

7. A grading plan and a temporary erosion and sedimentation control plan shall be implemented prior to site preparation to ensure earth related impacts are minimized. Cut and fill volumes should be balanced to the extent feasible within each site in order to eliminate the need for either imported or exported earth material.

8. During all clearing, grading, and construction activities, all exposed areas at final grade or remaining bare for more than 30 days between July 1, and October 31, shall be protected from erosion using weed-free straw mulch, plastic covering or similar method.

9. All snags (dead trees) and perch trees (trees with broken tops or limbs) shall be left in place to the extent possible, as they provide an important wildlife habitat component in the project vicinity.

8. DETERMINATION OF EFFECTS - SUMMARY FOR ALL LISTED SPECIES

Based on field work conducted by project biologists, evaluation of the proposed project design, construction timing, review of pertinent literature, interviews with local wildlife authorities, and NOAA Fisheries Engineering review of preliminary design drawings, we conclude that with the recommendations given above, this project may affect but is not likely to adversely affect bald eagle; Macfarlane's four O'Clock; and Spalding's catchfly. Although the biological impacts to listed fish species are expected to be low and even beneficial to spring/summer Chinook, site disturbances may disrupt the behavior and distribution of individual fish adjacent to and downstream of the activities. During and shortly after construction, no significant change in abundance or trend for affected populations is expected, and impacts are expected to be localized and short-lived. The recommended Likely to Adversely Affect determination for bull trout, steelhead and spring/summer Chinook was made due to the low potential for lethal take of these species from project activities. In addition, proposed actions may affect, but are not likely to adversely affect, destroy or adversely modify proposed critical habitat for bull trout, or designated critical habitat for Chinook or steelhead. Although fall Chinook are likely extirpated from waterbodies in the vicinity of the proposed project areas, they are known to occur in the lower reaches of both the Imnaha and Grande Ronde Rivers. In the unlikely event that they are present in the vicinity of the project sites, their recommended effect determination is also Likely to Adversely Affect. There would be no effect on Canada lynx or Howell's spectacular thelypody, and the project would have no significant impact on yellow-billed cuckoo, Columbia spotted frog and slender moonwort. Table 8.1-1 summarizes project conclusions.

Table 8.1-1. Determination of effects.

Federally Listed Species or Habitat	Status	Determination of Effects
Canada lynx	Threatened	No effect
Bald eagle	Threatened	May affect, but is not likely to adversely affect
Yellow-billed cuckoo	Candidate	No significant impact
Columbia River bull trout	Threatened	Likely to adversely affect
Proposed critical habitat for Columbia River dps of bull trout	Proposed	Not likely to adversely affect, destroy or adversely modify
Snake River spring/summer Chinook salmon	Threatened	Likely to adversely affect
Snake River fall Chinook salmon	Threatened	Likely to adversely affect
Critical habitat for Snake River fall and spring/summer Chinook salmon	Designated	Not likely to adversely affect
EFH for Pacific salmon	Designated	No effect
Snake River steelhead	Threatened	Likely to adversely affect
Columbia spotted frog	Candidate	No significant impact
Slender moonwort	Candidate	No significant impact
Macfarlane's four O'Clock	Threatened	May affect, but is not likely to adversely affect
Spalding's catchfly	Threatened	May affect, but is not likely to adversely affect
Howell's spectacular thelypody	Threatened	No effect

9. LIST OF ACRONYMS AND ABBREVIATIONS

BA	Biological Assessment
BO	Biological Opinion
BOD	Biochemical Oxygen Demand
BIA	Bureau of Indian Affairs
BKD	Bacterial Kidney Disease
BMPs	Best Management Practices
BPA	Bonneville Power Administration
cfs	Cubic Feet Per Second
CHSU	Critical Habitat Subunits
CRMP	Coordinated Resource Management Plans
CWA	Clean Water Act
cy	Cubic Yards
DPS	Distinct Population Segment
EA	Environmental Assessment
EFH	Essential Fish Habitat
ELISA	Enzyme Linked Immunosorbant Assay
EOs	Element Occurrences
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
fps	feet per second
ft	Foot or Feet
ft^2	Square Feet or Square Foot
GIS	Geographical Information System
gpm	Gallons Per Minute
GRMWP	Grande Ronde Model Watershed Program
HCNRA	Hells Canyon National Recreation Area
HGMP	Hatchery and Genetic Management Plan
IDEQ	Idaho Department of Environmental Quality
IFIM	Instream Flow Incremental Methodology
IHOT	Integrated Hatchery Operations Team
in.	Inch or Inches
INAD	Investigational New Animal Drug
ISRP	Independent Scientific Review Panel
LSRCP	Lower Snake River Compensation Plan
LWD	Large woody debris
M&E	Monitoring and Evaluation
mi	Mile
mi^2	Square Mile
NATURES	Natural Rearing and Enhancement Systems
NEOH	Northeast Oregon Hatchery
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NWPCC	Northwest Power and Conservation Council
NPDES	National Pollutant Discharge Elimination System

NWPPC	Northwest Power Planning Council
NPT	Nez Perce Tribe
ODEQ	Oregon Department of Environmental Quality
ODF	Oregon Department of Forestry
ODFW	Oregon Department of Fish and Wildlife
OHWM	Ordinary High Water Mark
ONHP	Oregon Natural Heritage Program
PNWFHPC	Pacific Northwest Fish Health Protection Committee
RHCA	Riparian Habitat Conservation Area
RM	River Mile
Rs	*Renibacterium salmoninarum*
S	Sensitive
SARs	Smolt-to-Adult Return Ratios
SWCD	Soil & Water Conservation District
TSS	Total Suspended Solids
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
V	Volt
W	Watch
WC/NPS&MS	Wallowa County/ Nez Perce Tribe Salmon Habitat Recovery and Multi-Species Strategy
WUA	Weighted Usable Area
WVIC	Wallowa Valley Irrigation Canal
WWNF	Wallowa-Whitman National Forest

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LINK TO APPENDICES