APPENDIX A
Species List Requests

Nisqually Environmental

July 8, 2002

Oregon Natural Heritage Program
1322 SE Morrison Street
Portland, OR 97214-2531

RE: Northeast Oregon Hatchery Project Data Request

We are currently under contract with the Bonneville Power Administration (BPA) to prepare a Section 7 Biological Analysis for federally listed species and a USFS Biological Evaluation for Forest sensitive species for the Northeast Oregon Hatchery (NEOH) – Grande Ronde and Imnaha Spring Chinook Project partially located within the Wallowa-Whitman National Forest. BPA is proposing to build new chinook salmon supplementation facilities and to modify existing facilities to aid in the recovery, conservation and reintroduction of natural populations of spring chinook salmon in the Grande Ronde and Imnaha River basins.

We are writing to request information on the potential presence of federally (ESA) listed threatened and endangered animal and plant species, proposed and candidate species, and listed critical habitat that may be present within the project vicinities. We also are interested in any information on the presence of U. S. Forest Service R-6 Wallowa-Whitman National Forest sensitive species within these areas and mapped wetlands or other sensitive habitat types.

The proposed recovery activities will be undertaken at several locations as described on the attached table. A map showing the approximate location of the project sites has also been included for your use.

Based on project requirements beyond our control, the field survey for the Biological Assessment will be conducted on July 17th through July 19th, 2002. If you need anything further to help expedite the data search please don't hesitate to call me at (360) 867-1953 or e-mail me at nisqually@earthlink.net. Thank you for your assistance in this matter.

Sincerely,

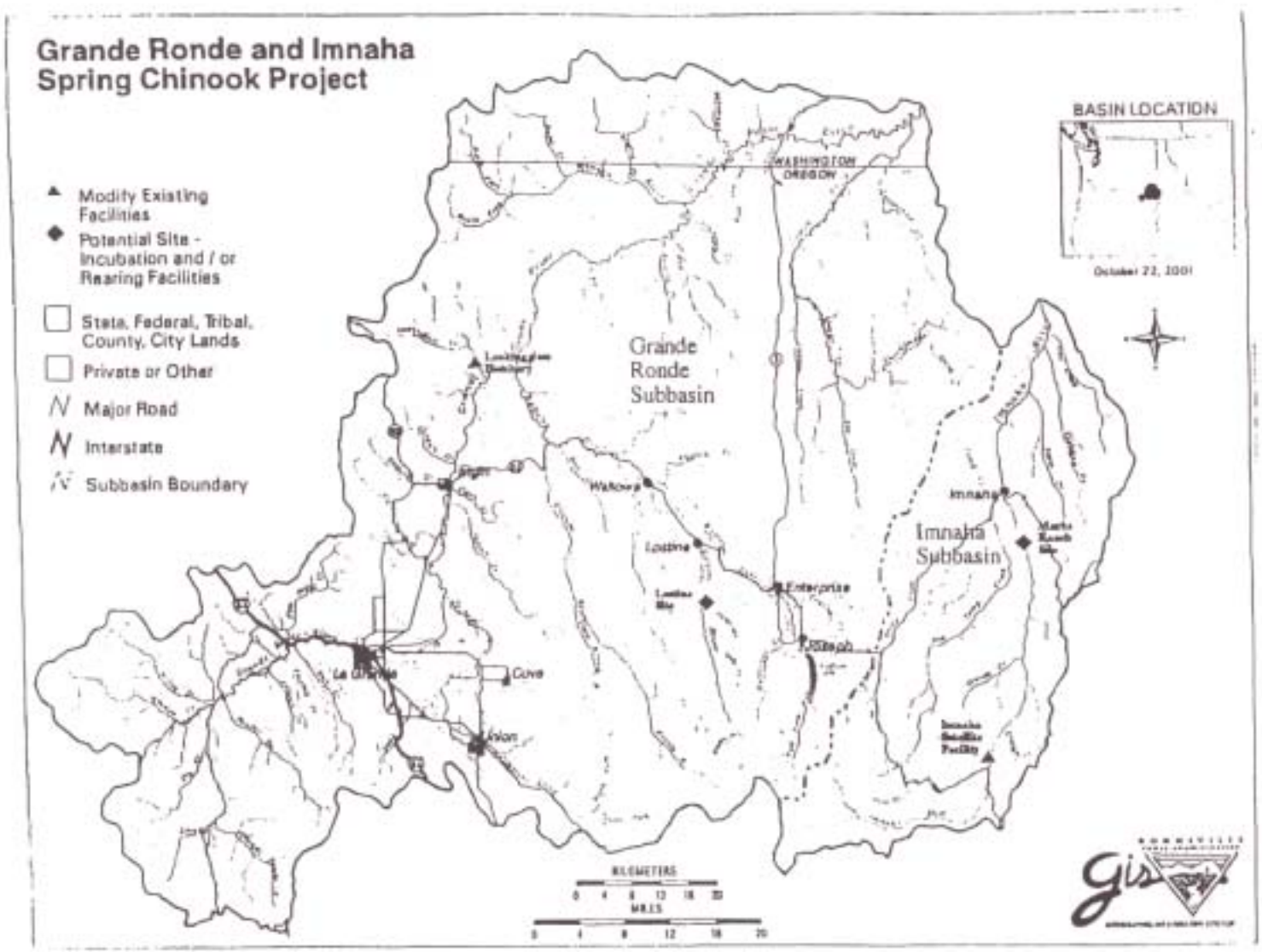
Laura A Scott

Laura A. Scott
Environmental Biologist

Nisqually Environmental, 6441 Young Road NW, Olympia, WA 98502, (360) 867-1953

NEOH – Site locations

Site	County	River Basin	Section Town Range	USGS Quad	USFS Lands
Lostine Hatchery - Acclimation and trapping facilities	Wallowa	Lostine R.	T2S, R43E, S3	Lostine	
Marks Ranch - New acclimation facilities	Wallowa	Imnaha R.	T1S, R48E, S none (or 14) unsurveyed land, nearest to S11, ~3mi. north]	Sheep Creek Divide	R-6 W-W NF
Lookingglass Hatchery - Modification	Union	Grande Ronde	T2N, R40E, S19	Rondawa	
Imnaha Satellite facility - Modification	Wallowa	Imnaha R.	T4S, R48E, S30	Puderbaugh Ridge	R-6 W-W NF
Wynan Trout Farm - Adult collection facility	Wallowa	Lostine R.	T1S, R43E, S15 or 22	Lostine	


Grande Ronde and Imnaha
Spring Chinook Project
Modify Existing Facilities
Potential Site - Incubation and / or Rearing Facilities
State, Federal, Tribal, County, City Lands
Private or Other
Major Road
Interstate
Subbasin Boundary
BASIN LOCATION
October 22, 2001
WASHINGTON
OREGON
Grande Ronde Subbasin
Imnaha Subbasin
Wallowa
Lostine
Enterprise
Imnaha
Cove
Kilometers
Miles

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

Refer to:
OHB2002-0211-SL

August 15, 2002

Mickey Carter
Environmental Protection Specialist
KEC-4
Bonneville Power Administration
Department of Energy
PO Box 3621
Portland, OR 97208-3621

Re: Request for Updated Species List for the Bonneville Power Administration's Grande Ronde-Imnaha Spring Chinook Project.

Dear Mr. Carter:

The National Marine Fisheries Service (NOAA Fisheries) received your July 29, 2002, letter requesting an updated list of threatened and endangered anadromous fish species which may be affected by the Grande Ronde-Imnaha Spring Chinook Project. The proposed projects are sponsored by the Bonneville Power Administration (BPA) in response to the Lower Snake River Compensation Plan (LSRCP) and the Northeast Oregon Hatchery Project-Spring Chinook Salmon Master Plan, and are located in Union County and Wallowa County, Oregon. We have enclosed a list of those anadromous fish species that are listed as endangered or threatened under the Endangered Species Act (ESA), those that are proposed for listing, and those that are candidates for listing in Oregon (Enclosure 1). This inventory only includes anadromous species under NOAA Fisheries' jurisdiction that occur in the Pacific Northwest. The U.S. Fish and Wildlife Service should be contacted regarding the presence of species falling under its jurisdiction.

Available information indicates that three anadromous fish species listed under the ESA are known to be present within or downstream from the proposed action:

1. Snake River (SR) fall chinook salmon (*Onchorynchus tshawytscha*)
2. SR spring/summer chinook salmon (*O. tshawytscha*)
3. SR Basin steelhead (*O. mykiss*)

In addition, habitat in and along the length of the Columbia River has been designated as critical habitat for SR fall chinook, SR spring/summer chinook, and SR sockeye salmon (*O. nerka*). Additional information on listed species' distribution, copies of Federal Register documents designating listed species status, and links to various ESA consultation policies and tools may be

AUG 26 '02 13:25 5032304089 PAGE.02

found on our web site at: www.nwr.noaa.gov. For information on the ESA section 7 consultation process, please refer to the ESA section 7 implementing regulations, 50 CFR Part 402.

In addition, please be aware that the Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act (SFA) of 1996 (Public Law 104-297), requires Federal agencies to consult with NOAA Fisheries on activities that may adversely affect designated essential fish habitat (EFH). All accessible habitat in the Lower Grande Ronde, Upper Grande Ronde, and Wallowa River Hydrologic Units have been designated as EFH for chinook and coho salmon. The Imnaha River Hydrologic Unit is designated EFH for chinook salmon.

This letter constitutes the required notification of the presence of Federally-listed threatened or endangered species or critical habitat under NOAA Fisheries' jurisdiction in the area that may be affected by the proposed project. Questions regarding this letter should be directed to Mike Bianchi, of my staff in the Oregon Habitat Branch, at 541.975.1835 ext. 221.

Sincerely,

Michael Tehan, Chief
Oregon State Branch
Habitat Conservation Division

Enclosure (1)
Endangered, Threatened, Proposed, and Candidate Species That Occur under National Marine Fisheries Service's Jurisdiction in Oregon

cc: Herbert Pollard, NOAA Fisheries
Gary Miller, USFWS
Brad Smith, ODFW

Enclosure

Endangered, Threatened, Proposed, and Candidate Species That Occur under National Marine Fisheries Service's Jurisdiction in Oregon

(T=threatened, E=endangered. CH=critical habitat, ESU=Evolutionarily Significant Unit)

Listed Species

Coho Salmon (*Oncorhynchus kisutch*)
- S. Oregon/N. California Coasts ESU(T)(CH)
- Oregon Coast ESU (T)

Chinook Salmon (*O. tshawytscha*)
- Snake River Fall-run ESU (T)(CH)
- Snake River Spring/Summer-run ESU (T)(CH)
- Lower Columbia River ESU (T)
- Upper Willamette River ESU (T)
- Upper Columbia River Spring-run ESU (E)

Chum Salmon (*O. keta*)
- Columbia River ESU (T)

Sockeye Salmon (*O. nerka*)
- Snake River ESU (E)(CH)

Steelhead (*O. mykiss*)
- Upper Columbia River ESU (E)
- Snake River Basin ESU (T)
- Lower Columbia River ESU (T)
- Upper Willamette River ESU (T)
- Middle Columbia River ESU (T)

Proposed for Listing
- None

Candidates for Listing

Coho Salmon
- Lower Columbia River/SW Washington ESU

Steelhead
- Oregon Coast ESU

United States Department of the Interior

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

Reply To: 8330.9261(02)
File Name: Sp926.wpd
TS Number: 02-6967

August 16, 2002

Mickey A. Carter
Bonneville Power Administration
P.O. Box 3621
Portland, OR 97208-3621

Subject: Imnaha Spring Chinook Project
USFWS Reference # (1-7-02-SP-926)

Dear Mr. Carter:

This is in response to your letter, dated July 29, 2002, requesting information on listed and proposed endangered and threatened species that may be present within the area of the Imnaha Spring Chinook Project in Wallowa County. The U.S. Fish and Wildlife Service (Service) received your correspondence on July 30, 2002.

We have attached a list (Attachment A) of threatened and endangered species that may occur within the area of the Imnaha Spring Chinook Project. The list fulfills the requirement of the Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Bonneville Power Administration (BPA) requirements under the Act are outlined in Attachment B.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems on which they depend may be conserved. Under section 7(a)(1) and 7(a)(2) of the Act and pursuant to 50 CFR 402 *et seq.*, BPA is required to utilize their authorities to carry out programs which further species conservation and to determine whether projects may affect threatened and endangered species, and/or critical habitat. A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) which are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (NEPA) (42 U.S.C. 4332 (2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to the Biological Assessment be prepared to determine whether they may affect listed and proposed species. Recommended contents of a Biological Assessment are described in Attachment B, as well as 50 CFR 402.12.

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

Attachment A includes a list of candidate species under review for listing. The list reflects changes to the candidate species list published June 13, 2002, in the Federal Register (Vol. 67, No. 114, 40657) and the addition of "species of concern." Candidate species have no protection under the Act but are included for consideration as it is possible candidates could be listed prior to project completion. Species of concern are those taxa whose conservation status is of concern to the Service (many previously known as Category 2 candidates), but for which further information is still needed.

If a proposed project may affect only candidate species or species of concern, BPA is not required to perform a Biological Assessment or evaluation or consult with the Service. However, the Service recommends addressing potential impacts to these species in order to prevent future conflicts. Therefore, if early evaluation of the project indicates that it is likely to adversely impact a candidate species or species of concern, BPA may wish to request technical assistance from this office.

Your interest in endangered species is appreciated. The Service encourages BPA to investigate opportunities for incorporating conservation of threatened and endangered species into project planning processes as a means of complying with the Act. If you have questions regarding your responsibilities under the Act, please contact Stacy Sroufe at (503) 231-6179. All correspondence should include the above referenced file number. For questions regarding salmon and steelhead trout, please contact National Marine Fisheries Service, 525 NE Oregon Street, Suite 500, Portland, Oregon 97232, (503) 230-5400.

Sincerely,

for Kemper M. McMaster
State Supervisor

Attachments
1-7-02-SP-926

cc: OFWO-ES
ODFW (nongame)
Sarah McNary BPA

ATTACHMENT A

FEDERALLY LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES, CANDIDATE SPECIES AND SPECIES OF CONCERN THAT MAY OCCUR WITHIN THE AREA OF THE IMNAHA SPRING CHINOOK PROJECT
1-7-02-SP-926

LISTED SPECIES[1]

Mammals		
Canada lynx[2]	*Lynx canadensis*	T
Birds		
Bald eagle[3]	*Haliaeetus leucocephalus*	T
Fish		
Steelhead (Snake River Basin)[4]	*Oncorhynchus mykiss*	**T
Chinook salmon	*Oncorhynchus tshawytscha*	**T
Snake River spring/summer runs		
Bull trout (Columbia River pop.)[5]	*Salvelinus confluentus*	T
Plants		
McFarlane's four o'clock[6]	*Mirabilis macfarlanei*	CH T
Spalding's campion[7]	*Silene spaldingii*	T

PROPOSED SPECIES

None

CANDIDATE SPECIES[8]

Birds	
Yellow-billed cuckoo[9]	*Coccyzus americanus*
Amphibians and Reptiles	
Columbia spotted frog	*Rana luteiventris*
Plants[10]	
Slender moonwort	*Botrychium lineare*

SPECIES OF CONCERN

Mammals	
Pale western big-eared bat	*Corynorhinus (=Plecotus) townsendii pallescens*
Spotted bat	*Euderma maculatum*
California wolverine	*Gulo gulo luteus*
Silver-haired bat	*Lasionycteris noctivagans*
Pacific fisher	*Martes pennanti pacifica*
Small-footed myotis (bat)	*Myotis ciliolabrum*
Long-eared myotis (bat)	*Myotis evotis*
Fringed myotis (bat)	*Myotis thysanodes*

Long-legged myotis (bat)	*Myotis volans*
Yuma myotis (bat)	*Myotis yumanensis*
Preble's shrew	*Sorex preblei*
Birds	
Northern goshawk	*Accipiter gentilis*
Western burrowing owl	*Athene cunicularia hypugea*
Ferruginous hawk	*Buteo regalis*
Olive-sided flycatcher	*Contopus cooperi (=borealis)*
Willow flycatcher	*Empidonax traillii adastus*
Harlequin duck	*Histrionicus histrionicus*
Yellow-breasted chat	*Icteria virens*
Lewis' woodpecker	*Melanerpes lewis*
Mountain quail	*Oreortyx pictus*
White-headed woodpecker	*Picoides albolarvatus*
Columbian sharp-tailed grouse	*Tympanuchus phasianellus columbianus*
Amphibians and Reptiles	
Tailed frog	*Ascaphus truei*
Fish	
Pacific lamprey	*Lampetra tridentata*
Interior redband trout	*Oncorynchus mykiss gibbsi*
Plants	
Wallowa ricegrass	*Achnatherum wallowaensis*
Hells Canyon rockcress	*Arabis hastatula*
Upward-lobed moonwort	*Botrychium ascendens*
Crenulate grape fern	*Botrychium crenulatum*
Twinspike moonwort	*Botrychium paradoxum*
Stalked moonwort	*Botrychium pedunculosum*
Clustered lady's-slipper	*Cypripedium fasciculatum*
Hazel's prickly-phlox	*Leptodactylon pungens* ssp. *hazeliae*
Membrane-leaved monkeyflower	*Mimulus hymenophyllus*

(E) - Listed Endangered *(T) - Listed Threatened* *(CH) - Critical Habitat has been designated for this species*
(PE) - Proposed Endangered *(PT) - Proposed Threatened* *(PCH) - Critical Habitat has been proposed for this species*
(S) - Suspected *(D) - Documented*

Species of Concern - Taxa whose conservation status is of concern to the Service (many previously known as Category 2 candidates), but for which further information is still needed.

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

[1] *U. S. Department of Interior, Fish and Wildlife Service, October 31, 2000, Endangered and Threatened Wildlife and Plants, 50 CFR 17.11 and 17.12*
[2] *Federal Register Vol. 65, No. 58, Mar 24, 2000, Final Rule-Canada lynx*
[3] *Federal Register Vol. 60, No. 133, July 12, 1995 - Final Rule - Bald Eagle*
[4] *Federal Register Vol. 62, No. 159, August 18, 1997, Final Rule-Snake River steelhead*
[5] *Federal Register Vol. 63, No. 111, June 10, 1998, Final Rule-Columbia River and Klamath River Bull Trout*
[6] *Federal Register Vol. 61, No. 12, March 13, 1996, Final Rule-Mirabilis macfarlanei*

[7] *Federal Register Vol. 66, No. 196, October 10, 2001, Final Rule-Silene spaldingii*
[8] *Federal Register Vol. 66, No. 210, October 30, 2001, Notice of Review - Candidate or Proposed Animals and Plants*
[9] *Federal Register Vol. 66, No. 142, July 25, 2001, 12-Month Finding for a Petition To List the Yellow-billed Cuckoo*
[10] *Federal Register Vol. 66, No. 109, June 6, 2001, Notice of Petition To List Botrychium lineare as Threatened*

ATTACHMENT B

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

SECTION 7(a)-Consultation/Conference

Requires:

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

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

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

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

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

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

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

United States Department of the Interior

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

Reply To: 8330.04321(03)
File Name: Sp0432.wpd
TS Number: 02-6967.1

June 11, 2003

Post-it® Fax Note 7671	Date	# of pages ▶ 5
To Patty Michalc	From Michey	
Co./Dept. Fish Pro	Co. BPA	
Phone #	Phone #	
Fax # 360 871-4460	Fax #	

Jan has a copy.

Mickey A. Carter
Bonneville Power Administration
P.O. Box 3621
Portland, OR 97208-3621

Subject: Imnaha Spring Chinook Project
USFWS Reference # (1-7-03-SP-0432)

Dear Mr. Carter:

This is in response to your letter, dated June 29, 2002, requesting information on listed and proposed endangered and threatened species that may be present within the area of the Imnaha Spring Chinook Project in Wallowa and Union Counties. The U.S. Fish and Wildlife Service (Service) received your correspondence on May 23, 2003.

We have attached a list (Attachment A) of threatened and endangered species that may occur within the area of the Imnaha Spring Chinook Project. The list fulfills the requirement of the Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Bonneville Power Administration (BPA) requirements under the Act are outlined in Attachment B.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems on which they depend may be conserved. Under section 7(a)(1) and 7(a)(2) of the Act and pursuant to 50 CFR 402 *et seq.*, BPA is required to utilize their authorities to carry out programs which further species conservation and to determine whether projects may affect threatened and endangered species, and/or critical habitat. A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) which are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (NEPA) (42 U.S.C. 4332 (2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to the Biological Assessment be prepared to determine whether they may affect listed and proposed species. Recommended contents of a Biological Assessment are described in Attachment B, as well as 50 CFR 402.12.

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

Attachment A includes a list of candidate species under review for listing. The list reflects changes to the candidate species list published June 13, 2002, in the Federal Register (Vol. 67, No. 114, 40657) and the addition of "species of concern." Candidate species have no protection under the Act but are included for consideration as it is possible candidates could be listed prior to project completion. Species of concern are those taxa whose conservation status is of concern to the Service (many previously known as Category 2 candidates), but for which further information is still needed.

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Sincerely,

Randy Rasmussen

for Kemper M. McMaster
State Supervisor

Attachments
1-7-03-SP-0432

cc: OFWO-ES
ODFW (nongame)
Sarah McNary BPA

ATTACHMENT A

FEDERALLY LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES, CANDIDATE SPECIES AND SPECIES OF CONCERN THAT MAY OCCUR WITHIN THE AREA OF THE IMNAHA SPRING CHINOOK PROJECT
1-7-03-SP-0432

LISTED SPECIES[1/]

Mammals		
Canada lynx[2/]	*Lynx canadensis*	T
Birds		
Bald eagle[3/]	*Haliaeetus leucocephalus*	T
Fish		
Steelhead (Snake River Basin)[4/]	*Oncorhynchus mykiss*	**T
Chinook salmon	*Oncorhynchus tshawytscha*	**T
Snake River spring/summer runs		
Bull trout (Columbia River pop.)[5/]	*Salvelinus confluentus*	T
Plants		
McFarlane's four o'clock[6/]	*Mirabilis macfarlanei*	CH T
Spalding's campion[7/]	*Silene spaldingii*	T

PROPOSED SPECIES

None

CANDIDATE SPECIES[8/]

Birds	
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Amphibians and Reptiles	
Columbia spotted frog	*Rana luteiventris*

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Spotted bat	*Euderma maculatum*
California wolverine	*Gulo gulo luteus*
Silver-haired bat	*Lasionycteris noctivagans*
Pacific fisher	*Martes pennanti pacifica*
Small-footed myotis (bat)	*Myotis ciliolabrum*
Long-eared myotis (bat)	*Myotis evotis*
Fringed myotis (bat)	*Myotis thysanodes*
Long-legged myotis (bat)	*Myotis volans*
Yuma myotis (bat)	*Myotis yumanensis*
Preble's shrew	*Sorex preblei*

Birds	
Northern goshawk	*Accipiter gentilis*
Olive-sided flycatcher	*Contopus cooperi (=borealis)*
Willow flycatcher	*Empidonax trailli adastus*
Harlequin duck	*Histrionicus histrionicus*
Yellow-breasted chat	*Icteria virens*
Lewis' woodpecker	*Melanerpes lewis*
Mountain quail	*Oreortyx pictus*
White-headed woodpecker	*Picoides albolarvatus*
Amphibians and Reptiles	
Tailed frog	*Ascaphus truei*
Northern sagebrush lizard	*Sceloporus graciosus graciosus*
Fish	
Pacific lamprey	*Lampetra tridentata*
Interior redband trout	*Oncorynchus mykiss gibbsi*
Invertebrates	
Great Columbia River spire snail	*Fluminicola columbianus*
Plants	
Wallowa ricegrass	*Achnatherum wallowaensis*
Clustered lady's-slipper	*Cypripedium fasciculatum*
Hazel's prickly-phlox	*Leptodactylon pungens* ssp. *hazeliae*
Membrane-leaved monkeyflower	*Mimulus hymenophyllus*
Oregon semaphore grass	*Pleuropogon oregonus*

(E) - Listed Endangered (T) - Listed Threatened (CH) - Critical Habitat has been designated for this species
(PE) - Proposed Endangered (PT) - Proposed Threatened (PCH) - Critical Habitat has been proposed for this species
(S) - Suspected (D) - Documented

Species of Concern - Taxa whose conservation status is of concern to the Service (many previously known as Category 2 candidates), but for which further information is still needed.

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

1/ *U. S. Department of Interior, Fish and Wildlife Service, October 31, 2000, Endangered and Threatened Wildlife and Plants, 50 CFR 17.11 and 17.12*
2/ *Federal Register Vol. 65, No. 58, Mar 24, 2000, Final Rule-Canada lynx*
3/ *Federal Register Vol. 60, No. 133, July 12, 1995 - Final Rule - Bald Eagle*
4/ *Federal Register Vol. 62, No. 159, August 18, 1997, Final Rule-Snake River steelhead*
5/ *Federal Register Vol. 63, No. 111, June 10, 1999, Final Rule-Columbia River and Klamath River Bull Trout*
6/ *Federal Register Vol. 61, No. 52, March 15, 1996, Final Rule-Mirabilis macfarlanei*
7/ *Federal Register Vol. 66, No. 196, October 10, 2001, Final Rule-Silene spaldingii*
8/ *Federal Register Vol. 67, No. 114, June 12, 2002, Notice of Review - Candidate or Proposed Animals and Plants*
9/ *Federal Register Vol. 66, No. 143, July 25, 2001, 12-Month Finding for a Petition To List the Yellow-billed Cuckoo*
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ATTACHMENT B

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

SECTION 7(a)-Consultation/Conference

Requires:

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

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

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

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

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

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

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

APPENDIX B

Photographs of NEOH Project Sites

Photo 1. Existing fish ladder at proposed Lostine Adult Collection Facility

Photo 2. Existing conditions on west bank of proposed Lostine Adult Collection Facility site.

Photo 3. Existing conditions at the proposed Lostine River Hatchery site.

Photo 4. Proposed outfall location at Lostine River Hatchery.

Photo 5. Proposed intake location at Lostine River Hatchery.

Photo 6. Existing Acrow Panel Bridge at Marks Ranch site.

Photo 7. Existing intake location and proposed additional intake location (looking upstream) at the Imnaha Satellite Facility.

Photo 8. Existing picket weir and adjacent upland habitat at the Imnaha Satellite Facility.

APPENDIX C

List of Plant Species Observed at NEOH Project Sites

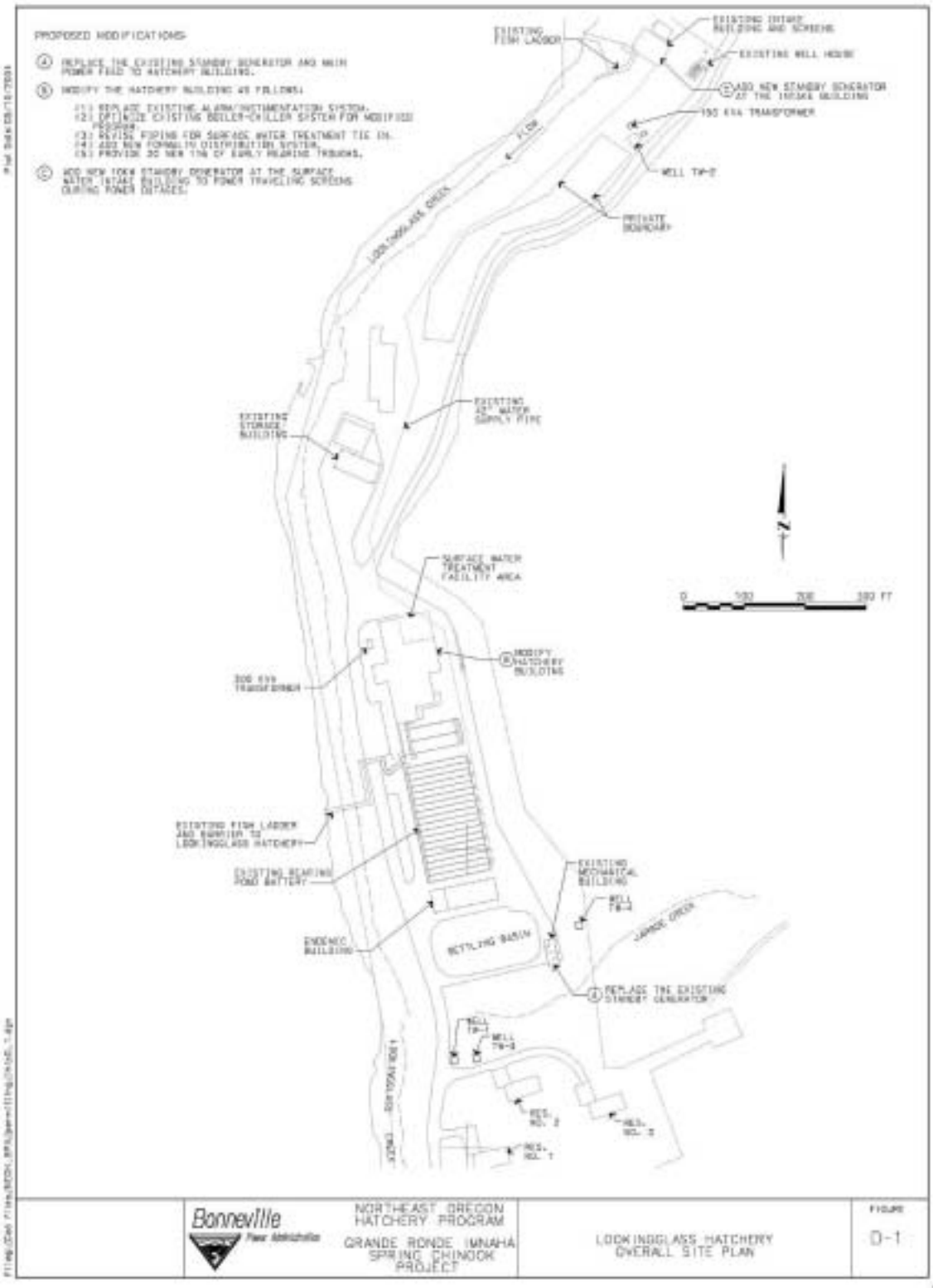
	Lookingglass Hatchery	Lostine R. Adult Collection	Lostine R. Hatchery	Acrow bridge site at Marks Ranch	Imnaha Satellite Facility
Elevation (ft)	2,565	3,470	3,700	1,995	3,760
Trees					
Abies grandis	X		X		X
Betula occidentalis		X	X	X	
Larix occidentalis	X				
Picea engelmannii			X		
Pinus ponderosa	X	X	X	X	X
Populus balsamifera	X	X	X	X	
Populus tremuloides		X	X		
Pseudotsuga menziesii	X		X		X
Shrubs					
Acer glabrum	X		X	X	
Alnus incana	X	X	X	X	X
Amelanchier alnifolia	X		X		X
Apocynum androsaemifolium	X	X			
Arctostaphylos uva-ursi			X		
Ceanothus sanguineus					X
Clematis ligusticifolia		X		X	
Cornus sericea	X	X	X	X	X
Crataegus douglasii	X		X	X	X
Holodiscus discolor	X		X		
Juniperus occidentalis		X	X		
Mahonia repens			X	X	X
Pachistima myrsinites	X				
Philadelphus lewisii	X		X	X	
Physocarpus malvaceus				X	
Prunus sp.				X	
Prunus viginiana	X	X		X	
Rhamnus purshiana	X			X	
Rhus radicans				X	
Ribes sp.			X	X	X
Ribes lacustre		X			
Rosa sp.	X	X	X	X	X
Rubus leucodermis			X	X	X
Rubus parviflorus	X				X
Salix spp.	X	X	X	X	
Sambucus cerulea	X	X	X	X	
Shepherdia canadensis			X		
Spiraea betulifolia	X				
Symphoricarpos albus	X	X	X	X	X
Vaccinium sp.			X		
Forbs					
Achillea millefolium	X	X	X	X	
Actea rubra		X			
Agastache utricifolia		X		X	
Allium cernuum			X		
Anchusa officinalis		X	X		X
Arctium minus				X	
Arnica cordifolia			X		X

	Lookingglass Hatchery	Lostine R. Adult Collection	Lostine R. Hatchery	Acrow bridge site at Marks Ranch	Imnaha Satellite Facility
Aster sp.			X	X	
Athyrium filix-femina			X		
Balsamorhiza sagittata			X	X	
Capsella bursa-pastoris				X	
Centaurea diffusa	X		X		
Chenopodium album	X			X	
Cirsium arvense	X	X	X	X	
Cirsium vulgare			X		
Clintonia uniflora					X
Collomia linearis	X				
Collomia grandis			X	X	
Conium maculatum				X	
Cynoglossum officinale			X		
Dipsacus sylvestris			X	X	
Equisetum spp.	X	X	X	X	X
Eriogonum sp.	X				
Erodium cicutarium	X				
Fragaria vesca			X		
Fragaria virginiana					X
Galium sp.	X	X	X		
Geranium viscosissimum	X				
Geum macrophyllum		X	X	X	
Habenaria dilitata			X		
Hackelia floribunda			X		
Heracleum lanatum			X		
Hieracium sp.			X		X
Hypericum perforatum	X				
Lactuca serriola	X	X	X	X	X
Leucanthemum vulgare			X		
Lomatium sp.				X	
Lupinus sp.				X	
Maianthemum stellatum		X	X		X
Marrubium vulgare				X	
Medicago lupulina	X	X		X	X
Medicago sativa		X			
Melilotus alba	X				
Melilotus officinalis	X				
Mentha arvensis		X			
Mimulus guttatus		X	X		
Myosotis sp.		X	X		
Osmorhiza berteroi		X		X	X
Paeonia brownii	X				
Penstemon sp.				X	
Phacelia hastata	X	X	X		
Plantago lanceolata				X	X
Plantago major		X	X		
Polemonium occidentalis		X			
Potentilla glandulosa	X				
Potentilla gracilis	X			X	X
Prunella vulgaris			X		
Pteridium aquilinum	X				
Pterospora andromedea					X
Ranunculus sp.				X	

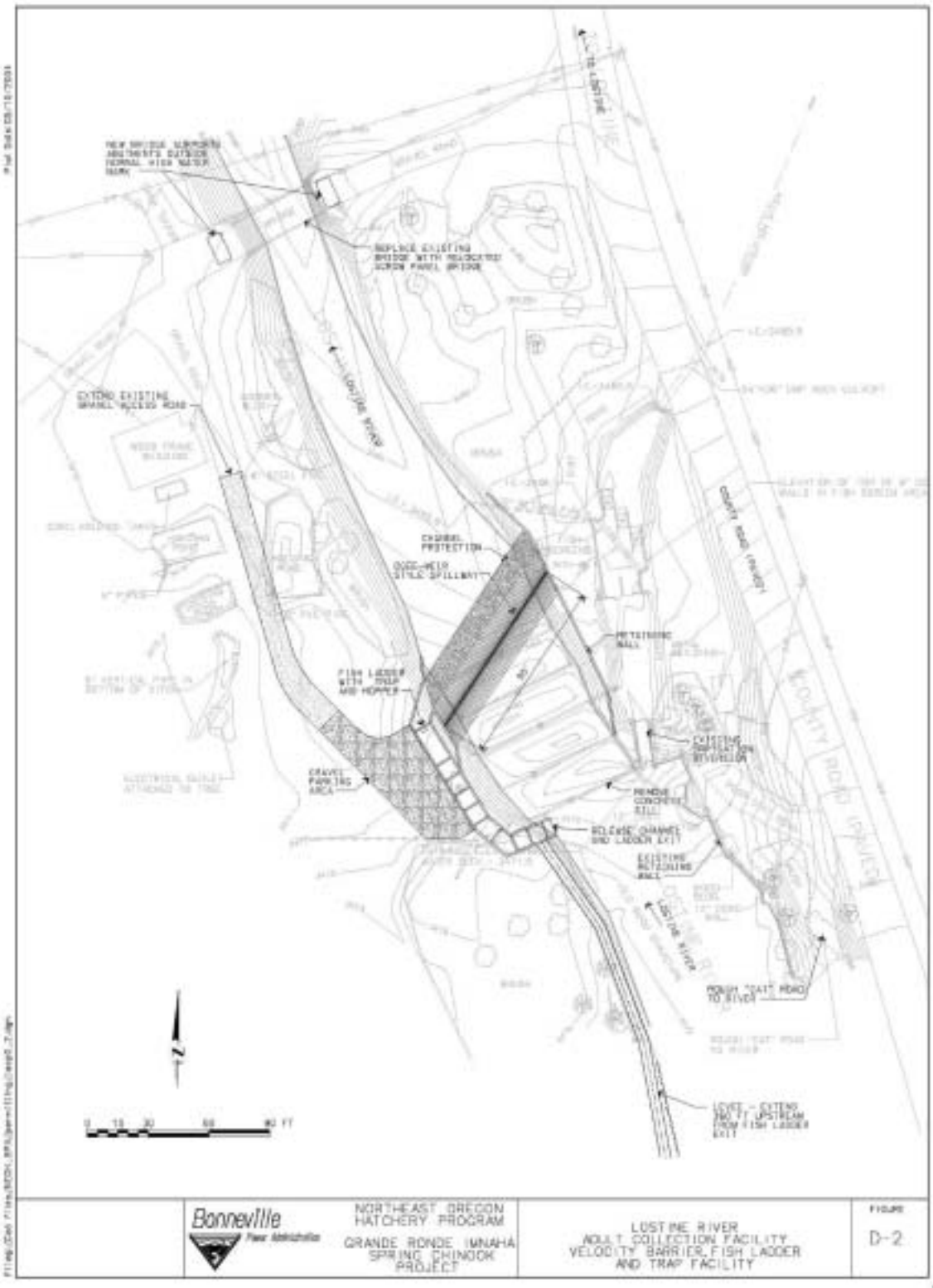
	Lookingglass Hatchery	Lostine R. Adult Collection	Lostine R. Hatchery	Acrow bridge site at Marks Ranch	Imnaha Satellite Facility
Rudbeckia occidentalis			X		
Rumex acetosella	X		X		
Rumex crispus	X	X		X	
Sedum stenopetalum			X		
Silene alba		X	X	X	
Sisymbrium altissimum				X	
Smilacina stellata			X		
Solanum dulcamara		X			
Solidago sp.			X		
Streptopus amplexifolius			X		X
Taraxacum officinale	X	X	X	X	
Thalictrum occidentale			X		
Thlapsi arvense			X		
Tragopogon dubius	X	X	X	X	
Trifolium spp.	X	X		X	X
Trifolium longipes		X			
Trillium ovatum					X
Urtica dioica		X	X	X	
Verbascum thapsis	X	X	X	X	
Vicia sp.		X	X		X
Viola sp.	X	X			X
Graminoids					
Agropyron spicatum	X				
Alopecurus pratense		X	X	X	
Bromus spp.	X		X		
Bromus tectorum			X	X	
Calamagrostis rubescens			X		X
Carex spp.		X	X		
Carex geyeri	X				
Carex stipata		X	X		
Dactylis glomerata	X	X		X	
Elymus glaucus	X	X			
Festuca arundinacea				X	
Festuca idahoensis					X
Festuca spp.	X	X	X		
Glyceria sp.		X	X		
Juncus spp.	X	X			
Juncus ensifolius		X			
Luzula sp.		X			
Phalaris arundinacea		X	X		
Phleum pratense		X	X	X	
Poa sp.			X		
Scirpus microcarpus		X			

APPENDIX D

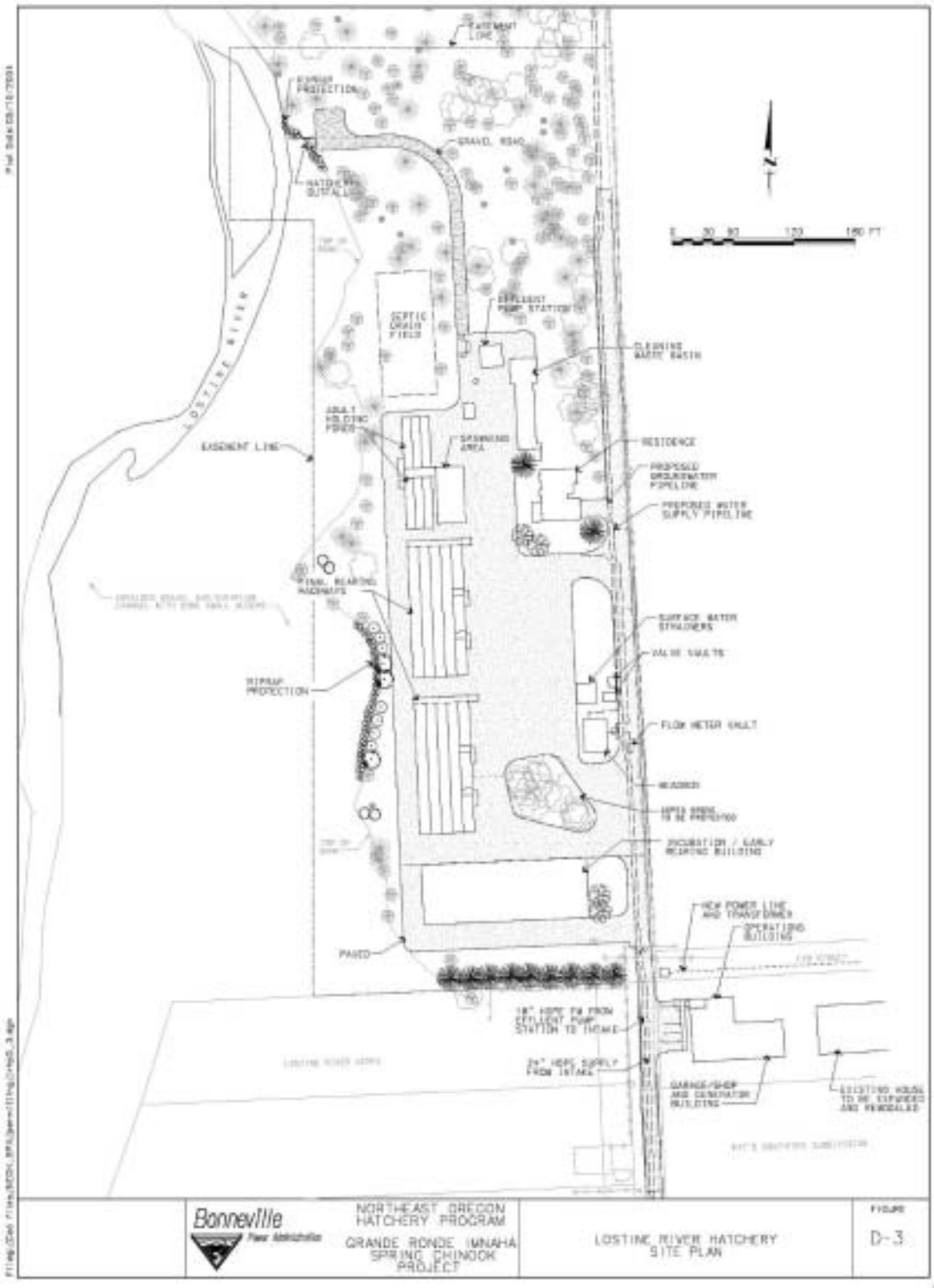
Design Drawings and Details



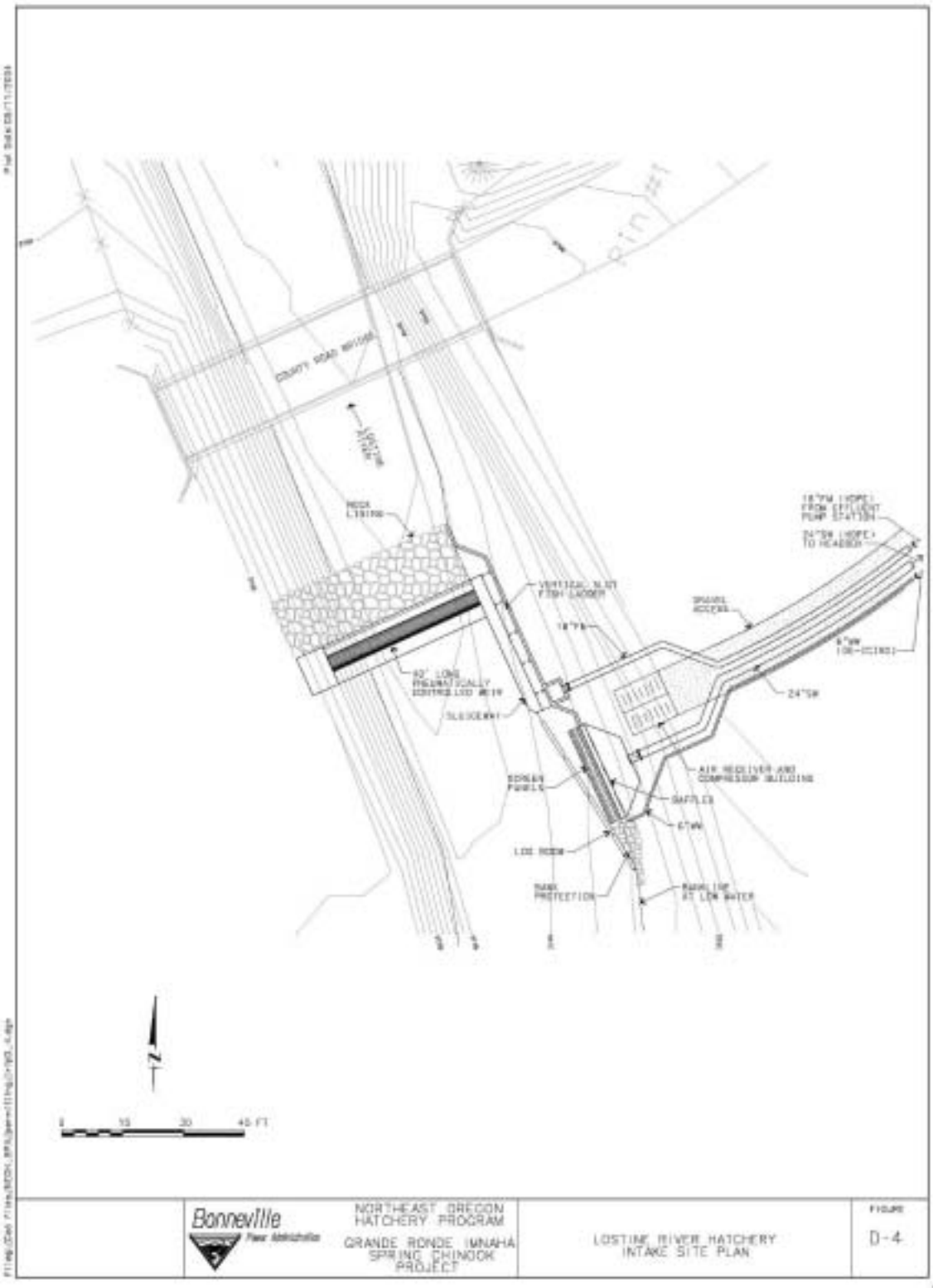
D-1. Lookingglass Hatchery Existing and Proposed Site Plan



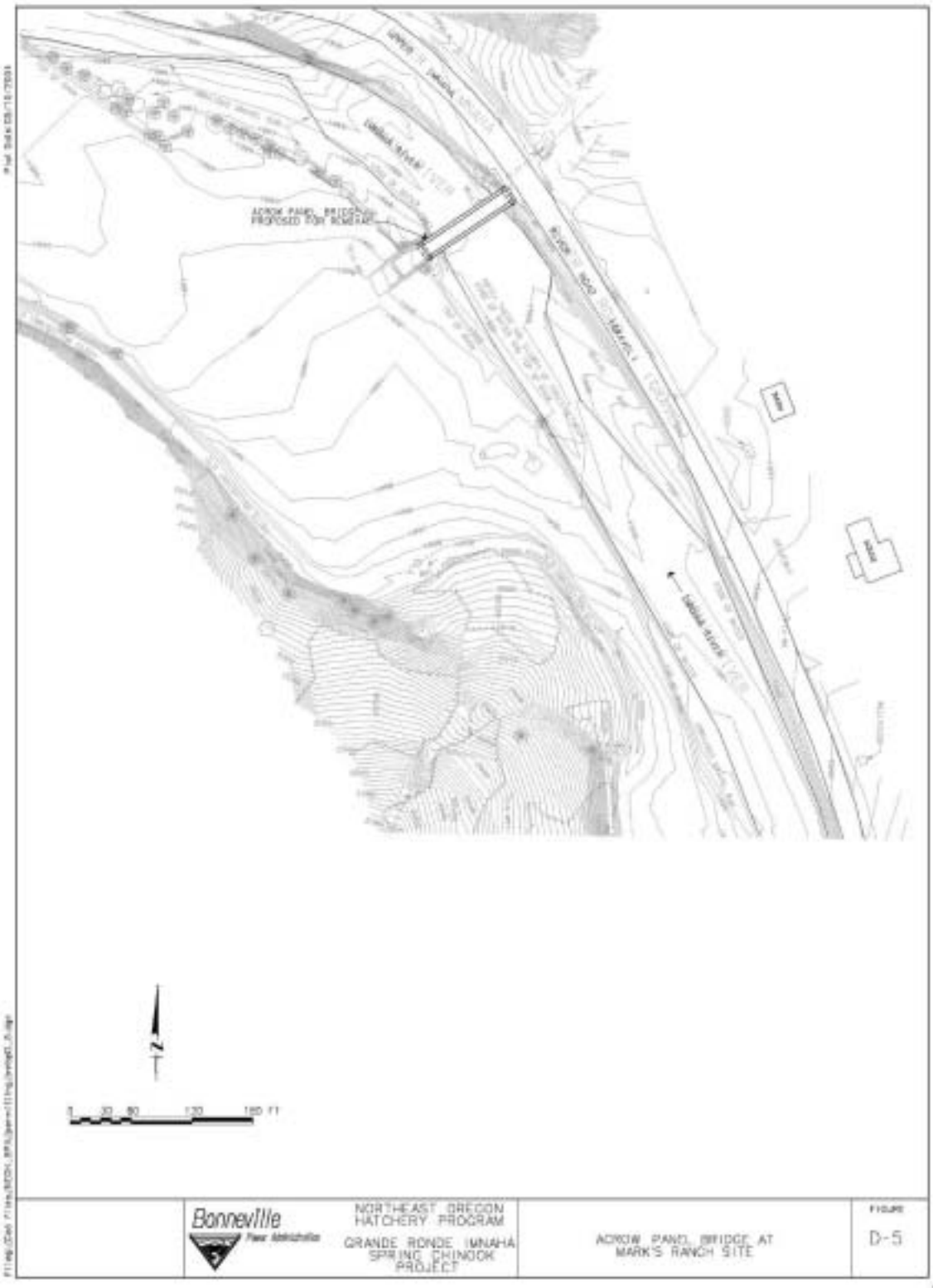
D-2. Lostine Adult Collection Facility Proposed Site Plan



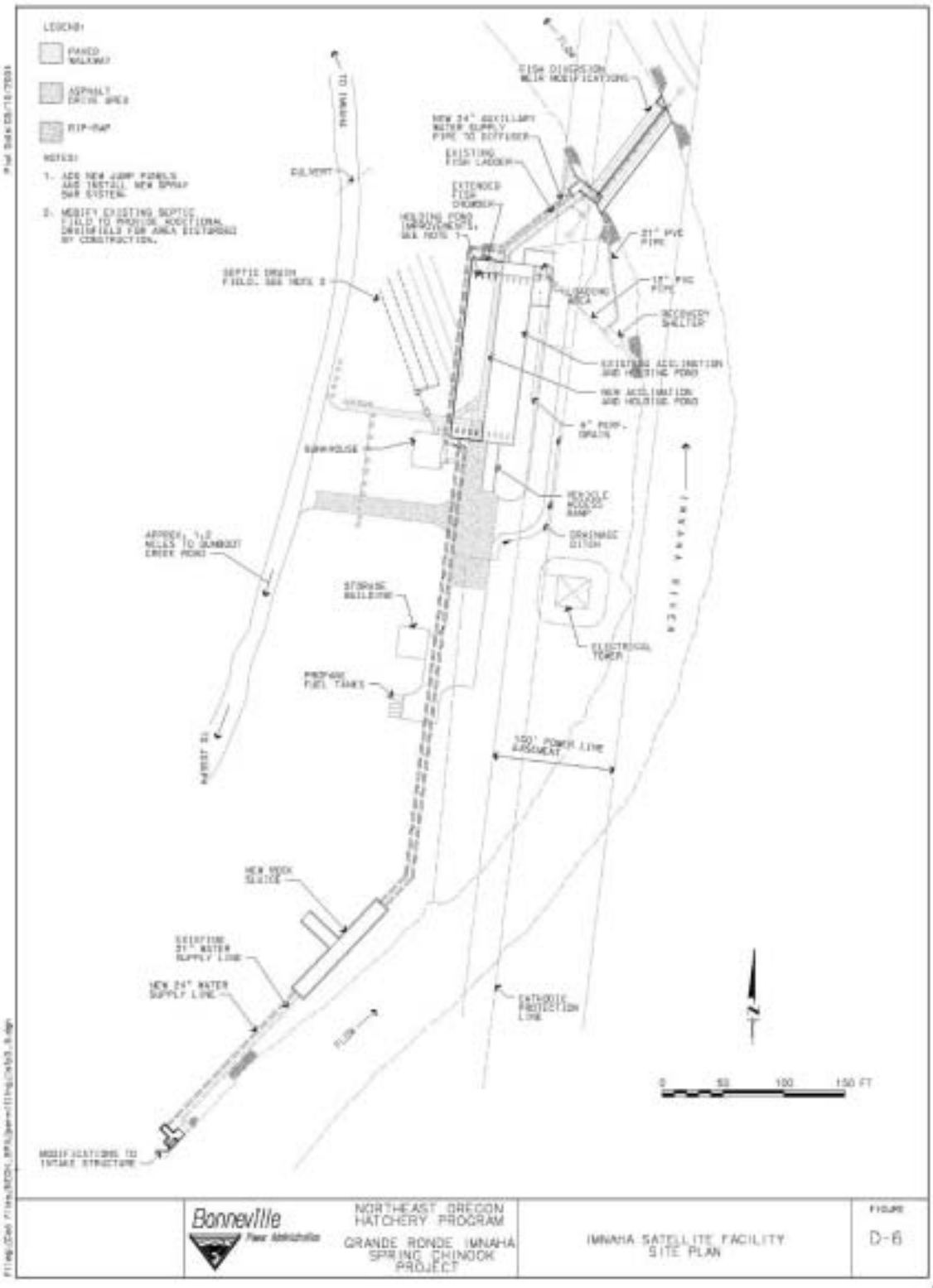
D-3. Lostine River Hatchery Proposed Site Plan



D-4. Lostine River Hatchery Intake Site Plan



D-5. Acrow Panel Bridge Location at Marks Ranch



D-6. Imnaha Satellite Facility Existing and Proposed Site Plan

APPENDIX E

Bull Trout Matrix of Pathways and Indicators

Table E-1. Matrix of Diagnostics/Pathways and Indicators for Bull Trout (NMFS 1996; USFWS 1998; USFS 1998) at Lookingglass Creek.

DIAGNOSTICS/ PATHWAYS INDICATORS	POPULATION AND ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION		
	Criteria	Present condition	Functionality (F/FR/FU)*	Restore	Maintain	Degrade
Subpop. Characteristics: Subpopulation Size	Total Juv, 5000-2000 & Adults >500 - <200	Low	FR		X	
Water Quality: Temperature (7 day average)	• Incubation 36-41 °F[1] • Rearing 39-54°F • Spawning 39-48°F • Migration not to exceed 59° F • Oregon criteria = 50°F	>70°F during July/August[6, 7]; on 303d list for exceeding bull trout temperature limit (50°F)[2]	FU[4]		X	
Sediment	<12% fines in gravel[1]	On 303d list for sediment[2, 3, 4]	FR		X	
Chemical Contamination/Nutrients	Low levels of chemicals; no CWA 303d reaches	Excess Nutrient Loading[3, 6]	FR		X	
Habitat Access: Physical Barriers	Human made barriers do not restrict passage	Fish ladders and intakes restrict passage at hatchery; on 303d list for habitat modifications[2]	FR[4]		X	
Habitat Elements: Substrate Embeddedness	Embeddedness <20%; mostly gravel and cobble	Excess fine sediment[6]	FR[3]		X	
Large Woody Debris	>20 pieces/mi >35ft long >12" diameter	Lack of LWD and riparian veg[6]	FR[3]		X	
Pool Frequency	Wetted width / pools/mi 0-5' 39 5-10' 60 10-15' 48 15-20' 39 20-30' 23 30-35' 18 35-40' 10 40-65' 9 65-100' 4		FR[3]		X	
Pool Quality	>1m deep with good cover	Pools lacking[6]	FU[3]		X	
Large Pools	Each reach has many large pools (>1m deep)				X	
Off-channel Habitat	Numerous ponds and backwaters with cover	Moderate amount of covered ponds	FR[4]		X	
Refugia	Sufficient in size and number to maintain pop.	Moderate amount of refugia	FR[4]		X	
Channel Conditions and Dynamics: Avg. Wetted Width/Max. Depth Ratio	Natural = 10	<10	FR[3]		X	
Streambank Condition	>90% stable or >80% of reach has = 90%	Erosive banks	FR[3]		X	
Floodplain Connectivity	Frequent with overbank	Moderate	FR[4]		X	
Flow/Hydrology: Change in Peak/Base Flows	Peak flow, base flow and timing similar to other watersheds		FR[3]		X	
Increase in Drainage Network	Zero or minimum increase in drainage network		FR[4]		X	
Watershed Conditions: Road Density & Location	<2mi/mi^2; no valley bottom roads	Valley bottom roads occur	FR[3]		X X	
Disturbance History	<15% with no unstable areas		FU[4]		X	
Riparian Reserve	Riparian corridor at least 80%intact; composed of 50% endemics	Invasive plants common	FR[3]		X	
Recruitment, Population Structure and Heterogeneity	Healthy subpopulation of bull trout (several thousand individuals) or directly linked to one. All life history modes are possible	Abundance of bull trout is low in Lookingglass Creek[5]	FR[5]		X	

* F = Functioning appropriately, FR = Functioning at risk, FU = Functioning at unacceptable risk

[1] USFWS 1998

[2] Nowak and Eddy 2001
[3] Upper Grande Ronde BA (USFS 1994a)
[4] BPA 1998
[5] B. Smith, ODFW, pers comm., October 17, 2002
[6] Wallowa County – NPT 1993, Revised 1999
[7] B. Lund, Lookingglass Hatchery Manager, pers comm., October 2, 2002

Table E-2. Matrix of Diagnostics/Pathways and Indicators for Bull Trout for the Lostine River (NMFS 1996a; USFWS 1998; USFS 1998b).

DIAGNOSTICS/ PATHWAYS INDICATORS	POPULATION AND ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION		
	Criteria	Present condition	Functionality (F/FR/FU)*	Restore	Maintain	Degrade
Subpop. Characteristics: Subpopulation Size	Total Juv, 5000-2000 & Adults >500 - <200	USFWS surveys (1999- 2003) indicate low utilization in lower Lostine[9]	F		X	
Water Quality: Temperature[1] (7 day average)	• Incubation 36-41 °F[1] • Rearing 39-54°F • Spawning 39-48°F • Migration not to exceed 59° F • Oregon criteria = 50°F	55.1°F during August[7]; migratory temps ok; spawning occurs upstream; low winter temps; Meets DEQ criteria for Alkalinity, Ammonia, BOD, Nitrogen, Oxygen, pH, Phosphates, Solids, Temp, and Turbidity	F[4]		X	
Sediment	<12% fines in gravel[1]	On 303d list for sediment[2]	F[2]		X	
Chemical Contamination/Nutrients	Low levels of chemicals; no CWA 303d reaches	Low levels of contamination	F		X	X
Habitat Access: Physical Barriers	Human made barriers do not restrict passage	On 303d list for habitat modifications[2]	FR[4]	X[8]	X[8]	X[8]
Habitat Elements: Substrate Embeddedness	Embeddedness <20%; mostly gravel and cobble		F[3]		X	
Large Woody Debris	>20 pieces/mi >35ft long >12" diameter		F[3]		X	
Pool Frequency	Wetted width / pools/mi 0-5' 39 5-10' 60 10-15' 48 15-20' 39 20-30' 23 30-35' 18 35-40' 10 40-65' 9 65-100' 4		F[3]		X	
Pool Quality	>1m deep with good cover		F[4]		X	
Large Pools	Each reach has many large pools (>1m deep)		F[4]		X	
Off-channel Habitat	Numerous ponds and backwaters with cover		FR[4]		X	
Refugia	Sufficient in size and number to maintain pop.		FR[4]		X	
Channel Conditions and Dynamics: Avg. Wetted Width/Max. Depth Ratio	Natural = 10		F[3]		X	
Streambank Condition	>90% stable or >80% of reach has = 90%		F[3]		X	
Floodplain Connectivity	Frequent with overbank		FR[4]		X	
Flow/Hydrology: Change in Peak/Base Flows	Peak flow, base flow and timing similar to other watersheds	On 303d list for flow modification[2]	FU[3]		X	
Increase in Drainage Network	Zero or minimum increase in drainage network		FR[4]		X	
Watershed Conditions: Road Density & Location	<2mi/mi^2; no valley bottom roads	<2mi/mi^2	F[3]		X	
Disturbance History	<15% with no unstable areas		FR[3]		X	
Riparian Reserve	Riparian corridor at least 80%intact; composed of 50% endemics		F[3]		X	
Recruitment, Population Structure and Heterogeneity	Healthy subpopulation of bull trout (several thousand individuals) or directly linked to one. All life history modes are possible	Population is healthy; abundance good	F[5]		X	

* F = Functioning appropriately, FR = Functioning at risk, FU = Functioning at unacceptable risk

[1] USFWS 1998

[2] Nowak and Eddy 2001
[3] Upper Grande Ronde BA (USFS 1994a); Lostine River Watershed BA (USFS 1994b)
[4] BPA 1998
[5] P. Sankovich, ODFW, pers comm., October 1, 2002; G. Sausen, USFS, pers comm., October 16, 2002
[6] Wallowa County – NPT 1993, Revised 1999
[7] MWH 2001
[8] Passage may be degraded due to installation of a new weir at the Lostine River Hatchery; however, improvements to passage at the Lostine Adult Collection Facility are likely
[9] G. Sausen, USFWS, pers comm., 3/23/04; P. Sankovich, USFWS, pers comm., 4/13/04

Effects on Bull Trout Population and Habitat Indicators

Lostine River Facilities and Lookingglass Hatchery

The effects analysis for the proposed Lostine Adult Collection Facility, the proposed Lostine River Hatchery and Lookingglass Hatchery is presented cumulatively based on similar impacts and identical in-stream work windows (July 15 – August 15) within the Lostine River. There will be no instream work at Lookingglass Hatchery.

Subpopulation Characteristics:

Matrix subpopulation information for the Lostine River and Lookingglass Creek systems was not available, but trends are discussed below.

Subpopulation Size – A seasonal reduction of habitat would occur from the water diversions but not to an extent that would affect the subpopulation throughout the watershed.

Growth and Survival – No lethal take of bull trout is anticipated through project activities. Instream work and operation of ladders and weirs would be conducted during juvenile emigration and adult migration. Juvenile migration is not anticipated to be disrupted. Adult migration may be temporarily delayed during the instream construction window, but the impact would be short term. Stream surveys conducted in 1992 indicated a low abundance of adult bull trout in the Lostine (ODFW 1995; Bellerud et al. 1997). As stated in the main document, Lostine River bull trout spawning surveys have been conducted by the USFWS from 1999 to 2003 (G. Sausen, USFWS, personal communication, March 23, 2004). Established spawning areas have been observed through these surveys, one of which is the Lundquist Bridge to OC Ranch section of the river. 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, the USFWS 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. Further downstream, at the junction of the forked split in the Lostine adjacent to the existing acclimation raceways, one bull trout redd was observed (G. Sausen, USFWS, pers comm., March 23, 2004). Bull trout do not spawn in the immediate vicinity of the 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 healthy in the Lostine. Because bull trout spawning occurs in September and October, with subsequent egg incubation into winter, the proposed instream work window would avoid impact to spawners and incubating eggs. Adult migrants and subadults could be in the vicinity, although high temperatures may cause them to move upstream into headwaters to seek

cooler temperatures. Due to the low occurrence of bull trout in the immediate vicinity of the proposed Lostine facilities, the subpopulation would likely be resilient to short-term impacts that may occur.

Life History Diversity/Isolation – The migratory connection would not be disrupted by this project.

Persistence and Genetic Integrity Subpopulation – The project would not impact the existence of the Lostine River or Lookingglass Creek local populations. Project activities would not affect this indicator.

Water Quality:

Temperature 7-day avg (summer) – As shown in Table E-2, existing values for several parameters including alkalinity, ammonia, BOD, nitrogen, oxygen, pH, phosphates, solids, temperature, and turbidity are rated as "A" under the ODEQ rating system in the Lostine River (ODEQ 1991). An "A" rating indicates that sampled parameter measurements are within the standards of ODEQ criteria. Estimated hatchery effluent at the Lostine River Hatchery, shown in Table 4.2-20, would not adversely impact these parameters. Ambient water temperature within the Lostine River and Lookingglass Creek would not be altered by this project. Reduced Lostine River flow within the diversion reach at the Lostine River Hatchery is not expected to increase temperatures. However, any potential instream temperature increases may be reduced by implementing low flow strategies (ie: higher densities and less volume of rearing water) for facility requirements. At the proposed Lostine River Hatchery, temperature issues could be further minimized by supplementation of instream flow through the pumping of effluent water to the base of the fish ladder. The use of chillers and well-water at the Lostine River Hatchery could potentially decrease temperatures in the immediate vicinity of the discharge; however, the water would rapidly mix with river water and the impact would be negligible.

Sediment – Disturbed stream banks would be armored with riprap or cobbles and revegetated with willow fascines to minimize erosion potential and protect structures. With the exception of cobble placement downstream of the weir, all work within the stream channel would be conducted behind cofferdams to minimize sediment introduction into the Lostine River and any construction impacts would be short-term. According to Waters (1995), most construction projects done essentially at a point on a stream, such as these projects, would have temporary effects. Subsequent flows within these river systems are high enough to scour away light deposits and fish would generally repopulate quickly (Waters 1995). Roads would be constructed in a manner to minimize sediment delivery to the Lostine River. Excess materials would be placed in an upland location where they would not be able to enter the Lostine River or Lookingglass Creek. All disturbed soils would be revegetated.

Chemical Contamination /Nutrients – No change in chemical discharge to Lookingglass Creek would occur as a result of activities. Two chemicals, formalin and erythromycin, would be introduced into the Lostine River through this project. Both chemicals would be applied according to labeling requirements (see *Water Quality* section in main document). Although indicated on the matrix table that degradation is possible from these introductions, introductions would be diluted in compliance with regulatory standards and the effect negligible. Equipment operation instream or adjacent to the river would use synthetic hydraulic oil as recommended by NOAA Fisheries. All equipment would be

free of petroleum or hydraulic fluid leaks and would be serviced outside the riparian zone. Nutrients would be introduced into the Lostine River through the return of spawned salmon carcasses. This action is considered a benefit to increase the level of marine derived micro-nutrients essential to a healthy ecosystem (Cederholm et al. 2000).

Additionally, the use of feed and subsequent effluent would introduce soluble nutrients to the Lostine River systems. The impacts caused by this action are not likely to adversely affect water quality and impacts could be further minimized by the use of low phosphorus feed. As discussed in the main text, hatchery effluent may alter a variety of parameters within the receiving water's mixing zone. However, according to NMFS (1999), this impact is expected to be very small and is likely localized at outfall areas as effluent is rapidly diluted in the receiving streams and rivers.

Habitat Access:

Physical Barriers – No stream crossings or culverts would be constructed. However, passage may be delayed due to the development of a new instream weir at the Lostine River Hatchery. Additionally, the Lostine Adult Collection Facility's flow velocity barrier may delay migration, but operational criteria developed by USFWS/NOAA Fisheries would be implemented to reduce and minimize effects. Bull trout passage would likely be improved at the Lostine Adult Collection Facility as compared to existing passage through outdated ladders and weir structures.

Habitat Elements:

Substrate Embeddedness – See sediment.

Large Woody Debris – LWD recruitment at a local level in the Lostine River would be impacted through the limited streamside tree removal at both Lostine facilities. Removed trees can be left on site for LWD recruitment if requested by NOAA Fisheries or USFWS. No existing LWD would be removed from the Lostine River. Project activities would not affect this indicator on a watershed scale.

Pool Frequency and Quality – The Lostine River intake structure would be placed into the toe of the stream bank and designed to operate in three ft depth of water**.** Installation of the intake at the Lostine Hatchery location may require the movement of large cobble/boulders that are common in this river segment. Care would be exercised to maintain pools and replace boulders to their original location, if possible.

Large Pools – See Pool Frequency above.

Off-channel habitat – A side channel located streamside of the proposed Lostine River Hatchery would be partially riprapped for facility flood protection. This meander channel is not likely used for spawning habitat as it is dry in the summer and substrate is not suitable for spawning (R. Zollman, NPT, pers comm., 1/2/03). Construction of the floodproofing levee at the Adult Collection Facility would isolate small side channels returning to the Lostine in this area. French drains would convey river and on-site spring water to the Lostine River, but approximately 600 square ft of seasonally wet, spring-fed intermittent channels that may serve as seasonal rearing habitat juvenile bull trout would be cut off from the mainstem due to construction of the proposed levee.

Refugia – Refugia would not be disturbed by project actions.

Channel Conditions and Dynamics:

Avg. Wetted width/Max. Depth Ratio – This indicator would be affected by the seasonal water diversion at both Lostine site locations. Water diversion would seasonally change the wetted width/maximum depth ratio in the diversion reaches below intake structures. Cross-sectional data, predicted by a recent IFIM study (R2 Resources 2002), indicated the change would be minimal. Wetted width/depth ratios would not be affected on watershed scale. Using these data, the WUA, defined as the surface area of a stream weighted by its suitability to an aquatic organism, can be predicted for different life stages of bull trout. Table E-3 shows the pre and post (during) diversion WUA for adult and juvenile bull trout according to the IFIM study. As shown in the table, an increase in the WUA for juveniles is predicted following diversions. The maximum WUA for juveniles occurs at 50 cfs. When water levels exceed this flow, juveniles require more energy to maintain their position in the water column. Therefore, the residual flow during diversion is more suitable to juveniles as they prefer lower velocities and less depth (R2 Resources 2002). Older juveniles may prefer higher velocities and greater depths.

As stated in the main text, bull trout can successfully migrate through waters with maintained depths of 0.6 feet. Chinook require a depth of 0.8 feet, which can be maintained by 10 cfs of flow. As a buffer, managers will maintain a minimum of 12 cfs during low flows by returning hatchery effluent to the point of diversion. Therefore, adult bull trout migrants should not be delayed in the diversion reach.

No change in channel conditions would occur as a result of upland modifications at Lookingglass Hatchery. Although no withdrawals would occur at the Lostine Adult Collection Facility site, during periods of low flow, all river water in excess of that required for irrigation diversion would be directed through the fish ladder. This would eliminate instream “habitat” (currently consists of concrete sills of existing fish ladder) during periods of low flow for a linear distance of approximately 150 ft. However, during these periods, the ladder would be monitored daily at a minimum to ensure safe passage of migrants, both upstream and downstream through the ladder. Monitoring activities may result in the need to allow a sufficient amount of water through the stream to allow for downstream passage of juveniles, but it is anticipated that, if present, they would use the ladder and follow river flow downstream. During low flow summer periods, high river temperatures would cause most juveniles to hold upstream in headwaters where water is a more suitable temperature.

Table E-3. Change in Weighted Usable Area – Lostine River Hatchery for adult and juvenile bull trout.

	Pre-diversion mean monthly flow (cfs)	Approximate WUA Pre-diversion (%)	Predicted diversion (cfs) using normal flow strategy	Post-diversion flow (cfs) (residual flow during diversion)	Approximate WUA Post-diversion (%)
Adult					
June	787.8	NA[1]	2.8	785.0	NA[1]
July	383.3	50	17.8	365.5	54
August	86.2	98	17.8	68.4	97
September	50.2	84	17.8	32.4	63
Juveniles					
June	787.8	NA[1]	2.8	785.0	NA[1]
July	383.3	48	17.8	365.5	50
August	86.2	90	17.8	68.4	95
September	50.2	100	17.8	32.4	90

[1]IFIM (R2 Resource Consultants, Inc. 2002) study predicted WUA only from 5 cfs to 400 cfs

Streambank condition – Streambank conditions would change at the following locations at the Lostine Adult Collection Facility: new fish ladder location, improved bridge abutment locations, and the floodproofing levee location. At the proposed Lostine River Hatchery, streambank conditions would be altered at the intake and outfall locations, and at the fish ladder location due to placement of riprap or cobbles. Although bank stabilization at the north well location is being completed under a separate project, on-going maintenance of this area may be necessary. Banks would be stabilized to prevent erosion and sedimentation into the Lostine River and to protect structures. Streambank change is not expected to be extensive enough to affect this indicator on a watershed basis. No streambank alterations would occur at the Lookingglass Hatchery.

Floodplain connectivity – No culverts, fords or stream crossings would be constructed. The Acrow panel bridge that currently spans the Imnaha will replace the existing bridge at the Lostine Adult Collection Facility. New bridge abutments would be re-located out of the floodway, above the OHWM. Although the proposed levee at the Lostine Adult Collection Facility would prevent flooding, there would be a loss of connection with wetlands and approximately 600 square ft of rearing habitat within seasonal, intermittent side channels. These losses are not expected to impact bull trout habitat on a watershed scale. The side channel that is proposed to be riprapped at the Lostine River Hatchery is not likely to impact wetland or riparian linkages as the area adjacent to the side channel contains upland vegetation.

Flow/Hydrology:

Change in Peak/Base Flows – No effect would occur due to the minimal change in forest disturbance and road density.

Increase in Drainage Network – No effect would occur due to the limited road constructed for the project. The addition of impervious surfaces is not anticipated to affect this parameter on a watershed scale.

Watershed Conditions:

Road Density and Location – Access road construction would not affect the road density criteria and watershed conditions would be maintained. The temporary access road on the west side of the river at the Lostine Adult Collection Facility would be constructed within 150-ft of the river. In accordance with the NMFS (2002) SLOPES Biological Opinion, soil disturbance would be minimized by clearing vegetation to ground level and placing clean gravel over geotextile fabric. The temporary access road would be obliterated, the soil stabilized and the area revegetated.

Disturbance History – Timber removal that could affect the Equivalent Clearcut Area would not occur.

Riparian Resource Areas – Project actions are expected to have minimal impact on large woody debris recruitment and shade and are therefore expected to have little effect on riparian corridors. As discussed previously, trees removed on site could be left for LWD recruitment if so stipulated.

Disturbance Regime – Project actions are not expected to increase the potential for landslides, scour or flooding.

Integration of Species and Habitat Conditions – Actions do not occur at a scale across the watershed (or subwatershed) that would affect the bull trout continued existence and connectivity to Columbia River DPS populations.

Table E-4. Matrix of Diagnostics/Pathways and Indicators for Bull Trout for the Imnaha River (NMFS 1996; USFWS 1998)

DIAGNOSTICS/ PATHWAYS INDICATORS	POPULATION AND ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION		
	Criteria	Present condition	Functionality (F/FR/FU)*	Restore	Maintain	Degrade
Subpop. Characteristics: Subpopulation Size	Total Juv, 5000-2000 & Adults >500 - <200	"low risk" of extinction	F		X	
Water Quality: Temperature (7 day average)	• Incubation 36-41 °F[1] • Rearing 39-54°F • Spawning 39-48°F • Migration not to exceed 59° F • Oregon criteria = 50°F	>63°F during July and August[5]; on 303d list for exceeding bull trout temperature limit (50°F) upstream of Summit Creek (~RM 45)	FU[2]		X	
Sediment	<12% fines in gravel[1]	Excess erosion and fine sediments may be a problem, but properly functioning.[4]	F[2]		X	
Chemical Contamination/Nutrients	Low levels of chemicals; no CWA 303d reaches	Potential herbicide and pesticide input, but properly functioning[4]	F[2]		X	X
Habitat Access: Physical Barriers	Human made barriers do not restrict passage	Fish ladders and intakes restrict passage at site; but no known manmade barriers on USFS land[2]	F[2]		X	
Habitat Elements: Substrate Embeddedness	Embeddedness <20%; mostly gravel and cobble	Gravels and cobbles stable[2]	FR[2]		X	
Large Woody Debris	>20 pieces/mi >35ft long >12" diameter	At natural potential even though does not have >20 pieces/mi	F[2]		X	
Pool Frequency	Wetted width / pools/mi 0-5' 39 5-10' 60 10-15' 48 15-20' 39 20-30' 23 30-35' 18 35-40' 10 40-65' 9 65-100' 4	Survey methodology not consistent with PACFISH/INFISH and NOAA Fisheries matrix -does not measure pools less than full width in size	FU[2]		X	
Pool Quality	>1m deep with good cover	Pools are Rosgen B and C channel types – plunge and step pools	F[2]			
Large Pools	Each reach has many large pools (>1m deep)	Deep plunge pools common	F[2]		X	
Off-channel Habitat	Numerous ponds and backwaters with cover	Properly functioning throughout except where channel modified	F[2]			
Refugia	Sufficient in size and number to maintain pop.	Properly functioning throughout except where channel modified	F[2]			
Channel Conditions and Dynamics: Avg. Wetted Width/Max. Depth Ratio	Natural = 10	Properly functioning throughout except where channel modified	F[2]		X	
Streambank Condition	>90% stable or >80% of reach has = 90%	Bank form has deteriorated in some areas[4]	F[2] & FR[4]		X	
Floodplain Connectivity	Frequent with overbank	Properly functioning except where scoured during 1997 flood	F[2]		X	

DIAGNOSTICS/ PATHWAYS INDICATORS	POPULATION AND ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION		
	Criteria	Present condition	Functionality (F/FR/FU)*	Restore	Maintain	Degrade
Flow/Hydrology: Change in Peak/Base Flows	Peak flow, base flow and timing similar to other watersheds	Irrigation diversion and icing may impact[2]	FR		X	
Increase in Drainage Network	Zero or minimum increase in drainage network	Minimal disturbance	F[2]		X	
Watershed Conditions: Road Density & Location	<2mi/mi^2; no valley bottom roads	1.52mi/mi^2; however, roads may contribute to increased sediment[2]	F[2]		X X	
Disturbance History	<15% with no unstable areas	ECA not concerned with Imnaha Watershed	F[2]		X	
Riparian Reserve/ Riparian Conservation Area (Satellite only)	Riparian corridor at least 80%intact; composed of 50% endemics	Riparian vegetation lacking - trees have died (spruce) [4]	FR[4]		X	
Recruitment, Population Structure and Heterogeneity	Healthy subpopulation of bull trout (several thousand individuals) or directly linked to one. All life history modes are possible	Populations healthy; support all life stages; abundance good[3]	F[3]		X	

* F = Functioning appropriately, FR = Functioning at risk, FU = Functioning at unacceptable risk
[1] USFWS 1998
[2] NPT 2001
[3] R. Zollman, NPT, and G. Sausen, USFS, pers comm., 10/16/02
[4] Wallowa County – NPT 1993, Revised 1999
[5] MWH 2001

Imnaha Satellite Facility

Subpopulation Characteristics:

Matrix subpopulation information for the Imnaha River was not available, but trends are discussed below.

Subpopulation Size – A seasonal reduction of habitat would occur from the water diversions but not to an extent that would affect the subpopulation.

Growth and Survival – No lethal take of bull trout is anticipated through project activities. Instream work would be conducted during late spawning. Juvenile migration is not anticipated to be disrupted. Spawning is not documented to occur in the vicinity of the Imnaha Satellite's in-water work locations therefore incubating eggs/fry would not be affected. Spawning occurs upstream, in cold water tributaries near the headwaters. Because of the connectivity with the Columbia DPS, the subpopulation may be resilient to short-term impacts that may occur.

Life History Diversity/Isolation – The migratory connection would not be disrupted by this project.

Persistence and Genetic Integrity Subpopulation – The project would not impact the existence of the Imnaha River local population. Project activities would not affect this indicator. Project activities at the Satellite Facility, including weir and ladder improvements, are anticipated to improve bull trout passage as compared to existing conditions.

Water Quality:

Temperature Avg max summer – The mainstem Imnaha River, from Summit Creek to the North/South Fork confluence, violates Oregon state temperature standards for bull trout and is on the Oregon Department of Environmental Quality's 303d list (Bryson et al. 2001). Ambient water temperature within the Imnaha River would not be altered by this project. Reduced Imnaha River flow within the diversion reach at the Satellite Facility is not expected to increase temperatures due to relatively short diversion distance and the good vegetative canopy within the diversion reach where the summer diversion would occur. No streamside tree removal at the Satellite Facility would occur within RHCA. Disturbed soils would be revegetated with native species.

Sediment – Disturbed stream banks would be armored with riprap or cobbles and revegetated with willow fascines to minimize erosion potential and protect structures. All work within the stream channel would be conducted behind cofferdams to minimize sediment introduction into the Imnaha River and any construction impacts would be short-term, requiring one instream work window. Access roads would be constructed to minimize sediment delivery to the river. Excess materials would be placed in an upland location where they would not be able to enter the Imnaha River. All disturbed soils would be revegetated.

Chemical Contamination /Nutrients – Formalin may be introduced into the Imnaha River. Erythromycin is currently used to inoculate both fish released above the Satellite weir and those taken for broodstock. Both chemicals would be applied according to regulatory requirements (see *Water Quality*). Although indicated on the matrix table that degradation is possible from these introductions, discharged chemicals would be diluted in compliance with regulatory standards and the effect negligible. Equipment operation instream or adjacent to the river would use synthetic hydraulic oil as recommended by NOAA Fisheries. All equipment would be free of petroleum or hydraulic fluid leaks and would be serviced outside the riparian zone and the RHCA at the Satellite Facility. Nutrients would be introduced into the Imnaha River through the return of spawned salmon carcasses. This action is considered a benefit to increase the level of marine derived micro-nutrients essential to a healthy ecosystem (Cederholm et al. 2000). The use of feed and subsequent effluent would introduce soluble nutrients into the Imnaha River at the Satellite Facility. The impacts caused by this action are not likely to adversely affect water quality, and impacts could be further minimized by the use of low phosphorus feed. As discussed in the main text (Table 4.2-23), hatchery effluent may alter a variety of parameters within the receiving water's mixing zone. According to NMFS (1999), the impact that effluent has on receiving waters is expected to be very small and is likely localized at outfall areas as effluent is rapidly diluted in the receiving streams and rivers.

Habitat Access:

Physical Barriers – No stream crossings or culverts would be constructed. The proposed weir at the Satellite Facility may delay migration, but operational criteria developed by NOAA Fisheries would be implemented to reduce and minimize effects. The weir and new ladder would replace an existing picket weir and ladder that do not function effectively and therefore habitat access and passage would likely improve.

Habitat Elements:

Substrate Embeddedness – See sediment.

Large Woody Debris – LWD recruitment at a local level in the Upper Imnaha River would not be impacted through the limited tree removal at the Imnaha Satellite Facility, as trees planned for removal are be too far from the river to contribute to LWD. Removed trees can be left on site for LWD recruitment if requested by USFS, NOAA Fisheries or USFWS. No existing LWD would be removed from the Imnaha River. Project activities would not affect this indicator on a watershed scale.

Pool Frequency and Quality – The intake structure would be placed into the toe of the stream bank and designed to operate in two to three ft depth of water. The existing pool near the new intake would not be altered during installation. However, the intake would then be located in this pool habitat, which may impact usage of the pool.

Large Pools – See Pool Frequency above.

Off-channel habitat – Disturbance of off-channel habitat would not occur.

Refugia – Refugia would not be disturbed by project actions.

Channel Conditions and Dynamics:

Avg. Wetted width/Max. Depth Ratio – Water diversion would seasonally change the wetted width/maximum depth ratio in the diversion reaches below intake structures.

Cross-sectional data was not available for the existing Imnaha Satellite Facility. However, channel characteristics, including gradients, substrate and widths are similar to cross sectional data available at the Marks Ranch site, downstream from the Satellite Facility. Based on these characteristics and similar mean monthly flows, it is anticipated that the additional 11.3 cfs withdrawal (total of 20.3 cfs withdrawal, plus 6 cfs for return pipe usage) would not affect seasonal bull trout habitat. Average monthly streamflows (Table 3.2-2) are high enough that withdrawals in the 1,000 ft diversion reach would not substantially alter WUA for bull trout.

Streambank condition – Streambank conditions would change at the following locations: new intake, abutments for the weir, and auxiliary water supply line. Banks would be stabilized via riprap to prevent erosion and sedimentation to the Imnaha River. Streambank change is not expected to be extensive enough to affect this indicator on a watershed basis.

Floodplain connectivity – No change in connectivity would occur from project actions. No culverts, fords or stream crossings would be constructed. Linkages between wetlands, riparian areas and the Imnaha River would be maintained.

Flow/Hydrology:

Change in Peak/Base Flows – No effect would occur due to the minimal change in forest disturbance and road density.

Increase in Drainage Network –No new road construction would occur at the Imnaha Satellite Facility. No effect on the in-drainage network is expected to occur. The minor

addition of impervious surfaces is not anticipated to affect this parameter on a watershed scale.

Watershed Conditions:

Road Density and Location - Within the RHCA at the Satellite Facility, existing gravel access roads would be used for construction. Road density would remain under the criteria of 2mi/mi^2 thereby maintaining watershed conditions.

Disturbance History – Timber removal that could affect the Equivalent Clearcut Area would not occur.

Riparian Conservation Areas – Project actions are expected to have minimal impact on LWD recruitment and shade and are therefore expected to have little effect on riparian conservation areas at the Imnaha Satellite. As discussed previously, trees removed on site could be left for LWD recruitment if so stipulated.

Disturbance Regime – Project actions are not expected to increase the potential for landslides, scour or flooding.

Integration of Species and Habitat Conditions – Actions do not occur at a scale across the watershed (or subwatershed) that would affect the bull trout continued existence and connectivity to the Columbia River DPS populations.

APPENDIX F

Chinook NOAA Fisheries Matrix of Pathways

Table F-1. Matrix of diagnostics/pathways and indicators for spring/summer Chinook at Lookingglass Creek (NMFS 1996a; USFWS 1998; Wallowa County and NPT 1993; Bjornn and Reiser 1991; BLM 1993)

DIAGNOSTICS/ PATHWAYS INDICATORS	POPULATION AND ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION		
	Properly Functioning Criteria	Present condition	Functionality (F/FR/FU)*	Restore	Maintain	Degrade
Water Quality: Temperature Avg Max Summer	40 - 57°F for spawning and incubation[1]	>70°F during July/August[6, 7]; on 303d list for temperature[2]	FU[4]		X	
Sediment	<12% fines	On 303d list for sediment[2, 3, 4]	FR		X	
Chemical Contamination/Nutrients	Low	Excess Nutrient Loading[3, 6]	FR		X	
Habitat Access: Physical Barriers	<1 barrier	Fish ladders and intakes restrict passage at hatchery; on 303d list for habitat modifications[2]	FR[4]		X	
Habitat Elements: Substrate Embeddedness % clean substrate	<20%[1, 2]	Excess fine sediment[6]	FR[3]		X	
Large Woody Debris	10-20 pieces/100 linear ft[1]	Lack of LWD and riparian veg[6]	FR[3]		X	
Pool Frequency	Channel width #pools/mi 5 ft = 184 10’ = 96 15’ = 70 20’ = 56 25’ = 47 50’ = 26 75’ = 23		FR[3]		X	
Pool Quality	>1m deep with good cover	Pools lacking[6]	FU[3]		X	
Large Pools	Each reach has many large pools (>1m deep)				X	
Off-channel Habitat	Many backwaters with cover		FR[4]		X	
Refugia	Sufficient		FR[4]		X	
Channel Conditions and Dynamics: Avg. Wetted Width/Max. Depth Ratio	<10		FR[3]		X	
Streambank Condition	>90% stable		FR[3]		X	
Floodplain Connectivity	Frequent		FR[4]		X	
Flow/Hydrology: Disturbance History/ Change in Peak/Base Flows	<15% ECA		FR[3]		X	
Increase in Drainage Network	Zero or minimum increase in drainage network		FR[4]		X	
Watershed Conditions: Road Density & Location	<2mi/mi^2; no valley bottom roads		FR[3]		X X	
Riparian Reserves	Riparian corridor at least 80%intact; composed of 50% endemics		FR[3]		X	
Integration of Species and Habitat Conditions					X	

* F = Functioning appropriately, FR = Functioning at risk, FU = Functioning at unacceptable risk
[1] USFWS 1998
[2] Nowak and Eddy 2001
[3] Upper Grande Ronde BA (USFS 1994)
[4] BPA 1998
[5] R. Zollman, NPT, pers comm., October 16, 2002
[6] Wallowa County – NPT 1993, Revised 1999
[7] B. Lund, Lookingglass Hatchery Manager, pers comm., October 2, 2002

Table F-2. Matrix of diagnostics/pathways and indicators for spring/summer Chinook at the Lostine River (NMFS 1996; USFWS 1998; Wallowa County and NPT 1993; Bjornn and Reiser 1991; BLM 1993)

DIAGNOSTICS/ PATHWAYS INDICATORS	POPULATION AND ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION		
	Properly Functioning Criteria	Present condition	Functionality (F/FR/FU)*	Restore	Maintain	Degrade
Water Quality: Temperature Avg Max Summer	40-57°F for spawning and incubation[1]	55.1°F during August[7]; migratory temps ok; spawning occurs upstream; low winter temps	F[4]		X	
Sediment	<12% fines	On 303d list for sediment[2]	F[2]		X	
Chemical Contamination/Nutrients	Low	Low levels of contamination	F		X	X
Habitat Access: Physical Barriers	Human made barriers do not restrict passage	On 303d list for habitat modifications[2]	FR[4]	X[8]		X[8]
Habitat Elements: Substrate Embeddedness % clean substrate	Embeddedness <20%; mostly gravel and cobble		F[3]		X	
Large Woody Debris	>20 pieces/mi >35ft long >12" diameter		F[3]		X	
Pool Frequency	Channel width #pools/mi 5 ft = 184 10' = 96 15' = 70 20' = 56 25' = 47 50' = 26 75' = 23		F[3]		X	
Pool Quality	>1m deep with good cover		F[4]		X	
Large Pools	Each reach has many large pools (>1m deep)		F[4]		X	
Off-channel Habitat	Numerous ponds and backwaters with cover		FR[4]		X	
Refugia	Sufficient in size and number to maintain pop.		FR[4]		X	
Channel Conditions and Dynamics: Avg. Wetted Width/Max. Depth Ratio	<10		F[3]		X	
Streambank Condition	>90% stable or >80% of reach has = 90%		F[3]		X	
Floodplain Connectivity	Frequent with overbank		FR[4]		X	
Flow/Hydrology: Disturbance History/ Change in Peak/Base Flows	<15% ECA	On 303d list for flow modification[2]	FU[3]		X	
Increase in Drainage Network	Zero or minimum increase in drainage network		FR[4]		X	
Watershed Conditions: Road Density & Location	<2mi/mi^2; no valley bottom roads		F[3]		X	
Riparian Reserves	Riparian corridor at least 80%intact; composed of 50% endemics		F[3]		X	
Integration of Species and Habitat Conditions					X	

* F = Functioning appropriately, FR = Functioning at risk, FU = Functioning at unacceptable risk

[1] USFWS 1998

[2] Nowak and Eddy 2001

[3] Upper Grande Ronde BA (USFS 1994); Lostine River Watershed BA (USFS 1994b)
[4] BPA 1998
[5] P. Sankovich, ODFW, pers comm., 10/1/02
[6] Wallowa County – NPT 1993, Revised 1999
[7] MWH 2001
[8]Passage at the Lostine Adult Collection Facility location will likely improve; however, an additional instream structure may degrade this factor at the Lostine River Hatchery fish ladder location

Effects on Spring/Summer Chinook Population and Habitat Indicators

Lostine River Facilities and Lookingglass Hatchery

Subpopulation Characteristics:

Subpopulation Size – Project actions are intended to prevent further population decline of Lookingglass Creek and Lostine River spring/summer Chinook, and to eventually recover the natural population. The goal of this project is to achieve a self-sustaining population that would meet or exceed NOAA Fisheries delisting criteria while maintaining the genetic characteristics of the population.

Growth and Survival – Project actions are intended to increase survival in the egg to smolt life stage through artificial propagation. Habitat effects from project actions are not expected to be detrimental to natural production of spring/summer Chinook.

Life History Diversity/Isolation – Population characteristics would be maintained through application of conditions of the Grande Ronde spring Chinook HGMP (Nowak and Eddy 2001) and implementation of the Monitoring and Evaluation Plan (Appendix D of Ashe et al. 2000; Hesse and Harbeck 2004).

Persistence and Genetic Integrity Subpopulation – The project would monitor actions to ensure that the population persists. Broodstock collection and spawning protocols have been developed to maintain the genetic integrity of Grande Ronde subbasin spring/summer Chinook (Ashe et al. 2000; Nowak and Eddy 2001). As a population, spring/summer-run Chinook of the Snake River generally exhibit low levels of genetic variation (Winans 1989).

Water Quality:

Temperature avg max summer – Ambient water temperature within the Lostine River and Lookingglass Creek would not be altered by this project. Diverted water from the streams may be exposed to solar thermal gain through storage in the raceways, but would pass through the facility under constant flow. Reduced Lostine River flow within the diversion reach at the Lostine River Hatchery is not expected to increase temperatures. Potential temperature increases may be reduced by implementing minimum flow strategies for hatchery requirements. The use of chillers and well-water at the Lostine River Hatchery could potentially decrease temperatures in the immediate vicinity of the discharge, however, the water would rapidly mix with river water and the impact would be negligible.

Sediment – Disturbed stream banks would be armored with riprap or cobbles and revegetated with willow fascines to minimize erosion potential and protect structures. With the exception of cobble placement downstream of the weir, all work within the stream channel would be conducted behind cofferdams to minimize sediment introduction into the Lostine River and any construction impacts would be short-term.

Roads would be constructed to minimize sediment delivery to the Lostine River. Excess materials would be placed in an upland location where they would not be able to enter the Lostine River or Lookingglass Creek. All disturbed soils would be revegetated.

Chemical Contamination /Nutrients – No change in chemical discharge to Lookingglass Creek would occur as a result of activities. Two chemicals, formalin and erythromycin, would be introduced into the Lostine River through this project. Both chemicals would be applied according to labeling requirements (see *Water Quality*). Although indicated on the matrix table that degradation is possible from these introductions, introductions would be diluted according to regulatory standards and the effect negligible. Equipment operation instream or adjacent to the river would use synthetic hydraulic oil as recommended by NOAA Fisheries. All equipment would be free of petroleum or hydraulic fluid leaks and would be serviced outside the riparian zone. Nutrients would be introduced into the Lostine River through the return of spawned salmon carcasses. This action is considered a benefit to increase the level of marine derived micro-nutrients essential to a healthy ecosystem (Cederholm et al. 2000). Additionally, the use of feed and subsequent effluent would introduce soluble nutrients to the Lostine River systems. The impacts caused by this action are not likely to adversely affect water quality and impacts could be further minimized by the use of low phosphorus feed.

As shown in Table E-2, measured values for several parameters in the Lostine River, including alkalinity, ammonia, BOD, nitrogen, oxygen, pH, phosphates, solids, temperature, and turbidity are 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. Estimated hatchery effluent at the Lostine River Hatchery, shown in Table 4.2-20, would not adversely impact these parameters. Additionally, according to NMFS (1999), any impact is expected to be very small and is likely localized at outfall areas as effluent is rapidly diluted in the receiving streams and rivers.

Habitat Access:

Physical Barriers – No stream crossings or culverts would be constructed. However, passage may be delayed due to the development of a new instream weir at the Lostine River Hatchery. Additionally, the Lostine Adult Collection Facility's flow velocity barrier may delay migration, but operational criteria developed by NOAA Fisheries would be implemented to reduce and minimize effects. Chinook passage would likely be improved at the Lostine Adult Collection Facility as compared to existing passage through outdated ladders and weir structures. No additional instream structures would be installed at the Lookingglass Hatchery location.

Habitat Elements:

Substrate Embeddedness – See sediment.

Large Woody Debris – LWD recruitment at a local level in the Lostine River would be impacted through the limited streamside tree removal at both Lostine facilities. Removed trees can be left on site for LWD recruitment if requested by USFS, NOAA Fisheries or USFWS. No existing LWD would be removed from the Lostine River. Project activities would not affect this indicator on a watershed scale.

Pool Frequency and Quality – The Lostine River Hatchery intake structure would be placed into the toe of the stream bank and designed to operate in one ft depth of water.

Installation of the intake at the Lostine Hatchery location may require the movement of large cobble/boulders that are common in this river segment. Care would be exercised to maintain pools and replace boulders to their original locations, if possible.

Large Pools – See Pool Frequency above.

Off-channel habitat – A side channel located streamside of the proposed Lostine River Hatchery would be riprapped for facility flood protection. Construction of the floodproofing levee at the Adult Collection Facility would isolate small side channels returning to the Lostine in this area. Wetlands would no longer have a connection to the river, however, they are likely spring fed. Construction of the levee and associated access roads would disturb wetlands. French drains would convey river and on-site spring water to the Lostine River, but a small amount of juvenile Chinook habitat (~600 square feet of seasonal, intermittent spring fed channels) would be lost.

Refugia – Refugia would not be disturbed by project actions.

Channel Conditions and Dynamics:

Avg. Wetted width/Max. Depth Ratio – As previously discussed, this indicator would be affected by the seasonal water diversion at the two locations. Water diversion would seasonally change the wetted width/maximum depth ratio in the diversion reaches below intake structures. Cross-sectional data, predicted by a recent IFIM study, indicated the change would be minimal (R2 Resources 2002). Wetted width/depth ratios would not be affected on watershed scale. Wetted width/depth ratios can be used to predict the WUA for a particular species. Table F-3 shows the pre and post diversion (residual flow during diversion) WUA for spawning adult and juvenile spring/summer Chinook according to the IFIM study (R2 Resources 2002). The improved WUA levels for juveniles are likely due to the fact that emerging fish and young fry prefer shallower waters and lower velocities, as predicted through the IFIM analysis.

Additionally, because the effluent pumpback system will be employed to maintain a minimum instream flow of 12 cfs, within which Chinook can successfully migrate and spawn, the proposed withdrawals are not anticipated to impact individuals.

No change in channel conditions would occur as a result of modifications at Lookingglass Hatchery. As previously discussed, habitat loss over a short distance at the Lostine Adult Collection Facility would occur during periods of low flow when all river water in excess of that required for irrigation is diverted through the proposed fish ladder.

Table F-3. Change in Weighted Usable Area – Lostine River Hatchery for spawning adult and juvenile spring/summer Chinook.

	Pre-diversion mean monthly flow (cfs)	Approximate WUA Pre-diversion (%)	Predicted diversion (cfs) using normal flow index	Post-diversion flow (cfs) (residual flow during diversion)	Approximate WUA Post-diversion (%)
Adult					
June	787.8	NA[1]	2.8	785.0	NA[1]
July	383.3	50	17.8	365.5	80
August	86.2	98	17.8	68.4	60
September	50.2	84	17.8	32.4	28
Juveniles					
June	787.8	NA[1]	2.8	785.0	NA[1]
July	383.3	48	17.8	365.5	27
August	86.2	90	17.8	68.4	81
September	50.2	100	17.8	32.4	97

[1]IFIM study predicted WUA only from 5 cfs to 400 cfs

Streambank condition – At the proposed Lostine Adult Collection Facility, streambank conditions would change due to the following components: new fish ladder, improved bridge and abutments, and the floodproofing levee. At the proposed Lostine River Hatchery, streambank conditions would be altered at the intake and outfall locations, and the fish ladder location due to placement of riprap or cobbles. Although bank stabilization at the north well location is being completed under a separate project, on-going maintenance of this area may be necessary. Banks would be stabilized to prevent erosion and sedimentation into the Lostine River and to protect structures. Streambank change is not expected to be extensive enough to affect this indicator on a watershed basis. No streambank alterations would occur at the Lookingglass Hatchery.

Floodplain connectivity – No culverts, fords or stream crossings would be constructed. The new bridge at the Lostine Adult Collection Facility would replace an existing bridge. New bridge abutments would be re-located out of the floodway, above the OHWM. Although the proposed levee would prevent flooding, there would be a loss of connection with wetlands and side channels. These losses are not expected to impact Chinook habitat on a watershed scale. The side channel that is proposed to be riprapped at the Lostine River Hatchery is not likely to impact wetland or riparian linkages as the area adjacent to the side channel contains upland vegetation.

Flow/Hydrology:

Change in Peak/Base Flows – No effect would occur due to the minimal change in forest disturbance and road density.

Increase in Drainage Network – No effect would occur due to the limited amount of roads constructed for the project. The addition of impervious surfaces is not anticipated to affect this parameter on a watershed scale.

Watershed Conditions:

Road Density and Location – Although the Lostine facilities and Lookingglass Hatchery are not located on USFS land, proposed access roads would not result in road densities that exceed the criteria of 2 mi of roads per square mi of land.

Disturbance History – Timber removal that could affect the Equivalent Clearcut Area (ECA) would not occur.

Riparian Resource Areas – Project actions are expected to have minimal impact on large wooded debris recruitment and shade and are therefore expected to have little effect on riparian corridors.

Disturbance Regime – Project actions are not expected to increase the potential for landslides, scour or flooding.

Integration of Species and Habitat Conditions – The intent of project actions is to recover the Lostine River spring/summer Chinook population through supplementation/recovery activities. Project actions are not expected to affect habitat conditions within the watershed (or subwatershed) to an extent that would affect the continued existence of the Lostine River spring/summer Chinook population. Monitoring and evaluation is proposed (Hesse and Harbeck 2004) to determine the effectiveness of the project, and detect any negative effects that may occur and modify project action to minimize or eliminate those effects.

Table F-4. Matrix of diagnostics/pathways and indicators for spring/summer Chinook for the Upper Imnaha River - Section 7 Watershed (USFWS 1998; NMFS 1996a; Imnaha Subbasin Summary, reproduced from the USDA Forest Service 1998a)**

DIAGNOSTICS/ PATHWAYS INDICATORS	POPULATION AND ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION		
	Properly Functioning Criteria	Present condition	Functionality (F/FR/FU)*	Restore	Maintain	Degrade
Water Quality: Temperature Avg Max Summer	< 50-57 deg F.	>63°F during July/August[5] (Ashe et al. 2000 = 71.8°F)	FU[2]		X	
Sediment	<20%	Excess erosion and fine sediments may be a problem, but properly func.[4]	F[2]		X	
Chemical Contamination/Nutrients	Low	Potential herbicide and pesticide input, but properly functioning[4]	F[2]		X	X
Habitat Access: Physical Barriers	<1 barrier	Fish ladders and intakes restrict passage at site; but no known manmade barriers on USFS land[2]	F[2]	X[6]		
Habitat Elements: Substrate Embeddedness % clean substrate	Embeddedness <20%; mostly gravel and cobble	Gravels and cobbles stable[2]	FR[2]		X	
Large Woody Debris	>20 pieces/mi >35ft long >12" diameter	At natural potential even though does not have >20 pieces/mi	F[2]		X	
Pool Frequency	Depends on width; 26-184 pools per mi	Does not meet PACFISH and NMFS matrix due to stream survey methodology – does not measure pools less than full width in size	FU[2]		X	
Pool Quality	>1m deep with good cover	Pools are Rosgen B and C channel types – plunge and step pools	F[2]		X	
Large Pools	> 3m deep[2]		F[2]		X	
Off-channel Habitat	Backwaters Many - few	Properly functioning throughout except where channel modified	F[2]		X	
Refugia	Sufficient in size and number to maintain pop.	Properly functioning throughout except where channel modified	F[2]		X	
Channel Conditions and Dynamics: Avg. Wetted Width/Max. Depth Ratio	>10	Properly functioning throughout except where channel modified	F[2]		X	
Streambank Condition	>90% stable or >80% of reach has = 90%	Bank form has deteriorated in some areas[4]	F[2] & FR[4]		X	
Floodplain Connectivity	Frequent with overbank to maintain wetlands	Properly functioning except where scoured during 1997 flood	F[2]		X	
Flow/Hydrology: Disturbance History/ Change in Peak/Base Flows	Hydrographs comparable to undisturbed watershed	Irrigation diversion and icing may impact[2]	FR		X	
Increase in Drainage Network	Zero or minimum increase in drainage network		F[2]		X	
Watershed Conditions: Road Density & Location	<2mi/mi^2; no valley bottom roads	1.52mi/mi^2; however, roads may contribute to increased sediment[2]	F[2]		X	
Riparian Reserves/ Riparian Conservation Areas (Satellite only)	Riparian corridor at least 80%intact; composed of 50% endemics	Riparian vegetation lacking - trees have died (spruce) [4]	FR[4]		X	
Disturbance Regime (haz/risk rating)	<15% ECA with no disturbance		F		X	
Integration of Species and Habitat Conditions					X	

* F = Functioning appropriately, FR = Functioning at risk, FU = Functioning at unacceptable risk
** Overall, the upper Imnaha River is properly functioning, however, segments within private lands are at risk (NPT 2001).
[1] USFWS 1998
[2] Imnaha Subbasin Summary
[3] R. Zollman, NPT, and G. Sausen, USFS, pers comms., 10/16/02
[4] Wallowa County – NPT 1993, Revised 1999
[5] MWH 2001
[6] Improvements at the Satellite weir would likely improve passage

Imnaha River Facilities

Subpopulation Characteristics:

Subpopulation Size – Project actions are intended to prevent further population decline of Imnaha River spring/summer Chinook, and to eventually recover the natural population. The goal of the NEOH project is to achieve a self-sustaining population that would meet, or exceed, NOAA Fisheries delisting criteria while maintaining the genetic characteristics of the population.

Growth and Survival – Project actions are intended to increase survival in the egg to smolt life stage through artificial propagation. Habitat effects from project actions are not expected to be detrimental to natural production of spring/summer Chinook.

Life History Diversity/Isolation – Population characteristics would be maintained through application of conditions of the Imnaha Subbasin HGMP (NPT 2001) and implementation of the Monitoring and Evaluation Plan (Appendix D of Ashe et al. 2000; Hesse and Harbeck 2004).

Persistence and Genetic Integrity Subpopulation – The project would monitor actions to ensure that the population persists. Broodstock collection and spawning protocols have been developed to maintain the genetic integrity of Imnaha River spring/summer Chinook (Ashe et al. 2000; NPT 2001).

Water Quality:

Temperature Avg max summer – Ambient water temperature within the Imnaha River would not be altered by this project. Diverted water from the Imnaha River may be exposed to solar thermal gain through storage, but would pass through the facility under constant flow. Reduced flow within the diversion reach at the Imnaha Satellite Facility is not expected to increase temperatures due to ample surface water flows and good shading vegetation within the diversion reach where the summer diversion would occur. Potential temperature increases may be reduced by implementing minimum flow strategies for facility requirements. The use of well-water at the Imnaha Satellite Facility could potentially alter temperatures in the immediate vicinity of the discharge, however, the proposed 100 gpm of use is negligible and the discharge would rapidly mix with river water. The Imnaha Satellite Facility is within the boundaries of the WWNF. Limited tree removal would occur within the RHCA. Disturbed soils would be revegetated with native species.

Sediment – Disturbed stream banks would be armored with riprap or cobbles and revegetated with willow fascines to minimize erosions potential and protect structures. All work within the stream channel would be conducted behind cofferdams to minimize sediment introduction into the Imnaha River and any construction impacts would be short-term. Roads would be constructed to minimize sediment delivery to the Imnaha

River. Excess materials would be placed in an upland location where they would not be able to enter the Imnaha River. All disturbed soils would be revegetated.

Chemical Contamination /Nutrients – Formalin may be introduced into the Imnaha River. Erythromycin is currently used at the Satellite Facility. Both chemicals would be applied according to labeling requirements (see *Water Quality* under Operational Impacts). Although indicated on the matrix table that degradation is possible from these introductions, introductions would be diluted and the affect negligible. Construction equipment operation instream or adjacent to the river would use synthetic hydraulic oil as recommended by NOAA Fisheries. All equipment would be free of petroleum or hydraulic fluid leaks and would be serviced outside the RHCA at the Satellite Facility. Nutrients would be introduced into the Imnaha River through the return of spawned salmon carcasses. This action is considered a benefit to increase the level of marine derived micro-nutrients essential to a healthy ecosystem (Cederholm et al. 2000). Additionally, the use of feed and subsequent effluent would introduce soluble nutrients to the Imnaha River systems. The impacts caused by this action are not likely to adversely affect water quality and impacts could be further minimized by the use of low phosphorus feed. As discussed previously, hatchery effluent may alter a variety of parameters within the receiving water's mixing zone. However, according to NMFS (1999), this impact is expected to be very small and is likely localized at outfall areas as effluent is rapidly diluted in the receiving streams and rivers.

Habitat Access:

Physical Barriers – No stream crossings or culverts would be constructed. The proposed hydraulically operated weir at the Satellite Facility may delay migration, but operational criteria developed by NOAA Fisheries would be implemented to reduce and minimize effects. The weir would replace an existing picket weir that does not function properly, effectively resulting in downstream spawning of some spring/summer Chinook that are unable to find the entrance to the fish ladder. An auxiliary water line would also introduce more attraction flow at the base of the ladder, facilitating ladder entry by fish. Therefore, habitat access would likely improve as compared to existing conditions.

Habitat Elements:

Substrate Embeddedness – See sediment.

Large Woody Debris – LWD recruitment at a local level in the Upper Imnaha River would not be impacted through limited tree removal at the Imnaha Satellite Facility as the trees planned for removal are ornamental and are too far from the river to contribute to LWD. Removed trees can be left on site for LWD recruitment if requested by USFS, NOAA Fisheries or USFWS. No existing LWD would be removed from the Imnaha River. Project activities would not affect this indicator on a watershed scale.

Pool Frequency and Quality – The intake structures at both facilities would be placed into the toe of the stream bank and designed to operate in two to three ft of water. The pool near the proposed location for the new intake at the Imnaha Satellite Facility would not be altered during installation of the intake. A one time crossing of construction equipment across the riverbed following removal of the Acrow bridge at the Marks Ranch site may require the movement of large cobble/boulders that are common in this location. Care would be exercised to maintain pools.

Large Pools – See Pool Frequency above.

Off-channel habitat – Disturbance to off-channel habitat would not occur.

Refugia – Refugia would not be disturbed by project actions.

Channel Conditions and Dynamics:

Avg. Wetted width/Max. Depth Ratio - Although there is no cross-sectional data for the Imnaha Satellite facility, water diversions are not anticipated to reduce the instream flow to less than 67 cfs, based on historic mean monthly flow data. Rick Zollman (NPT, pers comm., 1/2/03) has observed successful spring/summer Chinook spawning at 30 cfs within the Imnaha and therefore, it is anticipated that diversions would not impact spring/summer Chinook spawning or migration during the average flow year.

Streambank condition – At the Satellite Facility, streambank conditions would change due to the following components: new intake structure, abutments for the weir, and the addition of the auxiliary water line and associated diffuser. Banks would be stabilized to prevent erosion and sedimentation to the Imnaha River. Streambank change is not expected to be extensive enough to affect this indicator on a watershed basis.

Floodplain connectivity – No change in connectivity would occur from project actions. No culverts, fords or stream crossings would be constructed. Linkages between wetlands, riparian areas and the Imnaha River would be maintained.

Flow/Hydrology:

Change in Peak/Base Flows – No effect would occur due to the minimal change in forest disturbance and road density.

Increase in Drainage Network – No new roads would be required at the Imnaha Satellite Facility. Therefore, no effect on the in-drainage network is anticipated. The addition of impervious surfaces is not anticipated to affect this parameter on a watershed scale.

Watershed Conditions:

Road Density and Location - Within the RHCA at the Satellite Facility no new access roads would be constructed. Road density would remain under the criteria of 2mi/mi^2 thereby maintaining watershed conditions.

Disturbance History – Timber removal that could affect the Equivalent Clearcut Area would not occur.

Riparian Conservation Areas – Project actions are expected to have minimal impact on LWD recruitment and shade and are therefore expected to have little effect on riparian conservation areas at the Imnaha Satellite Facility. As discussed previously, trees removed on site could be left for LWD recruitment if so stipulated.

Disturbance Regime – Project actions are not expected to increase the potential for landslides, scour or flooding.

Integration of Species and Habitat Conditions – The intent of project actions is to recover the Imnaha River spring/summer Chinook population through supplementation/recovery

activities. Project actions are not expected to affect habitat conditions within the watershed (or subwatershed) that would affect the continued existence of the Imnaha River spring/summer Chinook population. Monitoring and evaluation would be conducted to determine the effectiveness of the project (Hesse and Harbeck 2004), and detect any negative effects that may occur and modify project action to minimize or eliminate those effects. One potential negative impact of hatchery releases on natural populations is the addition of high percentages of jacks to the river system. Hatcheries have been shown to produce 20% more jacks than occur naturally in the Imnaha River populations (Hoffnagle et al. 2002). Methods to reduce the number of jacks produced at hatcheries include limiting fast growth, which has been shown to increase jack production (Hoffnagle et al. 2002).

Appendix G

Steelhead NOAA Fisheries Matrix of Pathways

Table G-1. Matrix of diagnostics/pathways and indicators for steelhead at Lookingglass Creek (NMFS 1996; USFWS 1998; Wallowa County and NPT 1993; Bjornn and Reiser 1991; BLM 1993)

DIAGNOSTICS/ PATHWAYS INDICATORS	POPULATION AND ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION		
	Properly Functioning Criteria	Present condition	Functionality (F/FR/FU)*	Restore	Maintain	Degrade
Water Quality: Temperature Avg Max Summer	40 - 57°F for spawning and incubation[1]	>70°F during July/August[6, 7]; on 303d list for temperature[2]	FU[4]		X	
Sediment	<12% fines	On 303d list for sediment[2, 3, 4]	FR		X	
Chemical Contamination/Nutrients	Low	Excess Nutrient Loading[3, 6]	FR		X	
Habitat Access: Physical Barriers	<1 barrier	Fish ladders and intakes restrict passage at hatchery; on 303d list for habitat modifications[2]	FR[4]		X	
Habitat Elements: Substrate Embeddedness % clean substrate	<20%[1, 2]	Excess fine sediment[6]	FR[3]		X	
Large Woody Debris	10-20 pieces/100 lin ft[1]	Lack of LWD and riparian veg[6]	FR[3]		X	
Pool Frequency	Channel width #pools/mi 5 ft = 184 10’ = 96 15’ = 70 20’ = 56 25’ = 47 50’ = 26 75’ = 23		FR[3]		X	
Pool Quality	>1m deep with good cover	Pools lacking[6]	FU[3]		X	
Large Pools	Each reach has many large pools (>1m deep)				X	
Off-channel Habitat	Many backwaters with cover		FR[4]		X	
Refugia	Sufficient		FR[4]		X	
Channel Conditions and Dynamics: Avg. Wetted Width/Max. Depth Ratio	<10		FR[3]		X	
Streambank Condition	>90% stable		FR[3]		X	
Floodplain Connectivity	Frequent		FR[4]		X	
Flow/Hydrology: Disturbance History/ Change in Peak/Base Flows	<15% ECA		FR[3]		X	
Increase in Drainage Network	Zero or minimum increase in drainage network		FR[4]		X	
Watershed Conditions: Road Density & Location	<2mi/mi^2; no valley bottom roads		FR[3]		X	
Riparian Reserves	Riparian corridor at least 80%intact; composed of 50% endemics		FR[3]		X	
Integration of Species and Habitat Conditions					X	

* F = Functioning appropriately, FR = Functioning at risk, FU = Functioning at unacceptable risk

[1] USFWS 1998

[2] Grande Ronde Subbasin Summary

[3] Upper Grande Ronde BA (USFS 1994)
[4] BPA 1998
[5] R. Zollman, NPT, pers comm., 10/16/02
[6] Wallowa County – NPT 1993, Revised 1999
[7] B. Lund, Lookingglass Hatchery Manager, pers comm., 10/2/02

Table G-2. Matrix of diagnostics/pathways and indicators for steelhead at the Lostine River (NMFS 1996; USFWS 1998; Wallowa County and NPT 1993; Bjornn and Reiser 1991; BLM 1993)

DIAGNOSTICS/ PATHWAYS INDICATORS	POPULATION AND ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION		
	Properly Functioning Criteria	Present condition	Functionality (F/FR/FU)*	Restore	Maintain	Degrade
Water Quality: Temperature Avg Max Summer	40-57°F for spawning and incubation[1]	55.1°F during August[7]; migratory temps ok; spawning occurs upstream; low winter temps	F[4]		X	
Sediment	<12% fines	On 303d list for sediment[2]	F[2]		X	
Chemical Contamination/Nutrients	Low	Low levels of contamination	F		X	X
Habitat Access: Physical Barriers	Human made barriers do not restrict passage	On 303d list for habitat modifications[2]	FR[4]	X[8]	X	X[8]
Habitat Elements: Substrate Embeddedness % clean substrate	Embeddedness <20%; mostly gravel and cobble		F[3]		X	
Large Woody Debris	>20 pieces/mi >35ft long >12" diameter		F[3]		X	
Pool Frequency	Channel width #pools/mi 5 ft = 184 10' = 96 15' = 70 20' = 56 25' = 47 50' = 26 75' = 23		F[3]		X	
Pool Quality	>1m deep with good cover		F[4]		X	
Large Pools	Each reach has many large pools (>1m deep)		F[4]		X	
Off-channel Habitat	Numerous ponds and backwaters with cover		FR[4]		X	
Refugia	Sufficient in size and number to maintain pop.		FR[4]		X	
Channel Conditions and Dynamics: Avg. Wetted Width/Max. Depth Ratio	<10		F[3]		X	
Streambank Condition	>90% stable or >80% of reach has = 90%		F[3]		X	
Floodplain Connectivity	Frequent with overbank		FR[4]		X	
Flow/Hydrology: Disturbance History/ Change in Peak/Base Flows	<15% ECA	On 303d list for flow modification[2]	FU[3]		X	
Increase in Drainage Network	Zero or minimum increase in drainage network		FR[4]		X	
Watershed Conditions: Road Density & Location	<2mi/mi^2; no valley bottom roads		F[3]		X	
Riparian Reserves	Riparian corridor at least 80%intact; composed of 50% endemics		F[3]		X	
Integration of Species and Habitat Conditions					X	

* F = Functioning appropriately, FR = Functioning at risk, FU = Functioning at unacceptable risk

[1] USFWS 1998
[2] Grande Ronde Subbasin Summary
[3] Upper Grande Ronde BA (USFS 1994); Lostine River Watershed BA (USFS 1994b)
[4] BPA 1998
[5] P. Sankovich, ODFW, pers comm., 10/1/02
[6] Wallowa County – NPT 1993, Revised 1999
[7] MWH 2001
[8]Passage at the Lostine Adult Collection Facility location will likely improve; however, an additional instream structure may degrade this factor at the Lostine River Hatchery fish ladder location

Effects on Steelhead Population and Habitat Indicators

Lostine River Facilities and Lookingglass Hatchery

Subpopulation Characteristics:

Subpopulation Size - A seasonal reduction of habitat would occur from the water diversions but not to an extent that would affect the subpopulation.

Growth and Survival – No lethal take of steelhead is anticipated through project activities. Instream work would be conducted post spawning. Implementation of sediment control measures would protect eggs and fry downstream of the project sites. Operation of the Lostine River Hatchery fish ladder and the pneumatically-controlled weir would be conducted year-round. The operation of this facility could impact adult migration as well as juvenile and kelt emigration due to low flows. If migration is delayed, the low flow strategy and effluent pumpback would be implemented.

Life History Diversity/Isolation – The permanent migratory connection would not be disrupted by this project.

Persistence and Genetic Integrity Subpopulation – The project would not impact the existence of the Lostine River or Lookingglass Creek local populations. Project activities would not affect this indicator.

Water Quality:

Temperature avg max summer – Ambient water temperature within the Lostine River would not be altered by this project. No new water diversions are proposed at the Lookingglass Hatchery under the proposed action. Diverted water from the streams may be exposed to solar thermal gain through storage, but would pass through the facility under constant flow. Reduced Lostine River flow within the diversion reach at the Lostine River Hatchery is not expected to increase temperatures. In the unlikely event that instream temperatures do increase, the low flow strategy could be used. The use of chillers and well-water at the Lostine River Hatchery could potentially decrease temperatures in the immediate vicinity of the discharge; however, the water would rapidly mix with river water and the impact would be negligible.

Sediment – Disturbed stream banks would be armored with riprap or cobbles and revegetated with willow fascines to minimize erosion potential and protect structures. With the exception of the cobbles placed downstream of the weir, all work within the stream channel would be conducted behind cofferdams to minimize sediment

introduction into the Lostine River and any construction impacts would be short-term. Roads would be constructed to minimize sediment delivery to the Lostine River. Excess materials would be placed in an upland location where they would not be able to enter the Lostine River or Lookingglass Creek. All disturbed soils would be revegetated.

Chemical Contamination /Nutrients – No change in chemical discharge would occur to Lookingglass Creek as a result of activities. Two chemicals, formalin and erythromycin, would be introduced into the Lostine River through this project. Both chemicals would be applied according to labeling requirements (see *Water Quality* under Operational Impacts section). Although indicated on the matrix table that degradation is possible from these introductions, chemicals would be diluted and the effect negligible in the immediate vicinity of the discharge. Equipment operation instream or adjacent to the river would use synthetic hydraulic oil as recommended by NOAA Fisheries. All equipment would be free of petroleum or hydraulic fluid leaks and would be serviced outside the riparian zone. Nutrients would be introduced into the Lostine River through the return of spawned salmon carcasses. This action is considered a benefit to increase the level of marine derived micro-nutrients essential to a healthy ecosystem (Cederholm et al. 2000). Additionally, the use of feed and subsequent effluent would introduce soluble nutrients to the Lostine River systems. The impacts caused by this action are not likely to adversely affect water quality and impacts could be further minimized by the use of low phosphorus feed. As discussed previously, hatchery effluent may alter a variety of parameters within the receiving water's mixing zone. However, preliminary analysis (Table 4.2-20) indicates that all discharges will be well-below threshold limits. Additionally, according to NMFS (1999) the impact of effluent is expected to be very small and is likely localized at outfall areas since effluent is rapidly diluted in the receiving streams and rivers.

Habitat Access:

Physical Barriers – No stream crossings or culverts would be constructed. However, passage may be delayed due to the development of a new instream weir at the Lostine River Hatchery. Additionally, the Lostine Adult Collection Facility's flow velocity barrier may delay migration, but operational criteria developed by NOAA Fisheries would be implemented to reduce and minimize effects. Steelhead passage would likely be improved at the Lostine Adult Collection Facility as compared to existing passage through outdated ladders and weir structures.

Habitat Elements:

Substrate Embeddedness – See sediment.

Large Woody Debris – LWD recruitment at a local level in the Lostine River would be impacted through the limited streamside tree removal at both Lostine facilities. Removed trees can be left on site for LWD recruitment if requested by USFS, NMFS or USFWS. No existing LWD would be removed from the Lostine River. Project activities would not affect this indicator on a watershed scale.

Pool Frequency and Quality – The Lostine River intake structure would be placed into the toe of the stream bank and designed to operate in one ft depth of water. Installation of the

intake at the Lostine Hatchery location may require the movement of large cobble/boulders that are common in this river segment. Care would be exercised to maintain pools and replace boulders to their original location.

Large Pools – See Pool Frequency above.

Off-channel habitat – A side channel located streamside of the proposed Lostine River Hatchery would be riprapped for facility flood protection. Construction of the floodproofing levee at the Adult Collection Facility would isolate small side channels returning to the Lostine in this area. French drains would convey river and on-site spring water to the Lostine River, but approximately 600 square ft of seasonal, intermittent habitat for juvenile salmonids would be lost.

Refugia – Refugia would not be disturbed by project actions.

Channel Conditions and Dynamics:

Avg. Wetted width/Max. Depth Ratio – As previously discussed, this indicator would be affected by the seasonal water diversion at the Lostine locations. Water diversion would seasonally change the wetted width/maximum depth ratio in the diversion reaches below intake structures. Cross-sectional data for the Lostine River Hatchery, predicted by a recent IFIM study indicated the change would be minimal (R2 Resources 2002). Wetted width/depth ratios would not be affected on watershed scale. Wetted width/depth ratios can be used to predict the WUA for a particular species. Table G-3 shows the pre and post diversion (residual flow during diversion) WUA for spawning adult steelhead according to the IFIM study (R2 Resources 2002). The IFIM did not predict WUA for steelhead juveniles or non-spawning adults. No change in channel conditions would occur as a result of upland modifications at Lookingglass Hatchery. As previously discussed, habitat loss over a short distance at the Lostine Adult Collection Facility would occur during periods of low flow when all river water is diverted through the proposed fish ladder.

Steelhead can successfully migrate through maintained depths of 0.6 feet. Chinook require 0.8 feet, which can be supplied by 10 cfs of flow. Managers of the Lostine Hatchery would employ the effluent pumpback system to maintain 12 cfs of instream flow, at a minimum. Therefore, steelhead passage is not likely to be impacted by diversions.

Table G-3. Change in Weighted Usable Area – Lostine River Hatchery for spawning adult steelhead

	Pre-diversion mean monthly flow (cfs)	Approximate WUA Pre-diversion (%)	Predicted diversion (cfs) using normal flow strategy	Post-diversion flow (cfs) (residual flow during diversion)	Approximate WUA Post-diversion (%)
Month					
March	55.3	40	15.0	40.3	38
April	161.9	95	7.5	154.4	93
May	512.6	NA[1]	2.8	509.8	NA[1]

[1]IFIM study predicted WUA only from 5 cfs to 400 cfs

Streambank condition – At the Lostine Adult Collection Facility, streambank conditions would change due to the following components: new fish ladder, new bridge abutments, and the floodproofing levee. At the proposed Lostine River Hatchery, streambank conditions would be altered at the intake and outfall locations, and the fish ladder location due to placement of riprap or cobbles. Although bank stabilization at the north well location is being completed under a separate project, on-going maintenance of this area may be necessary. Banks would be stabilized to prevent erosion and sedimentation into the Lostine River and to protect structures. Streambank change is not expected to be extensive enough to affect this indicator on a watershed basis. No streambank alterations would occur at the Lookingglass Hatchery.

Floodplain connectivity – No culverts, fords or stream crossings would be constructed. The new bridge at the Lostine Adult Collection Facility would replace an existing bridge. New bridge abutments would be re-located out of the floodway, above the OHWM. Although the proposed levee at the Lostine Adult Collection Facility would prevent flooding, there would be a loss of connection with wetlands and side channels. Side channels are not likely used by steelhead for rearing, so there should be no loss of habitat due to the loss of connection to the river. The side channel that is proposed to be riprapped at the Lostine River Hatchery is not likely to impact wetland or riparian linkages as the area adjacent to the side channel contains upland vegetation.

Flow/Hydrology:

Change in Peak/Base Flows – No effect would occur due to the minimal change in forest disturbance and road density.

Increase in Drainage Network – No effect would occur due to the limited amount of roads constructed for the project. The addition of impervious surfaces is not anticipated to affect this parameter on a watershed scale.

Watershed Conditions:

Road Density and Location – Access road construction would not affect the road density criteria and watershed conditions would be maintained. The temporary access road at the Lostine Adult Collection Facility would be constructed within 150 ft of the river.

According to the NMFS SLOPES Biological Opinion (2002), soil disturbance would be minimized by clearing vegetation to ground level and placing clean gravel over geotextile fabric. The temporary access road would be obliterated, the soil stabilized and the area revegetated.

Disturbance History – Timber removal that could affect the Equivalent Clearcut Area would not occur.

Riparian Resource Areas – Project actions are expected to have minimal impact on large wooded debris recruitment and shade and are therefore expected to have little effect on riparian corridors. As discussed previously, trees removed on site could be left for LWD recruitment if so stipulated.

Disturbance Regime – Project actions are not expected to increase the potential for landslides, scour or flooding.

Integration of Species and Habitat Conditions - Project actions are not expected to affect habitat conditions within the watershed (or subwatershed) that would affect the continued existence of the steelhead population. Monitoring and evaluation would be conducted to determine the effectiveness of the project, detect any negative effects that may occur, and modify project actions to minimize or eliminate those effects.

Table G-4. Matrix of diagnostics/pathways and indicators for steelhead for the Upper Imnaha River - Section 7 Watershed (USFWS 1998; NMFS 1996; Imnaha Subbasin Summary, reproduced from the USDA Forest Service 1998a)

DIAGNOSTICS/ PATHWAYS INDICATORS	POPULATION AND ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION		
	Properly Functioning Criteria	Present condition	Functionality (F/FR/FU)*	Restore	Maintain	Degrade
Water Quality: Temperature Avg Max Summer	< 50-57°F.	>63°F during July/August[5] (Ashe et al. 2000 = 71.8°F)	FU[2]		X	
Sediment	<20%	Excess erosion and fine sediments may be a problem, but properly func.[4]	F[2]		X	
Chemical Contamination/Nutrients	Low	Potential herbicide and pesticide input, but properly functioning[4]	F[2]		X	X
Habitat Access: Physical Barriers	<1 barrier	Fish ladders and intakes restrict passage at site; but no known manmade barriers on USFS land[2]	F[2]	X		
Habitat Elements: Substrate Embeddedness % clean substrate	Embeddedness <20%; mostly gravel and cobble	Gravels and cobbles stable[2]	FR[2]		X	
Large Woody Debris	>20 pieces/mi >35ft long >12" diameter	At natural potential even though does not have >20 pieces/mi	F[2]		X	
Pool Frequency	Channel width #pools/mi 5 ft = 184 10' = 96 15' = 70 20' = 56 25' = 47 50' = 26 75' = 23	Does not meet PACFISH and NMFS matrix due to stream survey methodology – does not measure pools less than full width in size	FU[2]		X	
Pool Quality	>1m deep with good cover	Pools are Rosgen B and C channel types – plunge and step pools	F[2]		X	
Large Pools	> 3m deep[2]		F[2]		X	
Off-channel Habitat	Backwaters Many - few	Properly functioning throughout except where channel modified	F[2]		X	
Refugia	Sufficient in size and number to maintain pop.	Properly functioning throughout except where channel modified	F[2]		X	
Channel Conditions and Dynamics: Avg. Wetted Width/Max. Depth Ratio	>10	Properly functioning throughout except where channel modified	F[2]		X	
Streambank Condition	>90% stable or >80% of reach has = 90%	Bank form has deteriorated in some areas[4]	F[2] & FR[4]		X	
Floodplain Connectivity	Frequent with overbank to maintain wetlands	Properly functioning except where scoured during 1997 flood	F[2]		X	

DIAGNOSTICS/ PATHWAYS INDICATORS	POPULATION AND ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION		
	Properly Functioning Criteria	Present condition	Functionality (F/FR/FU)*	Restore	Maintain	Degrade
Flow/Hydrology: Disturbance History/ Change in Peak/Base Flows	Hydrographs comparable to undisturbed watershed	Irrigation diversion and icing may impact[2]	FR[2]		X	
Increase in Drainage Network	Zero or minimum increase in drainage network		F[2]		X	
Watershed Conditions: Road Density & Location	<2mi/mi^2; no valley bottom roads	1.52mi/mi^2; however, roads may contribute to increased sediment[2]	F[2]		X	
Riparian Reserves/ Riparian Conservation Areas (Satellite only)	Riparian corridor at least 80%intact; composed of 50% endemics	Riparian vegetation lacking - trees have died (spruce) [4]	FR[4]		X	
Disturbance Regime (haz/risk rating)	<15% ECA with no disturbance		F[2]		X	
Integration of Species and Habitat Conditions					X	

* F = Functioning appropriately, FR = Functioning at risk, FU = Functioning at unacceptable risk
[1] USFWS 1998
[2] Bryson et al. 2001
[3] R. Zollman, NPT, and G. Sausen, USFS, pers comms., 10/16/02
[4] Wallowa County – NPT 1993, Revised 1999
[5] MWH 2001

Effects on Population and Habitat Indicators

Imnaha River Facilities

Subpopulation Characteristics:

Subpopulation Size - A seasonal reduction of habitat would occur from the water diversions but not to an extent that would affect the subpopulation.

Growth and Survival – No lethal take of steelhead is anticipated through project activities. Instream work would be conducted post spawning. Implementation of sediment control measures would protect potential eggs and fry downstream of the project site. Operation of the Imnaha Satellite Facility's fish ladder and weir would not take place during adult migration or during peak juvenile emigration. However, juveniles likely move up and down portions of the Imnaha at all times of the year and may be affected during drought years in combination with water diversions.

Life History Diversity/Isolation – The migratory connection would not be disrupted by this project.

Persistence and Genetic Integrity Subpopulation – The project would not impact the existence of the Imnaha River local population. Project activities would not affect this indicator. Project activities at the Satellite Facility, including weir improvements and the addition of a significant amount of attraction flow, are anticipated to improve steelhead passage as compared to existing conditions.

Water Quality:

Temperature Avg max summer – Ambient water temperature within the Imnaha River would not be altered by this project. Diverted water from the river may be exposed to solar thermal gain through storage in the raceways, but would pass through the facility under constant flow. Reduced Imnaha River flow within the diversion reach at the Satellite Facility is not expected to increase temperatures due to relatively short diversion distance and the good vegetative canopy within the diversion reach where the summer diversion would occur. The use of well-water at the Satellite could potentially alter temperatures in the immediate vicinity of the discharge; however, only 100 gpm would be discharged and would rapidly mix with river water. Only limited tree removal at the Satellite Facility would occur within RHCA. Disturbed soils would revegetated with native species.

Sediment – Disturbed stream banks would be armored with riprap and revegetated with willow fascines to minimize erosion potential and protect structures. All work within the stream channel would be conducted behind cofferdams to minimize sediment introduction into the Imnaha River and any construction impacts would be short-term, requiring one instream work window. Excess materials would be placed in an upland location where they would not be able to enter the Imnaha River. All disturbed soils would be revegetated.

Chemical Contamination /Nutrients – Formalin may be introduced into the Imnaha River from the Satellite Facility (erythromycin is currently used). Both chemicals would be applied according to labeling requirements (see Water Quality in Section 4.2.2). Although indicated on the matrix table that degradation is possible from these introductions, chemicals would be diluted and the affect negligible in the immediate vicinity of the discharge. Construction equipment operation instream or adjacent to the river would use synthetic hydraulic oil as recommended by NOAA Fisheries. All equipment would be free of petroleum or hydraulic fluid leaks and would be serviced outside the RHCA at the Satellite Facility. Nutrients would be introduced into the Imnaha River through the return of spawned salmon carcasses. This action is considered a benefit to increase the level of marine derived micro-nutrients essential to a healthy ecosystem (Cederholm et al. 2000). Additionally, the use of feed and subsequent effluent would introduce soluble nutrients to the Imnaha River. The impacts caused by this action are not likely to adversely affect water quality and potential impacts could be further minimized by the use of low phosphorus feed. As discussed previously, hatchery effluent may alter a variety of parameters within the receiving water's mixing zone. However, according to NMFS (1999), this impact is expected to be very small and is likely localized at outfall areas as effluent is rapidly diluted in the receiving streams and rivers.

Habitat Access:

Physical Barriers – No stream crossings or culverts would be constructed. The proposed weir at the Satellite Facility may delay migration, but operational criteria developed by NOAA Fisheries would be implemented to reduce and minimize effects. The weir would replace an existing picket weir that does not function effectively and therefore habitat access would likely improve.

Habitat Elements:

Substrate Embeddedness – See sediment.

Large Woody Debris – LWD recruitment at a local level in the Upper Imnaha River would not be impacted through limited tree removal at the Imnaha Satellite Facility, as the trees planned for removal are too far from the river to contribute to LWD. Removed trees can be left on site for LWD recruitment if requested by USFS, NOAA Fisheries or USFWS. No existing LWD would be removed from the Imnaha River. Project activities would not affect this indicator on a watershed scale. Existing LWD conditions within the Imnaha are considered "not properly functioning."

Pool Frequency and Quality – The upgraded intake structure at the Imnaha Satellite Facility would be placed into the toe of the stream bank and designed to operate in two to three ft of water. The pool near the proposed location for the new intake would not be altered during installation of the intake.

Large Pools – See Pool Frequency above.

Off-channel habitat – Disturbance of off-channel habitat would not occur.

Refugia – Refugia would not be disturbed by project actions.

Channel Conditions and Dynamics:

Avg. Wetted width/Max. Depth Ratio - As previously discussed, cross-sectional data indicated the change in this parameter would be minimal (Table E-5). Wetted width/depth ratios would not be affected on watershed scale. These data assume that 100% of the area within each diversion reach is suitable habitat for steelhead (which is likely an overestimate). The minimum depth for steelhead migration is 0.6 feet (P. Sankovich, USFWS, pers comm., 4/13/04; Thompson 1972 in Pauley et al. 1986) and proposed diversions would not dewater the channel below that depth. During historic low flow events, the change in wetted width/depth would likely adversely impact the passage of steelhead. However, historic low flows would naturally impact the species throughout the watershed during these periods.

Streambank condition – At the Satellite Facility, streambank conditions would be altered by the placement of the following components: the new intake structure, abutments for the hydraulically operated weir, and the auxiliary water line/diffuser. Banks would be stabilized to prevent erosion and sedimentation to the Imnaha River. Streambank change is not expected to be extensive enough to affect this indicator on a watershed basis.

Floodplain connectivity – No change in connectivity would occur from project actions. No culverts, fords or stream crossings would be constructed. Linkages between wetlands, riparian areas and the Imnaha River would be maintained.

Flow/Hydrology:

Change in Peak/Base Flows – No effect would occur due to the minimal change in forest disturbance and road density.

Increase in Drainage Network – No new access roads would be required at the Imnaha Satellite Facility. Therefore, no effects on the in-drainage network are anticipated. The addition of impervious surfaces is not anticipated to affect this parameter on a watershed scale.

Watershed Conditions:

Road Density and Location - Within the RHCA at the Satellite Facility, existing access roads would be used for construction. Road density would remain under the criteria of $2mi/mi^2$ thereby maintaining watershed conditions.

Disturbance History – Timber removal that could affect the Equivalent Clearcut Area would not occur.

Riparian Conservation Areas – Project actions are expected to have minimal impact on LWD recruitment and shade and are therefore expected to have little effect on riparian conservation areas at the Imnaha Satellite Facility. As discussed previously, trees removed on site could be left for LWD recruitment if so stipulated.

Disturbance Regime – Project actions are not expected to increase the potential for landslides, scour or flooding.

Integration of Species and Habitat Conditions - Project actions are not expected to affect habitat conditions within the watershed (or subwatershed) that would affect the continued existence of the steelhead population. Monitoring and evaluation would be conducted to determine the effectiveness of the project, and detect any negative effects that may occur and modify project action to minimize or eliminate those effects.

Appendix H

Consistency with Forest Plan Standards – PACFISH/INFISH

The only NEOH facility that is located within USFS-managed property (WWNF) is the Imnaha Satellite Facility. Both the Imnaha Satellite Facility and the existing Acrow bridge location at Marks Ranch are within the Hells Canyon Recreational Area. All construction activities at the Imnaha Satellite Facility would occur within the RHCA, defined as 300 ft from the edge of the active stream channel of the Class 1 streams (the Imnaha River). The entire facility is within 300 ft of the Imnaha River and therefore is entirely within the RHCA.

Riparian Management Objectives (RMOs)

1) Pool Frequency – Pool frequency is expected to be maintained. Change in wetted depth due to water diversion is minimal and no pools would be filled or modified.
2) Water Temperature – Water quality within the Imnaha River would be maintained. The RMO of no measurable increase in maximum water temperature would be met as water diverted from rivers would flow through the facility and would not be impounded which could result in thermal gain.
3) Large Woody Debris – Limited tree removal (<10 trees) at the site would not reduce the potential LWD recruitment at this site, as the trees are not adjacent to the river corridor. Removed trees can be left on site for recruitment. The scale of the tree removal would not be detrimental to the LWD recruitment of the watershed. No existing LWD would be removed from the Imnaha River.
4) Bank Stability = 80% stable. All stream bank areas disturbed during construction would be stabilized with riprap (or cobbles) around large structures and/or revegetated with appropriate native vegetation. Limited areas of stream bank would be disturbed by this project.
5) Lower Bank Angle = 75% of banks with $<90^{o}$ angle (undercut). Bank angle within the project location does not meet this criteria. Bank angle post construction would match the existing contour. This indicator would not be changed by the Proposed Action.
6) Width/Depth Ratio = <10. Existing width and depth ratios at the project locations exceed the RMO and are not anticipated to be greatly affected by the project. Sedimentation would be managed during construction and operation of the facility and would not result in a source of sediment introduction to the Imnaha River. Water withdrawal is anticipated to maintain or only slightly change the pre-diversion ratio within the diversion reach.