HIP III HANDBOOK

Unabbreviated Guidance of Biological Opinion Requirements and RRT Process

Bonneville
POWER ADMINISTRATION

Version 4.1

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Chapter 1: Introduction.

HIP III Background.

This handbook represents a concise summary of the requirements of two biological opinions (BiOps) issued by the United States Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) on the effects of BPA's Habitat Improvement Program (HIP III).

> National Marine Fisheries Service. 2013. Endangered Species Act (ESA) Section 7 Formal Programmatic Biological and Conference Opinion, Letter of Concurrence, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Bonneville Power Administration's Habitat Improvement Program III (HIP III) KEC-4
>
> U.S. Fish and Wildlife Service. 2013. Formal Section 7 programmatic consultation on BPA's Columbia River Basin Habitat Improvement Program. Oregon Fish and Wildlife Office, Portland, Oregon. TAILS no. 01EOFW00-2013-F-0199.

The fish and wildlife habitat improvement projects funded by BPA are the focus of these two BiOps. BPA funds these projects in fulfillment of its obligations under two auspices: The Northwest Power and Conservation Council's (NWPCC's) Columbia River Basin Fish and Wildlife Program, and the various BiOps issued to BPA including the 2008 BiOp addressing the operation and maintenance of the Federal Columbia River Hydropower System (FCRPS).

With HIP III, BPA has formed an internal restoration review team (RRT) of technical experts who provide a design review of each medium to high risk project in accordance with design complexity and significance. This is a new internal quality assurance/quality control (QA/QC) process at BPA, the role of which is to define high, medium, and low risk project types, and then provide additional review on medium and high risk projects.

For USFWS terrestrial species, species-specific conservation measures (Page 100) may apply. Please contact your Environmental Compliance Lead (EC Lead) for additional requirements.

If at any time there are uncertainties in implementing or interpreting the Conservation Measures listed in this document, the project sponsor, in conjunction with BPA staff, will coordinate with the Services in effort to provide clarity and resolve any outstanding issues.

Link to this document:

www.bpa.gov/goto/ESA

HIP III Handbook Latest Version Changes.

- Global improvements to sentence structure, tense, and grammar.
- Improved organization by use of Chapters and Appendices.
- Added the descriptions and criteria for the following activity categories.

6. In-channel Nutrient Enhancement.

7. Irrigation and Water Delivery/Management Actions.

a. *Convert Delivery System to Drip or Sprinkler Irrigation.*
b. *Convert Water Conveyance from Open Ditch to Pipeline or Line Leaking Ditches or Canals.*
c. *Convert from Instream Diversions to Groundwater Wells for Primary Water Sources.*
d. *Install or Replace Return Flow Cooling Systems.*
e. *Install Irrigation Water Siphon Beneath Waterway.*
f. *Livestock Watering Facilities.*
g. *Install New or Upgrade/Maintain Existing Fish Screens.*

8. Fisheries, Hydrologic, and Geomorphologic Surveys.

9. Special Actions (for Terrestrial Species).

a. *Install/develop Wildlife Structures.*
b. *Fencing construction for Livestock Control*
c. *Implement Erosion Control Practices.*
d. *Plant Vegetation.*
e. *Tree Removal for LW Projects.*

- Moved variance request info from page 2 to page 22.
- Moved Restoration Review Team Frequently asked questions from page 75 to 8.
- Moved The NMFS Hydropower Division Review from 78 to 11.
- Moved Work Element by HIPIII Risk Category moved from 81 to 14.
- Moved HIPIII Forms PNF from 68 to 18.
- Moved HIPIII Forms PCF from 72 to 23.
- Moved HIPIII Forms HUF from 74 to 25.
- Timing of In-Water Work added: “Informal recommendations from appropriate state Fishery Biologist regards to the timing of in-water work will be followed.”
- Included NMFS 2011 Electrofishing Guidelines in Work Area Isolation and Fish Salvage Section.
- Added Figure 1: Suggested Visual Observational Differences in Turbidity on Page 40.
- Added General Conservation Measures for Terrestrial Plants, Wildlife, and Aquatic Invertebrates page 29.
- Added criteria on page 73:

Piling Installation for LW Structures.

1) *Type of pilings.*
   a. *Minimize the number (<12 per structure) and diameter (<24” diameter) of pilings.*
   b. *Use only wood piles, steel piles are not to be used under any circumstance.*
2) *Drive each piling as follows to minimize the use of force and resulting sound pressure.*
   a. *Use a vibratory hammer to drive the piles; an impact hammer shall not be used.*
   b. *Select areas with soft substrate rather than rocky hard substrate, avoid bedrock.*
   c. *Isolate the work area if possible to minimize acoustic disturbance.*

- Added Appendix A: Species Specific Conservation Measures for ESA-listed Mammals.
- Added Appendix B: Species Specific Conservation Measures for Birds.
- Added Appendix C: Species Specific Conservation Measures for Invertebrates.
- Added Appenix D: Species Specific Conservation Measures for Plants.

HIP III BO Categories of Action.

1. Fish Passage Restoration
- Profile Discontinuities
  - a. Dams, Water Control, or Legacy Structure Removal
  - b. Consolidate or Replace Existing Irrigation Diversions
  - c. Headcut and Grade Stabilization
  - d. Low Flow Consolidation
  - e. Providing Fish Passage at an Existing Facility
- Transportation Infrastructure
  - f. Bridge and Culvert Removal or Replacement
  - g. Bridge and Culvert Maintenance
  - h. Installation of Fords

2. River, Stream, Floodplain, and Wetland Restoration
- a. Improve Secondary Channel and Wetland Habitats
- b. Set-back or Removal of Existing, Berms, Dikes, and Levees
- c. Protect Streambanks Using Bioengineering Methods
- d. Install Habitat-Forming Natural Material Instream Structures (Large Wood, Boulders, and Spawning Gravel)
- e. Riparian Vegetation Planting
- f. Channel Reconstruction

3. Invasive Plant Control
- a. Manage Vegetation using Physical Controls
- b. Manage Vegetation using Herbicides

4. Piling Removal

5. Road and Trail Erosion Control, Maintenance, and Decommissioning
- a. Maintain Roads
- b. Decommission Roads

6. In-Channel Nutrient Enhancement

7. Irrigation and Water Delivery/Management Actions
- a. Convert Delivery System to Drip or Sprinkler Irrigation
- b. Convert Water Conveyance from Open Ditch to Pipeline or Line Leaking Ditches or Canals
- c. Convert from Instream Diversions to Groundwater Wells for Primary Water Sources
- d. Install or Replace Return Flow Cooling Systems
- e. Install Irrigation Water Siphon Beneath Waterway
- f. Livestock Watering Facilities
- g. Install New or Upgrade/Maintain Existing Fish Screens

8. Fisheries, Hydrologic, and Geomorphologic Surveys

9. Special Actions (for Terrestrial Species)
- a. Install/Develop Wildlife Structures
- b. Fencing construction for Livestock Control
- c. Implement Erosion Control Practices
- d. Plant Vegetation
- e. Tree Removal for Large Wood Projects

ESA-Listed Species Covered Under HIP III.

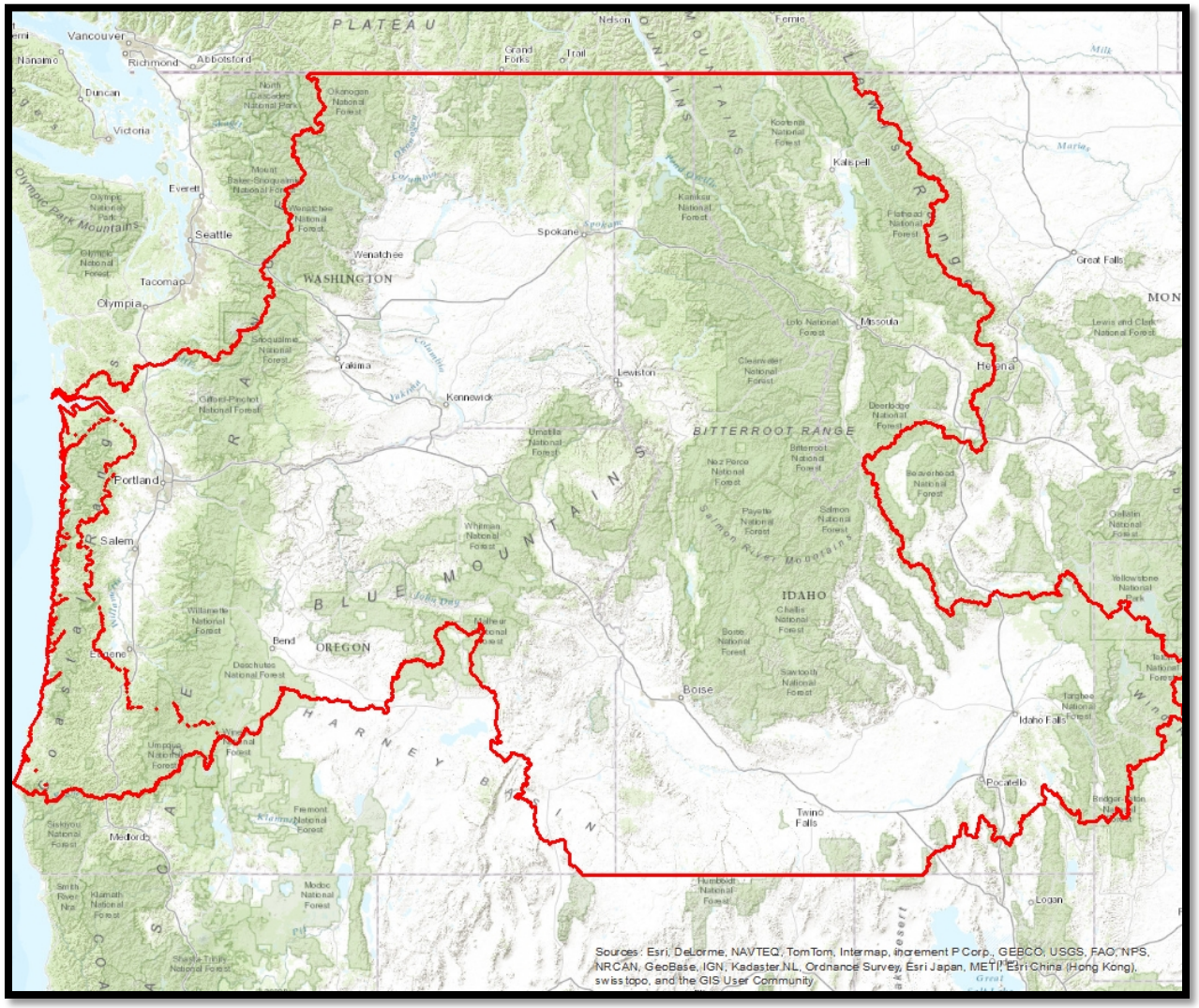
ANADROMOUS SALMONIDS (by Evolutionarily Significant Units)	
Lower Columbia River Chinook salmon	*Oncorhynchus tshawytscha*
Upper Willamette River spring-run Chinook salmon	*O. tshawytscha*
Upper Columbia River spring-run Chinook salmon	*O. tshawytscha*
Snake River spring/summer-run Chinook salmon	*O. tshawytscha*
Snake River fall-run Chinook salmon	*O. tshawytscha*
Columbia River chum salmon	*O. keta*
Lower Columbia River coho salmon	*O. kisutch*
Oregon Coast coho salmon	*O. kisutch*
Snake River sockeye salmon	*O. nerka*
Lower Columbia River steelhead	*O. mykiss*
Upper Willamette River steelhead	*O. mykiss*
Middle Columbia River steelhead	*O. mykiss*
Upper Columbia River steelhead	*O. mykiss*
Snake River Basin steelhead	*O. mykiss*
ANADROMOUS FISHERIES	
Pacific eulachon, southern DPS	*Thaleichthys pacificus*
Green sturgeon, southern DPS	*Acipenser medirostris*
FRESHWATER FISH	
bull trout	*Salvelinus confluentus*
MAMMALS	
Canada lynx, contiguous U.S. DPS	*Lynx canadensis*
Columbian white-tailed deer	*Odocoileus virginianus leucurus*
Gray wolf	*Canis lupus*
Grizzly bear	*Ursus arctos horribilis*
North American wolverine	*Gulo gulo luscus*
Northern Idaho ground squirrel	*Urocitellus brunneus*
Pygmy rabbit	*Brachylagus idahoensis*
Woodland caribou – Selkirk Mountain	*Rangifer tarandus caribou*
BIRDS	
Marbled murrelet	*Brachyramphus marmoratus*
Northern spotted owl	*Strix occidentalis caurina*
Streaked horned lark	*Eremophila alpestris strigata*
Western snowy plover	*Charadrius nivosus* ssp. *nivosus*
INVERTEBRATES	
Banbury Springs limpet	*Lanx* sp.
Bliss Rapids snail	*Taylorconcha serpenticola*
Bruneau Hot springsnail	*Pyrgulopsis bruneauensis*
Snake River Physa snail	*Physa natricina*
Fender's blue butterfly	*Icaricia icarioides fenderi*
Oregon Silverspot butterfly	*Speyeria zerene hippolyta*
Taylor's Checkerspot butterfly	*Euphydryas editha taylori*
PLANTS	
Bradshaw's desert-parsley	*Lomatium bradshawii*
Cook's lomatium	*Lomatium cookii*

New Species Consulted Upon

Gentner's fritillary	*Fritillaria gentneri*
Golden paintbrush	*Castilleja levisecta*
Howell's spectacular thelypody	*Thelypodium howellii spectabilis*
Kincaid's lupine	*Lupinus sulphureus* ssp. *kincaidii*
Large-flowered wooly meadowfoam	*Limnanthes floccosa* ssp. *grandiflora*
Malheur wire-lettuce	*Stephanomeria malheurensis*
McFarlane's four-o'clock	*Mirabilis macfarlanei*
Nelson's checkermallow	*Sidalcea nelsoniana*
Rough popcornflower	*Plagiobothrys hirtus*
Showy stickseed	*Hackelia venusta*
Slickspot peppergrass	*Lepidium papilliferum*
Spalding's catchfly	*Silene spaldingii*
Umtanum Desert buckwheat	*Eriogonum codium*
Ute ladies'-tresses	*Spiranthes diluvialis*
Water howellia	*Howellia aquatilis*
Wenatchee Mountains checkermallow	*Sidalcea oregana* var. *calva*
Western lily	*Lilium occidentale*
Willamette daisy	*Erigeron decumbens*
White Bluffs bladderpod	*Physaria douglasii* ssp. *tuplashensis*

Action Area.

BPA expanded the action area for the HIP III beyond the Columbia River Basin in Oregon, Washington, and Idaho. The new action area includes western Montana and Oregon coastal river basins from the Columbia River south to Cape Blanco in southwestern Oregon. The action area was expanded to reflect additional BPA projects, anticipated to be covered under the HIP III, in these geographic areas.



The HIP III Approval Process.

START

1) **Sponsor** provides conceptual designs to **EC Lead**.

2) **EC Lead** makes **Risk Determination**.
   a) If **Low** Risk, the **EC Lead** provides to **Sponsor** (then skip to step 7):
      i) Conservation Measures Checklist or CAD file.
      ii) HIP III Project Notification Form (PNF, Page 18).
   b) If **Med/High** Risk, the **EC Lead** provides to **Sponsor**:
      i) Conservation Measures Checklist or CAD file.
      ii) General Project and Data Summary Requirements (GPDSR, Page 16).
      iii) HIP III Project Notification Form (PNF, Page 18).

3) **Sponsor** provides draft GPDSR and design plans to EC Lead.

4) **EC Lead** submits project to **RRT**.

5) **RRT Process** begins (once information requirements are complete).
   a) **RRT** Team member is assigned.
   b) Review schedule is determined (how many review junctures).
   c) Interagency Participation is solicited (for **High** risk projects).
   d) Site visit scheduled (if necessary).
   e) **RRT** conducts review at specified review junctures (15, 30, 80% Page **Error! Bookmark not defined.**)
      i) Functional review (for **Med/High** risk projects).
      ii) Technical review (for **Med/High** risk projects).
      iii) Interagency review (for **High** risk projects).
   f) **RRT** shall compile and submit comments from review, comments shall be either:
      i) Clarifications.
      ii) Recommendations.
      iii) Requirements.
   g) **Sponsor** addresses comments and resubmits design documentation (if necessary).
   h) **Sponsor provides final GPDSR (usually at 60% design).**
   i) **RRT** approves design:
      i) If **Med** Risk RRT member sends approval email to EC Lead.
      ii) If **High** Risk RRT member solicits final approval from **NMFS** branch chief and/or **USFWS** field office supervisor.

6) **RRT** review is complete.

7) **EC Lead** or sponsor gets **NMFS** Hydro approval (where needed, see Page 11). This can be concurrent with **RRT** review.

8) **Sponsor** submits Final Designs and PNF to **EC lead**.

9) EC lead submits completed PNF to Services (NMFS/USFWS).

FINISH

10) HIP III coverage is complete.

Restoration Review Team Frequently Asked Questions.

What is the RRT?

Under the HIP III, BPA will use an internal QA/QC process on medium to high risk projects in the **Fish Passage Restoration** activity category and the **River, Stream, Floodplain, and Wetland Restoration** activity category to:

1) Meet the obligations set forth in the NMFS/USFWS BiOps within the action area;
2) Promote interagency (NMFS/USFWS) collaboration;
3) Maximize ecological benefits of BPA-funded restoration projects;
4) Facilitate site visits; and
5) Ensure consistent use and implementation of the HIP III throughout the action area.

Risk for the purposes of the RRT is defined primarily as risk to ESA-listed species and their habitats; however; risk may be applied to include, though not limited to:

1) Precedent- and/or policy-setting actions (e.g., application of new technology);
2) Actions that are not necessarily new but are new to a geographic area or stakeholder group;
3) Actions with which the project manager, sponsor, or EC Lead is unfamiliar, regardless of the relative risk; and
4) Actions that are considered large in complexity and scope or represent a significant investment in BPA resources.

Another purpose of the RRT is to provide updates and clarifications of the USFWS/NMFS HIP III BiOps to all users to ensure consistent use, and to resolve inconsistencies and obtain clarification from the Services when needed. All updates and clarifications are communicated via the most current version of the HIP III handbook.

The RRT does not replace any existing review process, nor shall it slow down project permitting and implementation, unless there are significant technical, policy, and/or program concerns with a particular restoration approach.

What types of projects require review by the RRT?

The BPA EC Lead, using guidance developed by the RRT, shall screen projects and forward only the medium and high risk projects to the RRT for review. Low risk projects would proceed along normal channels for HIP III compliance and not require RRT review.

The RRT shall only review medium to high risk projects within the **Fish Passage Restoration** activity category and the **River, Stream, Floodplain, and Wetland Restoration** activity category.

Who is on the RRT?

- Restoration Review Team Lead:
  - Dan Gambetta (503.230.3493)
- Team Members:
  - Michelle Guay (503.230.3459)
  - Israel Duran (503.230.3967)
  - Brenda Aguirre (503.230.5928)
- Technical Team:
  - Doug Knapp (503.230.3285)
  - Sean Welch (503.230.7691)
- NMFS and/or USFWS Representatives:
  - Assigned at the project level (high risk projects) by branch chief and field office supervisor

What information is needed?

A design report and plan set package that satisfies the General Project and Data Summary Requirements (GPDSR) (Page 16).

The following project review junctures are proposed as standard project quality assurance junctures for high risk projects and may be used for medium risk projects at the discretion of the RRT based on the scope and complexity of the project. The number of review junctures depends on the adequacy of information provided, incorporation of comments recommendations, and may be modified to align with identified project junctures.

Conceptual Project Review: The project sponsor will notify BPA at the 15% or project concept stage and coordinate a site visit to review project concepts, goals, and objectives and confirm the direction and planning for subsequent phases of project design. Staff biologists from the NMFS and USFWS shall be invited to the site visit. A typical site visit will include the review of limiting factors and any pertinent studies or reports that document restoration targets for implementation and draft project concepts. Additional data that may be presented and reviewed include other data sources (e.g., high resolution aerial photography, topographic maps, soil maps, GIS/CAD data layers or other resource data. After the site visit, BPA will collate and provide technical comments from BPA engineering and interagency partners, then notify the sponsor to proceed with the 30% design plans.

30% Project Review: Sponsor will notify BPA at the 30% project concept completion stage. The 30% project drawings and preferred project alternatives will be submitted for review and technical comment to BPA and our interagency partners. The 30% design should demonstrate incorporation of previous technical comments and recommendations developed at the previous design review. The 30% design submittals should include preliminary drawings and specifications, including overall site locations, site plans, profiles, cross sections, details, preliminary quantities, and provisional technical analyses as summarized in a draft Basis of Design Report using the GPDSR outline (Page 16). At this point, NMFS may require a separate

Hydro Review. BPA will perform review of the 30% submittal, collate any comments from interagency partners, and submit them to the sponsor. Outcomes from the review process will consist of 30% design approval and/or comments to be incorporated in the 80% design. BPA will notify sponsor to proceed to the 80% design plans.

80% Project Review: Sponsor will notify BPA at the 80% project concept completion stage. The 80% project drawings will be submitted for review and technical comment to BPA and our interagency partners. The 80% design should demonstrate complete incorporation of technical comments and recommendations developed at the previous design review. The 80% design submittals should include near-final drawings and specifications, including specific site locations, site plans, profiles, cross sections, details, construction quantities, implementation resource plans, and design technical analyses as summarized in a Basis of Design Report. The sponsor can refer to the GPDSR for an outline of information and requirements for the 80% project design submittal phase.

What is the RRT Technical Review?

RRT technical review provides an internal point of view on the merit, development, execution, and anticipated benefit of medium and high risk projects. Technical review is facilitated through open communication and cooperation with the project sponsor and interagency coordination with the Services.

What happens after a review?

Outcomes from the review process will consist of either:

1) comments to be addressed and re-submittal,
2) comments and approval, or
3) approval.

Final approval is contingent upon NMFS branch chief and/or USFWS field officer supervisor sign off. Upon final approval, BPA will notify the sponsor of acceptance of the project design and construction documentation for the project.

Is RRT review the same as NMFS Hydro Review?

No. NMFS Hydro Review is required for any project that affects fish passage or involves channel-spanning instream structures (with the exception of bridge/culvert replacement). See Page 11 for more information.

How to expedite the RRT Process?

The best way to expedite the RRT process is to have the Basis of Design Report follow and address the GPDSR in addition to incorporating HIP III conservation measures directly into the design plans. Turnaround time on reviewing plans and information is usually 2-4 weeks, depending on complexity.

The NMFS Hydropower Division Review Requirement.

NMFS Northwest Region Hydropower Division shall conduct reviews for fish passage on any instream project that may result in alterations or changes in fish passage (with the exception of bridge and culvert removal). Fish passage review is initiated by the EC Lead and usually occurs at the 60% design review juncture.

1. Fish Passage Restoration:

Profile Discontinuities Category

a. Dams, Water Control or Legacy Structure Removal*

YES, small dams with a maximum total head measurement greater than 3 feet, channel spanning weirs, earthen embankments, and spillway systems.

b. Consolidate, or Replace Existing Irrigation Diversions*

YES, irrigation diversion structures greater than 3 feet in height that are to be removed or replaced.

c. Headcut and Grade Stabilization

YES, installation of boulder weirs, roughened channels, and grade control structures that are above 18 inches in height

d. Low Flow Consolidation

YES, all projects with that as the primary intent and using artificial means

e. Providing Fish Passage at an Existing Facility

YES, fish passage improvements at an existing facility that are not maintenance such as re-engineering improperly designed fish passage or fish collection facilities, installation of a fish ladder at an existing facility, or other activities that are not upkeep or maintenance

Transportation Infrastructure

f. Bridge and Culvert Removal or Replacement*

NO Hydro Review Required

g. Bridge and Culvert Maintenance

NO Hydro Review Required

h. Installation of Fords

NO Hydro Review Required

2. River, Stream, Floodplain, and Wetland Restoration

a. Improve Secondary Channel and Wetland Habitats

NO Hydro Review Required

b. Set-back or Removal of Existing, Berms, Dikes, and Levees

NO Hydro Review Required

c. Protect Streambanks Using Bioengineering Methods

NO Hydro Review Required

d. Install Habitat-Forming Natural Material and Instream Structures (e.g., Large Wood, Boulders, and Spawning Gravel)

NO Hydro Review Required

e. Riparian Vegetation Planting

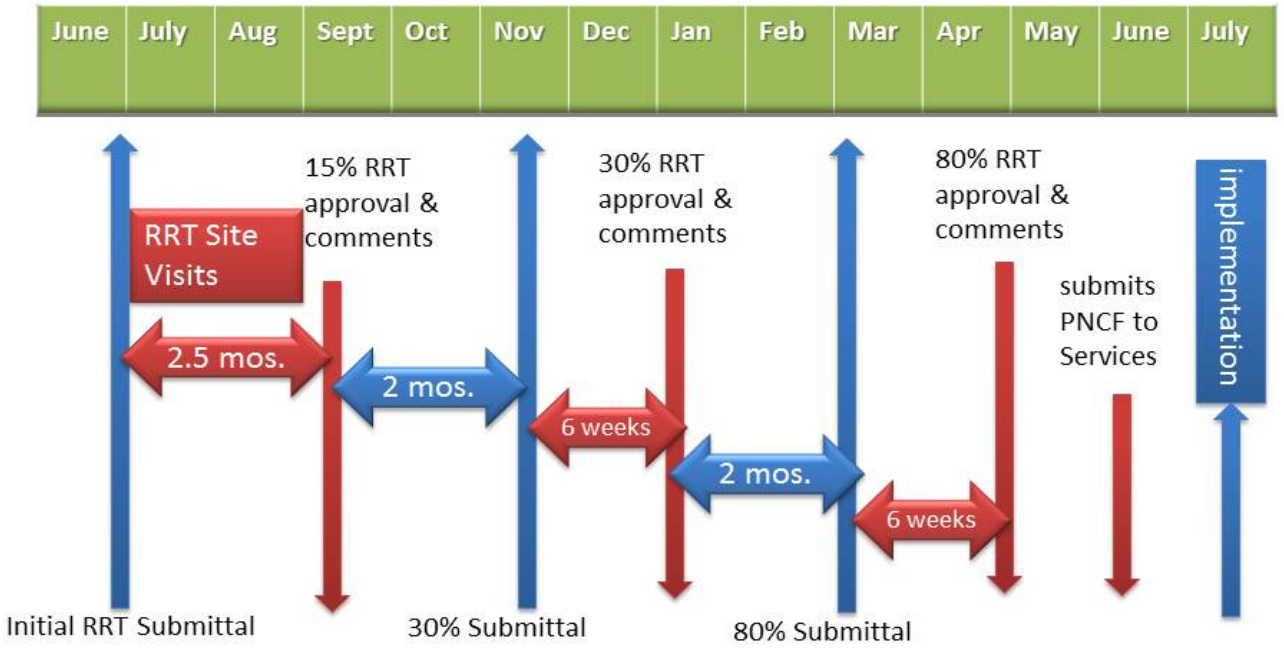
NO Hydro Review Required

f. Channel Reconstruction

YES, Hydro Review Required

***These activity categories may result in headcut or grade stabilization**
****In addition, any fish screen with pumping rate that may exceed 3cfs.**

RRT Process Timeline for High Risk Projects



**Blue indicates a project sponsor action, red indicates a BPA RRT action.*
***BPA typically has review junctures at 15% (conceptual), 30%, and 80% though these junctures may be adjusted to align with our sponsor's processes and with respective project management plans.*

Work Element by HIP III Risk Category.

ID	Work Element Name	Definition	HIP III Category	RRT Review Needed	HIP III Risk Level
29	Increase Instream Habitat Complexity and Stabilization	Work that adds natural materials instream to create habitat features or to improve channel morphology. Includes J-hooks, barbs, vortex weirs, and large wood; may include work to stabilize or maintain a streambank(e.g., riprap) or improve complexity by creation of pools or fish spawning habitat by addition of gravel	2d	✓	Low-Med-High
30	Realign, Connect, and/or Create Channel	Active attempts to directly add sinuosity, meanders, side channels, and/or off-channel habitats (e.g., sloughs or oxbows); may include reconnection of historical channels (either via excavation or diversion of existing streamflow), excavation of new channels, and/or significantly improving the functionality of existing channels (e.g., creating a "natural" spawning channel for chum)	2d, 2f	✓	Med-High
33	Decommission Road/Relocate Road	Any activity that makes a road or trail unusable including adding berms, pits, boulders or logs, and/or ripping, scarifying, recontouring, or obliterating the road or trail with heavy equipment that may involve re-contouring the slope ; also use for building a road or trail in a more appropriate location to replace a decommissioned road or trail.	5b		Low
34	Develop Alternative Water Source	Provision of water supply for livestock that is out of the water zone and at a distance beyond that which may affect the conditions of the water body; includes, but not limited to, watering troughs, spring and well development, and guzzler installation	7f		Low
35	Develop Pond	Development of a pond and its surrounding habitat for resident fish and/or waterfowl; may involve the installation of a water control structure or excavation.	2a	✓	Med
36	Develop Terrestrial Habitat Features	Installation and/or creation of structures for the benefit of wildlife species, including, but not limited to, nest boxes/platforms, avian perches, snags, guzzlers, and artificial roosting sites	9a		Low
38	Improve Road	Work designed to eliminate or reduce erosion, sediment, and/or toxic run-off from reaching streams, rivers, or wetlands from roads or trails currently in use includes road projects that reduce or eliminate inter-basin transfer of water, placement of structures to contain/ control run-off from roads or trails, road or trail reconstruction or reinforcement, surface and peak-flow drainage improvements, and roadside vegetation. These roads may be in or extend into the riparian zone.	5a		Low
40	Install Fence	Work to install various types of fence and/or gates for habitat improvement	9b		Low
44	Enhance Nutrients in Water Bodies	Addition of fish carcasses or direct nutrient introduction methods to improve biological diversity in streams, rivers, or lakes	6		Low
47	Plant Vegetation	Use during the first year (and only first year) of planting terrestrial or aquatic vegetation and/or applying seed (aerially, mechanically, and/or by hand) for purposes such as: wildlife cover and forage enhancement, erosion control and soil stabilization (run-off reduction and other soil destabilizing processes and activities not related to restoration after construction of facilities such as passage structures, buildings, or fish hatcheries), roughness recruitment, shading, restoration of native habitat, restoration after wildfires, and rehabilitation of removed roads/trails	9d, 9c		Low
55	Erosion and Sedimentation Control	This is work that occurs in the riparian and upland zones, which may include the installation of water bars, gully plugs and culvert outlets, grassed waterways, grade stabilization structures, sediment catchment ponds/basins, regrading or terracing, and removal of drainage pipes and other blockages specifically to prevent erosion,	9c		Low

		sediment slumps, or landslides.			
180	Enhance Floodplain/Remove, Modify, Breach Dike	Removal, breaching, or alteration/set-back of a dike to restore riparian/floodplain or wetland habitat; also includes re-contouring of habitat to restore or enhance wetland or floodplain functionality and connectivity	2a, 2b	✓	Med-High
181	Create, Restore, and/or Enhance Wetland	Creation, restoration, or enhancement of a wetland area or function; this may be from the installation of a water control structure, re-contouring, and excavation to improve habitat connectivity	2a	✓	Med-High
199	Remove Vegetation	Use during the initial year of treating a site if removing one or more plant species, or a number of individuals of a plant species, by mechanical, biological, and/or chemical means, or by controlled burn	3a, 3b		Low
27	Remove Debris	Removal of items such as trash, old buildings, and abandoned equipment from water or land; does not include removal of a diversion or instream structure	4		Low
198	Maintain Vegetation	Maintain planted or pre-existing vegetation through physical, chemical, mechanical, and/or biological activities such as scalping, installing mats or mulch, mowing, irrigating, fertilizing, applying herbicide(s), burning, using Integrated Pest Management (IPM), preventing or reducing animal damage (e.g., browse repellents, tree tubes); includes using different, or the same, treatment techniques in previously treated areas the second year (or later) of planting	3a, 3b		Low
69	Install Fish Screen	Work to install or replace a fish screen associated with a diversion or pump; typical screen types include rotary drum, flat plate or traveling	7g		Low-Med-High
80	Install Siphon	Work that installs a siphon, flume, or other structure to separate canal flow from stream flow where the two have been intermingled as part of past water diversion development, resulting in fish using the natural stream course for passage and rearing	7e		Low
84	Remove/Install Diversion	Work that removes, replaces, or avoids creating a fish passage barrier associated with a stream diversion, including push-up dams; may be part of a diversion consolidation effort that reduces the number of diversion sites	1b	✓	Med-High
85	Remove/Breach Fish Passage Barrier	Work that facilitates fish passage over a natural (e.g., beaver) or human-made barrier by breaching or removal; includes dams, weirs, fish ladders, tidegates, culverts, bridges, and road crossings	1a	✓	Med-High
184	Install Fish Passage Structure	Installation, replacement, or modification of structures when the intent is to improve fish passage and/or flow, typically by removing or modifying a full or partial instream barrier	1e	✓	Med-High
82	Install Well	Installation of a well to enable groundwater to be used for irrigation as an alternative to instream flow	7c		Low
149	Install Pipeline	Activities related to installing a pipeline; only for work designed to provide irrigation efficiencies which result in increased instream flow	7b		Low
150	Install Sprinkler	Activities related to installing a sprinkler system; only for work designed to provide irrigation efficiencies which result in increased instream flow	7a		Low
151	Line Diversion Ditch	Activities related to lining a ditch; only for work designed to provide irrigation efficiencies which result in increased instream flow	7b		Low

Chapter 2: Required Information (GPDSR).

Planning and design documentation of conservation practices should effectively communicate that appropriate planning, analysis, design, and resulting construction documentation are met. The project documentation should provide other persons the means of quickly following the rationale used in determining all features of a design including the design objective(s), data, criteria, assumptions, procedures, and decisions used in the designs, specifications and details.

A design report should be included as part of any engineering design contract. It is not an additional or separate action. Monitoring and Adaptive Management Plans, however, can be a separate additional item but should not be very expensive because we have templates available and most of the information is copied directly out of the design report.

The GPDSR (General Project and Data Summary Requirements) serves as the design submittal framework that is needed to assess and evaluate the adequacy of the proposed project. The GPDSR criteria were developed using the River Restoration Analysis Tool (RiverRAT) and address the 16 overarching questions proposed within the RiverRAT Framework.

The RRT will review submitted GPDSR documents to determine if the technical deliverables provided are:

1. Adequate for functionality (adherence to HIP III Conservation Measures), and
2. Adequate for technical quality (competent execution of design and project plans – contract documents).

A GPDSR basis of design report template is available and follows the outline below.

Project Background.

1. Name and titles of sponsor, firms, and individuals responsible for design
2. List of project elements that have been designed by a licensed Professional Engineer
3. Identification and description of risk to infrastructure or existing resources
4. Explanation and background on fisheries use (by life stage - period) and limiting factors addressed by project
5. List of primary project features including constructed or natural elements
6. Description of performance/sustainability criteria for project elements, assessment of risk of failure to perform, potential consequences, and compensating analysis to reduce uncertainty
7. Description of disturbance including timing, areal extent, as well as potential impacts associated with implementation of each project element

Resource Inventory and Evaluation.

1. Description of past and present impacts on channel, riparian, and floodplain conditions
2. Instream flow management and constraints in the project reach
3. Description of existing geomorphic conditions and constraints on physical processes

4. Description of lateral connectivity to floodplain and historical floodplain impacts
5. Tidal influence in project reach and influence of structural controls (dikes or gates)

Technical Data.

1. Incorporation of HIP III activity-specific conservation measures for all included project elements
2. Summary of site information and measurements (survey, bed material, etc.) used to support assessment and design
3. Summary of hydrologic analyses conducted, data sources, and period of record; include a list of design discharge (Q) and return interval (RI) for each design element
4. Summary of sediment supply and transport analyses conducted; include data sources; and sediment size gradation used in streambed design
5. Summary of hydraulic modeling/analyses conducted, outcomes, and implications relative to proposed design
6. Stability analyses/computations for project elements and a comprehensive project plan
7. Description of how preceding technical analysis has been incorporated into the project designs
8. For projects that address profile discontinuities (e.g., grade stabilization, small dam and structure removals), a longitudinal profile of the stream channel thalweg for 20 channel widths upstream and downstream of the structure shall be used to determine the potential for channel degradation.
9. For projects that address profile discontinuities (e.g., grade stabilization, small dam and structure removals), a minimum of three cross-sections (one downstream of the structure, one through the reservoir area upstream of the structure, and one upstream of the reservoir area outside of the influence of the structure) shall be used to characterize the channel morphology and quantify the stored sediment.

Construction – Contract Documentation.

1. Incorporation of the HIP III General and Construction Conservation Measures
2. Design – construction plan set including, but not limited to: plan, profile, section and detail sheets that identify all project elements and construction activities of sufficient detail to facilitate project bidding and implementation
3. List of all proposed project materials and quantities
4. Description of BMPs that will be implemented and resource plans including:
    a) Site Access Staging and Sequencing Plan with description
    b) Work Area Isolation and Dewatering Plan with description of how aquatic species within the action area will be affected/protected
    c) Erosion and Sediment Control Plan
    d) Spill, Pollution, Prevention Control Plan
    e) Site Reclamation and Restoration Plan
    f) List Proposed Equipment and Fuels Management Plan
5. Calendar schedule for construction/implementation procedures

Site- or project-specific environmental compliance monitoring

Chapter 3: HIP III Forms

HIP III Forms – Project Notification Form (PNF).

B O N N E V I L L E P O W E R A D M I N I S T R A T I O N

HIP III PROGRAMMATIC - CONSULTATION
PROJECT NOTIFICATION FORM
HIP III No:

Please refer to HIPIII No# when discussing project.

Basic Project Info

Lead Action Agency: BPA			
NMFS Tracking #: 2013/9724	Statutory Authority: ☐ ESA & EFH ☐ ESA		USFWS Tracking #: 01EOFW00-2013-F-0199
Date of Request:	DATE		
Project Title:	Click here to enter text.		
BPA Project #:	Click here to enter text.	Contract #:	Click here to enter text.
BPA EC Contact:	Click here to enter text.	Phone:	Click here to enter text.
Project Sponsor Contact:	Click here to enter text.	Phone:	Click here to enter text.
Project Affiliation:	Click here to enter text.		
NMFS Branch Office:	Choose a NMFS Branch Office		
USFWS Field Office:	Choose a USFWS Field Office		
Lat/Long: (in decimal degrees, WGS84)	Click here to enter text.	County:	Choose a County.
6th Field HUC:	Click here to enter text.	HUC Name:	Click here to enter text.

Project Start Date:	DATE	Project End Date:	DATE	Completed Form Due Date:	DATE

(Project Completion Form and/or Herbicide Use Form due ≤60-days after Project End Date)

Note Project Completion Form (PCF) Due Date

Does the project consist of Invasive Plant Control only?	Yes ☐	No☐
Does the project require work area isolation/fish salvage?	Yes ☐	No☐
Does the project require a variance?	Yes ☐	No☐

If Invasive Plants only no need for PCF

Project Description
List the project activities and describe the intended result(s); tell when the project is to occur; describe how the activities will be implemented; provide any other pertinent information. Please include Work Element for each activity.

Click here to enter text.

Simple Description: "Adding 40 pieces of large wood to RM 3."

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VER 03.10

This is where Variance information gets communicated to Services

B O N N E V I L L E P O W E R A D M I N I S T R A T I O N

Variance Request

Describe how the effects of the requested variance fall within the range of effects described for the proposed activities in the HIP III Opinion, by addressing the following:

1) Define the requested variance and the relevant criterion by page number.
Click here to enter text.

2) Environmental conditions anticipated at the time of the proposed work (flow and weather conditions).
Click here to enter text.

3) Biological justification as to why a variance is necessary and a brief rationale why the variance will either provide a conservation benefit or, at a minimum, not cause additional adverse effects beyond the scope of the Opinion.
Click here to enter text.

4) Include as attachments any necessary approvals from state agencies.
Click here to enter text.

NMFS Species/Critical Habitat Present in Action Area:

Species Affected

Anadromous Fish:

- ☐ Lower Columbia River Chinook
- ☐ Lower Columbia River coho
- ☐ Lower Columbia River steelhead
- ☐ Middle Columbia River steelhead
- ☐ Upper Columbia River spring-run Chinook
- ☐ Upper Columbia River steelhead
- ☐ Columbia River chum
- ☐ Green sturgeon
- ☐ Upper Willamette River Chinook
- ☐ Upper Willamette River steelhead
- ☐ Snake River spring/summer-run Chinook
- ☐ Snake River fall-run Chinook
- ☐ Snake River Basin steelhead
- ☐ Snake River sockeye
- ☐ Pacific eulachon

Essential Fish Habitat Species:

- ☐ Salmon (West Coast Salmon FMP)
- ☐ Estuarine Composite (Ground fish, pelagics)

USFWS Species/Critical Habitat Present in Action Area:

Freshwater Fish Species:

- ☐ Bull Trout

Mammalian Species:

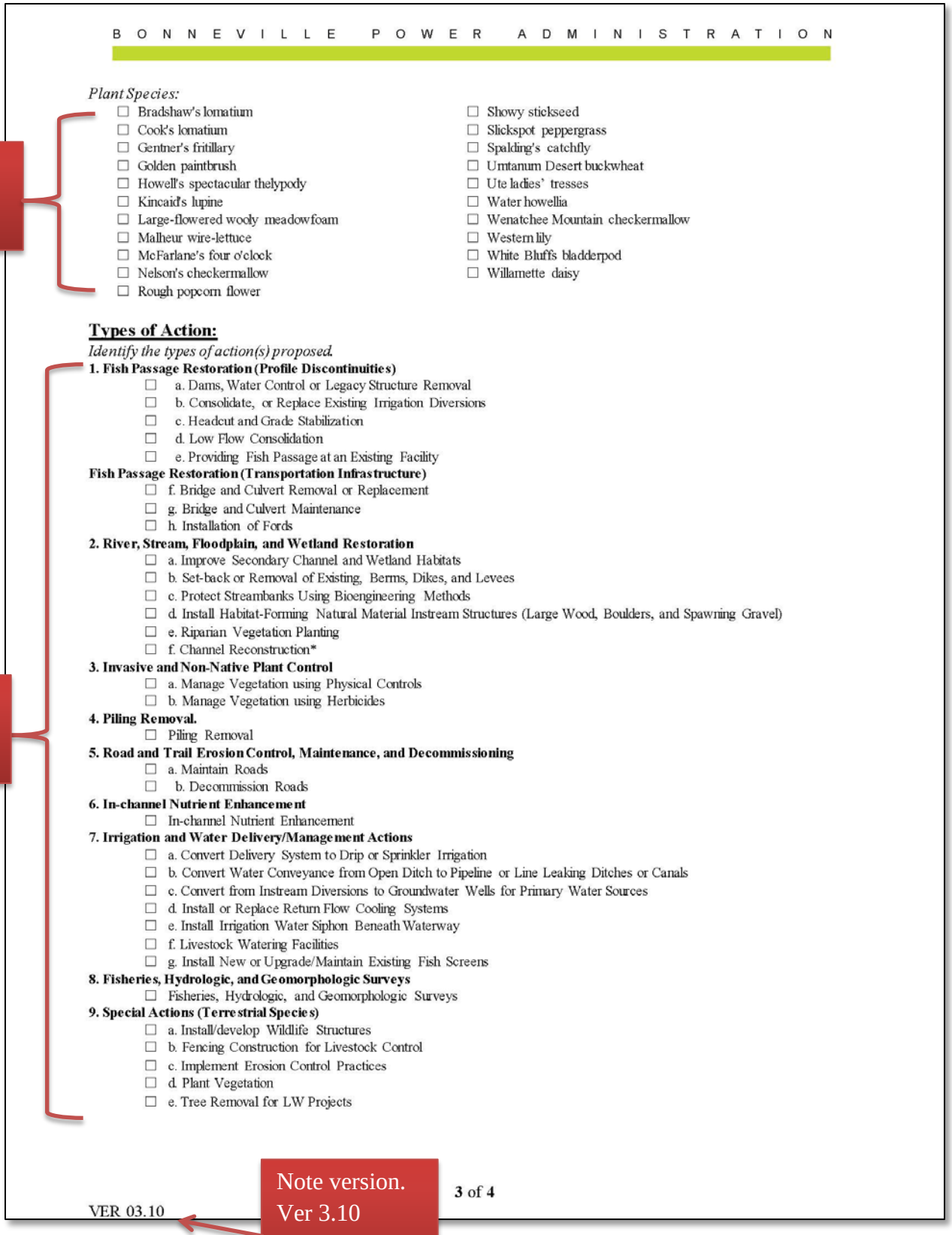
- ☐ Canada lynx*
- ☐ Columbia white-tailed deer*
- ☐ Gray wolf*
- ☐ Grizzly bear*
- ☐ North American wolverine
- ☐ Pygmy rabbit*
- ☐ Northern Idaho ground squirrel*
- ☐ Woodland caribou*

Avian Species:

- ☐ Marbled murrelet
- ☐ Northern spotted owl
- ☐ Streaked horned lark*
- ☐ Western snowy plover

Invertebrate Species:

- ☐ Banbury Springs limpet
- ☐ Bliss Rapids snail*
- ☐ Bruneau Hot springsnail*
- ☐ Fender's blue butterfly
- ☐ Taylor's checkerspot butterfly
- ☐ Snake River physa snail*
- ☐ Oregon silverspot butterfly



B O N N E V I L L E P O W E R A D M I N I S T R A T I O N

Plant Species:

- ☐ Bradshaw's lomatium
- ☐ Cook's lomatium
- ☐ Gentner's fritillary
- ☐ Golden paintbrush
- ☐ Howell's spectacular thelypody
- ☐ Kincaid's lupine
- ☐ Large-flowered wooly meadowfoam
- ☐ Malheur wire-lettuce
- ☐ McFarlane's four o'clock
- ☐ Nelson's checkermallow
- ☐ Rough popcorn flower
- ☐ Showy stickseed
- ☐ Slickspot peppergrass
- ☐ Spalding's catchfly
- ☐ Umtanum Desert buckwheat
- ☐ Ute ladies' tresses
- ☐ Water howellia
- ☐ Wenatchee Mountain checkermallow
- ☐ Western lily
- ☐ White Bluffs bladderpod
- ☐ Willamette daisy

Species Affected Continued

Types of Action:

Identify the types of action(s) proposed.

1. Fish Passage Restoration (Profile Discontinuities)
- ☐ a. Dams, Water Control or Legacy Structure Removal
- ☐ b. Consolidate, or Replace Existing Irrigation Diversions
- ☐ c. Headcut and Grade Stabilization
- ☐ d. Low Flow Consolidation
- ☐ e. Providing Fish Passage at an Existing Facility

Fish Passage Restoration (Transportation Infrastructure)
- ☐ f. Bridge and Culvert Removal or Replacement
- ☐ g. Bridge and Culvert Maintenance
- ☐ h. Installation of Fords

2. River, Stream, Floodplain, and Wetland Restoration
- ☐ a. Improve Secondary Channel and Wetland Habitats
- ☐ b. Set-back or Removal of Existing, Berms, Dikes, and Levees
- ☐ c. Protect Streambanks Using Bioengineering Methods
- ☐ d. Install Habitat-Forming Natural Material Instream Structures (Large Wood, Boulders, and Spawning Gravel)
- ☐ e. Riparian Vegetation Planting
- ☐ f. Channel Reconstruction*

3. Invasive and Non-Native Plant Control
- ☐ a. Manage Vegetation using Physical Controls
- ☐ b. Manage Vegetation using Herbicides

4. Piling Removal.
- ☐ Piling Removal

5. Road and Trail Erosion Control, Maintenance, and Decommissioning
- ☐ a. Maintain Roads
- ☐ b. Decommission Roads

6. In-channel Nutrient Enhancement
- ☐ In-channel Nutrient Enhancement

7. Irrigation and Water Delivery/Management Actions
- ☐ a. Convert Delivery System to Drip or Sprinkler Irrigation
- ☐ b. Convert Water Conveyance from Open Ditch to Pipeline or Line Leaking Ditches or Canals
- ☐ c. Convert from Instream Diversions to Groundwater Wells for Primary Water Sources
- ☐ d. Install or Replace Return Flow Cooling Systems
- ☐ e. Install Irrigation Water Siphon Beneath Waterway
- ☐ f. Livestock Watering Facilities
- ☐ g. Install New or Upgrade/Maintain Existing Fish Screens

8. Fisheries, Hydrologic, and Geomorphologic Surveys
- ☐ Fisheries, Hydrologic, and Geomorphologic Surveys

9. Special Actions (Terrestrial Species)
- ☐ a. Install/develop Wildlife Structures
- ☐ b. Fencing Construction for Livestock Control
- ☐ c. Implement Erosion Control Practices
- ☐ d. Plant Vegetation
- ☐ e. Tree Removal for LW Projects

Project Activity Categories

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VER 03.10

Note version. Ver 3.10 current as of 2/22/16

B O N N E V I L L E P O W E R A D M I N I S T R A T I O N

NMFS Hydro Division Review

Does the project require approval from NMFS Hydro Division for:

Fish Passage Restoration **(Profile Discontinuities)**	Yes ☐	No ☐	Approval Date: DATE
Install New or Upgrade/Maintain Existing Fish Screens	Yes ☐	No ☐	Approval Date: DATE
Channel Reconstruction	Yes ☐	No ☐	Approval Date: DATE

USFWS Terrestrial Species Review

Does the project require confirmation of NLAA Effects determination for:

Mammalian Species	Yes ☐	No ☐	Approval Date: DATE
Invertebrate Species	Yes ☐	No ☐	Approval Date: DATE
Avian Species	Yes ☐	No ☐	Approval Date: DATE
Plant Species	Yes ☐	No ☐	Approval Date: DATE

Internal BPA Use Only

RRT REVIEW (for medium or high risk projects only)

Medium Risk Project requiring internal RRT review Yes ☐ No ☐

High Risk project requiring inter-agency review? Yes ☐ No ☐

Date of RRT submittal: DATE Date of RRT Approval: DATE RRT Reviewer:

BPA Determination of Consistency with all Requirements of the HIP III Consultation

The BPA must certify that the proposed project is consistent with all requirements and applicable terms and conditions of the HIP III Consultation.

BPA EC Contact (constitutes your electronic signature):

Date of Certification: DATE

Once this has been signed and returned with HIPIII No# this document serves as proof of coverage.

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VER 03.10

Variance Requests.

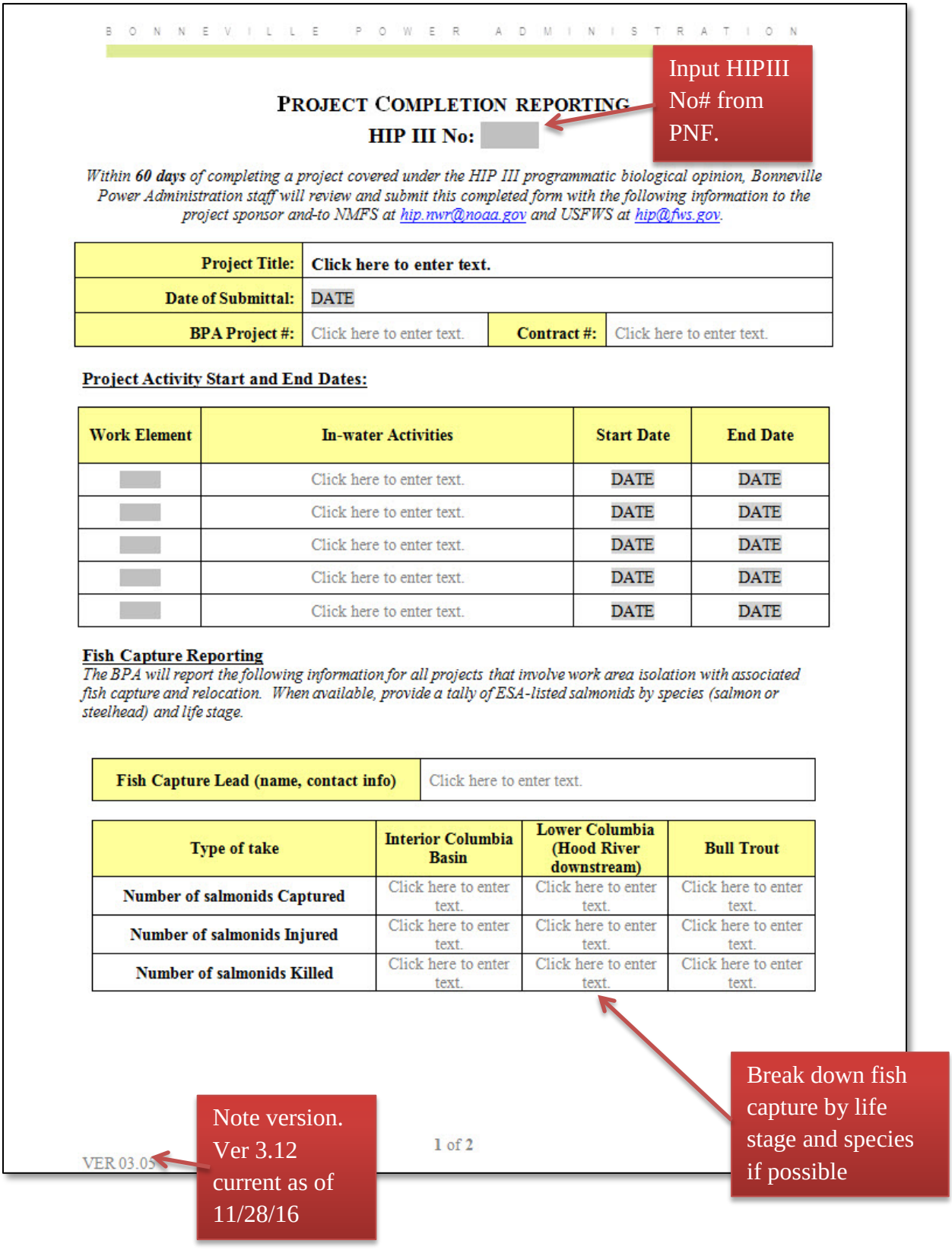
Because of the wide range of proposed activities and the natural variability within and between stream systems, BPA (on behalf of the applicant) may require variances from criteria specified by the HIP III BiOps. The Services will consider granting variances, especially when there is a clear conservation benefit or there are no additional adverse effects (especially incidental take) beyond that analyzed in the BiOps. Contact your EC lead for more information.

Variance requests shall be made on the PNF, which shall then be submitted to and approved by the Services via email correspondence.

1) Define the requested variance and the relevant criterion.
2) Environmental conditions during when the action takes place (flow and weather).
3) Biological justification as to why a variance is necessary and a brief rationale why the variance will either provide a conservation benefit or, at a minimum, not cause additional adverse effects beyond the scope of the BiOps.
4) Include as attachments any necessary approvals by state agencies.

Variances must be authorized by both the NMFS Branch Chief and USFWS Field Office Supervisor. If the Services do not approve a request for variance, the project sponsor and BPA will initiate an individual Section 7 consultation with the USFWS and/or NMFS on the identified action.

HIP III Forms – Project Completion (PCF).



B O N N E V I L L E P O W E R A D M I N I S T R A T I O N

PROJECT COMPLETION REPORTING

HIP III No:

Input HIPIII No# from PNF.

*Within **60 days** of completing a project covered under the HIP III programmatic biological opinion, Bonneville Power Administration staff will review and submit this completed form with the following information to the project sponsor and to NMFS at hip.nwr@noaa.gov and USFWS at hip@fws.gov.*

Project Title:	**Click here to enter text.**		
Date of Submittal:	DATE		
BPA Project #:	Click here to enter text.	**Contract #:**	Click here to enter text.

Project Activity Start and End Dates:

Work Element	In-water Activities	Start Date	End Date
	Click here to enter text.	DATE	DATE
	Click here to enter text.	DATE	DATE
	Click here to enter text.	DATE	DATE
	Click here to enter text.	DATE	DATE
	Click here to enter text.	DATE	DATE

Fish Capture Reporting

The BPA will report the following information for all projects that involve work area isolation with associated fish capture and relocation. When available, provide a tally of ESA-listed salmonids by species (salmon or steelhead) and life stage.

Fish Capture Lead (name, contact info)	Click here to enter text.

Type of take	Interior Columbia Basin	Lower Columbia (Hood River downstream)	Bull Trout
Number of salmonids Captured	Click here to enter text.	Click here to enter text.	Click here to enter text.
Number of salmonids Injured	Click here to enter text.	Click here to enter text.	Click here to enter text.
Number of salmonids Killed	Click here to enter text.	Click here to enter text.	Click here to enter text.

Break down fish capture by life stage and species if possible

VER 03.05

Note version. Ver 3.12 current as of 11/28/16

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B O N N E V I L L E P O W E R A D M I N I S T R A T I O N

Turbidity Reporting

The Project Sponsor shall complete and record the following water quality observations to ensure that any increase in suspended sediment is not exceeding the limit for HIP III compliance.

Monitoring Individual (name, contact info)

Size of Stream		Measurement Compliance Point*
<30 feet	☐	*50 feet downstream*
>30 & <100feet	☐	*100 feet downstream*
>100feet	☐	*200 feet downstream*
Tidal	☐	*300 feet downcurrent*

Predominant Stream Bottom Characteristics (Use % if possible)		
Clay	☐	
Silt	☐	
Sand	☐	
Gravel	☐	
Rock	☐	

This information gives us a better idea of why there was a turbidity exceedance.

Providing turbidity information is a very important element to ensure the future of the HIPIII program.

Work Element	Date	Start		Start +2 hrs	Start +4 hrs	Start + 6 hrs	Start + 8 hrs	COMMENTS -- if turbidity was visible at interim checks, how was work modified to reduce turbidity? What special circumstances led to exceedance?
		In-water work Start Time	Back-ground Measurement	Measured Turbidity (NTUs) or (Yes/No) for observed difference.				
Maximum Linear extent of observed turbidity downstream (ft)						**Is Turbidity Plume Channel Spanning?**		Yes ☐ No ☐

Instructions: First take a background measurement approximately 100 ft up-stream in undisturbed water. Then take a 2nd measurement down stream of work site at the measurement compliance point*. If the downstream observed turbidity visibly exceeds background turbidity greater than 10% or more of the background NTU measurement modify BMPs and continue to monitor every 2 hours. If exceedance continues for second monitoring interval (2 intervals in a row) STOP WORK until turbidity resumes to background and notify EC lead.

Narrative Assessment

Provide a narrative assessment of the project sponsor's success in meeting all requirements including the terms and conditions of the HIP III BO consultation. Please include:

- Photos of habitat conditions before, during, and after action completion.
- Evidence of compliance with fish screen criteria, for any pump used in fish-bearing waters.
- A summary of the results of pollution and erosion control inspections, including any erosion control failure, turbidity in exceedance of HIP III standards, contaminant release, and correction effort.
- A description of the post-project condition of any riparian area cleared within 150 feet of Ordinary High Water.
- A description of site restoration completed and future site restoration plans.
- A description of any project activities that were not implemented or differ from what was proposed.
- Any issues that were encountered during implementation or lessons learned.

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VER 03.05

Include a brief description of the project, before and after photos, and any lessons learned.

HIP III Forms – Herbicide Use Form (HUF).

Year when herbicides were applied.

Check the box if this is pre- or post-application

VER 2.02

HIPIIII HERBICIDE USE FORM

HIPIII NO# | YEAR 2016 | PROPOSED ☐ | ACTUAL ☑

Project Sponsor/person filling out form:
Email Address:
BPA Project Number (yyyy-xxx-xx):
BPA Contract Number:
EC Lead:
Date:

INSTRUCTIONS: Only the Herbicides listed in note #1 are allowed for use under the HIPIII. Use "VARIANCE" for a variance approved herbicide not on the list and write it under trade name. Mixtures of up to three herbicides may be used and use one row for each herbicide application (mixture). All Herbicide Reporting is due by April 1st, you may have to submit 2 forms for one contract if the herbicide application period bisects this date. "Near ESA listed terrestrial species" is within 1 mile of habitat where they are known to occur. Near ESA-listed aquatic species follows Riparian Definition below.

	LOCATION			Near ESA-Species or their Habitat?		HERBICIDE (Note #1)		Application Rate		Adjuvant (Note #3)	RIPARIAN (Note #4)			UPLAND (Note #5)			
	Location Name	Latitude (Note#2)	Longitude	Aquatic species	Terrestrial species	Active Ingredient	Trade Name	lbs/ acre	oz/ acre	Trade Name	Actual Acres Treated	Methodology (Note #7)	Amount A.I. Actually Used (Note #6) lbs	Amount A.I. Actually Used (Note #6) oz	Actual Acres Treated	Methodology (Note #7)	Amount A.I. Actually Used (Note #6) lbs	Amount A.I. Actually Used (Note #6) oz
EX	Rock Creek Watershed	45.4853	-119.0317	☐	☐	Imazapyr Metsulfuron	Plateau Escort		0.1 0.3	Agri-Dex	7	Broadcast		0.4 2.3				
1				☐	☐													
2				☐	☐													
3				☐	☐													
4				☐	☐													
5				☐	☐													
6				☐	☐													
7				☐	☐													
8				☐	☐													
9				☐	☐													
10				☐	☐													
										TOTAL 0 acres			TOTAL 0 acres					
												TOTAL 0 lbs 0 oz				TOTAL 0 lbs 0 oz		

Use one entry for each Herbicide Mixture.

Up to 3 herbicides can be used for each mixture

Application rate and amount used are the most important items to report accurately;from this, we derive treatment area.

The Lat and Long must be in decimal degrees.

Chapter 4: HIP III Conservation Measures.

General Aquatic Conservation Measures Applicable to all Actions.

The activities covered under the HIP III are intended to protect and restore fish and wildlife habitat with long-term benefits to ESA-listed species; however, construction activities may have short-term adverse effects on ESA-listed species and associated critical habitat. To avoid and minimize these short-term adverse effects, BPA has developed the following general Conservation Measures in coordination with USFWS and NMFS. These measures will be implemented on all projects covered under the HIP III.

Project Design and Site Preparation.

1) **Climate change.** Best available science regarding the future effects within the project area of climate change, such as changes instream flows and water temperatures, will be considered during project design.

2) **State and federal permits.** All applicable regulatory permits and authorizations will be obtained prior to project implementation. These permits and authorizations include, but are not limited to, the National Environmental Policy Act (NEPA), National Historic Preservation Act (NHPA), state and federal Section 404 of the Clean Water Act (CWA) permits, and Section 401 water quality certifications.

3) **Timing of in-water work.** Formal recommendations published by state agencies such as the Oregon Department of Fish and Wildlife (ODFW), Washington Department of Fish and Wildlife (WDFW), Idaho Department of Fish and Game (IDFG), and Montana Fish Wildlife and Parks (MFWP) or informal recommendations from the appropriate state Fishery Biologist in regard to the timing of in-water work will be followed.
   a) Bull trout - Utilizing state-recommended in-water work windows will decrease potential effects to bull trout, but this alone may not be sufficient to protect local bull trout populations. This is especially true if work will occur in spawning and rearing areas because eggs, alevin, and fry are present nearly year round. Some project locations may not have designated in-water work windows for bull trout, or if they do, they may differ from the in-water work windows for salmon and steelhead. If this is the case, or if the proposed work is to occur within bull trout spawning and rearing habitats, the project sponsor will contact the appropriate USFWS field office to ensure that all reasonable implementation measures are considered and an appropriate in-water work window is being used to minimize project effects.
   b) Lamprey - the project sponsor and/or their contractors will avoid working instream or river channels that contain Pacific lamprey from March 1 to July 1 in low- to mid-elevation reaches (<5,000 feet). In high-elevation reaches (>5,000 feet), the project sponsor will avoid working instream or river channels from March 1 to August 1. If either timeframe is incompatible with other objectives, the area will be surveyed for nests and lamprey presence, and avoided if possible. If lampreys are known to exist, the project sponsor will

utilize dewatering and salvage best management practices (BMPs) outlined in USFWS 2010[1].

c) Exceptions to ODFW, WDFW, MFWP, or IDFG in-water work windows will be requested through the Variance Process (Page 22).

Work area isolation and fish salvage activities are considered incidental to construction-related activities and shall occur during state-recommended in-water work windows.

4) **Contaminants.** The project sponsor will complete a site assessment with the following elements to identify the type, quantity, and extent of any potential contamination for any action that involves excavation of more than 20 cubic yards of material:
   a) A review of available records, such as former site use, building plans, and records of any prior contamination events;
   b) A site visit to inspect the areas used for various industrial processes and the condition of the property;
   c) Interviews with knowledgeable people, such as site owners, operators, and occupants, neighbors, or local government officials; and
   d) A summary, stored with the project file that includes an assessment of the likelihood that contaminants are present at the site, based on items 4(a) through 4(c).

5) **Site layout and flagging.** Prior to construction, the project area will be clearly flagged to identify the following:
   a) Sensitive resource areas, such as areas below ordinary high water (OHW), spawning areas, springs, and wetlands;
   b) Equipment entry and exit points;
   c) Road and stream crossing alignments;
   d) Staging, storage, and stockpile areas; and
   e) No-herbicide-application areas and buffers.

6) **Temporary access roads and paths.**
   a) Existing access roads and paths will be preferentially used whenever possible, and the number and length of temporary access roads and paths through riparian areas and floodplains will be minimized to lessen soil disturbance, soil compaction, and impacts to vegetation.
   b) Temporary access roads and paths will not be built on slopes where grade, soil, or other features suggest a likelihood of excessive erosion or failure. If slopes are steeper than 30%, the road will be designed by a civil engineer with experience in steep road design.
   c) The removal of riparian vegetation during construction of temporary access roads will be minimized. When temporary vegetation removal is required, vegetation will be cut at ground level (not grubbed).

[1] USFWS. 2010. Best management practices to minimize adverse effects to Pacific lamprey. Available online at: http://www.fws.gov/pacific/Fisheries/sphabcon/lamprey/pdf/Best%20Management%20Practices%20for%20Pacific%20Lamprey%20April%202010%20Version.pdf

d) At project completion, all temporary access roads and paths will be obliterated, and the soil will be stabilized and revegetated. Road and path obliteration refers to the most comprehensive degree of decommissioning and involves decompacting the road surface and associated ditches, pulling the fill material onto the running surface, and reshaping to match the original contour.
e) Temporary roads and paths in wet areas or areas prone to flooding will be obliterated by the end of the in-water work window.

7) **Temporary stream crossings.**
   a) Existing stream crossings will be preferentially used whenever reasonable, and the number of temporary stream crossings will be minimized.
   b) Temporary bridges and culverts will be installed to allow for equipment and vehicle crossing over perennial streams during construction. Treated wood shall not be used on temporary bridge crossings or in locations in contact with or over water.
   c) Equipment and vehicles will cross streams in the wet only where:
      i. The streambed is bedrock; or
      ii. Mats or off-site logs are placed in the stream and used as a crossing.
   d) Vehicles and machinery will cross streams at right angles to the main channel wherever possible.
   e) The location of the temporary crossing will avoid areas that may increase the risk of channel re-routing or avulsion.
   f) Impacts to potential spawning habitat (i.e., pool tailouts) and pools will be avoided to the maximum extent possible.
   g) No stream crossings will occur at active spawning sites, when holding adult listed fish are present, or when eggs or alevins are in the gravel. The appropriate state fish and wildlife agency will be contacted for specific timing information.
   h) After project completion, temporary stream crossings will be obliterated, and the stream channel and banks restored.

8) **Staging, storage, and stockpile areas.**
   a) Staging areas (used for construction equipment storage, vehicle storage, fueling, servicing, and hazardous material storage) will be 150 feet or more from any natural waterbody or wetland, or on an adjacent established road area in a location and manner that will preclude erosion into or contamination of the stream or floodplain.
   b) Natural materials used for implementation of aquatic restoration, such as large wood, gravel, and boulders, may be staged within the 100-year floodplain.
   c) Any large wood, topsoil, and native channel material displaced by construction will be stockpiled for use during site restoration at a specifically identified and flagged area.
   d) Any material not used in restoration, and not native to the floodplain, will be removed to a location outside of the 100-year floodplain for disposal.

9) **Equipment.** Mechanized equipment and vehicles will be selected, operated, and maintained in a manner that minimizes adverse effects on the environment (e.g., minimally-sized, low pressure

tires; minimal hard-turn paths for tracked vehicles; temporary mats or plates within wet areas or on sensitive soils). All vehicles and other mechanized equipment will be:

a) Stored, fueled, and maintained in a vehicle staging area located 150 feet or more from any natural water body or wetland or on an adjacent, established road area;
b) Refueled in a vehicle staging area located 150 feet or more from a natural waterbody or wetland, or in an isolated hard zone, such as a paved parking lot or adjacent, established road (this measure applies only to gas-powered equipment with tanks larger than 5 gallons);
c) Biodegradable lubricants and fluids shall be used on equipment operating in and adjacent to the stream channel and live water.
d) Inspected daily for fluid leaks before leaving the vehicle staging area for operation within 150 feet of any natural water body or wetland; and
e) Thoroughly cleaned before operation below ordinary high water (OHW), and as often as necessary during operation, to remain grease free.

10) **Erosion control.** Erosion control best management practices (BMPs) will be prepared and carried out, commensurate in scope with the action, that may include the following:
    a) Temporary erosion control BMPs.
        i. Temporary erosion control BMPs will be in place before any significant alteration of the action site and appropriately installed downslope of project activity within the riparian buffer area until site rehabilitation is complete.
        ii. If there is a potential for eroded sediment to enter the stream, sediment barriers will be installed and maintained for the duration of project implementation.
        iii. Temporary erosion control measures may include fiber wattles, silt fences, jute matting, wood fiber mulch and soil binder, or geotextiles and geosynthetic fabric.
        iv. Soil stabilization utilizing wood fiber mulch and tackifier (hydro-applied) may be used to reduce erosion of bare soil if the materials are noxious weed-free and nontoxic to aquatic and terrestrial animals, soil microorganisms, and vegetation.
        v. Sediment will be removed from erosion control BMP once it has reached 1/3 of the exposed height of the BMP.
        vi. Once the site is stabilized following construction, temporary erosion control BMPs will be removed.
    b) Emergency erosion control BMPs. The following materials for emergency erosion control will be available at the work site:
        i. A supply of sediment control materials; and
        ii. An oil-absorbing floating boom whenever surface water is present.

11) **Dust abatement.** The project sponsor will determine the appropriate dust control measures by considering soil type, equipment usage, prevailing wind direction, and the effects caused by other erosion and sediment control measures. In addition, the following criteria will be followed:
    a) Work will be sequenced and scheduled to reduce exposed bare soil subject to wind erosion.
    b) Dust-abatement additives and stabilization chemicals (typically magnesium chloride, calcium chloride salts, or ligninsulfonate) will not be applied within 25 feet of a natural waterbody or wetland and will be applied so as to minimize the likelihood that they will

enter streams. Applications of ligninsulfonate will be limited to a maximum rate of 0.5 gallons per square yard of road surface, assuming a 50:50 (ligninsulfonate to water) solution.

c) Application of dust abatement chemicals will be avoided during or just before wet weather and at stream crossings or other areas that could result in unfiltered delivery of the dust abatement chemicals to a waterbody (typically these would be areas within 25 feet of a natural waterbody or wetland; distances may be greater where vegetation is sparse or slopes are steep).
d) Spill containment equipment will be available during application of dust abatement chemicals.
e) Petroleum-based products will not be used for dust abatement.

13) **Spill prevention, control, and counter measures.** The use of mechanized machinery increases the risk for accidental spills of fuel, lubricants, hydraulic fluid, or other contaminants into the riparian zone or directly into the water. Additionally, uncured concrete and form materials adjacent to the active stream channel may result in accidental discharge into the water. These contaminants can degrade habitat and injure or kill benthic invertebrates and ESA-listed species. The project sponsor will adhere to the following measures:
   a) A description of hazardous materials that will be used, including inventory, storage, and handling procedures will be available on-site.
   b) Written procedures for notifying environmental response agencies will be posted at the work site.
   c) Spill containment kits (including instructions for cleanup and disposal) adequate for the types and quantity of hazardous materials used at the site will be available at the work site.
   d) Workers will be trained in spill containment procedures and will be informed of the location of spill containment kits.
   e) Any waste liquids generated at the staging areas will be temporarily stored under an impervious cover, such as a tarpaulin, until they can be properly transported to and disposed of at a facility that is approved for receipt of hazardous materials.

14) **Invasive species control.** The following measures will be followed to avoid introduction of invasive plants and noxious weeds into project areas:
   a) Prior to entering the site, all vehicles and equipment will be power-washed, allowed to fully dry, and inspected to make sure no plants, soil, or other organic material adheres to the surface.
   b) Watercraft, waders, boots, and any other gear to be used in or near water will be inspected for aquatic invasive species. Wading boots with felt soles are not to be used due to their propensity for aiding in the transfer of invasive species.

Work Area Isolation & Fish Salvage.

Any work area within the wetted channel will be isolated from the active stream whenever ESA-listed fish are reasonably certain to be present, or if the work area is less than 300-feet upstream from known spawning habitats. Work area isolation & fish salvage activities are considered incidental to construction-related activities and shall occur during the state-recommended in-water work windows.

When work area isolation is required, design plans will include all isolation elements, fish release areas, and, when a pump is used to dewater the isolation area and fish are present, a fish screen that meets NMFS's fish screen criteria (NMFS 2011[2], or most current). Work area isolation and fish capture activities will occur during periods of the coolest air and water temperatures possible, normally early in the morning versus late in the day, and during conditions appropriate to minimize stress and death of species present.

For salvage operations in known bull trout spawning and rearing habitat, electrofishing shall only occur from May 1 to July 31. No electrofishing will occur in any bull trout occupied habitat after August 15. Bull trout are very temperature sensitive and generally should not be electrofished or otherwise handled when temperatures exceed 15 degrees Celsius. Salvage activities should take place during periods of the coolest air and water temperatures possible, normally early in the morning versus late in the day, and during conditions appropriate to minimize stress to fish species present.

Salvage operations will follow the ordering, methodologies, and conservation measures specified below in Steps 1 through 6. Steps 1 and 2 will be implemented for all projects where work area isolation is necessary according to conditions above. Electrofishing (Step 3) can be implemented to ensure all fish have been removed following Steps 1 and 2, or when other means of fish capture may not be feasible or effective. Dewatering and rewatering (Steps 4 and 5) will be implemented unless wetted instream work is deemed to be minimally harmful to fish, and is beneficial to other aquatic species. Dewatering will not be conducted in areas known to be occupied by lamprey, unless lampreys are salvaged using guidance set forth in USFWS 2010[3].

1) **Isolate.**
   a) Block nets will be installed at upstream and downstream locations and maintained in a secured position to exclude fish from entering the project area.
   b) Block nets will be secured to the stream channel bed and banks until fish capture and transport activities are complete. Block nets may be left in place for the duration of the project to exclude fish.

[2] NMFS. 2011. Anadromous salmonid passage facility design. Northwest Region. Available online at: http://www.nwr.noaa.gov/Salmon-Hydropower/FERC/upload/Fish-Passage-Design.pdf

[3] USFWS. 2010. Best management practices to minimize adverse effects to Pacific lamprey. Available online at: http://www.fws.gov/pacific/Fisheries/sphabcon/lamprey/pdf/Best%20Management%20Practices%20for%20Pacific%20Lamprey%20April%202010%20Version.pdf

c) If block nets remain in place more than one day, the nets will be monitored at least daily to ensure they are secured to the banks and free of organic accumulation. If the project is within bull trout spawning and rearing habitat, the block nets must be checked every 4 hours for fish impingement on the net. Less frequent intervals must be approved through a variance request.
d) Nets will be monitored hourly anytime there is instream disturbance.

2) **Salvage.** As described below, fish trapped within the isolated work area will be captured to minimize the risk of injury, then released at a safe site:
   a) Remove as many fish as possible prior to dewatering.
   b) During dewatering, any remaining fish will be collected by hand or dip nets.
   c) Seines with a mesh size to ensure capture of the residing ESA-listed fish will be used.
   d) Minnow traps will be left in place overnight and used in conjunction with seining.
   e) If buckets are used to transport fish:
      i. The time fish are in a transport bucket will be limited, and will be released as quickly as possible;
      ii. The number of fish within a bucket will be limited based on size, and fish will be of relatively comparable size to minimize predation;
      iii. Aerators for buckets will be used or the bucket water will be frequently changed with cold clear water at 15 minute or more frequent intervals.
      iv. Buckets will be kept in shaded areas or will be covered by a canopy in exposed areas.
      v. Dead fish will not be stored in transport buckets but will be left on the streambank to avoid mortality counting errors.
   f) As rapidly as possible (especially for temperature-sensitive bull trout), fish will be released in an area that provides adequate cover and flow refuge. Upstream release is generally preferred, but fish released downstream will be sufficiently outside of the influence of construction.
   g) Salvage will be supervised by a qualified fisheries biologist experienced with work area isolation and competent to ensure the safe handling of all fish.

3) **Electrofishing.** Electrofishing will be used only after other salvage methods have been employed or when other means of fish capture are determined to not be feasible or effective. If electrofishing will be used to capture fish for salvage, the salvage operation will be led by an experienced fisheries biologist and the following guidelines will be followed:

The NMFS's electrofishing guidelines (NMFS 2000[4]).

a) Initial Site Surveys and Equipment Settings
   i. In order to avoid contact with spawning adults or active redds, researchers must conduct a careful visual survey of the area to be sampled before beginning electrofishing.
   ii. Prior to the start of sampling at a new location, water temperature and conductivity measurements shall be taken to evaluate electrofisher settings and adjustments.

[4] http://www.westcoast.fisheries.noaa.gov/publications/reference_documents/esa_refs/section4d/electro2000.pdf

No electrofishing should occur when water temperatures are above 18°C or are expected to rise above this temperature prior to concluding the electrofishing survey. In addition, studies by NMFS scientists indicate that no electrofishing should occur in California coastal basins when conductivity is above 350 µS/cm.

iii. Whenever possible, a block net should be placed below the area being sampled to capture stunned fish that may drift downstream.

iv. Equipment must be in good working condition and operators should go through the manufacturer's preseason checks, adhere to all provisions, and record major maintenance work in a logbook.

v. Each electrofishing session must start with all settings (voltage, pulse width, and pulse rate) set to the **minimums** needed to capture fish. These settings should be gradually increased only to the point where fish are immobilized and captured, and generally not allowed to exceed conductivity-based maxima (**Table 1**). Only direct current (DC) or pulsed direct current (PDC) should be used.

Table 1. Guidelines for initial and maximum settings for backpack electrofishing.

	Initial settings	Maximum settings		Notes
Voltage	100 V	Conductivity (µS/cm) < 100 100 - 300 > 300	Max. Voltage 1100 V 800 V 400 V	In California coastal basins, settings should never exceed 400 volts. Also, no electrofishing should occur in these basins if conductivity is greater than 350 µS/cm.
Pulse width	500 µs	5 ms		
Pulse rate	30 Hz	70 Hz		*In general*, exceeding 40 Hz will injure more fish

b) Electrofishing Technique

i. Sampling should begin using straight DC. The power needs to remain on until the fish is netted when using straight DC. If fish capture is unsuccessful with initial low voltage, gradually increase voltage settings with straight DC.

ii. If fish capture is not successful with the use of straight DC, then set the electrofisher to lower voltages with PDC. If fish capture is unsuccessful with low voltages, increase pulse width, voltage, and pulse frequency (duration, amplitude, and frequency).

iii. Electrofishing should be performed in a manner that minimizes harm to the fish. Stream segments should be sampled systematically, moving the anode continuously in a herringbone pattern (where feasible) through the water. Care should be taken when fishing in areas with high fish concentrations, structure (e.g., wood, undercut banks) and in shallow waters where most backpack electrofishing for juvenile salmonids occurs. Voltage gradients may be high when electrodes are in shallow water where boundary layers (water surface and substrate) tend to intensify the electrical field.

iv. Do not electrofish in one location for an extended period (e.g., undercut banks) and regularly check block nets for immobilized fish.
v. Fish should not make contact with the anode. The zone of potential injury for fish is 0.5 m from the anode.
vi. Electrofishing crews should be generally observant of the condition of the fish and change or terminate sampling when experiencing problems with fish recovery time, banding, injury, mortality, or other indications of fish stress.
vii. Netters should not allow the fish to remain in the electrical field any longer than necessary by removing stunned fish from the water immediately after netting.

c) Sample Processing and Recordkeeping

i. Fish should be processed as soon as possible after capture to minimize stress. This may require a larger crew size.
ii. All sampling procedures must have a protocol for protecting held fish. Samplers must be aware of the conditions in the containers holding fish; air pumps, water transfers, etc., should be used as necessary to maintain safe conditions. Also, large fish should be kept separate from smaller prey-sized fish to avoid predation during containment.
iii. Use of an approved anesthetic can reduce fish stress and is recommended, particularly if additional handling of fish is required (e.g., length and weight measurements, scale samples, fin clips, tagging).
iv. Fish should be handled properly (e.g., wetting measuring boards, not overcrowding fish in buckets, etc.).
v. Fish should be observed for general condition and injuries (e.g., increased recovery time, dark bands, visually observable spinal injuries). Each fish should be completely revived before releasing at the location of capture. A plan for achieving efficient return to appropriate habitat should be developed before each sampling session. Also, every attempt should be made to process and release ESA-listed specimens first.
vi. Pertinent water quality (e.g., conductivity and temperature) and sampling notes (e.g., shocker settings, fish condition/injuries/mortalities) should be recorded in a logbook to improve technique and help train new operators. *It is important to note that records of injuries or mortalities pertain to the entire electrofishing survey, including the fish sample work-up.*
vii. The anode will not intentionally contact fish.
viii. Electrofishing shall not be conducted when the water conditions are turbid and visibility is poor. This condition may be experienced when the sampler cannot see the stream bottom in one foot of water.
ix. If mortality or obvious injury (defined as dark bands on the body, spinal deformations, de-scaling of 25% or more of body, and torpidity or inability to maintain upright attitude after sufficient recovery time) occurs during electrofishing, operations will be immediately discontinued, machine settings, water temperature, and conductivity checked, and procedures adjusted or electrofishing postponed in order to reduce mortality.

4) **Dewater.** Dewatering, when necessary, will be conducted over a sufficient period of time to allow species to naturally migrate out of the work area and will be limited to the shortest linear extent practicable.
   a) Diversion around the construction site may be accomplished with a cofferdam and a by-pass culvert or pipe, or a lined, non-erodible diversion ditch. Where gravity feed is not possible, a pump may be used, but must be operated in such a way as to avoid repetitive dewatering and rewatering of the site. Impoundment behind the cofferdam must occur slowly through the transition, while constant flow is delivered to the downstream reaches.
   b) All pumps will have fish screens to avoid juvenile fish impingement or entrainment, and will be operated in accordance with NMFS's current fish screen criteria (NMFS 2011[5], or most recent version). If the pumping rate exceeds 3 cubic feet per second (cfs), a NMFS Hydro fish passage review will be necessary.
   c) Dissipation of flow energy at the bypass outflow will be provided to prevent damage to riparian vegetation and/or stream channel.
   d) Safe re-entry of fish into the stream channel will be provided, preferably into pool habitat with cover, if the diversion allows for downstream fish passage.
   e) Seepage water will be pumped to a temporary storage and treatment site or into upland areas to allow water to percolate through soil or to filter through vegetation prior to reentering the stream channel.

5) **Salvage Notice.** Monitoring and recording of fish presence, handling, and mortality must occur for the duration of the isolation, salvage, electrofishing, dewatering, and rewatering operations. Once operations are completed, a salvage report will document procedures used, any fish injuries or deaths (including numbers of fish affected), and causes of any deaths.

[5] NMFS. 2011. Anadromous salmonid passage facility design. Northwest Region. Available online at: http://www.nwr.noaa.gov/Salmon-Hydropower/FERC/upload/Fish-Passage-Design.pdf

Construction and Post-Construction Conservation Measures.

1) **Fish passage.** Fish passage will be provided for any adult or juvenile fish likely to be present in the project area during construction, unless passage did not exist before construction, or the stream is naturally impassable at the time of construction. If the provision of temporary fish passage during construction will increase negative effects on ESA-listed species or their habitat, a variance can be requested from the NMFS Branch Chief and the USFWS Field Office Supervisor. Pertinent information, such as the species affected, length of stream reach affected, proposed time for the passage barrier, and alternatives considered will be included in the variance request.

2) **Construction and discharge water.**
   a) Surface water may be diverted to meet construction needs, but only if developed sources are unavailable or inadequate.
   b) Diversions will not exceed 10% of the available flow.
   c) All construction discharge water will be collected and treated using the best available technology suitable for site conditions.
   d) Treatments to remove debris, nutrients, sediment, petroleum hydrocarbons, metals and other pollutants likely to be present will be provided.

3) **Minimize time and extent of disturbance.** Earthwork (including drilling, excavation, dredging, filling and compacting) in which mechanized equipment is utilized instream channels, riparian areas, and wetlands will be completed as quickly as possible. Mechanized equipment will be used instreams only when project specialists believe that such actions are the only reasonable alternative for implementation, or would result in less sediment in the stream channel or damage (short- or long-term) to the overall aquatic and riparian ecosystem relative to other alternatives. To the extent feasible, mechanized equipment will work from the top of the bank, unless work from another location would result in less habitat disturbance.

4) **Cessation of work.** Project operations will cease under the following conditions:
   a) High flow conditions that may result in inundation of the project area, except for efforts to avoid or minimize resource damage;
   b) When allowable water quality impacts, as defined by the state CWA section 401 water quality certification or HIP III Turbidity Monitoring Protocol, have been exceeded; or
   c) When “incidental take” limitations have been reached or exceeded.

5) **Site restoration.** When construction is complete:
   a) All streambanks, soils, and vegetation will be cleaned up and restored as necessary using stockpiled large wood, topsoil, and native channel material.
   b) All project-related waste will be removed.
   c) All temporary access roads, crossings, and staging areas will be obliterated. When necessary for revegetation and infiltration of water, compacted areas of soil will be loosened.

d) All disturbed areas will be rehabilitated in a manner that results in similar or improved conditions relative to pre-project conditions. This will be achieved through redistribution of stockpiled materials, seeding, and/or planting with local native seed mixes or plants.

6) **Revegetation.** Long-term soil stabilization of disturbed sites will be accomplished with reestablishment of native vegetation using the following criteria:
   a) Planting and seeding will occur prior to or at the beginning of the first growing season after construction.
   b) An appropriate mix of species that will achieve establishment, shade, and erosion control objectives, preferably forb, grass, shrub, or tree species native to the project area or region and appropriate to the site will be used.
   c) Vegetation, such as willow, sedge and rush mats, will be salvaged from disturbed or abandoned floodplains, stream channels, or wetlands.
   d) Invasive species will not be used.
   e) Short-term stabilization measures may include the use of non-native sterile seed mix (when native seeds are not available), weed-free certified straw, jute matting, and other similar techniques.
   f) Surface fertilizer will not be applied within 50 feet of any stream channel, waterbody, or wetland.
   g) Fencing will be installed as necessary to prevent access to revegetated sites by livestock or unauthorized persons.
   h) Re-establishment of vegetation in disturbed areas will achieve at least 70% of pre-project conditions within 3 years.
   i) Invasive plants will be removed or controlled until native plant species are well-established (typically 3 years post-construction).

7) **Site access.** The project sponsor will retain the right of reasonable access to the site in order to monitor the success of the project over its life.

8) **Implementation monitoring.** Project sponsor staff or their designated representative will provide implementation monitoring by filling out the Project Completion Form (PCF) to ensure compliance with the applicable BiOp, including:
   a) General conservation measures are adequately followed.
   b) Effects to listed species are not greater than predicted and incidental take limitations are not exceeded.
   c) Turbidity monitoring shall be conducted in accordance with the HIP III turbidity monitoring protocol (Page 39) and recorded in the PCF (Page 23).

9) **CWA section 401 water quality certification.** The project sponsor or designated representative will complete and record water quality observations to ensure that in-water work is not degrading water quality. During construction, CWA section 401 water quality certification provisions provided by the Oregon Department of Environmental Quality, Washington Department of Ecology, or Idaho Department of Environmental Quality will be followed.

Staged Rewatering Plan.

When appropriate, the project sponsor shall implement a staged rewatering plan for projects that involve introducing streamflow into recently excavated channels under the 2a) **Improve Secondary Channel and Wetland Habitat Activity category (Page 64)** or 2f) **Channel Reconstruction (Page 76) categories.**

1) Pre-wash the newly-excavated channel before rewatering. Turbid wash water will be detained and pumped to the floodplain, rather than discharging to fish-bearing waters.

2) Prepare new channel for water by installing seine at upstream end to prevent fish from moving downstream into new channel until 2/3 of total streamflow is available in that channel. Starting in the early morning, introduce 1/3 of the flow into the new channel over a period of 1-2 hours.

3) Perform monitoring according to HIP III Turbidity Monitoring Protocol (Page 39).
   a) If turbidity exceeds 10% of background, modify the activity to reduce turbidity. In this case, this may mean decreasing the amount of flow entering the new channel and/or correcting any other issues causing turbidity (e.g., correct a bank that is sloughing, install or correct a BMP, etc.).
   b) Monitor every 2 hours as long as the instream activity is occurring.
   c) If exceedances occur for more than 2 monitoring intervals in a row (4 hours), then the activity must stop until turbidity reaches background levels. This means that the contractor may have to plug off water supply to the new meander until turbidity is within acceptable levels.
   d) Once turbidity is within 10% of background levels, move on to the next re-watering stage.

4) Prepare to introduce the second 1/3 of the flow (up to a total of 2/3) to the new channel by installing seine at upstream end of old channel in order to prevent fish from moving into a partially-dewatered channel. Introduce the second 1/3 of the flow over the next 1-2 hours. Salvage fish from the old channel at this time, so that the old channel is fish-free before dropping below 1/3 of the flow. *Note: the fish will be temporarily blocked from moving downstream into either channel until 2/3 of the flow has been transitioned to the new channel. This blockage to downstream fish passage is expected to persist for roughly 12 to 14 hours, but fish will still be able to volitionally move out of the channel in the downstream direction.* Perform monitoring as in #3 above.

5) After the second 1/3 of flow is introduced over 2 hours, and turbidity is within 10% of the background level, remove seine nets from the new channel, and allow fish to move downstream back into the channel.

6) Introduce the final 1/3 of flow. Once 100% of the flow is in the new channel, install plug to block flow into the old channel and remove seines from the old channel.

HIP III Turbidity Monitoring Protocol.

The Project Sponsor shall complete and record the following water quality observations to ensure that any increase in suspended sediment does not exceed the limit for HIP III compliance. Records shall be reported on the HIP III PCF.

If the geomorphology of the project area (e.g., silty or claylike materials) or the nature of the action (e.g., large amounts of bare earth exposed below the bankfull elevation) shall preclude the successful compliance with these triggers, notify your EC Lead who shall pre-notify the Services of the likelihood of an exceedance.

1. Take a background turbidity sample using a recently-calibrated turbidimeter in accordance with manufacturer's instructions, or measure turbidity with a visual turbidity observation (Figure 1). Turbidity should be measured every 2 hours while work is being implemented or more often if sediment disturbance varies greatly. Frequent monitoring will ensure that the in-water work area is not creating turbid conditions within the water column. The background samples/visual observations should be taken at a relatively undisturbed location approximately 100 feet upstream from the project area. Record the observation, location, and time before monitoring at the downstream point, known as the measurement compliance point.

2. Take a second sample or observation, immediately after each upstream sample or observation, at the measurement compliance point, approximately 50 feet downstream from the project area instreams that are 30 feet wide or less; 100 feet downstream from the project area for streams between 30 and 100 feet wide; 200 feet downstream from the project area for streams greater than 100 feet wide; and 300 feet from the discharge point or nonpoint source for locations subject to tidal or coastal scour. Record the downstream observation, location, and time.

3. Compare the upstream and downstream observations/samples. If observed or measured turbidity downstream is more than upstream observation or measurement (> 10%), the activity must be modified to reduce turbidity. If visual estimates are used, an obvious difference between upstream and downstream observations shall bear the assumption of a (> 10%) difference (Figure 1). Mark "Yes" or "No" on your datasheet. Continue to monitor every 2 hours as long as instream activity continues.

4. If exceedances occur for more than two consecutive monitoring intervals (after 4 hours), the activity must stop until the turbidity level returns to background, and the EC lead must be notified within 48 hours. The EC lead shall document the reasons for the exceedance and corrective measures taken, then notify the local NMFS branch chief and/or USFWS field supervisor and seek recommendations.

5. If at any time, monitoring, inspections, or observations/samples show that the turbidity controls are ineffective, immediately mobilize work crews to repair, replace, or reinforce controls as necessary.

Figure 1. Suggested Visual Observational Differences in Turbidity.

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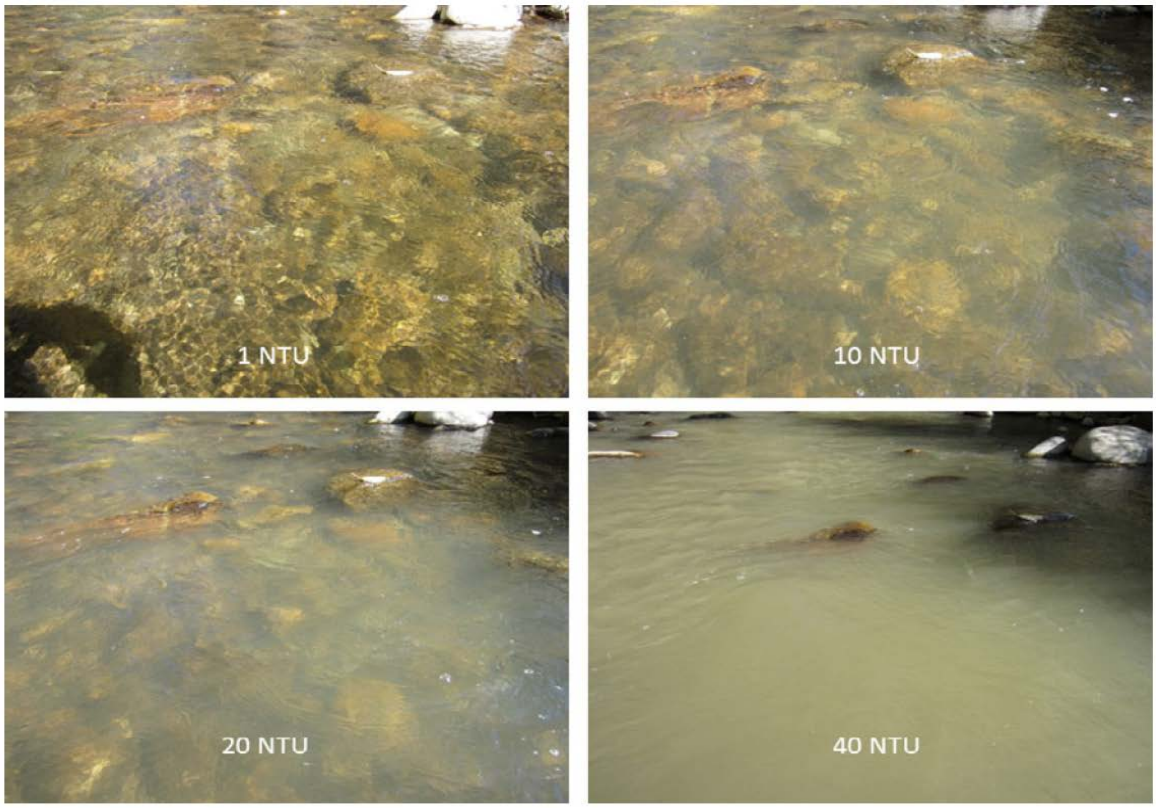


Figure 9 – Turbidity levels in Carmen Creek during Parmenter Lane culvert upgrade.

Stormwater Management Guidance.

The project sponsor must provide stormwater management for any project that will: increase the impervious area within the project area; construct new pavement that increases traffic capacity or widens the road prism; construct pavement down to subgrade; rehabilitate or restore a bridge to repair structural or functional deficiencies that are too complicated to be corrected through normal maintenance, except for seismic retrofits that make a bridge more resistant to earthquake damage (e.g., external post-tensioning, supplementary dampening) but do not affect the bridge deck or drainage; replace a stream crossing; change stormwater conveyance. Stormwater management is not required for the following pavement actions: minor repairs, patching, chip seal, grind/inlay, overlay or resurfacing (i.e., non-structural pavement preservation, a single lift or inlay).

Stormwater management consists of:

1) Water quality (pollution reduction) treatment for post-construction stormwater run-off from all contributing impervious area
2) Water quantity treatment
    a) Water quantity (flow) management for runoff from all contributing impervious area that will discharge into an intermittent or perennial waterbody in a watershed that is smaller than 100 square miles, unless the outfall discharges directly into a lake, reservoir, or estuary.

        OR

    b) Water quantity (flow) management for runoff from all contributing impervious area that will discharge more than 0.5 cfs during the 2-year, 24-hour storm into an intermittent or perennial waterbody in a watershed smaller than 100 square miles, unless the outfall discharges directly into a lake, reservoir, or estuary.

Stormwater management plans must:

1) Explain how highway runoff from all contributing impervious area that is within or contiguous with the project area will be managed using site sketches, drawings, specifications, calculations, or other information commensurate with the scope of the action.
2) Identify the pollutants of concern.
3) Identify all contributing and non-contributing impervious areas that are within and contiguous with the project area.
4) Describe the BMPs that will be used to treat the identified pollutants of concern, and the proposed maintenance activities and schedule for the treatment facilities.
5) Provide a justification for the capacity of the facilities provided based on the expected runoff volume. This justification should include elements like: the design storm; BMP geometry; and analyses of residence time, as appropriate.
6) Include the name, email address, telephone number of a person responsible for designing the stormwater management facilities so that NMFS may contact that person if additional information is necessary.

All stormwater quality treatment practices and facilities must be designed to accept 50% of the cumulative rainfall from the 2-year, 24-hour storm for that site, except as follows: climate zone 4 – 67%; climate zone 5 – 75%; and climate zone 9 – 67%. A continuous rainfall/runoff model may be used instead of the above runoff depths to calculate water quality treatment depth.

Use low impact development practices to infiltrate or evaporate runoff to the maximum extent feasible. For runoff that cannot be infiltrated or evaporated and therefore will discharge into surface or subsurface waters, apply one or more of the following specific primary treatment practices, supplemented with appropriate soil amendments:

1) Bioretention cell
2) Bioslope, also known as an "ecology embankment"
3) Bioswale
4) Constructed wetlands
5) Infiltration pond
6) Media filter devices with demonstrated effectiveness
7) Porous pavement, with no soil amendments and appropriate maintenance

All stormwater flow control treatment practices and facilities must be designed to maintain the frequency and duration of flows generated by storms within the following end-points:

1) Lower discharge endpoint, by the U.S. Geological Survey (USGS) flood frequency zone:
    a) Western Region = 42% of 2-year event
2) Eastern Region
    a) Southeast, Northeast, North Central = 48% of 2-year event
    b) Eastern Cascade = 56% of 2-year event
3) Upper discharge endpoint
    a) Entrenchment ratio <2.2 = 10-year event, 24-hour storm
    b) Entrenchment ratio >2.2 = bank overtopping event

When conveyance is necessary to discharge treated stormwater directly into surface water or a wetland, the following requirements apply:

1) Maintain natural drainage patterns.
2) To the maximum extent feasible, ensure that water quality treatment for highway runoff from all contributing impervious area is completed before commingling with offsite runoff for conveyance.

Terrestrial Plants, Wildlife, and Aquatic Invertebrates.

This section describes general conservation measures and practices developed to minimize or avoid the exposure of certain endangered, threatened, and proposed (candidate) species managed by USFWS to any effects of the project activities. These standards include practices that would minimize or avoid any such effects on designated critical habitat for those species.
A USFWS biologist will review the PNF/PCF for each project to confirm the project design meets the conditions for *no effect* or *not likely to adversely affect* for listed species and/or critical habitat. Projects than cannot meet these conditions will need to be modified or will require a separate Section 7 consultation.

Identifying Species Locations. When proposed project locations have been identified, the EC Lead or project sponsor will obtain the current species list for the county in which the proposed project is located. The species lists can be accessed at the following websites:

- **Idaho**: http://www.fws.gov/idaho/species/IdahoSpeciesList.pdf
- **Oregon**: http://www.fws.gov/oregonfwo/Species/Lists/default.asp
- **Montana**: http://www.fws.gov/montanafieldoffice/Endangered_Species/Listed_Species/countylist.pdf
- **Washington, Western**: http://www.fws.gov/wafwo/speciesmap.html
- **Washington, Eastern**: http://www.fws.gov/wafwo/species_EW.html

If species are located within the county where the proposed project is located, refer to the habitat descriptions for each species below for each species or critical habitat to determine whether that listed species may occur in the vicinity of the proposed project.For additional assistance, contact the appropriate state USFWS office for more information:

- **Idaho Fish and Wildlife Office**: (208) 378-5243
- **Oregon Fish and Wildlife Office:** (503) 231-6179
- **Montana Ecological Services**: (406) 459-5225
- **Washington Fish and Wildlife Office**: (360) 753-9440
- **Eastern Washington Field Office:** (509) 891-6839
- **Central Washington Field Office:** (509) 665-3508

Site-specific information of listed species occurrences in Washington State may be obtained from the Washington Department of Fish and Wildlife Priority Habitat and Species Program http://www.wdfw.wa.gov/hab/phspage.htm and from the Washington Department of Natural Resources Natural Heritage Program at http://wdfw.wa.gov/mapping/phs/. Site-specific information of listed species occurrences in Oregon may also be available from the Oregon Biodiversity Information Center at http://orbic.pdx.edu/index.html.

General Conservation Measures for ESA-Listed Terrestrial Species.

If it is determined that ESA-listed species, critical habitat, or unsurveyed suitable habitat for ESA-listed species are located within the vicinity (generally within 1 mile) of the proposed project, BPA will implement the following project design criteria for each species. Additional species-specific conservation measures may apply (the EC lead shall provide these).

1) **Project Access.** Existing roads or travel paths will be used to access project sites whenever possible; vehicular access ways to project sites will be planned ahead of time and will provide for minimizing impacts on riparian corridors and areas where listed species or their critical habitats may occur.

2) **Vehicle use and human activities.** Vehicle use and human activities, including walking in areas occupied by ESA- listed species, will be minimized to reduce damage or mortality to listed species.

3) **Flight patterns.** Helicopter flight patterns will be established in advance and located to avoid seasonally-important wildlife habitat

4) **Herbicide Use.** On sites where ESA-listed **terrestrial wildlife** may occur, herbicide applications will be avoided or minimized to the extent practicable while still achieving project goals. Staff will avoid any potential for direct spraying of wildlife, or immediate habitat in use by wildlife for breeding, feeding, or sheltering. Herbicide use in or within 1 mile of habitat where ESA-listed terrestrial wildlife occur will be limited to the chemicals and application rates as shown in **Table 2**.

Table 2: Maximum Application Rates within 1 Mile of Habitat where ESA-listed Terrestrial Species Occur.

	2,4-D	Aminopyralid	Chlorsulfuron	Clethodim	Clopyralid	Dicamba	Glyphosate 1	Glyphosate 2	Imazapic	Imazapyr	Metsulfuron	Picloram	Sethoxydim	Sulfometuron	Triclopyr (TEA)
Listed Species	Maximum Rate of Herbicide Appliction (lb/ac)														
Mammals	NA	0.22	0.083	NA	0.375	NA	2.0	2.0	0.189	1.0	0.125	NA	0.3	NA	NA
Birds*	NA	0.11	0.083	NA	0.375	NA	2.0	2.0	0.189	1.0	0.125	NA	0.3	NA	NA
Invertebrates*	NA	NA	NA	NA	0.375	NA	2.0	2.0	NA	1.0	NA	NA	0.3	NA	NA

NA = Not Authorized for use
** See required buffers and methods restrictions within each species-specific PDS*

Category 1: Fish Passage Restoration.

Profile Discontinuities.

BPA proposes to review and fund fish passage projects for ESA-listed salmon, steelhead, and bull trout ("salmonids"). The objective of fish passage restoration is to allow all life stages of salmonids access to historical habitat from which they have been excluded and focuses on restoring safe upstream and downstream fish passage to stream reaches that have become isolated by obstructions, non-functioning structures, or instream profile discontinuities resulting from insufficient depth, or excessive jump heights and velocities.

Although passage actions are generally viewed as positive actions for native fish restoration, there may be occasions where restoring passage exposes native fish (isolated above or below a barrier) to negative influences (predation, competition, hybridization) from non-native species such as brook trout, brown trout, and lake trout.

Proposed passage projects that may increase connectivity of bull trout to non-native species must be approved by the appropriate USFWS Field Office Supervisor.

BPA grouped passage projects according the effects and review requirements in the following subcategories: **Profile Discontinuities** and **Transportation Infrastructure**. These subcategories represent a logical break between transportation-related effects (transportation infrastructure) and effects due to physical fish barriers, classified by water velocity, water depth, and barrier height (profile discontinuities).

BPA proposes the following activities to improve fish passage; (a) Dams, Water Control or Legacy Structure Removal; (b) Consolidate, or Replace Existing Irrigation Diversions; (c) Headcut and Grade Stabilization; (d) Low Flow Consolidation; and (e) Providing Fish passage at an existing facility.

1a) Dams, Water Control Structures, or Legacy Structures Removal.

Description. BPA proposes to fund and review fish passage projects, and restore more natural channel and flow conditions by removing small dams, channel-spanning weirs, earthen embankments, subsurface drainage features, spillway systems, tide gates, outfalls, pipes, instream flow redirection structures (*e.g.*, drop structure, gabion, groin), or similar devices used to control, discharge, or maintain water levels.

"Small dams" include instream structures (1) up to 10 feet in height for streams with an active channel width of less than 50 feet and a slope less than 4%, or (2) up to 16.4 feet in height for streams with an active channel width of less than 50 feet and a slope greater than 4%.

If the structure being removed contains material (i.e. large wood, boulders, etc.) that is typically found within the stream or floodplain at that site, the material can be reused to implement habitat improvements. Any such project must follow the design criteria outlined in the **Install Habitat-Forming Natural Material Instream Structures (Large Wood, Boulders, and Spawning Gravel)** activity category (Page 71).

Guidelines for Review:

Low Risk: Removal of subsurface drainage features, tide gates, outfalls, pipes, small dams with total head measurement equal to or less than 3 feet, instream flow redirection structures and drawings that demonstrate the incorporation of applicable conservation measures.

Medium Risk: Removal of channel spanning weirs, earthen embankments and spillway systems. Removal of dams, water-control, or legacy structures < 3 feet that do not meet all conservation measures will require both RRT and NMFS Hydropower Division (Hydro) Review.

High Risk: Removal of small dams > 3 feet and <10 feet in height for streams with an active channel width of < 50 feet and a slope <4%, or >3 feet and < 16.4 feet in height with a slope greater than 4% and an active channel width of <50 feet will require both RRT and NMFS Hydro Review.

Conservation Measures:

1) Surveys must be taken of any downstream spawning areas that may be affected by sediment released by removal of the water control structure or dam.

2) Sediment characterization must demonstrate the proportion of coarse sediment (>2mm) in the reservoir area. Reservoirs with a D35 greater than 2 mm (i.e., 65% of the sediment by weight exceeds 2 mm in diameter) may be removed without excavation of stored material, if the sediment contains no contaminants. Reservoirs with a D35 less than 2 mm (i.e., 65% of the sediment by weight is less than 2 mm in diameter) will require partial removal of the fine sediment to create a pilot channel, in conjunction with stabilization of the newly exposed streambanks with native vegetation.

3) Restore all structure banklines and fill in holes with native materials to restore contours of streambank and floodplain. Compact the fill material adequately to prevent washing out of the soil during over-bank flooding. Do not mine material from the stream channel to fill in "key" holes. When removal of buried (keyed) structures could result in significant disruption to riparian vegetation and/or the floodplain, consider leaving the buried structure sections within the streambank.

4) If the legacy structures (log, rock, or gabion weirs) were placed to provide grade control, evaluate the site for potential headcutting and incision due to structure removal by using the appropriate guidance.[6] If headcutting and channel incision are likely to occur due to structure removal, additional measures must be taken to reduce these impacts. See grade control options described under **Headcut and Grade Stabilization** activity category (Page 51).

5) If the structure is being removed because it has caused an over-widening of the channel, consider implementing other HIP III restoration categories to decrease the width to depth ratio of the stream at that location to a level similar to the natural and representative upstream and downstream sections of the stream, within the same channel type.

6) Tide gates can only be removed not modified or replaced. Modification or replacement of tidegates are not covered under the HIP III.

[6] Castro, J. 2003. Geomorphologic Impacts of Culvert Replacement and Removal: Avoiding Channel Incision. Oregon Fish and Wildlife Office, Portland, OR. Available at: http://library.fws.gov/pubs1/culvert-guidelines03.pdf

1b) Consolidate, or Replace Existing Irrigation Diversions.

Description. BPA proposes to fund and review the consolidation or replacement of existing diversions with pump stations or engineered riffles (including cross vanes, "W" weirs, or "A" frame weirs) to reduce the number of diversions on streams and thereby conserve water and improve habitat for fish, improve the design of diversions to allow for fish passage and adequate screening, or reduce the annual instream construction of push-up dams and instream structures. Small instream rock structures that facilitate proper pump station operations are allowed when designed in association with the pump station. Periodic maintenance of irrigation diversions will be conducted to ensure their proper functioning (i.e., cleaning debris buildup and replacement of parts). If low flow conditions coupled with diversion withdrawals result in impassable conditions for fish, then irrigation system efficiencies will be implemented with water savings committed to improve reach passage conditions.

The HIP III will only cover irrigation efficiency actions within this activity category that use state-approved regulatory mechanisms (e.g., Oregon ORS 537.455-.500, Washington RCW 90.42) for ensuring that water savings will be protected as instream water rights, or in cases where project implementers identify how the water conserved will remain instream to benefit fish without any significant loss of the instream flows to downstream diversions.

Unneeded or abandoned irrigation diversion structures will be removed where they are barriers to fish passage, have created wide shallow channels or simplified habitat, or are causing sediment concerns through deposition behind the structure or downstream scour according to **Dams, Water Control Structures, or Legacy Structures Removal** section (Page 46).

Lay-flat stanchions are not covered under HIP III.

Guidelines for Review:

Low Risk: Removal or replacement of Irrigation diversion structures less than 3 feet in height and drawings that demonstrate the incorporation of applicable conservation measures.

Medium Risk: Removal or replacement of irrigation diversion structures greater than 3 feet in height and/or any irrigation project that does not meet all of the conservation measures will require both RRT and NMFS Hydro Review.

Prior to going to the RRT, medium to high risk projects shall address the **General Project and Data Summary Requirements** (Page 16).

Conservation Measures:

1) Diversion structures shall be designed to meet NMFS Anadromous Salmonid Passage Facility Design Guidelines (NMFS 2011 or more recent version)[7].

2) Placement of rock structures or engineered riffles shall follow criteria outlined in the **Headcut and Grade Stabilization** activity category (Page 51).

3) Project design shall include the installation of a totalizing flow meter device on all diversions for which installation of this device is possible. A staff gauge or other device capable of measuring instantaneous flow will be utilized on all other diversions.

4) Multiple existing diversions may be consolidated into one diversion if the consolidated diversion is located at the most downstream existing diversion point unless sufficient low flow conditions are available to support unimpeded passage. The design will clearly identify the low flow conditions within the stream reach relative to the cumulative diverted water right. If instream flow conditions are proven favorable for fish passage and habitat use, then diversion consolidation may occur at the upstream structure.

5) Diversions will be designed to incorporate Point of Diversion (POD) flow restrictions to limit the diverted flow to satisfy the irrigator's water right at the 95% exceedance flow stage. Diversion flow restriction may be accomplished by any practical means available but must be supported by hydraulic calculations and a stage rating curve. POD flow restriction may be accomplished by:
   a) Incorporation of a restricted orifice plate or screen at the POD that provides at a maximum, the required area to pass the irrigators water right;
   b) Mechanically restricting the opening of a variable head gate to the maximum area required to pass the irrigator's water right; or
   c) Any other method that will satisfy the intent of the diversion flow governance requirement that can be justified by the design documents.

6) Treated wood and copper- or zinc-plated hardware shall not be used in the construction of irrigation diversions. Concrete must be sufficiently cured or dried (48-72 hours depending on temperature) before coming into contact with stream flow.

7) Irrigation diversion intake and return points will be designed or replaced to prevent fish and other aquatic organisms of all life stages from swimming or being entrained into the irrigation system.
   a) Fish screens for surface water that is diverted by gravity or by pumping at a rate that exceeds 3 cfs will be submitted to NMFS for review and approval.

[7] NMFS. 2011. Anadromous Salmonid Passage Facility Design. NMFS, Northwest Region, Portland, Oregon. Available at: http://www.nwr.noaa.gov/Publications/Reference-Documents/Passage-Refs.cfm

b) Diversions equipped with a fish screen that utilizes an automated cleaning device will have a minimum effective surface area of 2.5 square feet per cfs, and a nominal maximum approach velocity of 0.4 feet per second (fps).

c) Diversions with no automated cleaning device shall have a minimum effective surface area of 5 square foot per cfs, and a nominal maximum approach rate of 0.2 fps; and a round or square screen mesh that is no larger than 2.38 mm (0.094 inch) in the narrow dimension, or any other shape that is no larger than 1.75 mm (0.069 inch) in the narrow dimension.

d) Each fish screen will be installed, operated, and maintained according to NMFS' fish screen criteria (NMFS 2011).

e) Periodic maintenance, which may include temporary removal, of fish screens will be conducted to ensure their proper functioning (e.g., cleaning debris buildup and replacement of parts).

1c) Headcut and Grade Stabilization.

Description. BPA proposes to fund and review the restoration of fish passage and grade control (i.e., headcut stabilization) with geomorphically-appropriate structures constructed from rock or large wood (LW). Boulder weirs and roughened channels may be installed for grade control at culverts to mitigate headcuts, and to provide passage at small dams or other channel obstructions that cannot otherwise be removed. For wood-dominated systems, grade control engineered log jams (ELJs) should be considered as an alternative.

Grade control ELJs are designed to arrest channel downcutting or incision, retain sediment, lower stream energy, and increase water elevations to reconnect floodplain habitat and diffuse downstream flood peaks. Grade control ELJs also serve to protect infrastructure that is exposed by channel incision and to stabilize over-steepened banks. Unlike hard weirs or rock grade control structures, a grade control ELJ is a complex broad-crested structure that dissipates energy more gradually.

If geomorphic conditions are appropriate, consideration should be given towards use of a roughened channel or constructed riffle to minimize the potential for future development of a passage (jump height) barrier.

Construction of passage structures is limited to facilitate passage at existing diversion dams of less than 7 feet in height not in combination with new dams.

Guidelines for Review:

Low Risk: Boulder weirs and other grade control structures that address headcuts less than 18 inches in height (elevation differential across headcut from streambed) and drawings that demonstrate the incorporation of applicable conservation measures.

***Medium Risk*:** Boulder weirs and other grade control structures that are above 18 inches in height (elevation differential across headcut from streambed) will require both RRT and NMFS Hydro Review. Roughened channels or constructed riffles are considered medium risk.

Prior to going to the RRT, medium to high risk projects shall address the **General Project and Data Summary Requirements** (Page 16)**.**

Conservation Measures:

1) All structures will be designed to the design benchmarks set forth in NMFS 2011 (or most recent version).

2) Boulder weirs shall incorporate the following design features:
   a) Install boulder weirs low in relation to channel dimensions so that they are completely overtopped during channel-forming flow events (approximately a 1.5-year flow event).

b) Boulder weirs are to be placed diagonally across the channel or in upstream pointing "V" or "U" configurations (with the apex oriented upstream). The apex should be lower in elevation than the structure wings to support low flow consolidation.
c) Boulder weirs are to be constructed to allow upstream and downstream passage of all native fish species and life stages that occur in the stream. This can be accomplished by providing plunges no greater than 6 inches in height, allowing for juvenile fish passage at all flows.
d) Key weirs into the streambed to minimize structure undermining due to scour, preferably at least 2.5 times their exposure height. The weir should also be keyed into both banks, if feasible, greater than 8 feet.
e) Include fine material in the weir material mix to help seal the weir/channel bed, thereby preventing subsurface flow. Geotextile material can be used as an alternative approach to prevent subsurface flow.
f) Rock for boulder weirs shall be durable and of suitable quality to assure permanence in the climate in which it is to be used.
g) Full spanning boulder weir placement shall be coupled with measures to improve habitat complexity (e.g., LW placement, etc.) and protection of riparian areas.
h) The use of gabions, cable or other means to prevent the movement of individual boulders in a boulder weir is not allowed.

3) Headcut stabilization shall incorporate the following design features:

a) Armor head-cut with sufficiently sized and amounts of material to prevent continued up-stream movement. Materials can include both rock and organic materials which are native to the area.
b) Focus stabilization efforts in the plunge pool, the head cut, as well as a short distance of stream above the headcut.
c) Minimize lateral migration of channel around head cut ("flanking") by placing rocks and organic material at a lower elevation in the center of the channel cross section to direct flows to the middle of channel.
d) Provide fish passage over a stabilized head-cut through a series of log or rock weir structures or a roughened channel.
e) Headcut stabilization structure will be constructed utilizing streambed simulation bed material, which will be pressure-washed into place until there is apparent surface flow and minimal subsurface material to ensure fish passage immediately following construction if natural flows are sufficient. Successful washing will be determined by minimization of voids within placed matrix such that ponding occurs with little to no percolation losses.

1d) Low Flow Consolidation.

Description: BPA proposes to fund and review projects that: (a) modify diffused or braided flow conditions that impede fish passage; (b) modify dam aprons with shallow depth (less than 10 inches); or (c) utilize temporary placement of sandbags, hay bales, and ecology blocks to provide depths and velocities passable to upstream migrants.

Land use practices such as large-scale agriculture, including irrigation, and urban and residential development have drastically changed the hydrology of affected watersheds. Reduced forest cover and increased impervious surface have resulted in increased runoff and peak flows and in less aquifer recharge, resulting in increased frequency, duration, and magnitude of summer droughts. During recent droughts, temporary placement of sandbags, hay bales, and ecology blocks have been successful in providing short term fish passage through low flow consolidation measures.

Guidelines for Review:

***Medium or High Risk*:** All of the sub-activities under the Low Flow Consolidation activity category will require both RRT and NMFS Hydro Review.

Conservation Measures:

1) Fish Passage will be designed to the design benchmarks set forth in NMFS 2011 (or most recent version)[8]. This shall be verified during NMFS Hydro Review.

2) All temporary material placed in the stream to aid low flow fish passage will be removed when stream flows increase, prior to anticipated high flows that could wash consolidation measures away or cause flow to go around them.

[8] NMFS. 2011. Anadromous Salmonid Passage Facility Design. NMFS, Northwest Region, Portland, Oregon. Available at: http://www.nwr.noaa.gov/Publications/Reference-Documents/Passage-Refs.cfm

1e) Provide Fish Passage at an Existing Facility.

Description: BPA proposes to fund and review projects that: (a) re-engineer fish passage or fish collection facilities that are improperly designed; (b) periodic maintenance of fish passage or fish collection facilities to ensure proper functioning (e.g., cleaning debris buildup, replacement of parts); and (c) installation of a fish ladder at an existing facility.

Guidelines for Review:

Low Risk: Periodic Maintenance of Fish passage or Fish Collection Facilities.

Medium or High Risk: Re-engineering improperly-designed fish passage or fish collection facilities, installation of a fish ladder at an existing facility, or other activities that are not considered maintenance. Requires both RRT and NMFS Hydro Review.

Conservation Measures:

1) Fish Passage will be designed to the design benchmarks set forth in NMFS 2011[9] (or most recent version).

2) Design consideration should be given for Pacific lamprey passage[10]. Fish ladders that are primarily designed for salmonids are usually impediments to lamprey passage as they do not have adequate surfaces for attachment, velocities are often too high, and there are inadequate places for resting. Providing rounded corners, resting areas, or providing a natural stream channel (stream simulation) or wetted ramp for passage over the impediment have been effective in facilitating lamprey passage.

3) Treated wood and copper- or zinc-plated hardware shall not be used in the construction of fish ladders. Concrete must be sufficiently cured or dried[11] before coming into contact with stream flow.

[9] NMFS (National Marine Fisheries Service). 2011. Anadromous Salmonid Passage Facility Design. NMFS, Northwest Region, Portland, Oregon. Available at: http://www.nwr.noaa.gov/Publications/Reference-Documents/Passage-Refs.cfm

[10] USFWS. 2010. Best Management Practices to Minimize Adverse Effects to Pacific Lamprey. http://www.fws.gov/pacific/Fisheries/sphabcon/lamprey/pdf/Best%20Management%20Practices%20for%20Pacific%20Lamprey%20April%202010%20Version.pdf

[11] NMFS recommends 48 to 72 hours, depending on temperature.

Transportation Infrastructure.

BPA proposes to review and fund maintenance, removal, or replacement of bridges, culverts, and fords to improve fish passage, prevent streambank and roadbed erosion, facilitate natural sediment and wood movement, and eliminate or reduce excess sediment loading.
BPA proposes the following activities to improve fish passage: (a) Bridge and Culvert Removal or Replacement; (b) Bridge and Culvert Maintenance; and (c) Installation of Fords.

1f) Bridge and Culvert Removal or Replacement.

Description. For unimpaired fish passage, it is desirable to have a crossing that is a larger than the channel bankfull width, allows for a functional floodplain, allows for a natural variation in streambed elevation, and provides bed and bank roughness similar to the upstream and downstream channel. In general, bridges will be preferentially implemented over culverts because they typically do not constrict a stream channel to as great a degree as culverts. In addition, they usually allow for vertical movement of the streambed (see #3 below). When the right substrate conditions exist, bottomless culverts may provide a good alternative for fish passage and can meet the width criteria. Closed bottom or embedded pipes are the least preferred option and shall be at least 9 feet in diameter to fulfill stream simulation requirements below.

Guidelines for Review:

***Medium Risk*:** Culverts and bridges will require RRT Review.

Prior to going to the RRT, medium to high risk projects shall address the **General Project and Data Summary Requirements** (Page 16).

Conservation Measures:

1) A crossing (utilizing an open bottom technique) shall:
    a) Maintain the general scour prism, as a clear, unobstructed opening (i.e., free of any fill, embankment, scour countermeasure, or structural material).
    b) Be a single span structure that maintains a clear, unobstructed opening above the general scour elevation (2-year recurrence interval) that is at least as wide as 1.5 times the bankfull width (Figure 2).
    c) Be a multiple span structure that maintains a clear, unobstructed opening above the general scour elevation, except for piers or interior bents, that is at least as wide as 2.2 times the bankfull width.

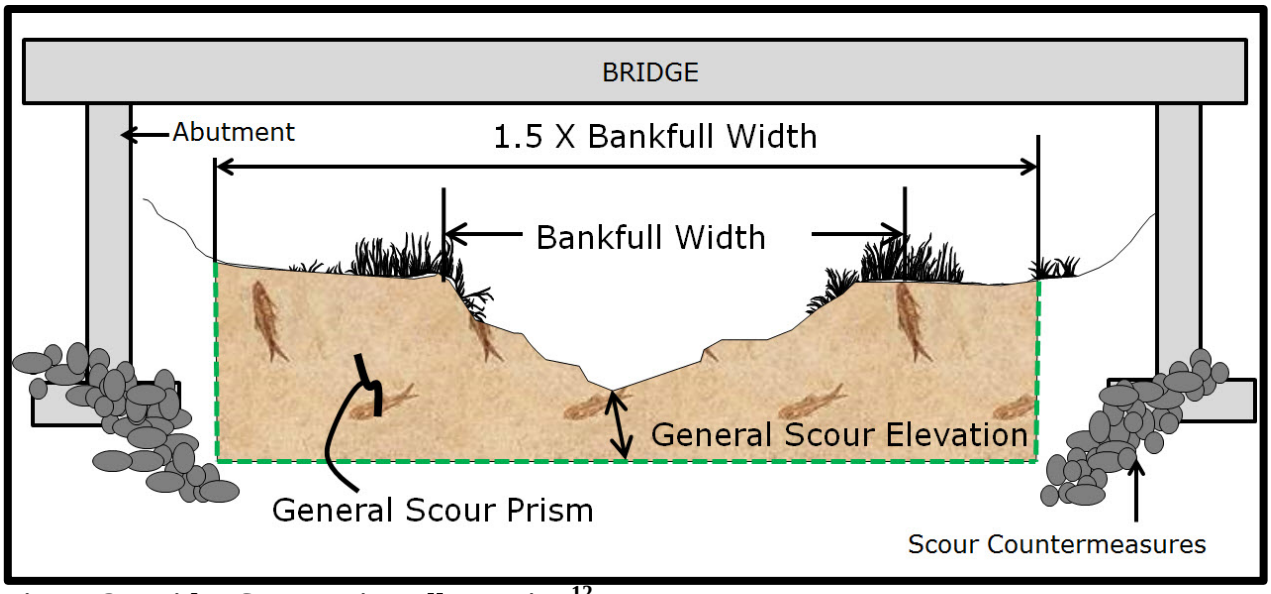


Figure 2: Bridge Scour Prism Illustration[12].

2) Bridge scour and stream stability countermeasures may be applied below the general scour elevation, however, except as described above in (1c), no scour countermeasure may be applied above the general scour elevation.

3) Remove all other artificial constrictions within the functional floodplain of the project area as follows:
   a) Remove existing roadway fill, embankment fill, approach fill, or other fills.
   b) Install relief conduits through existing fill.
   c) Remove vacant bridge supports below total scour depth, unless the vacant support is part of the rehabilitated or replacement stream crossing.
   d) Reshape exposed floodplains and streambanks to match upstream and downstream conditions.

4) If the crossing will occur within 300 feet of active spawning area, only full-span bridges or streambed simulation (continuous streambed that simulates natural channel width, depth, and slope connects the reaches up and downstream of the crossing) will be used:
   a) **Channel Vertical Clearance:** The minimum vertical clearance between the culvert bed and ceiling should be more than 6 feet.
   b) **Channel Slope:** The slope of the reconstructed streambed within the culvert should approximate the average slope of the adjacent stream from approximately ten channel widths upstream and downstream of the site in which it is being placed, or in a stream reach that represents natural conditions outside the zone of the road crossing influence.
   c) **Embedment:** If a culvert is used, the bottom of the culvert should be buried into the streambed not less than 30%, not more than 50% of the culvert height, and a minimum of 3 feet.

[12] For guidance on how to complete bridge scour and stream stability analysis, refer to page 41 of this document.

d) **Maximum Length of Road Crossing:** The length for streambed simulation should be less than 150 feet.
e) **Fill Materials:** Fill materials should be comprised of materials of similar size composition to natural bed materials that form the natural stream channels adjacent to the road crossing.
f) **Water Depth and Velocity:** Water depth and velocity must closely resemble those that exist in the adjacent stream.

5) Structure material must be concrete, metal, or untreated wood. Concrete must be sufficiently cured or dried[13] before coming into contact with stream flow. The use of treated wood for bridge construction or replacement is not allowed.

6) Projects in stream channels with gradients above six percent will utilize a bridge or open bottom culvert.

7) The minimum culvert width must be 1.5 times the bankfull width.

8) Culvert length shall not be longer than:
   a) 150 feet for stream simulation; and
   b) 75 feet for no-slope.

9) The project sponsor shall include suitable grade controls to prevent culvert failure caused by changes in stream elevation. Grade control structures to prevent headcutting above or below the culvert or bridge may be built using rock or wood as outlined in the **Headcut and Grade Stabilization** criteria under the **Profile Discontinuity** activity subcategory (Page 51).

[13] NMFS recommends 48 to 72 hours, depending on temperature.

Guidelines for Calculating General Scour Elevations.

General scour is a lowering of the streambed across the stream or waterway at the crossing. This lowering may be uniform across the bed or non-uniform, that is, the depth of scour may be deeper in some parts of the cross section. The following method shall be the minimum analyses required to determine general scour elevation and, in combination with the 1.5 times bankfull top width, used to establish the general scour prism as presented in the Figure 2 (Page 56) above.

Equation #1 is used to determine the flow velocity (Vc) needed to move the streambed material. The bankfull depth (y) is determined from hydraulic model results for the 2-year flood. The computed bankfull depth should be compared against the field measured bankfull depth with the larger of the two values used for (y) in Equation #1. The D50 particle size should be defined from the project reach specific pebble count.

$$V_c = 11.17 y^{1/6} D_{50}^{1/3}$$

V_c = Critical velocity above which bed material of size D and smaller will be transported (ft)
y = Bankfull depth within the proposed culvert or bridge (ft)
D_{50} = Particle for which 50% is finer (ft)

Equation #2 is used to determine the scour depth (ds) below the streambed elevation. The bankfull depth (y) and the critical velocity (Vc) are taken from Equation #1 above. The mean velocity (Vm) is determined from hydraulic model results for the 2-year flood.

$$d_s = y\left(\frac{V_m}{V_c} - 1\right)$$

d_s = Scour depth below streambed at thalweg (ft)
y = Bankfull depth within the proposed culvert or bridge (ft)
V_c = Critical velocity above which bed material of size D and smaller will be transported (ft)
V_m = Mean velocity within the proposed culvert or bridge (ft)

Results from the scour depth calculation should be compared against observed scour holes or pools within or adjacent to the project reach. Consideration should be also given to evaluating the stream bed mobility upstream and downstream of the proposed crossing. The general scour prism and the proposed stream crossing shall be presented relative to a surveyed cross section of the stream channel and floodplain.

For additional guidance on engineering calculations for all components of bridge and culvert scour analysis, the designer is directed to **Evaluating Scour at Bridges**, Fifth Edition, Hydraulic Engineering Circular No. 18, April 2012, Publication No. FHWA-HIF-12-003, U.S. Department of Transportation Federal Highway Administration.

For additional guidance on engineering design of stream crossings, the designer is directed to: **Design For Fish Passage At Roadway-Stream Crossings**: Synthesis Report, June 2007, Publication No. FHWA-HIF-07-033, Office of Infrastructure Research and Development, U.S. Department of Transportation, Federal Highway Administration.

Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings, May 2008, 7700—Transportation Management, 0877 1801—SDTDC, Forest Service National Technology and Development Program; U.S. Department of Agriculture, Forest Service.

1g) Bridge and Culvert Maintenance.

Guidelines for Review:

Low Risk: *Culverts and bridge maintenance is a low risk activity and requires no review.*

Conservation Measures:

1) Culverts will be cleaned by working from the top of the bank, unless culvert access using work area isolation would result in less habitat disturbance. Only the minimum amount of wood, sediment and other natural debris necessary to maintain culvert function will be removed; spawning gravel will not be disturbed.

2) All large wood, cobbles, and gravels recovered during cleaning will be placed downstream of the culvert.

3) Do all routine work in the dry. If this is not possible, follow work area isolation criteria outlined in the **General Conservation Measures Applicable to all Actions** (Page 26).

1h) Installation of Fords.

Description. In many streams, crossings have degraded riparian corridors and instream habitat resulting in increased and chronic sedimentation and reduced riparian functions including shading and recruitment of LW. Fords will be installed to allow improved stream crossing conditions only. New fords shall not be installed when there was not a previously existing stream crossing and no new fords will be constructed in salmonid spawning areas (including spawning and rearing habitat for bull trout). For the purposes of this proposed action, fords are defined as crossings for vehicles, off-highway vehicles (OHVs), bikes, pack animals, and livestock.

Guidelines for Review:

Low Risk: Fords that meet all conservation measures.

Medium Risk: Fords that do not meet all conservation measures shall require a review by the RRT.

Conservation Measures:

1) The ford will not create barriers to the passage of adult and juvenile fish.

2) Ford stream crossings will involve the placement of river rock along the stream bottom.

3) Existing access roads or trails and stream crossings will be used whenever possible, unless new construction would result in less habitat disturbance and the old trail or crossing is retired.

4) The ford will not be located in an area that will result in disturbance or damage to a properly functioning riparian area.

5) Fords will be placed on bedrock or stable substrates whenever possible.

6) Fords will not be placed in areas where ESA-listed salmonids (salmon, steelhead, bull trout) spawn or are suspected of spawning, or within 300 feet of such areas if spawning areas may be disturbed. For bull trout this conservation measure applies to areas identified as spawning and rearing habitat. Sufficient information detailing locations of ESA-listed salmonid spawning areas within the reach shall be provided to demonstrate adherence to this conservation measure.

7) Bank cuts, if any, will be stabilized with vegetation, and approaches and crossings will be protected with river rock (not crushed rock) when necessary to prevent erosion.

8) Fords will have a maximum width of 20 feet.

9) Fences will be installed (or are already existing and functioning) along with all new fords to limit access of livestock to riparian areas. Fenced off riparian areas will be maximized and planted with native vegetation. Fences will not inhibit upstream or downstream movement of

fish or significantly impede bedload movement. Where appropriate, construct fences at fords to allow passage of LW and other debris.

10) Vehicle fords will only be allowed in intermittent streams with no salmonid fish spawning.

11) Designs must demonstrate that the ford accommodates reasonably foreseeable flood risks, including associated bedload and debris, and to prevent the diversion of streamflow out of the channel and down the trail if the crossing fails.

Category 2: River, Stream, Floodplain, and Wetland Restoration.

BPA proposes to review and fund river, stream, floodplain, and wetland restoration actions with the objective of providing appropriate habitat conditions required for foraging, rearing, and migrating ESA-listed fish.

Projects utilizing habitat restoration actions outlined within this activity category shall be related to limiting factors identified within the applicable sub-basin plan for the watershed, a recovery plan for ESA-listed species, or shall be prioritized by recommended restoration activities identified within a localized region by a technical oversight and steering committee (e.g., the Columbia River Estuary). Individual projects may utilize a combination of the activities listed in the **River, Stream, Floodplain, and Wetland Restoration** activity category.

BPA proposes the following activities to improve fish habitat: (a) improve secondary channel and wetland habitats; (b) set-back or removal of existing berms, dikes, and levees; (c) protect streambanks using bioengineering methods; (d) install habitat-forming natural material instream structures (e.g., large wood, boulders, and spawning gravel); (e) riparian vegetation planting; and (f) channel reconstruction.

2a) Improve Secondary Channel and Wetland Habitats.

Description. BPA proposes to review and fund projects that reconnect historical stream channels within floodplains; restore or modify hydrologic and other essential habitat features of historical river floodplain swales, abandoned side channels, spring-flow channels, wetlands, and historical floodplain channels; and create new self-sustaining side channel habitats, which are maintained through natural processes.

Actions include the improvement and creation of secondary channels, off-channel habitats, and wetlands to increase the available area for and access to rearing habitat; increase hydrologic capacity, providing resting areas for aquatic species at various levels of inundation; reduce flow velocities; and provide protective cover for fish and other aquatic species.

Reconnection of historical off- and side channel habitat that has been blocked includes the removal of plugs, which impede water movement through these areas; excavation of pools and ponds in the historical floodplain/channel migration zone to create connected wetland complexes; and reconnection of existing side channels with a focus on restoring fish access and habitat forming processes (e.g., hydrology, riparian vegetation restoration). In addition, wetland habits will be created to reestablish a hydrologic regime that has been disrupted by human activities, including functions such as water depth, seasonal fluctuations, flooding periodicity, and connectivity.

All activities intended for improving secondary channel habitats will provide the greatest degree of natural stream and floodplain function achievable and shall be implemented to address limiting factors specific to the basin. The long-term development of a restored side channel will depend on natural processes like floods and mainstem migration.

If more than 20% of the amount of water from the main channel shall be diverted into the secondary channel then the action shall be considered **Channel Reconstruction** (Page 76).

Guidelines for Review:

Medium or High Risk: All of the sub-activities under the **Improve Secondary Channel and Wetland Habitats** projects subcategory will require RRT review.

Prior to going to the RRT, medium to high risk projects shall address the **General Project and Data Summary Requirements** (Page 16).

Conservation Measures:

1) Off- and side-channel improvements may include minor excavation (≤ 10%) of naturally-accumulated sediment within historical channels. Evidence of historical channel location, such as land use surveys, historical photographs, topographic maps, remote sensing information, or personal observation. There is no limit as to the amount of excavation of anthropogenic fill

within historical side channels as long as such channels can be clearly identified through field and/or aerial photographs.

2) Designs must demonstrate sufficient hydrology and that the project will be self-sustaining over time. Self-sustaining means the restored or created habitat would not require major or periodic maintenance, but function naturally within the processes of the floodplain.

3) Proposed new side channel construction must be within the functional floodplain (5-year recurrence interval), current channel meander migration zone, and require limited excavation for construction. Reconnection of historical fragmented habitats is preferred.

4) Side channel habitat will be constructed to prevent fish stranding by providing a continual positive **overall** grade to the intersecting river or stream or by providing a year-round water connection.

5) Excavated material removed from off- or side-channel habitat shall be hauled to an upland site or spread across the adjacent floodplain in a manner that does not restrict floodplain capacity. Hydric soils may be salvaged to provide appropriate substrate and/or seed source for hydrophytic plant community development. Hydric soils will only be obtained from wetland salvage sites.

6) Excavation depth will never exceed the maximum thalweg depth of the main channel.

7) All side channel and pool habitat work will occur in isolation from waters occupied by ESA-listed salmonid species until project completion. During project completion, a reconnection may be made by either excavation to waters occupied by ESA-listed salmonids or re-watering of these channel units.

8) Adequate precautions will be taken to prevent the creation of fish passage issues or stranding of juvenile or adult fish by demonstrating sufficient hydrologic conditions.

9) **Re-watering stream channels**. For stream channels which have been isolated and dewatered during project construction:
   a) Reconstructed stream channels will be “pre-washed” into a reach equipped with sediment capture devices, prior to reintroduction of stream flow.
   b) Stream channels will be re-watered slowly to minimize a sudden increase in turbidity (see **Staged Rewatering Plan** on Page 38).

2b) Set-back or Removal of Existing Berms, Dikes, and Levees.

Description. BPA proposes to review and fund projects that reconnect estuary, stream, and river channels with floodplains; increase habitat diversity and complexity; moderate flow disturbances; and provide refuge for fish during high flows by either removing existing berms, dikes, or levees or increasing the distance that they are set back from active stream channels or wetlands. This action category includes the removal of fill (e.g., dredge spoils) from past channelization projects, roads, trails, railroad beds, dikes, berms, and levees in order to restore natural estuary and freshwater floodplain functions. Such functions include overland flow during high flow events, dissipation of flood energy, increased water storage to augment low flows, sediment and debris deposition, growth of riparian vegetation, nutrient cycling, and the development of off- and side channel habitat.

The sole purpose of actions covered by the HIP III must be to restore floodplain and estuary functions or to enhance fish habitat. Actions in freshwater, estuarine, and marine areas include: 1) full and partial removal of levees, dikes, berms, and jetties; 2) breaching of levees, dikes, and berms; 3) lowering of levees, dikes, and berms; and 4) setback of levees, dikes, and berms.

Guidelines for Review:

Medium or High Risk: All of the sub-activities under the **Set-back or Removal of Existing Berms, Dikes, and Levees** projects subcategory will require RRT review.

Prior to going to the RRT, medium to high risk projects shall address the **General Project and Data Summary Requirements** (Page 16)**.**

Conservation Measures:

1) To the greatest degree possible, non-native fill material, originating from outside the floodplain of the action area, will be removed from the floodplain and disposed of at an upland site.

2) Where it is not possible to remove or set-back all portions of dikes and berms, or in areas where existing berms, dikes, and levees support abundant riparian vegetation, breaches will be created.

3) Breaches shall be equal to or greater than the active channel width to reduce the potential for channel avulsion during flood events.

4) In addition to other breaches, the berm, dike, or levee shall always be breached at the downstream end of the project and/or at the lowest elevation of the floodplain to ensure that flows will naturally recede back into the main channel,minimizing fish entrapment.

5) When necessary, loosen compacted soils once overburden material is removed.

6) Overburden or fill material that is native to the project area, may be used within the floodplain to create set-back dikes and fill anthropogenic holes provided that this does not impede floodplain function.

7) When full removal of fill is not possible and a setback is therefore required, setback locations should be prioritized to the outside of either the meander belt width or the channel meander zone margins.

2c) Protect Streambanks Using Bioengineering Methods.

Description. BPA proposes to review and fund projects that restore eroding streambanks through bank shaping; installation of soil reinforcements (e.g., coir logs, large wood, etc.) and other bioengineering techniques, as necessary, to support development of riparian vegetation; and/or planting of trees, shrubs, and herbaceous cover, as necessary, to restore ecological functions in riparian and floodplain habitats.

As actions that are covered by this programmatic need to have the sole purpose of restoring floodplain and estuary functions or to enhance fish habitat, streambank stabilization shall only be proposed when there are additional interrelated and interdependent habitat restoration actions.

Streambank erosion often occurs within meandering alluvial rivers on the outside of meander bends. The rate of erosion and meander migration is often accelerated due to degradation or removal of the riparian vegetation and land use practices that have removed riparian woody species. Historically, as the river migrates into the adjacent riparian areas, large wood would be recruited from the banks resulting in reduced near-bank velocities and increased channel boundary roughness. Where a functional riparian area is lacking, the lateral bank erosion may occur at an unnaturally accelerated rate. The goal of streambank restoration is to reestablish long-term riparian processes through re-vegetation and riparian buffer strips. Structural bank protection may be used to provide short-term stability to streambanks, allowing for vegetation establishment.

The primary structural streambank protection action proposed is the installation of large wood and riparian vegetation configured to increase bank strength and resistance to erosion. This is considered to be an ecological approach to managing streambank erosion (i.e., bioengineering).

The following bioengineering techniques[14] are proposed for use either individually or in combination: (a) woody plantings and variations (e.g., live stakes, brush layering, facines, brush mattresses); (b) herbaceous cover, for use on small streams or adjacent wetlands; (c) deformable soil reinforcement, consisting of soil layers or lifts strengthened with biodegradable coir fabric and plantings that are penetrable by plant roots; (d) coir logs [long bundles of coconut fiber], straw bales, and straw logs used individually or in stacks to trap sediment and provide a growth medium for riparian plants; (e) bank reshaping and slope grading, when used to reduce a bank slope angle without changing the location of its toe, to increase roughness and cross-section, and to provide more favorable planting surfaces; (f) tree and large wood rows, live siltation fences, brush traverses, brush rows, and live brush sills in floodplains, when used to reduce the likelihood of avulsion in areas where natural floodplain roughness is poorly-developed or has been removed; (g) floodplain

[14] For detailed descriptions of each technique refer to the WDFW Integrated Streambank Protection Guidelines: http://wdfw.wa.gov/publications/00046/,the USACE's EMRRP Technical Notes, Stream Restoration: http://el.erdc.usace.army.mil/publications.cfm?Topic=technote&Code=emrrp, or the NRCS National Engineering Handbook Part 654, Stream Restoration: http://policy.nrcs.usda.gov/viewerFS.aspx?id=3491

flow spreaders, consisting of one or more rows of trees and accumulated debris used to spread flow across the floodplain; and (h) use of large wood as a primary structural component.

Guidelines for Review:

Low Risk: Streambank projects with 1) bankfull flow less than 500 cfs; 2) height of bank less than 5 feet; 3) bankfull velocity less than 5 feet per second (fps), and drawings that demonstrate the incorporation of applicable conservation measures.

Medium or High Risk: Streambank projects with 1) bankfull flow greater than 500 cfs, or 2) height of bank greater than 5 feet; or 3) bankfull velocity greater than 5 fps. Installation of any streambank project that does not meet all of the conservation measures.

Prior to going to the RRT, medium to high risk projects shall address the **General Project and Data Summary Requirements** (Page 16)**.**

Conservation Measures:

1) Without changing the location of the bank toe, damaged streambanks will be restored to a natural slope, pattern, and profile suitable for establishment of permanent woody vegetation. This may include sloping of unconsolidated bank material to a stable angle of repose or the use of benches in consolidated cohesive soils. The purpose of bank shaping is to provide a more stable platform for the establishment of riparian vegetation, while also reducing the depth to the water table, therefore promoting better plant survival.

2) Streambank restoration projects shall include the placement of a riparian buffer strip, consisting of a diverse assemblage of species native to the project area or region, including trees, shrubs, and herbaceous species. Do not use invasive species.

3) Large wood will be used as an integral component of all streambank protection treatments unless restoration can be achieved with soil bioengineering techniques alone.

4) Large wood will be placed to maximize near-bank hydraulic complexity and interstitial habitats through use of various large wood sizes and configurations of the placements.

5) Structural placement of large wood should focus on providing channel boundary roughness for energy dissipation versus flow re-direction that may affect the stability of the opposite streambank.

6) Large wood will be intact, hard, and undecayed to partly decaying with untrimmed root wads to provide functional refugia habitat for fish. Use of decayed or fragmented wood found lying on the ground may be used for additional roughness and to add complexity to large wood placements but will not constitute the primary structural components.

7) Wood that is already within the stream or suspended over the stream may be repositioned to allow for greater interaction with the stream.

8) Large wood anchoring will not utilize cable or chain. Manila, sisal or other biodegradable ropes may be used for lashing connections. If hydraulic conditions warrant use of structural connections then rebar pinning or bolting may be used. The utilization of structural connections should be used minimally and only to ensure structural longevity in highly energetic systems (high gradient systems with lateral confinement and a limited floodplain). The need for structural anchorage shall be demonstrated in the design documentation.

9) Rock will not be used for streambank restoration, except as ballast to stabilize large wood unless it is necessary to prevent scouring or downcutting of an existing flow control structure (e.g., a culvert, bridge support, headwall, utility lines, or building). In this case, rock may be used as the primary structural component for construction of vegetated riprap with large wood. Scour holes may be filled with rock to prevent damage to structural foundations but will not extend above the adjacent bed of the river. This does not include scour protection for bridge approach fills.

10) The rock may not impair natural stream flows into or out of secondary channels or riparian wetlands.

11) Fencing will be installed as necessary to prevent access and grazing damage to revegetated sites and project buffer strips.

12) Riparian buffer strips associated with streambank protection shall extend from the bankfull elevation towards the floodplain a minimum distance of 35 feet.

2d) Install Habitat-Forming Natural Material Instream Structures (Large Wood, Boulders, and Spawning Gravel).[15]

Description. BPA proposes to review and fund projects that include placement of natural habitat-forming structures to provide instream spawning, rearing, and resting habitat for salmonids and other aquatic species. Projects will provide high-flow refugia; increase interstitial spaces for benthic organisms; increase instream structural complexity and diversity, including rearing habitat and pool formation; promote natural vegetation composition and diversity; reduce embeddedness in spawning gravels and promote spawning gravel deposition; reduce siltation in pools; reduce the width/depth ratio of the stream; mimic natural input of large wood (e.g., whole conifer and hardwood trees, logs, root wads, etc.); decrease flow velocities; and deflect flows into adjoining floodplain areas to increase channel and floodplain function. In areas where natural gravel supplies are low (e.g., immediately below reservoirs), gravel placement can be used to improve spawning habitat.

Anthropogenic activities that have altered riparian habitats, such as splash damming and the removal of large wood and logjams, have reduced instream habitat complexity in many rivers and have eliminated or reduced features like pools, cover, and bed complexity. Salmonids need habitat complexity for rearing, feeding, and migrating. To offset these impacts, large wood, boulders, and spawning gravel will be placed in stream channels either individually or in combination.

Large wood will be placed to increase coarse sediment storage, increase habitat diversity and complexity, retain gravel for spawning habitat, improve flow heterogeneity, provide long-term nutrient storage and substrate for aquatic macroinvertebrates, moderate flow disturbances, increase retention of leaf litter, and provide refugia for fish during high flows. Engineered log jams create a hydraulic shadow, a low-velocity zone downstream that allows sediment to settle out. Scour holes develop adjacent to the log jam which can provide valuable fish and wildlife habitat by redirecting flow and providing stability to a streambank or downstream gravel bar.

Boulder placements increase habitat diversity and complexity, improve flow heterogeneity, provide substrate for aquatic vertebrates, moderate flow disturbances, and provide refuge for fish during high flows. The placement of individual large boulders and boulder clusters to increase structural diversity is important to provide holding and rearing habitat for ESA-listed salmonids where similar natural rock has been removed. This treatment will be used in streams that have been identified as lacking structural diversity and that naturally and/or historically have had boulders.

[15] For detailed descriptions of each technique refer to the WDFW Stream Habitat Restoration Guidelines: http://wdfw.wa.gov/publications/pub.php?id=00043, WDFW Integrated Streambank Protection Guidelines: http://wdfw.wa.gov/publications/00046/,the USACE's EMRRP Technical Notes, Stream Restoration: http://el.erdc.usace.army.mil/publications.cfm?Topic=technote&Code=emrrp, or the NRCS National Engineering Handbook Part 654, Stream Restoration: http://policy.nrcs.usda.gov/viewerFS.aspx?id=3491

The quality and quantity of available spawning gravel has been impacted by many anthropogenic features and activities. For example, dams and culverts can block the downstream movement of gravel and result in gravel-starved reaches. Channelization, bank armoring, and diking restrict a stream from meandering and recruiting gravel. Elimination of riparian buffers and grazing up to the streambank introduces fines that often cause embedded or silted-in spawning gravel. Spawning gravel will be placed to improve spawning substrate by compensating for an identified loss of a natural gravel supply and may be placed in conjunction with other project actions, such as installation of engineered log jams and boulders.

All activities intended for installing habitat-forming instream structures will provide the greatest degree of natural stream and floodplain function achievable through application of an integrated ecological approach and will correspond to limiting factors specific to the basin. Instream structures capable of enhancing habitat-forming processes and migratory corridors will be installed only within previously degraded stream reaches, where past disturbances have removed habitat elements such as large wood, boulders, or spawning gravel.

Guidelines for Review:

Low Risk: Installation of habitat forming structures with drawings that demonstrate the incorporation of applicable conservation measures.

Medium or High Risk: Installation of habitat forming structures that do not meet all conservation measures.

Prior to going to the RRT, medium to high risk projects shall address the **General Project and Data Summary Requirements** (Page 16)**.**

Conservation Measures (Large Wood):

3) Large wood placements must mimic natural accumulations of large wood in the channel, estuary, or marine environment and addresses basin defined limiting factors.

4) Large wood placements for other purposes than habitat restoration or enhancement are excluded from this consultation.

5) Large wood will be placed in channels that have an intact, well-vegetated, protected riparian buffer (of 35 feet or more) or in conjunction with riparian rehabilitation or management.

6) Stabilizing or key pieces of large wood that will be relied on to provide streambank stability or redirect flows must be intact, hard, and undecayed to partly decaying and should have untrimmed root wads to provide functional refugia habitat for fish. Use of decayed or fragmented wood found lying on the ground or partially sunken in the ground is not acceptable for key pieces but may be incorporated to add habitat complexity.

7) Large wood anchoring will not utilize cable or chain. Manila, sisal or other biodegradable ropes may be used for lashing connections. If hydraulic conditions warrant use of structural connections then rebar pinning or bolting may be used. The utilization of structural connections should be used minimally and only to ensure structural longevity in highly energetic systems (high gradient systems with lateral confinement and limited floodplain). Need for structural anchorage shall be demonstrated in the design documentation.

8) Rock may be used for ballast but should be limited to what is needed to anchor the large wood.

9) Piling installation for large wood structures
    a. Minimize the number (<12 per structure) and diameter (<24-inch diameter) of pilings
    b. Use only wood piles; steel piles are not to be used under any circumstance

10) Drive each piling as follows to minimize the use of force and resulting sound pressure
    a. Use a vibratory hammer to drive the piles; an impact hammer shall not be used
    b. Select areas with soft substrate rather than rocky hard substrate; avoid bedrock
    c. Isolate the work area if possible to minimize acoustic disturbance

Conservation Measures (Boulder Placement):

1) Boulder placements for purposes other than habitat restoration or enhancement are not covered under HIP III.

2) Boulder placements will be limited to stream reaches with an intact well-vegetated riparian corridor, which includes native trees and shrubs. These plants may be either naturally-occurring or part of a restoration action. In addition, boulder placements will be limited reaches with a streambed that consists predominantly of coarse gravel or larger sediments.

3) The cross-sectional area of boulder placements may not exceed 25% of the cross-sectional area of the low-flow channel.

4) Boulder placements may not be installed with the purpose of shifting the stream flow to a single flow pattern in the middle or to the side of the stream.

5) Boulders will be machine-placed (no end dumping allowed) and will rely on the size of boulder for stability.

6) Boulders will be installed in a low position in relation to channel dimensions so that they are completely overtopped during channel-forming flow events (approximately a 2-year flow event).

7) Permanent anchoring, including rebar or cabling, may not be used.

Conservation Measures (Spawning Gravel):

1) Spawning gravel augmentation is limited to areas where the natural supply has been eliminated or significantly reduced through anthropogenic means.

2) Spawning gravel to be placed instream must be obtained from an upland source outside of the channel and riparian area and a properly-sized gradation for that stream, clean, and non-angular.

3) A maximum of 100 cubic yards of spawning-sized gravel can be imported or relocated and placed upstream of each structure.

4) Spawning gravel must be used in combination with other restoration activities that address the basin-specific limiting factors. For example, a project may consist of all of the following: planting streambank vegetation; placing instream large wood; and supplementing spawning gravel.

5) Imported gravel must be free of invasive species and non-native seeds.

2e) Riparian Vegetation Planting.

Description. BPA proposes to fund vegetation planting to recover watershed processes and functions associated with native plant communities and that will help restore natural plant species composition and structure. Under this activity category, the project sponsors would plant trees, shrubs, herbaceous plants, and aquatic macrophytes to help stabilize soils. Large trees such as cottonwoods and conifers will be planted in areas where they historically occurred but are currently either scarce or absent. Native plant species and seeds will be obtained from local sources to ensure plants are adapted to local climate and soil chemistry.

Vegetation management strategies will be utilized that are consistent with local native succession and disturbance regimes and specify seed/plant source, seed/plant mixes, and soil preparation. Planting will address the abiotic factors contributing to the sites' succession (i.e., weather and disturbance patterns, nutrient cycling, and hydrologic condition). Only certified noxious weed-free seed (99.9%), hay, straw, mulch or other vegetation material for site stability and revegetation projects will be utilized.

Guidelines for Review:

Low Risk: Riparian vegetation planting is considered low risk and requires no review.

Conservation Measures:

1) An experienced silviculturist, botanist, ecologist, or associated technician shall be involved in designing vegetation treatments.

2) Species to be planted must be of the same species that naturally occurs in the project area.

3) Tree and shrub species as well as sedge and rush mats to be used as transplant material shall come from outside the bankfull width, typically in abandoned floodplains, and where such plants are abundant.

4) Sedge and rush mats should be sized to prevent their movement during high flow events.

5) Concentrate plantings above the bankfullelevation.

6) Species distribution shall mimic natural distribution in the riparian and floodplain areas.

2f) Channel Reconstruction.

Description. BPA proposes to review and fund channel reconstruction projects to improve aquatic and riparian habitat diversity and complexity, reconnect stream channels to floodplains, reduce bed and bank erosion, increase hyporheic exchange, provide long-term nutrient storage, provide substrate for macroinvertebrates, moderate flow disturbance, increase retention of organic material, and provide refuge for fish and other aquatic species. All this will be accomplished by reconstructing stream channels and floodplains that are compatible within the appropriate watershed context and geomorphic setting.

The reconstructed stream system shall be composed of a naturally sustainable and dynamic planform, cross-section, and longitudinal profile which incorporates unimpeded passage and temporary storage of water, sediment, organic material, and species. Stream channel adjustment over time is to be expected in naturally dynamic systems and is a necessary component to restore a wide array of stream functions. It is expected that for most projects that there will be a primary channel with secondary channels that are activated at various flow levels to increase floodplain connectivity and to improve aquatic habitat through a range of flows. This proposed action is not intended to artificially stabilize streams into a single location or into a single channel for the purposes of protecting infrastructure or property.

Channel reconstruction consists of re-meandering or movement of the primary active channel and may include structural elements such as streambed simulation materials, streambank restoration, and hydraulic roughness elements. For bed stabilization and hydraulic control structures, constructed riffles shall be preferentially used in pool-riffle stream types, while roughened channels and boulder weirs shall be preferentially used in step-pool and cascade stream types. Material selection (large wood, rock, gravel) shall also mimic natural stream system materials.

Because of the complexity of channel reconstruction projects, there shall be an interdisciplinary design team minimally consisting of a biologist, engineer, and hydrologist. In order to complete the review, information addressing the conservation measures must be included in the design package submitted to the RRT.

Guidelines for Review:

Medium Risk: Channel Reconstruction that restores historical alignment with minimal excavation shall require both RRT and NMFS Hydro Review.

High Risk: Channel Reconstruction that creates entirely new channel meanders through significant excavation shall require RRT, NMFS Hydro Review, and Interagency Review.

High Risk projects in the Channel Reconstruction activity shall address the **General Project and Data Summary Requirements** (Page 16), the following **Conservation Measures**, a **Staged Rewatering Plan** (Page 38) and include a **Monitoring and Adaptive Management Plan** (Page 77).

Conservation Measures:

1) Detailed construction drawings must be provided.

2) Designs must demonstrate that channel reconstruction will identify, correct (to the extent possible), and account for in the project development process, the conditions that lead to the degraded condition.

3) Designs must demonstrate that the proposed action will mimic natural conditions for gradient, width, sinuosity and other hydraulic parameters.

4) Designs must demonstrate that structural elements shall fit within the geomorphic context of the stream system.

5) Designs must demonstrate sufficient hydrology and that the project will be self-sustaining over time. Self-sustaining means the restored or created habitat would not require major or periodic maintenance but function naturally within the processes of the floodplain.

6) Designs must demonstrate that the proposed action will not result in the creation of fish passage issues or post-construction stranding of juvenile or adult fish.

Monitoring and Adaptive Management Plan.

1) Introduction
2) Responsible parties involved
3) Existing Monitoring Protocols
4) Project Effectiveness Monitoring Plan
    a) Objective 1
    b) Objective 2
5) Project Review Team Triggers
6) Monitoring Frequency, Timing, and Duration
    a) Baseline Survey
    b) As-built Survey
    c) Monitoring Site Layout
    d) Post-Bankfull Event Survey
    e) Future Survey (related to flow event)
7) Monitoring Technique Protocols
    a) Photo Documentation and Visual Inspection
    b) Longitudinal Profile
    c) Habitat Survey
    d) Survival Plots
    e) Channel and Floodplain Cross-sections
    f) Fish Passage
8) Data Storage and Analysis
9) Monitoring Quality Assurance Plan

Category 3: Invasive Plant Control.

3a: Manage Vegetation Using Physical Control.

Description. BPA proposes to use two mechanisms for vegetation management by physical control: (a) Manual control includes hand pulling and grubbing with hand tools; bagging plant residue for burning or other proper disposal; mulching with organic materials; shading or covering unwanted vegetation; controlling brush and pruning using hand and power tools such as chain saws and machetes; using grazing goats. When possible, manual control (e.g., hand pulling, grubbing, cutting) will be used in sensitive areas to avoid adverse effects to listed species or water quality. (b) Mechanical control includes techniques such as mowing, tilling, disking, or plowing. Mechanical control may be carried out over large areas or be confined to smaller areas (known as scalping). Ground-disturbing mechanical activity will be restricted in established buffer zones adjacent to streams, lakes, ponds, wetlands and other identified sensitive habitats based on percent slope. For slopes less than 20%, a buffer width of 35 feet will be used. For slopes over 20%, no ground-disturbing mechanical equipment will be used.

Conservation Measures:

1) For mechanical control that will disturb the soil, an untreated area will be maintained within the immediate riparian buffer area to prevent any potential adverse effects to stream channel or water quality conditions. The width of the untreated riparian buffer area will vary depending on site-specific conditions and type of treatment.

2) Ground-disturbing mechanical activity will be restricted in established buffer zones adjacent to streams, lakes, ponds, wetlands and other identified sensitive habitats based on percent slope. For slopes less than 20%, a buffer width of 35 feet will be used. For slopes over 20%, no ground-disturbing mechanical equipment will be used.

3) When possible, manual control (e.g., hand pulling, grubbing, cutting) will be used in sensitive areas to avoid adverse effects to listed species or water quality.

4) All noxious weed material will be disposed of in a manner that will prevent its spread. Noxious weeds that have developed seeds will be bagged and burned.

3b: Manage Vegetation Using Herbicides.

Description. BPA proposes to fund management of vegetation using chemical herbicides to recover watershed processes and functions associated with native plant communities.
Herbicides will be applied in liquid or granular form using wand or boom sprayers mounted on or towed by trucks, backpack equipment containing a pressurized container with an agitation device, injection, hand wicking cut surfaces, and ground application of granular formulas. Herbicides will be mixed with water as a carrier (no petroleum-based carriers will be used) and may also contain a variety of additives (see adjuvant paragraph below) to promote saturation and adherence, to stabilize, or to enhance chemical reactions. Aerial treatment is not proposed to be covered under this consultation, nor is treatment of aquatic weeds except for knotweed (*Polygonum cuspidatum*).

1) **Maximum herbicide treatment area.** The area treated with herbicides above bankfull elevation, within riparian areas, will not exceed 10 acres above bankfull elevation and 2 acres below bankfull elevation, per 1.6-mile reach of a stream, per year.

2) **Herbicide applicator qualifications.** Herbicides will be applied only by an appropriately licensed applicator using an herbicide specifically targeted for a particular plant species that will cause the least impact to non-target species. The applicator will be responsible for preparing and carrying out the herbicide transportation and safety plan shown below.

3) **Herbicide transportation and safety plan.** The applicator will prepare and carry out an herbicide safety/spill response plan to reduce the likelihood of spills or misapplication, take remedial actions in the event of spills, and fully report the event. At a minimum, the plan will:
   a) Address spill prevention and containment;
   b) Estimate and limit the daily quantity of herbicides to be transported to treatment sites;
   c) Require that impervious material be placed beneath mixing areas in such a manner as to contain small spills associated with mixing/refilling;
   d) Require a spill cleanup kit be readily available for herbicide transportation, storage and application;
   e) Outline reporting procedures, including reporting spills to the appropriate regulatory agency;
   f) Require that equipment used in herbicide storage, transportation, and handling are maintained in a leak proof condition;
   g) Address transportation routes so that hazardous conditions are avoided to the extent possible;
   h) Specify mixing and loading locations away from waterbodies so that accidental spills do not contaminate surface waters;
   i) Require that spray tanks be mixed or washed further than 150 feet of surface water;
   j) Ensure safe disposal of herbicide containers;
   k) Identify sites that may only be reached by water travel and limit the amount of herbicide that may be transported by watercraft; and
   l) Instruct all individuals involved, including any contracted applicators, on the plan.

4) **Herbicides.** BPA proposes the use of the following herbicides in the typical application rates (see Table 3 and Table 4) for invasive plant control.

Table 3. Allowable Herbicides under HIP III.

Active Ingredient	Trade Name	Typical Application Rates (ai/ac)	Maximum Label Application Rate (ai/ac)	General Geographic Application Areas
2,4-D (amine)	Many	0.5 - 1.5 lbs.	4.0 lbs	Upland[16] & Riparian
Aminopyralid	Milestone®	0.11 - 0.22 lbs	0.375 lb	Upland & Riparian
Chlorsulfuron	Telar®	0.25 - 1.33 oz	3.0 oz	Upland
Clethodim	Select®	0.125 – 0.5 lbs	0.50 lb	Upland
Clopyralid	Transline®	0.1 - 0.375 lbs	0.5 lb	Upland & Riparian
Dicamba	Banvel® only	0.25 - 7.0 lbs	8.0 lbs	Upland & Riparian
Glyphosate 1 Glyphosate 2	Many Many	0.5 - 2.0 lbs 0.5 - 2.0 lbs	3.75 lbs 3.75 lbs	Upland & Riparian Upland
Imazapic	Plateau®	0.063 – 0.189 lbs	0.189 lb	Upland & Riparian
Imazapyr	Arsenal® Habitat®	0.5 – 1.5 lbs.	1.5 lbs	Upland & Riparian
Metsulfuron methyl	Escort®	0.33 - 2.0 oz	4.0 oz	Upland
Picloram	Tordon®	0.125 - 0.50 lb	1 lb	Upland
Sethoxydim	Poast®	0.1875 – 0.375 lb	0.375 lb	Upland
Sulfometuron methyl	Oust®	0.023 - 0.38 oz	2.25 oz	Upland
Triclopyr (TEA)	Garlon 3A®	1.0 - 2.5 lbs	9.0 lbs	Upland & Riparian

5) **2,4-D.** As a result of the national consultation on herbicides[17], this herbicide shall comply with all relevant reasonable and prudent alternatives from the 2011 Biological Opinion (NMFS 2011a):

[16] Uplands are as defined by FEMAT (1993) for fish-bearing streams in all watersheds as the combined average height of two site potential trees or 300 feet (whichever is greater).

[17] On June 30, 2011, NMFS issued a final BiOp, addressing the effects of this herbicide on ESA-listed Pacific salmonids. The BiOp has concluded that EPA's proposed registration of certain uses of 2,4-D, including aquatic uses of 2,4-D BEE are likely to jeopardize the continued existence of the 28 endangered and threatened Pacific salmonids. http://www.nmfs.noaa.gov/pr/consultation/pesticides.htm

a) Do not apply when wind speeds are below 2 mph or exceed 10 mph, except when winds in excess of 10 mph will carry drift away from salmonid-bearing waters.
b) Do not apply when a precipitation event, likely to produce direct runoff to salmonid bearing waters from the treated area, is forecasted by NOAA/NWS (National Weather Service) or other similar forecasting service within 48 hours following application.

6) Control of invasive plants within the riparian habitat shall be by individual plant treatments for woody species, and spot treatment of less than 1/10 acre for herbaceous species per project per year.

7) **Adjuvants.** The adjuvants in **Table 4** below are proposed for use. Polyethoxylated tallow amine (POEA) surfactant and herbicides that contain POEA (e.g., Roundup®) have been removed from the proposed action.

8) **Herbicide carriers.** Herbicide carriers (solvents) are limited to water or specifically labeled vegetable oil.

9) **Herbicide mixing.** Herbicides will be mixed more than 150 feet from any natural waterbody to minimize the risk of an accidental discharge and no more than three different herbicides may be mixed for any one application.

10) **Herbicide application rates.** Herbicides will be applied at the lowest effective label rates, including the typical and maximum rates given (**Table 3**). For broadcast spraying, application of herbicide or surfactant will not exceed the typical label rates.

Table 4. Allowable Adjuvants under HIP III.

Adjuvant Type	Trade Name	Labeled Mixing Rates per Gallon of Application Mix	General Geographic Application Areas
Colorants	Dynamark™ U.V. (red)	0.1 fl oz	Riparian
	Aquamark™ Blue	0.1 fl oz	Riparian
	Dynamark™ U.V. (blu)	0.5 fl oz	Upland
	Hi-Light® (blu)	0.5 fl oz	Upland
Surfactants	Activator 90®	0.16 – 0.64 fl oz	Upland
	Agri-Dex®	0.16 – 0.48 fl oz	Riparian
	Entry II®	0.16 – 0.64 fl oz	Upland
	Hasten®	0.16 – 0.48 fl oz	Riparian
	LI 700®	0.16 – 0.48 fl oz	Riparian
	R-11®	0.16 – 1.28 fl oz	Riparian
	Super Spread MSO®	0.16 – 0.32 fl oz	Riparian
	Syl-Tac®	0.16 – 0.48 fl oz	Upland
Drift Retardants	41-A®	0.03 – 0.06 fl oz	Riparian
	Valid®	0.16 fl oz	Upland

11) **Herbicide application methods.** Liquid or granular forms of herbicides to be applied by a licensed applicator as follows:
   a) Broadcast spraying – hand held nozzles attached to back pack tanks or vehicles, or vehicle-mounted booms;
   b) Spot spraying – hand-held nozzles attached to backpack tanks or vehicles, hand-pumped spray, or squirt bottles to spray herbicide directly onto small patches or individual plants;
   c) Hand/selective – wicking and wiping, basal bark, fill ("hack and squirt"), stem injection, cut-stump; and

12) **Emergent Knotweed Application.** No aquatic application of chemicals is covered by this consultation except for treating emergent knotweed. Only aquatic labeled glyphosate formulations will be used. The only application methods for emergent knotweed are stem injection (formulation up to 100% for emergent stems greater than 0.75 inches in diameter), wicking or wiping (diluted to 50% formulation), and hand-held spray bottle application of glyphosate (up to the percentage allowed by label instructions when applied to foliage using low-pressure hand-held spot spray applicators).

13) **Water Transportation.** Most knotweed patches are expected to have overland access; however, some sites may be reached only by water travel (e.g., wading, inflatable raft, kayak, etc.). The following measures will be used to reduce the risk of a spill during water transport:

a) No more than 2.5 gallons of glyphosate will be transported per person or raft, and typically, it will be 1 gallon or less.
b) Glyphosate will be carried in 1 gallon or smaller plastic containers. The containers will be wrapped in plastic bags and then sealed in a dry-bag. If transported by raft, the dry-bag will be secured to the watercraft.

14) **Minimization of herbicide drift and leaching.** Herbicide drift and leaching will be minimized as follows:
a) Do not spray when wind speeds exceed 10 mph or are less than 2 mph;
b) Be aware of wind directions and potential for herbicides to affect aquatic habitat area downwind;
c) Keep boom or spray as low as possible to reduce wind effects;
d) Increase spray droplet size whenever possible by decreasing spray pressure, using high flow rate nozzles, using water diluents instead of oil, and adding thickening agents;
e) Do not apply herbicides during temperature inversions, or when ground temperatures exceed 80 degrees Fahrenheit;
f) Do not spray when rain, fog or other precipitation is falling or is imminent. Wind and other weather data will be monitored and reported for all broadcast applications. **Table 5** identifies BPA's proposed minimum weather and wind speed restrictions (to be used in the absence of more stringent label instructions and restrictions). During application, applicators will monitor weather conditions hourly at sites where spray methods are being used.

Table 5. Required Herbicide Buffer Widths (from Bankfull Elevation).

Active Ingredient	Broadcast Application[18]		Backpack Sprayer/Bottle[19] Spot Spray Foliar/Basal		Hand Application[20] Wicking/Wiping/Injection
	Min buffer from bankfull elevation (ft)	Max/ Min wind speed (mph)	Min buffer from bankfull elevation (ft)	Max/ Min wind speed (mph)	Min buffer from bank full elevation
2,4-D (amine)	100	10/2	50	5/2	15
Aminopyralid	100	10/2	15	5/2	0
Chlorsulfuron	100	10/2	15	5/2	0
Clethodim	**Not Allowed**	**Not Allowed**	50	5/2	50
Clopyralid	100	10/2	15	5/2	0
Dicamba	100	10/2	15	5/2	0
Glyphosate (aquatic)	100	10/2	15	5/2	0
Glyphosate	100	10/2	100	5/2	100
Imazapic	100	10/2	15	5/2	0
Imazapyr	100	10/2	15	5/2	0
Metsulfuron	100	10/2	15	5/2	0
Picloram	100	8/2	100	5/2	100
Sethoxydim	100	10/2	50	5/2	50
Sulfometuron	100	10/2	15	5/2	0
Triclopyr (TEA)	**Not Allowed**	**Not Allowed**	50	5/2	0 for cut-stump application; 15 feet for other applications
Herbicide Mixtures	100	Most conservative of listed herbicides	15	Most conservative of listed herbicides	Most conservative of listed herbicides

[18] Ground-based only broadcast application methods via truck/ATV with motorized low-pressure, high-volume sprayers using spray guns, broadcast nozzles, or booms

[19] Spot and localized foliar and basal/stump applications using a hand-pump backpack sprayer or field-mixed or pre-mixed hand-operated spray bottle

[20] Hand applications to a specific portion of the target plant using wicking, wiping, or injection techniques; herbicides do not touch the soil during the application process

Table 6. Required Adjuvant Buffer Widths (from Bankfull Elevation).

Adjuvant	Broadcast Application[21]	Backpack Sprayer/Bottle[22] Spot Spray Foliar/Basal	Hand Application[23] Wicking/Wiping/Injection
	Min buffer from bankfull elevation (ft)	Min buffer from bankfull elevation (ft))	Min buffer from bankfull elevation (ft)
Dynamark® (red)	100	15	0
Dynamark® (yel)	100	15	0
Dynamark® (blu)	100	50	50
Hi-Light® (blu)	100	50	50
Activator 90®	100	15	0
Agri-Dex®	100	15	0
Entry II®	100	100	100
Hasten®	100	15	0
LI 700®	100	15	0
R-11®	100	50	50
Super Spread MSO®	100	15	0
Syl-Tac®	100	50	50
41-A®	100	15	0.
Valid	100	50	50

[21] Ground-based only broadcast application methods via truck/ATV with motorized low-pressure, high-volume sprayers using spray guns, broadcast nozzles, or booms

[22] Spot and localized foliar and basal/stump applications using a hand-pump backpack sprayer or field-mixed or pre-mixed hand-operated spray bottle

[23] Hand applications to a specific portion of the target plant using wicking, wiping, or injection techniques; herbicides do not touch the soil during the application process

Variances for Herbicides.

BPA (on behalf of the applicant) may require variances to use herbicides not on Table 3, Page 80), because of the wide range of commercially available herbicides and adjuvants being sold under trade names with the same active ingredients proposed under the HIP III BiOps. The Services will consider granting variances, especially when there is clear evidence that the herbicide's toxic profile is less than the listed herbicides presented in Table 3.

Variance requests shall be made on the Project Notification Form (PNF, Page 18), which shall then be submitted to and approved by the Services via email correspondence and shall include:

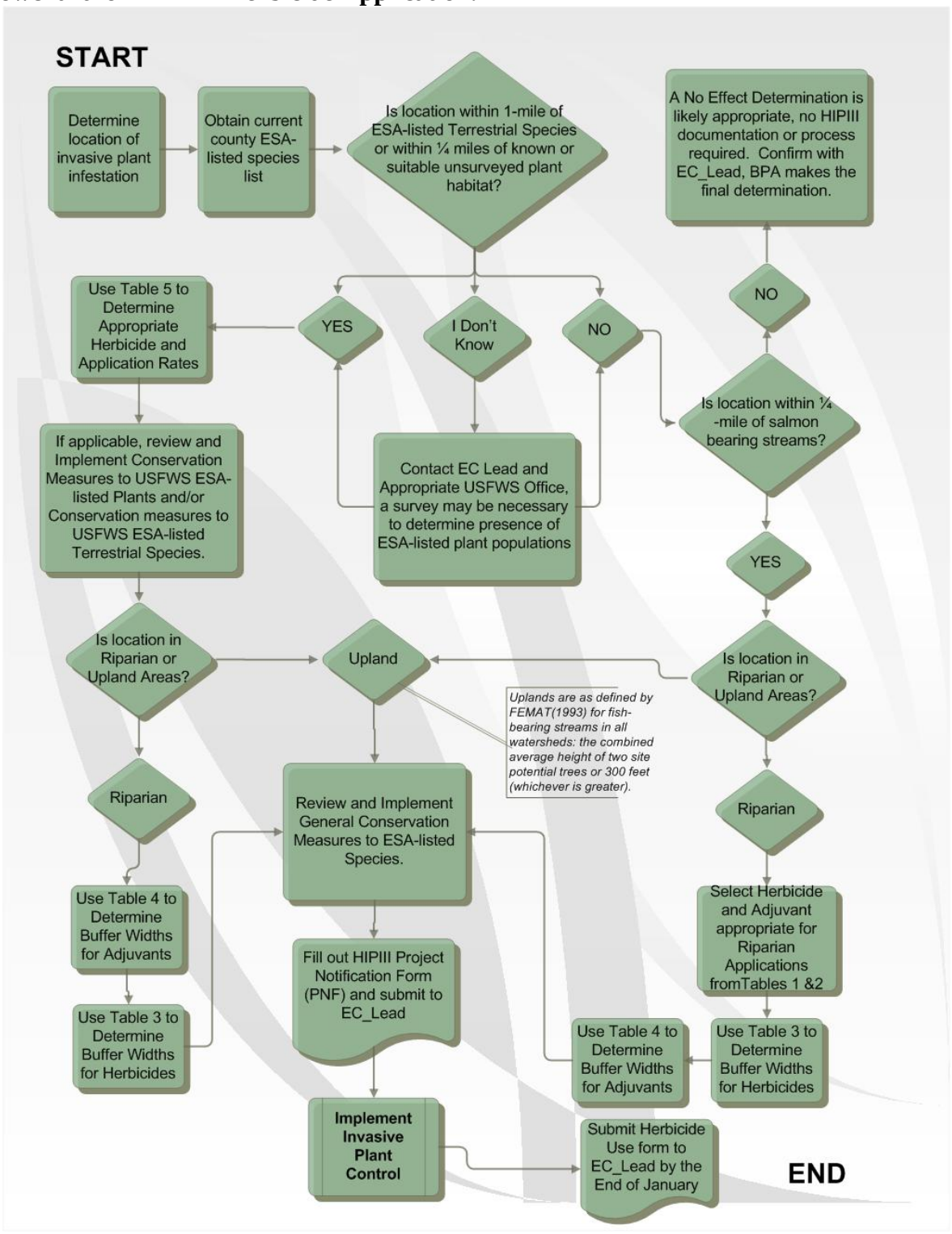
1) Name and active ingredient;
2) Environmental conditions during proposed application (a general description of topography and current vegetative cover);
3) Information regarding the herbicide's environmental toxicity (e.g., LC50 with salmonid end points) compared to the environmental toxicity of herbicides listed on Table 3;
4) Information regarding environmental fate, transport, and evidence to support that there will be less drift or runoff than herbicides listed on Table 3, Page 80; and
5) Supporting information as attachments (e.g., MSDS, Toxic profiles, fact sheets, etc.).

Variances must be authorized by both the NMFS Branch Chief and USFWS Field Office Supervisor. If the Services do not approve a request for variance, the project sponsor and BPA will initiate individual Section 7 consultation with USFWS and/or NMFS on the identified action.

The following is an example of a previously approved variance request for herbicides and the information needed:

BPA requests a variance to use the drift-retardant Compadre in lieu of Valid, for herbicide applications on the Shillapoo Wildlife Area to control invasive weeds in the uplands of this site (latitude 45.677852, longitude 122.748205). The adjuvant Valid® was a covered product considered in our HIP III biological opinion with BPA; however, it is no longer commercially available. Based on review of the MSDS information for the proposed replacement, Compadre® is a mixture of lecithin, alcohol ethoxylate and methyl esters of fatty acids, with low aquatic toxicity (LC50 > 10 mg/L in rainbow trout). Given the upland application envisioned, the environmental fate of the ingredients in the Compadre® mixture, the low inherent toxicity of the mixture, and the lack of conditions that could lead to aquatic exposure from the proposed application, the use of Compadre® does not raise additional effects to ESA-listed species or their critical habitat that were not already addressed under the NMFS HIP III BiOp (NMFS NWR-2013/9724).

Process Flowchart for HIP III Herbicide Application.



Category 4: Piling Removal.

1) **Pollution Minimization.** The following steps will be used to minimize creosote release, sediment disturbance, and total suspended solids:
   a) Installation of a floating surface boom to capture floating surface debris;
   b) Keeping all equipment (e.g., bucket, steel cable, vibratory hammer) out of the water, grip piles above the waterline;
   c) Completing all work during low water and low current conditions;
   d) Dislodging the piling with a vibratory hammer, whenever feasible; never intentionally breaking a pile by twisting or bending;
   e) Slowly lifting the pile from the sediment and through the water column;
   f) Placing the pile in a containment basin on a barge deck, pier, or shoreline without attempting to clean or remove any adhering sediment (a containment basin for the removed piles and any adhering sediment may be constructed of durable plastic sheeting with sidewalls supported by hay bales or another support structure to contain all sediment and return flow may be directed back to the waterway);
   g) Filling the holes left by each piling with clean, native sediments; and
   h) Disposing of all removed piles, floating surface debris, any sediment spilled on work surfaces, and all containment supplies at a permitted upland disposal site.

2) **Broken piles.** If a pile breaks above the surface of uncontaminated sediment, or less than 2 feet below the surface, every attempt short of excavation will be made to remove it entirely. If the pile cannot be removed without excavation, saw the stump off at the surface of the sediment. If a pile breaks above contaminated sediment, saw the stump off at the sediment line. If a pile breaks within contaminated sediment, make no further effort to remove it and cover the hole with a cap of clean substrate appropriate for the site. If dredging is likely in the area of piling removal, use a global positioning system(GPS) device to note the location of all broken piles for future use in site debris characterization.

Category 5: Road and Trail Erosion Control, Maintenance, and Decommissioning.

5a: Road Maintenance.

Description. BPA proposes to fund road maintenance activities, including: (a) creating barriers to human access, e.g., gates, fences, boulders, logs, tank traps, vegetative buffers, and signs); (b) surface maintenance, e.g., building and compacting the road prism, grading, and spreading rock or surfacing material; (c) drainage maintenance and repair of inboard ditch lines, waterbars, and sediment traps; (d) removing and hauling or stabilizing pre-existing cut and fill material or slide material; (e) snowplowing; and (f) relocating portions of roads and trails to less sensitive areas outside of riparian buffer areas. The proposed activity does not include asphalt resurfacing, widening roads, or new construction/relocation of any permanent road inside a riparian buffer area except for a bridge approach, in accordance to the section on **Transportation Infrastructure.**

Road grading and shaping will maintain, not destroy, the designed drainage of the road, unless modification is necessary to improve drainage problems that were not anticipated during the design phase. Road maintenance will not be attempted when surface material is saturated with water and erosion problems could result.

1) Dust-abatement additives and stabilization chemicals (typically magnesium chloride or calcium chloride salts) will not be applied within 25 feet of water or a stream channel and will be applied so as to minimize the likelihood that they will enter streams.

2) Spill containment equipment will be available during chemical dust abatement application.

3) Oil, oil-based, petroleum-based products will not be used for dust abatement.

4) Application will be avoided during or just before wet weather and at stream crossings or other locations that could result in direct delivery to a water body (typically within 25 feet of a water body or stream channel).

5) Waste material generated from road maintenance activities and slides will be disposed on stable non-floodplain sites approved by a geotechnical engineer or other qualified personnel.

6) Disturbance of existing vegetation in ditches and at stream crossings will be minimized to the greatest extent possible.

7) Ditches and culverts will be promptly cleaned of materials resulting from slides or other debris.

8) Berms will not be left along the outside edge of roads, unless an outside berm was specifically designed to be a part of the road, and low-energy drainage is provided.

9) Ditch back-slopes will not be undercut to avoid slope destabilization and erosion acceleration.

10) When blading and shaping roads, excess material will not be sidecast onto the fill. All excess material that cannot be bladed into the surface will be hauled to an appropriate site. Haul and prohibition of sidecasting will not be required for organic material like trees, needles, branches, and clean sod; however, fine organics like sod and grass will not be cast into water.

11) Slides and rock failures, including fine material of more than approximately ½ yard at one site, will be hauled to disposal sites. Fine materials (1-inch or smaller) from slides, ditch maintenance, or blading may be worked into the road. Scattered clean rocks (1-inch or larger) may be raked or bladed off the road except within either 300 feet of perennial or 100 feet of intermittent streams.

12) Road grading material will not be sidecast along roads within ¼ mile of perennial streams and from roads onto fill slopes having a slope greater than 45%.

13) Road maintenance will not be attempted when surface material is saturated with water and erosion problems could result.
14) Large wood, >9 m in length and >50 cm in diameter, present on roads will be moved intact down-slope of the road, subject to site-specific considerations. Movement down-slope will be subject to the guidance of a natural resource specialist with experience in fish biology.

15) Snowplowing will be performed in accordance with the following criteria:
    a) No chemical additives such as salt or de-icing chemicals will be used in conjunction with snowplowing.
    b) Drainage holes will be placed in snow berms to provide drainage.
    c) A minimum of 2 inches of snow will be left on gravel roads during plowing. Paved roads may be scraped to the surface.
    d) No gravel or surfacing material will be bladed off the road.
    e) No deliberate sidecasting of snow into or over drainage structures will be permitted.
    f) Plowing will not be allowed on gravel roads during thaw periods when the road is wet.

5b: Road Decommissioning.

Description. BPA proposes to decommission and obliterate roads that are no longer needed, e.g., logging roads. Water bars will be installed, road surfaces will be in-sloped or out-sloped, asphalt and gravel will be removed from road surfaces, culverts and bridges will be altered or removed, streambanks will be recontoured at stream crossings, cross drains will be installed, fill or sidecast materials will be removed, the road prism will be reshaped, and sediment catchbasins will be created.

1) All surfaces will be revegetated to reduce surface erosion of bare soils.

2) Recontour the affected area to mimic natural floodplain contours and gradient to the extent possible.

3) Surface drainage patterns will be recreated, and dissipaters, chutes, or rock will be placed at remaining culvert outlets.

4) Conduct activities during dry field conditions, generally May 15 – October 15, when the soil is more resistant to compaction and soil moisture is low.

5) Slide and waste material will be disposed in stable non-floodplain sites unless materials are to restore natural or near-natural contours and approved by a geotechnical engineer or other qualified personnel.

Category 6: In-Channel Nutrient Enhancement.

***Description*.** BPA proposes to fund the application of nutrients throughout a waterway corridor by placement of salmon carcasses into waterways, placement of carcass analogs (processed fish cakes) into waterways, or placement of inorganic fertilizers into waterways.

1) In Oregon, projects are permitted through the Oregon Department of Environmental Quality. Carcasses from the treated watershed or those that are certified disease-free by an ODFW pathologist will be used.

2) In Washington, the WDFW publication, entitled "Salmon Carcass Analogs, and Delayed Release Fertilizers to Enhance Stream Productivity in Washington State" (WDFW 2004), will be followed.

3) Carcasses will be of species native to the watershed and placed during the normal migration and spawning times, as would naturally occur in the watershed.

4) Eutrophic or naturally oligotrophic systems will not be supplemented with nutrients.

5) Each waterway will be individually assessed for available light, water quality, stream gradient, and life history of the fish present. Adaptive management will be used to derive the maximum benefits of nutrient enhancement.

Category 7: Irrigation and Water Delivery/Management Actions.

NOTE: The HIP III will only cover irrigation efficiency actions within this activity category that use state-approved regulatory mechanisms (e.g., Oregon ORS 537.455-.500 and Washington RCW 90.42) for ensuring that water savings will be protected as instream water rights, or in cases for which project sponsors identify how the water conserved will remain instream to benefit fish without any significant loss of the instream flows to downstream diversions.

7a: Convert Delivery System to Drip or Sprinkler Irrigation.

Description. Flood or other inefficient irrigation systems will be converted to drip or sprinkler irrigation. Education will be provided to irrigators on ways to make their systems more efficient. This proposed activity will involve the installation of pipe, possibly trenched and buried into the ground, and possibly pumps to pressurize the system.

7b: Convert Water Conveyance from Open Ditch to Pipeline or Line Leaking Ditches and Canals.

Description. Open ditch irrigation water conveyance systems will be replaced with pipelines to reduce evaporation and transpiration losses. Leaking irrigation ditches and canals will be converted to pipeline or lined with concrete, bentonite or other appropriate lining materials.

7c: Convert from Instream Diversions to Groundwater Wells for Primary Water Source.

Description. Wells will be drilled as an alternative water source to surface water withdrawals. Water from the wells will be pumped into ponds or troughs for livestock or used to irrigate agricultural fields. Instream diversion infrastructure will be removed or downsized, if feasible. If an instream diversion is downsized, it will be covered under the HIP III only by following all criteria outlined in the **Consolidate or Replace Existing Irrigation Diversions** section. New wells will be located more than ¼ mile from the stream and will not be hydrologically connected to the stream.

7d: Install or Replace Return Flow Cooling Systems.

Description. Above-ground pipes and open ditches that return tailwater from flood-irrigated fields back to the river will be replaced. Return flow cooling systems will be constructed by trenching and burying a network of perforated PVC pipes that will collect irrigation tailwater below ground, eliminating pools of standing water in the fields and exposure of the water to direct solar heating. No instream work is involved, except for installing the drain pipe outfall. Most work will be in uplands or in riparian buffer areas that are already plowed or grazed.

7e: Install Irrigation Water Siphon Beneath Waterway.

Description. Siphons transporting irrigation water will be installed beneath waterways, where irrigation ditch water currently enters a stream and commingles with stream water, with subsequent withdrawal of irrigation water back into an irrigation ditch system downstream. Periodic maintenance of the siphon will be conducted. Work may entail use of heavy equipment, power tools, and/or hand tools.

1) Directional drilling to create siphon pathway will be employed whenever possible.
2) Trenching will occur in dry stream beds only.
3) Work area isolation will be employed in perennial streams.
4) Stream widths will be maintained at bankfull width or greater.
5) No part of the siphon structure will block fish passage.
6) No concrete will be placed below the bankfull elevation.
7) Siphon surface structures will be set back from the bankfull elevation at least 10 feet.
8) Minimum cover over a siphon structure within the streambed shall be 3 feet of natural substrate.
9) Waterways will be reconstructed to a natural streambed configuration upon completion.
10) The criteria, plans and specifications, and operation and maintenance protocols of this activity category shall use the most recent versions of Natural Resource Conservation Service (NRCS) guidance.

7f: Livestock watering facilities.

Description. Watering facilities will consist of various low-volume pumping or gravity-feed systems to move the water to a trough or pond at an upland site. Either above-ground or underground piping will be installed between the troughs or ponds and the water source. Water sources may include springs and seeps, streams, or groundwater wells. Pipes will generally range from 0.5 to 4 inches but may exceed 4 inches in diameter. Placement of the pipes in the ground will typically involve minor trenching using a backhoe or similar equipment. The off-channel watering facility will (a) avoid steep slopes; and (b) ensure that each livestock water development has a float valve or similar device limiting use to demand, a return flow system, a fenced overflow area, or similar means to minimize water withdrawal and potential runoff and erosion. All pumping and gravity-feed systems within habitat occupied by ESA-listed salmonids will have fish screens to avoid juvenile fish entrainment and will be operated in accordance with NMFS' current fish screen criteria (NMFS 2011 or most recent version). If pumping rate exceeds 3 cfs, a NMFS Hydro Review will be necessary.

7g: Install New or Upgrade/Maintain Existing Fish Screens.

Description. Irrigation diversion intake and return points will be designed or replaced to prevent fish and other aquatic organisms of all life stages from swimming or being entrained into the irrigation system. Fish screens for surface water that is diverted by gravity or by pumping at a rate

that exceeds 3 cfs will be submitted to NMFS for review and approval. All other diversions will have a fish screen that utilizes 1) an automated cleaning device with a minimum effective surface area of 2.5 square feet per cfs and a nominal maximum approach velocity of 0.4 fps, or no automated cleaning device, a minimum effective surface area of 1 square foot per cfs, and a nominal maximum approach rate of 0.2 fps; and 2) a round or square screen mesh that is no larger than 2.38 mm (0.094 inch) in the narrow dimension, or any other shape that is no larger than 1.75 mm (0.069") in the narrow dimension. Each fish screen will be installed, operated, and maintained according to NMFS' fish screen criteria (NMFS 2011 or most recent version). Periodic maintenance, which may include temporary removal of fish screens will be conducted to ensure their proper functioning, e.g., cleaning debris buildup and replacement of parts.

State resource agencies may submit one PNC form for all anticipated fish screen installation, repairs, and maintenance for each field season. The PNC shall contain proposed locations (GIS map) and specific activities. PNCs shall contain actual locations, specific activities undertaken, and a statement of compliance with NMFS fish screen criteria (NMFS 2011).

Category 8: Fisheries, Hydrologic, and Geomorphologic Surveys.

Description. BPA proposes to fund the collection of information in uplands, wetlands, floodplains, and streambeds regarding existing on-the-ground conditions relative to 1) habitat type, condition, and impairment; 2) species presence, abundance, and habitat use; and 3) conservation, protection, and rehabilitation opportunities or effects. Electro-shocking and fish handling for research purposes is not included, as this work must have an ESA Section 10 research permit.

Work may entail use of trucks, survey equipment, and crews using hand tools, and includes the following activities:

1) Measuring/assessing and recording physical measurements by visual estimates or with survey instruments;
2) Installing rebar or other markers along transects or at reference points;
3) Installing piezometers and staff gauges to assess hydrologic conditions;
4) Installing recording devices for stream flow and temperature;
5) Conducting snorkel surveys to determine species of fish in streams and observing interactions of fish with their habitats;
6) Excavating cultural resource test pits; and
7) Installing PIT detector arrays.

Category 9: Special Actions (for Terrestrial Species).

9a: Install/Develop Wildlife Structures.

***Description*.** This activity involves the installation or development of a variety of structures that mimic natural features and provide support for wildlife foraging, breeding, and/or resting/refuge. These can include bat roosting/breeding structures, avian nest boxes, hardwood snags, brush/cover piles, coarse woody debris, and raptor perches. Work may entail use of power tools and/or crews with hand tools.

9b: Construct Fencing for Grazing Control.

Description. Permanent or temporary livestock exclusion fences or cross-fences will be installed to assist in grazing management. Individual fence posts will be pounded or dug using hand tools or augers on backhoes or similar equipment. Fence posts will be set in the holes and backfilled. Fence wire will be strung or wooden rails placed. Installation may involve the removal of native or non-native vegetation along the proposed fence line. Occasionally rustic wood X-shaped fence that does not require setting posts will be used. No grazing will be allowed within riparian area fenced enclosures.

9c: Plant Vegetation.

***Description*.** Plant trees, shrubs, herbaceous plants, and aquatic macrophytes to help stabilize soils. Develop a vegetation plan that is responsive to the biological and physical factors at the site. Plant trees such as cottonwoods and conifers, in areas where they have historically occurred but at present are either scarce or absent. Obtain plants and seeds from local sources to ensure plants are adapted to local climate and soil chemistry.

Pastures and rangelands will be planted or seeded with native or adapted perennial and biannual vegetation. The ground will be scarified as necessary to promote seed germination. In areas with severe erosion or high erosion potential, trees, shrubs, vines, grasses, and legumes will be planted to stabilize soils. Because noxious weeds, nonnative invasive plants, and aggressive weedy species can take over disturbed lands and degrade range values, vegetation will be controlled through the use of herbicide application, mechanical removal, and hand pulling.
Prepare planting sites by cutting, digging, grubbing roots, scalping sod, de-compacting soil as needed, and removing existing vegetation. Place woody debris, wood chips, or soil at select locations to alter microsites. Plants will be fertilized, mulched, and stems wrapped to protect from rodent girdling. Buds will be capped to protect plants from herbivores. Work may entail use of heavy equipment, power tools, and/or hand tools.

1) Planting plans shall require the use of native species and specify seed/plant source, seed/plant mixes, soil preparation, etc.
2) Planting Plans shall include vegetation management strategies that are consistent with local native succession and disturbance regime.

3) Vegetation Plans shall address the abiotic factors contributing to the sites' succession, i.e., weather and disturbance patterns, nutrient cycling, and hydrologic condition.

9d: Tree Removal for Large Wood Projects.

Description. This activity involves the the manipulation, harvest, placement, or removal and stockpiling of large wood for restoration projects. For this activity live conifers and other trees can be felled or pulled/pushed over for in-channel large wood placement when conifers and trees are fully stocked., Danger trees and trees killed through fire, insects, disease, blow-down and other means can be felled and used for in-channel placement regardless of live-tree stocking levels. Tree felling shall not create excessive streambank erosion or increase the likelihood of channel avulsion during high flows. Trees may be removed by cable, ground-based equipment, or helicopter. Trees may be felled or pushed/pulled directly into a stream or floodplain. Trees may be stockpiled for future instream restoration projects. The project manager for an aquatic restoration action will coordinate with the EC Lead and/or an action-agency wildlife biologist in tree-removal planning efforts. If these actions fall within the range of specific listed terrestrial species such as the northern spotted owl and/ or the marbled murrelet, there may be timing and or equipment/distance restrictions. Please see Conservation Measures for terrestrial species (Page 112) and work with your EC lead to ensure these are being implemented properly.

The purpose of these criteria is to ensure that there would be no removal of, or adverse modification to suitable habitat or the respective critical habitat(s) for the marbled murrelet or the northern spotted owl. Any removal of habitat shall have a "no effect" or shall "not likely adversely affect" either species.

The following Conservation Measures apply to tree removal within the range of the marbled murrelet and/or the northern spotted owl in forested stands less than 80 years old that are not functioning as foraging habitat within a spotted owl home range and do not contain marbled murrelet nesting structure. It does not apply to tree selection in older stands or hardwood-dominated stands unless stated otherwise.

1) A wildlife biologist must be fully involved in all tree-removal planning efforts and be involved in making decisions on whether individual trees are suitable for nesting or have other important documented bird habitat values.
2) Outside of one site potential tree height from streams[24], trees can be removed to a level not less than a relative density (RD) of approximately 35 (stand scale), which is considered as fully occupying a site. This equates to approximately 60 trees per acre in the overstory and a tree spacing averaging 26 feet. Additionally 40% canopy cover would be maintained when in northern spotted owl or marbled murrelet critical habitat, within 300 feet of occupied or unsurveyed murrelet nesting structure, or when dispersal habitat for spotted owls is limited in the area.
3) Tree species removed should be relatively common in the stand (i.e., not "minor" tree species).

[24] Site Potential – The average max height of tallest dominant trees for a given site class (FEMAT 1993).

4) Snags and trees with broad deep crowns ("wolf" trees), damaged tops or other abnormalities that may provide a valuable wildlife habitat component shall not be removed.
5) No gaps (openings) greater than 0.5 acre will be created in northern spotted owl critical habitat. No gaps greater than ¼ acre will be created in marbled murrelet critical habitat.

The following conservation measures applies to tree removal within the range of the marbled murrelet and/ or the northern spotted owl in forested stands greater than 80 years old, or stands that are functioning as foraging habitat within a spotted owl home range, and/or do contain marbled murrelet nesting structure.

1) Individual trees or small groups of trees should come from the periphery of permanent openings (e.g., roads) or from the periphery of non-permanent openings (e.g., plantations, along recent clear-cuts, etc.).
2) Groups of trees (4 or more) 1) shall not be removed from within marbled murrelet suitable habitat stands or from stands buffering or within 300 feet of marbled murrelet suitable habitat stands, and 2) shall not be buffering or removed within 300 feet of individual trees with marbled murrelet nesting structure.
3) A minimum distance of one potential tree height feet should be maintained between individual or group removals.
4) Trees up to 36-inch diameter at breast height (DBH) may be felled in any stands with agreement from a USFWS wildlife biologist that the trees are not providing marbled murrelet nesting structures or providing cover for potential nest sites/trees.
5) In general, no known northern spotted owl nest trees or alternate nest trees are to be removed, including historical nest sites. Potential northern spotted owl nest trees may only be removed in limited instances when it is confirmed with the USFWS wildlife biologist that nest trees will not be limited in the stand post removal
6) In order to minimize the creation of canopy gaps or edges, groups of adjacent trees selected for large wood removal shall not create openings greater than ¼ acre in size within 0.5 mile of marbled murrelet occupied habitat, unsurveyed marbled murrelet suitable habitat, or suitable marbled murrelet nesting substrate, or when within marbled murrelet critical habitat.
7) When within either northern spotted owl critical habitat, stands greater than 80 years old, providing suitable habitat, or within stands providing foraging habitat to spotted owl home ranges[25], gaps will be restricted to 1/2 acre openings or less.

[25] This applies in spotted owl provincial home ranges where the levels of nesting, roosting, and foraging habitat are so low that owls rely on dispersal habitat as their primary foraging habitat. Site-specific determinations should be made by the unit wildlife biologist.

APPENDIX A: Species-Specific Conservation Measures for ESA-Listed Mammals.

Within the Columbia River Basin, BPA funded activities may occur in areas that are near or occupied by the following mammalian ESA-listed species: (a) North American wolverine (*Gulo gulo luscus*) (b) Northern Idaho ground squirrel (*Urocitellus brunneus*), (c) Columbian white-tailed deer (*Odocoileus virginianus leucurus*) (Columbia River DPS), (d) gray wolf (*Canis lupus*), (e) pygmy rabbit (*Brachylagus idahoensis*) (Columbia Basin DPS), (f) woodland caribou (*Rangifer tarandus caribou*) and critical habitat (Southern Selkirk Mountains DPS), (g) Canada lynx (*Lynx canadensis*) and critical habitat (Contiguous U.S. DPS), and (h) Grizzly bear (*Ursus arctos horribilis*).

North American Wolverine (*Gulo gulo luscus*).

Description. Mean seasonal elevations used by wolverines in the northern Rocky Mountains and North Cascades vary between 1,400 and 2,600 meters (4,592 and 8,528 ft) depending on location, but are always relatively high on mountain slopes. Wolverines do not appear to specialize on specific vegetation or geological habitat aspects, but instead select areas that are cold and receive enough winter precipitation to reliably maintain deep persistent snow late into the warm season. Wolverines prefer to move across suitable habitat (as defined by persistent spring snow cover) rather than to cross unsuitable habitats during dispersal movements. In the contiguous U.S., valley bottom habitat appears to be used only for dispersal movements and not for foraging or reproduction. Litters are born in mid-February through March. Natal birthing dens are used through late April or early May and are located in snow deeper than 1.5 meters (5 ft). Depending on weather or disturbance, wolverines may move to maternal dens during the month of May. Rendezvous sites may be used through early July.

Conservation Measures:

1) Restoration activities at locations at or above the elevation of 4,000 ft, that generate noise above ambient levels (the typical level of background noise within an environment), within 0.25 mile (1 mile for blasting and pile driving) of any known wolverine den, will not occur from February 1 to May 15.
2) Within suitable or occupied habitat, use only herbicides listed under **General Conservation Measures for Terrestrial Species and Critical Habitats(Page 44)**.

Northern Idaho Ground Squirrel (*Urocitellus brunneus*).

Description. The Northern Idaho ground squirrel (NIDGS) needs large quantities of grass seed, stems and other green leafy vegetation to store fat reserves for its eight-month hibernation period (August/early September through late April/May). Adult males are first to emerge from burrows in the spring followed by females and their young. Populations of NIDGS have been found in Adams

and Valley counties of western Idaho, though the species historic range extends into neighboring Washington County.
It occurs in dry meadows surrounded by ponderosa pine and Douglas-fir forests, including lands managed by the U.S. Forest Service's Payette National Forest (1,500 to 7,500-foot elevations). This species is not likely to be found in riparian areas of streams.

Conservation Measures:

1) If a project occurs within NIDGS suitable habitat, a qualified wildlife biologist must conduct on-site surveys during the appropriate time of year at least 3 times during a 7-day period in potential NIDGS habitat to determine their presence.
2) If upland projects will occur within 0.25 miles of a known occurrence or potential habitat of NIDGGS, contact the appropriate USFWS field office to confirm the project will have *no effect* or is *not likely to adversely affect* NIDGS.
3) Avoid blasting and pile driving within 1 mile of occupied NIDGS habitat, unless it is confirmed the activity is *not likely to adversely affect* NIDGS.
4) Avoid ground-disturbing activities within occupied NIDGS habitat between April 1 and August 15 to avoid the NIDGS above-ground activity period.
5) Do not locate parking, vehicle turnout, staging, or fueling areas, or any type of temporary sites associated with a project, within occupied or potential habitat.
6) No off-road travel in occupied habitat.
7) Avoid conducting weed treatments during the NIDGS' above-ground activity period (April 1 through August 15). Within suitable or occupied habitat, use only herbicides listed under **General Conservation Measures for Terrestrial Species and Critical Habitats (Page 44)**.

Columbian White-tailed Deer (*Odocoileus virginianus leucurus*) (Columbia River DPS).

Description. Within the action area, Columbian white-tailed deer are closely associated with riparian habitats in the Lower Columbia River**.** The deer found on islands in the Columbia River use "tidal spruce" habitats characterized by densely forested swamps covered with tall shrubs and scattered spruce, alder, cottonwood, and willows. In the summer, Columbian white-tailed deer preferentially inhabit mixed forests of western red cedar, red alder, and parkland habitat with a grassy understory. Breeding activity begins the first week of November and lasts a month or more. The gestational period is approximately 210 days, with the peak of fawning occurring in mid-to-late June. Fawns stay with their mother until just prior to the next fawning season.

Conservation Measures

1) To avoid and minimize impacts to Columbian white-tailed deer during the fawning period, restoration activities will not occur from June 1 to July 15 within the following region: the Columbia River, including all islands and extending 2 miles inland from both sides of the river, from Svensen Island, Clatsop County, to the confluence with the Willamette River.

The Columbia River includes the outlet of Vancouver Lake from the lake, north to its confluence with the Columbia River just south of the confluence of the Lewis River and Columbia Rivers.

2) To avoid and minimize impacts to Columbian white-tailed deer and their movements, fencing projects on Puget Island, the Hunting Islands, Price Island, and 2 miles inland from the Columbia River between 2 miles east of Cathlamet and 2 miles west of the community of Ridgefield, will use only 3-strand barbed wire and have a maximum fence height of 42 inches, with lower strands 18 or more inches above the ground.
3) Project personnel will be instructed not to approach Columbian white-tailed adults or fawns at any time and reduce vehicle speeds around project sites where deer occur to avoid vehicle-deer collisions.
4) Herbicides will not be used in known or suitable Columbian white-tailed deer fawning areas from June 1 to July 15. Within suitable or occupied habitat use only herbicides listed under **General Conservation Measures for Terrestrial Species and Critical Habitats (Page 44)**.
5) Restoration projects proposed within the areas identified in conservation measures #1 & 2 above, which include activities under **Categories 1a (Fish Passage Restoration: Dams, Water Control or Legacy Structure Removal) and 2b (River, Stream, Floodplain, and Wetland Restoration: Set-back or Removal of Existing Berms, Dikes, and Levees)** will be reviewed by the appropriate USFWS field office to confirm the project will have *no effect* or *is not likely to adversely affect* Columbian white-tailed deer habitat. Those projects that cannot avoid adverse effects to Columbian white-tailed deer or their habitat are not covered under the BiOp and will require a separate Section 7 consultation.

Gray Wolf (*Canis lupus*).

The Rocky Mountain DPS of the gray wolf was delisted on February 27, 2008. Within the action area, the gray wolf remains listed in portions of Oregon and Washington as follows:

Oregon: that portion of OR west of the centerline of Highway 395 and Highway 78 north of Burns Junction and that portion of OR west of the centerline of Highway 95 south of Burns Junction. To date, no wolf packs have been identified in these areas.

Washington: that portion of WA west of the centerline of Highway 97 and Highway 17 north of Mesa and that portion of WA west of the centerline of Highway 395 south of Mesa). Within this area, wolf packs have recently been identified in Okanogan and Kittitas Counties (http://wdfw.wa.gov/conservation/gray_wolf/).

Description. Habitat for wolves is diverse and generally encompasses areas with adequate supply of prey. Wolves prey primarily on ungulates but may also prey on smaller mammals, including beaver. Wolves breed in mid to late February and pups are usually born 2 months later. Dens are often in underground burrows but can occur in abandoned beaver lodges, hollow trees, and shallow rock caves. Dens are commonly located on southerly aspects of moderately steep slopes in well-drained soils (or rock caves/abandoned beaver lodges), usually within 400 yards of surface water and at an

elevation overlooking surrounding low-lying areas. As pups grow older, they are taken from the den to a rendezvous site. One or more rendezvous sites are used over the summer until the pups are large enough to travel and hunt with the pack. Rendezvous sites are usually complexes of meadows and adjacent hillside timber, with surface water nearby.

Conservation Measures:

1) Restoration activities generating noise above ambient levels within 1 mile of any known gray wolf den or rendezvous site (based on current information from state wildlife agencies and the USFWS) will not occur from December 1 to June 30, unless the project is reviewed by the appropriate USFWS field office to confirm the project will have *no effect* or is *not likely to adversely affect* the gray wolf.
2) Restoration activities will not increase trail or road densities within gray wolf habitat.
3) Within suitable or occupied habitat use only herbicides listed under **General Conservation Measures for Terrestrial Species and Critical Habitats** (Page 44)

Pygmy Rabbit (*Brachylagus idahoensis*) (Columbia Basin DPS).

Description. Pygmy rabbits are typically found in areas that include tall dense stands of sagebrush (*Artemisia* spp.) and are highly dependent on sagebrush to provide both food and shelter throughout the year. During winter months, the rabbits' diet consists of up to 99% sagebrush. In the summer and spring months, their diet becomes more varied, including more grass and forbs. The pygmy rabbit digs its own burrows, which are typically found in deep loose soils. However, pygmy rabbits occasionally make use of burrows abandoned by other species and, as a result, may occur in areas of shallower or more compact soils that support sufficient shrub cover.

Pygmy rabbits breed in early spring, having up to 3 litters per year and averaging 6 young per litter. Recent information on captive and wild pygmy rabbits indicates that pregnant females dig secret, relatively shallow burrows, known as natal burrows. These natal burrows, which are found in the vicinity of the pygmy rabbit's regular burrows, are used to give birth in and for nursing and early rearing of their litters.

Conservation Measures:

1) Prior to initiating restoration activities in the central Columbia Plateau (Douglas, Lincoln, Adams and Grant counties) in dense tall stands of sagebrush, or if any evidence of pygmy rabbit presence is detected on a project outside of these counties, but within the historic range of the pygmy rabbit, contact the appropriate USFWS field office to confirm the project will have *no effect* or is *not likely to adversely affect* the pygmy rabbit.
2) Within suitable or occupied habitat, use only herbicides listed under **General Conservation Measures for Terrestrial Species and Critical Habitats** (Page 44)

Woodland Caribou (*Rangifer tarandus caribou*) and Critical Habitat.

Description. The Selkirk Mountain woodland caribou occurs in the Selkirk mountains at elevations of 4,000 feet or above in Bonner or Boundary counties in Idaho or east of the Pend Oreille River, Pend Oreille County, Washington. A general description of seasonal habitats used by Selkirk Mountain woodland caribou follows **Table 7**. A more detailed description is available in the Recovery Plan for Selkirk Mountain woodland caribou at: http://ecos.fws.gov/docs/recovery_plan/940304.pdf.

Table 7: Seasonal Habitats Used by Selkirk Mountain Woodland Caribou

Season	Habitat Description
Early Winter	Mature to old-growth cedar-hemlock and spruce-fir stands, 70% canopy closure, high windthrow, and lichen densities
Late Winter	High elevation, open canopied spruce-fir stands, high lichen density
Spring	Mature timber with canopy openings
Calving	Secluded, high elevation, mature old-growth forest
Summer	Relatively flat terrain, abundant understory cover, variable overstories
Fall	Mature old-growth stands with dense understories

Conservation Measures:

1) Prior to initiating restoration activities at elevations of 4,000 feet or above in Bonner or Boundary counties in Idaho or east of the Pend Oreille River, Pend Oreille County, Washington, within recovery zones (as defined in the Woodland Caribou Recovery Plan, USFWS 1993), contact the appropriate USFWS field office to confirm the project will have *no effect* or is *not likely to adversely affect* woodland caribou.
2) Projects that are scheduled during early winter in the caribou recovery area (Michael Borysewicz pers. com. 2003) and generate noise above ambient levels will be evaluated by the local USFWS wildlife biologist to determine if there will be disturbance effects to Selkirk Mountain woodland caribou.
3) Any vegetation management in Selkirk Mountain woodland caribou habitat will not affect more than 1 acre of native forest per year.
4) Projects will not result in increased access for snowmobiles or other off-road vehicles and will not result in new roads in woodland caribou habitat.
5) Within suitable or occupied habitat, use only herbicides listed under **General Conservation Measures for Terrestrial Species and Critical Habitats** (Page 44).

Canada Lynx (*Lynx canadensis*) and Critical Habitat (Contiguous U.S. DPS).

Description. Canada lynx inhabit lodgepole pine, cedar/hemlock, and sub-alpine forest habitats at or above 3000-foot elevation in Idaho, Montana, Oregon, and Washington. Canada lynx are specialized predators that are highly dependent on the snowshoe hare (*Lepus americanus*) for food but also eat alternate prey such as squirrels and grouse. The range of the snowshoe hare coincides with Canada lynx. The snowshoe hare prefer diverse, early successional forests with dense stands of conifers and shrubby understories that provide food, cover to escape from predators, and protection during extreme weather. Lynx usually concentrate their winter foraging activities in areas where hare activity is high.

Canada lynx den in forests with large wood (e.g., downed logs and windfalls) to provide denning sites with security and thermal cover for kittens. In Washington, lynx use lodgepole pine (*Pinus contorta*), spruce (*Picea* spp.), and subalpine fir (*Abies lasiocarpa*) forests older than 200 years for denning. Based on information from the western U.S., sites selected for denning also must provide for minimal disturbance by humans and proximity to foraging habitat (early successional forests) with denning stands at least 1 hectare (2.5 acres) in size. Intermediate-age forests allow for lynx access between den sites and foraging areas, movement within home ranges, and random foraging opportunities.

Conservation Measures:

1) Prior to initiating restoration activities in lodgepole pine, cedar/hemlock, and sub-alpine forest habitats at or above 3000 feet in elevation in Idaho, Montana, Oregon, and Washington, contact the appropriate USFWS field office to confirm the project will have *no effect* or is *not likely to adversely affect* Canada lynx.
2) Activities within or near potential denning sites will be reviewed by the appropriate USFWS field office to confirm the project will have *no effect* or is *not likely to adversely affect* the lynx.
3) The project will meet the standards and guidelines identified in the Northern Rockies Lynx Management Direction (NRLMD) and/or in the current and upcoming revised 2013 Lynx Conservation Assessment and Strategy (LCAS). The current LCAS is available at: http://library.fws.gov/Pubs5/Lynx_consassess_2000.pdf
4) The project will not result in increased off-road vehicle/snowmobile access to lynx habitat during or following implementation.
5) Within suitable or occupied habitat for Canada lynx or its key prey species, snowshoe hare (*Lepus americanus*), use only herbicides listed under **General Conservation Measures for Terrestrial Species and Critical Habitats** (Page 44).

Grizzly Bear (*Ursus arctos horribilis*).

Description. The grizzly bear has a broad range of habitat tolerance. Contiguous, relatively undisturbed mountainous habitat having a high level of topographic and vegetative diversity,

characterizes most areas where the species remains. Forest cover is also especially important to grizzly bears. However, the search for food has a prime influence on grizzly bear movements and individuals will go where they are able to locate these resources.

Displacement of grizzly bears from trails (motorized and non-motorized) and roads has been well-documented (Archibald et al. 1987, Mattson et al. 1987, McLellan and Shackleton 1988, 1989; Kasworm and Manley 1990; Mace and Waller 1996, 1998; Mace et al. 1996, 1999, Ciarniello et al. 2007). Factors related to human access include increased potential for poaching, collisions with vehicles, and chronic negative human interactions at campgrounds and campsites that are accessed by roads and trails (Claar et al. 1999, Wisdom et al. 2000, Ciarniello et al. 2005, Ciarniello et al. 2007). Human access is managed by assessing the quality and quantity of seasonal habitats within core areas (IGBC 1998). Core areas are defined as areas that are greater than 500 meters from an open road, motorized trail, or high-use trail within the recovery zones identified below (Gaines et al. 2003).

Mating appears to occur from late May though mid-July with delayed implantation until late November. Den excavation starts as early as September or may take place just prior to entry in late November. Dens are usually at higher elevations dug on steep slopes where wind and topography cause an accumulation of deep snow that is unlikely to melt during warm periods. Birth of cubs occurs during hibernation near February 1st. Upon emergence from the den, they seek the lower elevations, drainage bottoms, avalanche chutes, and ungulate winter ranges where their food requirements can be met. Throughout late spring and early summer, they follow plant phenology back to higher elevations. In late summer and fall, there is a transition to fruit and nut sources as well as herbaceous materials that may occur at lower elevations.

Grizzly bears may occur both within and outside of recovery zones. Within the proposed action area, the following recovery zones have been identified for grizzly bear in Idaho, Montana, and Washington.

Bitterroot Ecosystem Recovery Zone. The BE recovery zone is located primarily in northern Idaho with small portions in western Montana.

Cabinet-Yaak Ecosystem Recovery Zone. The CYE recovery zone is located primarily in northwestern Montana with small portions in northern Idaho.

North Cascades Ecosystem Recovery Zone. The NCASC recovery zone is in north-central Washington State.

Northern Continental Divide Ecosystem Recovery Zone. The NCDE is contained entirely within the State of Montana.

Selkirk Mountains Ecosystem Recovery Zone. The SE recovery zone is located primarily in northern Idaho but also includes portions of Washington and Canada.

Conservation Measures:

1) Restoration activities generating noise above ambient levels will not occur within 0.25 mile (1 mile for blasting and pile driving) of known grizzly bear den sites (based on current information from state wildlife agencies and the USFWS) from October 15 through May 15. Activities within 0.25 mile of a known den site at any time of year will be reviewed by the appropriate USFWS field office to confirm the project will have *no effect* or *is not likely to adversely affect* grizzly bear.
2) Restoration activities generating noise above ambient levels, motorized vehicle use (including helicopters), or increasing human use within 0.25 mile (1 mile for blasting and pile driving) of grizzly bear core areas is not covered by the BiOp and will require a separate Section 7 consultation.
3) Restoration activities will not degrade or destroy key grizzly bear foraging habitat (e.g., avalanche chutes, berry/shrub fields, fruit/nut sources).
4) Restoration activities will not increase trail or road densities within core areas or areas actively used by grizzly bears.
5) Within recovery areas, or areas actively used by grizzly bears, all attractants (e.g., food and garbage) will be stored in a manner unavailable to wildlife at all times.
6) Within recovery areas, or areas actively used by grizzly bears, 25-foot no-cut buffers will be maintained in riparian zones to provide vegetative screening along streams and wetlands. Visual cover will also be maintained adjacent to roads and major habitat components such as snow chutes and shrub fields.
7) Within suitable or occupied habitat, use only herbicides listed under **General Conservation Measures for Terrestrial Species and Critical Habitats (Page 44).**

APPENDIX B: Species-Specific Conservation Measures for Birds.

Within the Columbia River Basin, BPA-funded activities may occur in areas that are near or occupied by the following avian ESA-listed species: (a) Streaked horned lark (*Eremophila alpestris strigata*); (b) Marbled murrelet (*Brachyramphus marmoratus*) and critical habitat; (c) Northern spotted owl (*Strix occidentalis caurina*) and critical habitat; and (d) Western snowy plover (*Charadrius nivosus* ssp. *nivosus*) and their critical habitat (Pacific coast DPS).

Streaked Horned Lark (*Eremophila alpestris strigata*)

Description. Streaked horned lark and its critical habitat were proposed to be listed as threatened on October 11, 2012. The current range of the streaked horned lark can be divided into three regions: (1) Puget lowlands in Washington; (2) Washington coast and lower Columbia River islands, including dredge spoil deposition sites near the Columbia River in Portland, Oregon; and (3) Willamette Valley in Oregon.

Streaked horned larks prefer wide open spaces with no trees and few or no shrubs. They nest on the ground in sparsely vegetated sites dominated by grasses and forbs. Data indicate that sites used by larks are generally found in open (i.e., flat, treeless) landscapes of 120 hectares (300 acres) or more. Some patches with the appropriate characteristics (i.e., bare ground, low stature vegetation) may be smaller in size if the adjacent fields provide the required open landscape context. This situation is common in agricultural habitats and on sites next to water. For example, many of the sites used by larks on the islands in the Columbia River are small but are adjacent to open water, which provides the landscape context needed.

Conservation Measures:

1) Restoration projects proposed at locations with suitable habitat will be surveyed for streaked horned larks (using a survey protocol approved by the USFWS) prior to project design. If streaked horned larks are identified, contact the appropriate USFWS field office to confirm the project is *not likely to adversely affect* streaked horned lark.
2) Restoration activities generating noise above ambient levels within 200 feet (1 mile for blasting and pile driving) of likely occupied nesting habitat will not occur from March 15 to August 15.
3) If an area is identified as likely to be occupied by larks, riparian plantings will not occur within 300 feet to maintain the open habitat suitable required by streaked horned larks unless individual project approval has been received from the appropriate USFWS field office.

Marbled Murrelet (*Brachyramphus marmoratus*) and Critical Habitat

Description. The marbled murrelet (MAMU) is a small, robin-sized, diving seabird that feeds primarily on fish and invertebrates in near-shore marine waters. It spends the majority of its time on the ocean, roosting and feeding, but comes inland up to 80 kilometers (50 miles) to nest in forest

stands with old growth forest characteristics, or younger stands with older remnant trees, or trees with deformities adequate to provide appropriate nesting structure i.e. platforms. These dense shady forests are generally characterized by large trees with large branches or deformities for use as nest platforms.

Murrelets nest in stands varying in size from several acres to thousands of acres. However, larger unfragmented stands of old growth appear to be the highest quality habitat for marbled murrelet nesting. Nesting stands are typically dominated by Douglas-fir and western hemlock in Oregon and Washington and by old-growth redwoods in California.

Marbled murrelets nest from mid-April to late September. The sexually mature adult murrelet (at age 2 or 3 of an average 15-year lifespan) generally lays a single egg on a mossy limb of an old-growth conifer tree. Both sexes incubate the egg in alternating 24-hour shifts for 30 days.

Murrelet chicks are virtually helpless at hatching and rely on the adults for food. The adults feed the chick at least once per day, flying in (primarily at dawn and dusk) from feeding on the ocean, carrying one fish at a time. The young fledge from the nest in about 28 days and appear to fly directly to the sea upon leaving the nest. Marbled murrelets have a naturally low reproductive rate because they lay only one egg per nest and not all adults nest every year.

Definitions:

Suitable habitat: Conifer-dominated stands that generally are 80 years old or older and/or have trees greater than or equal to 18 inches mean dbh. Murrelet-suitable habitat must include potential nesting structure.
Potential Nesting Structure: Consists of an individual tree (or trees) with the following characteristics:

- Occurs within 50 miles (81 km) of the coast (USFWS 1997);
- A conifer tree (USFWS 1997);
- ≥ 19.1 inches (49 cm) in diameter (dbh), > 107 feet (33 m) in height, has at least one platform ≥ 4 inches (10 cm) in diameter, nesting substrate (e.g., moss, epiphytes, duff) on that platform, and an access route through the canopy that a murrelet could use to approach and land on the platform (Burger 2002, Nelson & Wilson 2002);
- Has a platform ≥ 32.5 feet (9.9 m) above the ground (Nelson & Wilson 2002); and
- Has a tree branch or foliage, either on the tree with nesting structure or on an adjacent tree, which provides protective cover over the platform (Nelson & Wilson 2002).

Unsurveyed Habitat: Consists of suitable habitat or potential structure within younger stands that has not been surveyed by the established survey protocol (Evans et al. 2003). In cases of uncertainty such as stand occupancy, it is USFWS policy to give the benefit of the doubt to the listed species. On that basis, the USFWS considers unsurveyed habitat as occupied when analyzing effects to murrelets.

Conservation Measures:

1) Projects will not occur within the applicable disruption and disturbance distances from occupied MAMU nest trees or suitable nest trees in unsurveyed nesting habitat for MAMUs (**Table 8**) [during the critical nesting period], unless a protocol survey determines MAMUs are not present. Otherwise, in Oregon the project would be *likely to adversely affect* and either delayed until August 6 (with 2-hour timing restrictions) [at which point it would be considered *not likely to adversely affect* or until it is determined that young are not present; or it may be counted toward the limited number of *likely to adversely affect* projects covered under this programmatic (with 2-hour timing restrictions). In Washington, the project would be *likely to adversely affect* and either delayed until September 4 (with 2-hour timing restrictions) or until it is determined that young are not present; or counted toward the limited number of *likely to adversely affect* projects covered under this programmatic.
2) Projects within the applicable disruption and disturbance distances for MAMUs implemented between April 1 and September 15 would not begin until 2 hours after sunrise and would end 2 hours before sunset.
3) No suitable, potential, or critical MAMU habitat is to be modified as part of this action to the extent that the functionality is changed for MAMU.
4) Within suitable, potential, or critical habitat, garbage containing food and food trash generated by workers in project areas is secured or removed daily to minimize attraction of corvids, which have been identified as predators of murrelet eggs and young.
5) **Table 8** shows MAMU disruption distances that are applicable to the proposed actions under this BiOp. Distances and times can be locally revised based on current information available from the appropriate USFWS field office.
6) For large wood projects, follow conservation measures as outlined in the **Tree Removal for Large Wood Projects under the Proposed Action's Special Actions, Action-Category-9 (Page 98).**

Table 8. Disturbance and disruption distance[26] thresholds for Marbled Murrelet during the nesting season (April 1 to September 15 for OR; April 1 to September 23 for WA).

Action	Action Not Likely Detected Above Ambient Levels	Disturbance Distances	Disruption Distances	Increased Risk of Physical Injury and/or Mortality
Light maintenance (e.g., road brushing and grading) and heavily-used roads	> 0.25 mile	≤ 0.25 mile	NA[1]	NA
Log hauling on heavily-used roads (FS maintenance levels 3, 4, 5)	>0.25 mile	≤ 0.25 mile	NA[1]	NA
Chainsaws (includes felling hazard/danger trees)	>0.25 mile	111 yards to 0.25 mile	≤ 110 yards[2]	Potential for mortality if trees felled contain platforms
Heavy equipment for road construction, road repairs, bridge construction, culvert replacements, piling removal, etc.	>0.25 mile	111 yards to 0.25 mile	≤ 110 yards[2]	NA
Helicopter: Chinook 47d	>0.5 mile	266 yards to 0.5 mile	≤ 265 yards[5]	100 yards[6] (injury/mortality)
Helicopter: Boeing Vertol 107, Sikorsky S-64 (SkyCrane)	>0.25 mile	151 yards to 0.25 mile	≤ 150 yards[7]	50 yards[6] (injury/mortality)
Helicopters: K-MAX, Bell 206 L4, Hughes 500	>0.25 mile	111 yards to 0.25 mile	≤ 110 yards[8]	50 yards[6] (injury/mortality)

1. NA = not applicable. We anticipate that marbled murrelets that select nest sites in close proximity to heavily used roads are either undisturbed by or habituate to the sounds and activities associated with these roads (Hamer and Nelson 1998, p. 21).
2. Based on recommendations from murrelet researchers that advised buffers of greater than 100 meters to reduce potential noise and visual disturbance to murrelets (Hamer and Nelson 1998, p. 13, USFWS 2012c, pp. 6-9).
3. Based on an estimated 92 dBA sound-contour (approximately 265 yards) for the Chinook 47d (Newman et al. 1984, Table D.1).
4. Because murrelet chicks are present at the nest until they fledge, they are vulnerable to direct injury or mortality from flying debris caused by intense rotor wash directly under a hovering helicopter. Hovering distance is based on a 300-foot radius rotor-wash zone for large helicopters hovering at < 500 feet above ground level (from WCB 2005, p. 2 – logging safety guidelines). We reduced the hovering helicopter rotor-wash zone to a 50-yard radius for all other helicopters based on the smaller rotor-span for all other ships.
5. Based on an estimated 92 dBA sound contour from sound data for the Boeing Vertol 107 the presented in the San Dimas Helicopter Logging Noise Report (USFS 2008, chapters 5, 6).
6. The estimated 92 dBA sound contours for these helicopters is less than 110 yards (e.g., K-MAX [100 feet] (USFS 2008, chapters 5, 6), and Bell 206 (85-89 dbA at 100 m)(Grubb et al. 2010, p. 1277).

[26] Distances are to a known occupied marbled murrelet nest tree or suitable nest trees in unsurveyed nesting habitat.

Northern Spotted Owl (*Strix occidentalis caurina*) and Critical Habitat

Description. Northern spotted owls typically live in forests characterized by dense canopy closure of mature and old-growth trees, abundant logs, standing snags, and live trees with broken tops. Although they are known to nest, roost, and feed in a wide variety of habitat types, spotted owls prefer older forest stands with variety: multi-layered canopies of several tree species of varying size and age; both standing and fallen dead trees; and open space among the lower branches to allow flight under the canopy. Typically, forests do not attain these characteristics until they are at least 150 to 200 years old.

Like most owl species, the spotted owl nests in the tops of trees or in cavities of naturally deformed or diseased trees, and are also known to use mistletoe clumps and abandoned raptor stick nests for nesting substrate. Spotted owls primarily mate for life and may live up to 20 years. Although the breeding season varies with geographic location and elevation, spotted owls generally nest from February to June. 1to 4 (usually 2) pure white eggs are laid in the early spring and hatch about a month later. During incubation, the male typically does most of the foraging and brings food to the female and the young owlets. At 3 to 4 weeks of age, the owlets are able to perch away from the nest, but still depend on their parents for food. Predation on these juveniles by great horned owls and other predators is high at this time and many do not survive. Parental care of the juveniles generally lasts into September when the young owls finally take off on their own. This period, too, is hard for the young birds, and starvation is common in the first few months on their own.

Suitable habitat: Consists of stands with sufficient structure (large trees, snags, and downed wood) to provide opportunities for owl nesting, roosting, and foraging. Generally, these conditions are associated with conifer-dominated stands, 80 years old or older, multi-storied in structure, have trees greater than or equal to 18 inches mean dbh and the canopy closure generally exceeds 60%. These conditions do vary among forest types; particularly in fire prone, dry, mixed conifer forests. For the purpose of large scale planning and consultations, stands are defined at a larger scale (e.g., province) as suitable based just on age or size (i.e., 80 years, >18 inches) alone.

Conservation Measures:

1) To reduce adverse effects to NSO, projects will not occur during the critical breeding period, typically between March 1 – July 15, but may vary by location. Timing can be locally revised based on current information available from the appropriate USFWS field office. Projects should be delayed until (a) after the critical breeding season (unless action involves Type I helicopters, which extends the critical nesting window to September 30) and (b) it is determined that young are not present.
2) The USFWS wildlife biologist may extend the restricted season based on site-specific information (e.g., a late or recycled nesting attempt).
3) **Table 9** shows disruption distances applicable to the equipment. These distances can be locally altered based on current information and concurred with by appropriate USFWS official
4) No activity within the BiOp will cause adverse effects to spotted owl critical habitat when analyzed against the appropriate local scale as determined by the unit wildlife biologist.

5) For large wood projects, follow conservation measures as outlined in the **Tree Removal for Large Wood Projects under Special Actions (Page 98).**
6) No hovering or lifting within 500 feet of the ground within occupied spotted owl habitat during the critical breeding season by ICS Type I or II helicopters would occur as part of any proposed action addressed by the programmatic.

Table 9. Disturbance, disruption (harass) and/or physical injury (harm) distance thresholds for Spotted Owls. Distances are to a known occupied spotted owl nest tree or suitable nest trees in unsurveyed habitat.

Project Activity	**No Effect (Mar 1 – Sep 30)**	**NLAA** "may affect" disturbance distance **(Mar 1 – Sep 30)**	**LAA – Harass** early nesting season disruption distance (**Mar 1–Jul 15**[11])	**LAA – Harass** late nesting season disruption distance (**Jul 16**[11]**–Sep 30**)	**LAA – Harm** direct injury and/or mortality (**Mar 1 – Sep 30)**
Light maintenance (e.g., road brushing and grading) and heavily-used roads	>0.25 mile	≤ 0.25 mile	NA[1]	NA	NA
Log hauling on heavily-used roads (FS maintenance levels 3, 4, and 5)	>0.25 mile	≤ 0.25 mile	NA[1]	NA	NA
Chainsaws (includes felling hazard/danger trees)	>0.25 mile -	66 yards to 0.25 mile -	≤ 65 yards[2]	NA	NA
Heavy equipment for road construction, road repairs, bridge construction, culvert replacements, piling removal, etc.	>0.25 mile	66 yards to 0.25 mile	≤ 65 yards[2]	NA	NA
Helicopter: Chinook 47d	>0.5 mile	266 yards to 0.5 mile	≤ 265 yards[5]	≤ 100 yards[6] (hovering only)	NA
Helicopter: Boeing Vertol 107, Sikorsky S-64 (SkyCrane)	>0.25 mile	151 yards to 0.25 mile	≤ 150 yards[7]	≤ 50 yards[6] (hovering only)	NA
Helicopters: K-MAX, Bell 206 L4, Hughes 500	>0.25 mile	111 yards to 0.25 mile	≤ 110 yards[8]	≤ 50 yards[6] (hovering only)	NA

Table 9. (Spotted Owl) Footnotes:

1. NA = not applicable. Based on information presented in Temple and Guttiérez (2003, p. 700), Delaney et al. (1999, p. 69), and Kerns and Allwardt (1992, p. 9), we anticipate that spotted owls that select nest sites in close proximity to open roads either are undisturbed by or habituate to the normal range of sounds and activities associated with these roads.
2. Based on Delaney et al. (1999, p. 67) which indicates that spotted owl flush responses to above-ambient equipment sound levels and associated activities are most likely to occur at a distance of 65 yards (60 m) or less.

3. Based on an estimated 92 dBA sound-contour (approximately 265 yards) from sound data for the Chinook 47d presented in Newman et al. (1984, Table D.1).
4. Rotor-wash from large helicopters is expected to be disruptive at any time during the nesting season due the potential for flying debris and shaking of trees located directly under a hovering helicopter. The hovering rotor-wash distance for the Chinook 47d is based on a 300-ft radius rotor-wash zone for large helicopters hovering at < 500 above ground level (from WCB 2005, p. 2 – logging safety guidelines). We reduced the hovering helicopter rotor-wash zone to a 50-yard radius for all other helicopters based on the smaller rotor-span for all other ships.
5. Based on an estimated 92 dBA sound contour from sound data for the Boeing Vertol 107 the presented in the San Dimas Helicopter Logging Noise Report (USFS 2008, chapters 5, 6).
6. The estimated 92 dBA sound contours for these helicopters is less than 110 yards (e.g., K-MAX (100 feet) (USFS 2008, chapters 5, 6), and Bell 206 (85-89 dbA at 100 m)(Grubb et al. 2010, p. 1277).

Western Snowy Plover (*Charadrius nivosus* ssp. *nivosus*) and Critical Habitat (Pacific Coast DPS).

Description. The Pacific coast population of western snowy plovers (WSP) breeds on coastal beaches from southern Washington to southern Baja California, Mexico. Plovers lay their eggs in shallow depressions in sandy or salty areas that generally do not have much vegetation. Because the sites they choose are in loose sand or soil, nesting habitat is constantly changing under the influence of wind, waves, storms, and encroaching plants. The nesting season extends from early March through late September. Fledging of late-season broods may extend into the third week of September throughout the breeding range.

Conservation Measures:

1) Prior to initiating restoration activities on coastal beaches, project cooperators will coordinate with local USFWS plover monitoring biologists to identify western snowy plover nesting areas.
2) Restoration activities occurring on coastal beaches will not occur within western snowy plover nesting or foraging habitat from March 15 to September 30.
3) Ground disturbing activities on coastal dunes will occur during the fall and winter months before the plover's critical nesting period (i.e., March 15-September 15). These activities will include the control or removal of invasive and non-native vegetation on coastal dunes through manual, mechanical, and chemical methods.
4) Proposed restoration activities generating noise above ambient levels will not occur within 0.4 km (0.25 mi) of a western snowy plover occupied beach during the critical nesting period. Project cooperators will coordinate with local plover monitoring biologists to identify these areas.
5) In-channel nutrient enhancement activities will not occur in coastal streams between March 15 - September 15 nor within 15 km (9.3 mi) of a western snowy plover-occupied beach in order to not attract potential avian or mammalian predators to project sites.
6) Project personnel must take appropriate measures not to attract potential avian or mammalian predators to project sites in WSP habitat. These include eliminating human-introduced food sources, properly disposing of organic waste, and not planting vegetation that could be potential cover or perches for predators near designed critical or suitable habitats.
7)

APPENDIX C: Species-Specific Conservation Measures for Invertebrates.

Within the Columbia River Basin, BPA-funded activities may occur in areas that are near or occupied by the following invertebrate ESA-listed species: (a) Fender's blue butterfly (*Icaricia icarioides fenderi*); (b) Oregon silverspot butterfly (*Speyeria zerene Hippolyta*); (c) Taylor's (Edith's) checkerspot butterfly (*Euphydryas editha taylori*); (d) Banbury Springs limpet (*Lanx* sp.); (e) Bliss Rapids snail (*Taylorconcha serpenticola*); (f) Snake River Physa snail (*Physa natricina*); and (g) Bruneau Hot springsnail (*Pyrgulopsis bruneauensis*).

Fender's Blue Butterfly (*Icaricia icarioides fenderi*) and Critical Habitat.

Description. Fender's blue butterfly occurs in native prairie habitats. Most Willamette Valley prairies are early seral (one stage in a sequential progression) habitats, requiring natural or human-induced disturbance for their maintenance. The vast majority of these prairies would eventually be forested if left undisturbed. Fender's blue butterfly is typically found in native upland prairies, dominated by red fescue (*Festuca rubra*) and/or Idaho fescue (*F. idahoensis*).
The butterfly uses three lupine species as larval food plants which include: Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*), sickle-keeled lupine (*L. albicaulis*), and spur lupine (*L. arbustus*). Kincaid's lupine (listed as Threatened), occurs on a few small prairie remnants in the Willamette Valley. Adult Fender's blue butterflies use a variety of plants as nectar sources, which includes: tapertip onion (*Allium acuminatum*), narrowleaf onion (*Allium amplectens*), Tolmie's mariposa lily (*Calochortus tolmiei*), small camas (*Camassia quamash*), clearwater cryptantha (*Cryptantha intermedia*), Oregon sunshine (*Eriophyllum lanatum*), Oregon geranium (*Geranium oreganum*), toughleaf iris (*Iris tenax*), pale flax (*Linum angustifolium*), blue flax (*Linum perenne*), Meadow checkermallow (*Sidalcea campestris*), rose checkermallow (*Sidalcea virgata*), Amercian vetch (*Vicia Americana*), bird vetch (*V. cracca*), common vetch (*V. sativa*), and tiny vetch (*V. hirsuta*). Native plants that occur on native upland prairies serve as herbaceous indicators of prairie condition. These dry, fescue prairies make up the majority of habitat for Fender's blue butterfly. Although Fender's blue butterfly is occasionally found on steep, south-facing slopes and barren rocky cliffs, it does not appear to thrive in the xeric oatgrass communities often found there.

The life cycle of a Fender's blue butterfly begins in late spring or early summer when an adult female deposits an egg on the underside of a Kincaid's lupine leaflet. The egg soon hatches and the larva feeds on lupine leaflets. The larva may pass through one molt before dropping to the ground in mid-June or July where it goes into hibernation for the fall and winter. In the following March or April, the larva begins to feed on fresh lupine leaflets again. After 3 to 4 additional molts, it ecloses into a butterfly in May and begins the cycle again.

Conservation Measures:

1) Within the Willamette Valley, pre-project surveys will be conducted by a qualified biologist for adult Fender's blue butterflies during the mid-May to early-July flight period on any project site that supports or may support Kincaid's lupine, spur lupine, or sickle-keeled lupine. Information acquired through population and vegetation surveys will be used to direct restoration/recovery activities away from key breeding areas.

2) Restoration activities will not remove or disturb Kincaid's lupine, spur lupine, or sickle-keeled lupine or remove habitat including the following nectar sources: tapertip onion, narrowleaf onion, Tolmie's mariposa lily, small camas, clearwater cryptantha, Oregon sunshine, Oregon geranium, toughleaf iris , pale flax , blue flax, Meadow checkermallow, rose checkermallow, Amercian vetch, bird vetch, common vetch, and tiny vetch within the range of the Fender's blue butterfly.
3) Manual and mechanical treatments for invasive and non-native plant control may occur adjacent to occupied habitat or critical habitat for Fender's blue butterfly but will not occur during the butterfly flight period from mid-April to late May to avoid impacts to adults. Occupied areas include all nectar habitat within 0.5 km of occupied lupine habitat. Mowing, tilling, disking, plowing, excavation or other extensive ground disturbing activities will not occur within 20 m (65 feet) of critical habitat or known Fender's blue butterfly or Kincaid's, spur, or sickle-keeled lupine occupied habitats.
4) Livestock grazing will not occur in critical habitat or any habitat occupied by the Fender's blue butterfly.
5) Hand applications of herbicides may be used to control or remove invasive native and non-native vegetation in prairie habitats but will not occur within a minimum distance of 20 m (65 feet) of occupied habitat or critical habitat for Fender's blue butterfly. Areas known to have high nectar plant densities will also be avoided. Herbicide treatments must be followed with native seed or plant introductions to minimize or eliminate the establishment of invasive and non-native vegetation.
6) Broadcast herbicide applications will not be used within 275 m (900 feet) of occupied habitat or critical habitat for Fender's blue butterfly.

Oregon Silverspot Butterfly (*Speyeria zerene hippolyta*) and Critical Habitat

Description. The Oregon silverspot butterfly occupies three types of grassland habitat. One type consists of marine terrace and coastal headland salt-spray meadows (e.g., Cascade Head, Bray Point Rock Creek-Big Creek, and portions of Del Norte sites). The second consists of stabilized dunes as found at the Long Beach Peninsula, Clatsop Plains, and the remainder of Del Norte. Both of these habitats are strongly influenced by proximity to the ocean, mild temperatures, high rainfall, and persistent fog. The third habitat type consists of montane grasslands found on Mount Hebo and the Fairview Mountains. Conditions at these sites include colder temperatures, significant snow accumulations, less coastal fog, and no salt spray.

The most important feature of the habitat of the Oregon silverspot butterfly is the presence of the early blue violet (*Viola adunca*). This plant is normally the only species on which the Oregon silverspot butterfly can successfully feed and develop as larva. This plant is part of the salt-spray meadow vegetation and is an obligatory component of the butterfly's habitat. Other features of optimum habitat include moderate grass cover, including red fescue used as a shelter for larvae, and a mixture of herbaceous plants such as California aster (*Aster chilensis*) used for nectaring by adults. Apparently the more inland meadow sites occupied by related subspecies of silverspots are not accessible to Oregon silverspot butterfly. The habitat is similar on Mount Hebo with early blue violet as the key component. The distribution and composition of the flora may differ slightly, but

the habitat functions similarly to the salt-spray meadow. The shallow soil apparently helps to keep this area in the meadow stage.

Upon eclosion (metamorphosis of the pupa into the adult butterfly), the adults generally move out of the meadows into the fringe of conifers or brush where there is shelter for more efficient heat conservation and nectaring flights. The forest shelter may also be used for courtship and mating. Where such sheltered conditions exist, the adults will use various nectar sources, including native and exotic plants, particularly composites such as the native California aster, yarrow (*Achillea millefolium*), Canada goldenrod (*Solidago canadensis*), Pearly everlasting (*Anaphalis margaritacea*), and Indian thistle (*Cirsium edule*) as well as some exotics such as false dandelion (*Hypochaeris radicata*) and tansy ragwort (*Senecio jacobaea*).

The life history of the Oregon silverspot butterfly revolves around its obligatory host plant, the early blue violet. Females oviposit up to 200+ eggs singly amongst the salt-spray meadow vegetation near the violet host plant, usually in late August and early September. Sites with good sun exposure are favored. The eggs hatch in approximately 16 days and the newly hatched larvae wander short distances to find a suitable site for diapause (suspended growth for overwintering). The larvae end diapause sometime in early spring and begin to feed on the violet leaves. As the larvae grow, they pass through five molts (shed outer covering) before they enter the intermediate stage between larval and adult forms (pupate). Approximately 2o or more weeks later, the butterflies emerge from their pupal case (eclose). Adult emergence starts in July and extends into September. Shortly thereafter, their wings and other body parts harden and they escape the windy cool meadows for nearby forests or brush lands.

Mating occurs through August and September. Those individuals (male and female) which are most efficient at basking and maintaining proper body temperature will be able to operate longer and deeper in the windy meadow zone, thus improving their opportunities for successful reproduction.

Conservation Measures:

1) Population surveys for Oregon silverspot butterfly will be required prior to restoration activities proposed in areas with suitable habitat for the butterfly. Surveys using direct observation will be conducted for Oregon silverspot butterfly from mid to July-September 30 during the flight period using a modified Pollard walk method in occupied habitat (Pickering et al. 1992). Habitat surveys for early blue violets will be done during the peak violet blooming period April-May. Information acquired through population and vegetation surveys will be used to direct restoration/recovery activities away from key breeding areas.
2) Manual and mechanical treatments will only be used to maintain or increase meadow size in unsuitable habitat areas which do not contain early blue violets or Oregon silverspot butterfly larvae or pupae. These activities may occur adjacent to occupied habitat but will not occur during the butterfly flight period from mid to July-September 30 to avoid impacts to adults. Mowing, tilling, disking, plowing, excavation or other extensive ground disturbing activities will not occur during the butterfly flight period or within 20 m (65 feet) of critical habitat or known Oregon silverspot butterfly or early blue violet occupied habitats.

3) Livestock grazing will not occur in critical habitat or any habitat occupied by the Oregon silverspot butterfly or early blue violet.
4) Hand application of herbicides may be used to control or remove invasive native and non-native plants, but will not occur within a minimum distance of 20 m (65 feet) of occupied habitat or critical habitat for the Oregon silverspot butterfly. Areas known to have high nectar plant densities will also be avoided (see above description of nectar species). Herbicide treatments must be followed with native seed or plant introductions to minimize or eliminate the establishment of invasive and non-native vegetation.
5) Broadcast herbicide applications will not be used within 275 m (900 feet) of occupied habitat or critical habitat for Oregon silverspot butterfly.

Taylor's (Edith's) Checkerspot Butterfly (*Euphydryas editha taylori*) and Proposed Critical Habitat.

Description. Habitat requirements for the Taylor's checkerspot butterfly consist of open grasslands and grass/oak woodland sites where food plants for larvae and nectar sources for adults are available. These sites include coastal and inland prairies on post-glacial, gravelly outwash, and balds. In Oregon, Taylor's checkerspot butterflies occur along the BPA right-of-way corridor in an area known as Fitton Green in Benton County and on grassland openings within the Beazell Memorial Forest in Benton County. These two locations for Taylor's checkerspot butterfly are currently the only occupied patches known from Oregon. Known occurrences in Washington are located outside the proposed action area.

Taylor's checkerspot larvae have been documented feeding on members of the figwort or snapdragon family (*Scrophulariaceae*), which includes the paintbrush (*Castilleja hispida*). They also feed on native and non-native *Plantago* spp. in the plantain family (*Plantaginacea*). The population in Oregon depends upon the narrow-leaf plantain (*P. lanceolata*). Adults emerge in the spring, during April and May, when they mate and lay clusters of as many as 1,200 eggs. Larvae emerge and grow until the fourth or fifth instar. Larvae feeding on wildflowers in Puget Trough have been documented to enter diapause in mid-June to early July, hibernating through the winter.

Conservation Measures:

1) Population surveys for Taylor's checkerspot butterfly will be required prior to restoration activities proposed in areas with suitable habitat for the butterfly. Surveys using direct observation will be conducted for Taylor's checkerspot butterfly from April through May during the flight period using a survey approved by the ODFW office. Information acquired through population surveys will be used to direct restoration/recovery activities away from key breeding areas.
2) Manual and mechanical treatments for invasive and non-native plant control may occur adjacent to occupied habitat or critical habitat for Taylor's checkerspot butterfly but will not occur during the butterfly flight period from April to May to avoid impacts to adults. Mowing, tilling, disking, plowing, excavation or other extensive ground disturbing activities will not occur

within 20 m (65 feet) of known Taylor's checkerspot butterfly occupied habitats or proposed critical habitat.
3) Livestock grazing will not occur in critical habitat or any habitat occupied by the Taylor's checkerspot butterfly.
4) Hand application of herbicides may be used to control or remove invasive native and non-native vegetation but will not occur within a minimum distance of 20 m (65 feet) of occupied habitat or proposed critical habitat for Taylor's checkerspot butterfly. Areas known to have high nectar plant densities will also be avoided. Herbicide treatments must be followed with native seed or plant introductions to minimize or eliminate the establishment of invasive and non-native vegetation.
5) Broadcast herbicide applications will not be used within 275 m (900 feet) of occupied habitat or critical habitat for Taylor's checkerspot butterfly.

Banbury Springs Limpet (*Lanx* sp.).

Description. *Lanx* requires cold, clear, and well-oxygenated water with swift currents. *Lanx* are found on smooth basalt, boulders, or cobble-sized grounds ranging from 2 to 20 inches deep, but they avoid areas with green algae. Currently this species only exists at four cold-spring locations in Idaho that are isolated from each other: Thousand Springs, Box Canyon Springs, Briggs Springs, and Banbury Springs.

Conservation Measure:

Prior to initiating restoration activities in Thousand Springs, Box Canyon Springs, Briggs Springs, and Banbury Springs in Gooding County, Idaho contact the appropriate USFWS field office to confirm the project will have *no effect* or is *not likely to adversely affect* the limpet.

Bliss Rapids Snail (*Taylorconcha serpenticola*).

Description. The Bliss Rapids snail occurs in cold water springs and spring-fed tributaries to the Snake River, and in some reaches of the Snake River. The Bliss Rapids snail is primarily found on cobble boulder substrate, and in water temperatures between 59 and 61 degrees Fahrenheit. Recent surveys indicate the species is distributed discontinuously over 22 miles, from River Mile (RM) 547-560, RM 566-572, and at RM 580 on the Snake River. The species is also known to occur in 14 springs or tributaries to the Snake River. The species does not occur in reservoirs.

Conservation Measure:

Prior to initiating restoration activities in habitat occupied by the Bliss Rapids snail, contact the appropriate USFWS field office to confirm the project will have *no effect* or *is not likely to adversely affect* the Bliss Rapids snail.

Snake River Physa Snail (*Physa natricina*)

Description. The Snake River physa snail occurs in the mainstem Snake River, between rkm 890 to 1086 (RM 553 to 775), inhabiting areas of swift current on sand to boulder-sized substrate.

Conservation Measure:

Prior to initiating restoration activities in habitat occupied by the Snake River physa snail, contact the appropriate USFWS field office to confirm the project will have *no effect* or *is not likely to adversely affect* the Snake River physa snail.

Bruneau Hot Springsnail (*Pyrgulopsis bruneauensis*).

Description. The Bruneau Hot springsnail is only found in geothermal springs and seeps along an 8-kilometer length of the Bruneau River in Southwest Idaho. It prefers wetted rock faces of springs and flowing water with large cobbles and boulders. Spring water temperatures are the predominant factor that determines the springsnail's distribution and abundance. The springsnail requires constant spring water temperatures to survive.

Conservation Measure:

Prior to initiating restoration activities in habitat occupied by the Bruneau Hot springsnail, contact the appropriate USFWS field office to confirm the project will have *no effect* or *is not likely to adversely affect* the Bruneau Hot springsnail.

APPENDIX D: Species-Specific Conservation Measures for Plants.

Within the Columbia River Basin, BPA funded activities may occur in areas that are near or occupied by the following ESA-listed plant species; Bradshaw's desert-parsley (*Lomatium bradshawii*), Cook's lomatium (*Lomatium cookii*) and their critical habitat, Gentner's fritillary (*Fritillaria gentneri*), Golden paintbrush (*Castilleja levisecta*), Howell's spectacular thelypody (*Thelypodium howellii spectabilis*), Kincaid's lupine (*Lupinus sulphureus* ssp. Kincaidii) and their critical habitat, large-flowered wooly meadowfoam (*Limnanthes floccosa* ssp. *grandiflora*) and their critical habitat, Malheur wire-lettuce (*Stephanomeria malheurensis*) and their critical habitat, McFarlane's four o'clock (*Mirabilis macfarlanei*), Nelson's checkermallow (*Sidalcea nelsoniana*), rough popcorn flower (*Plagiobothrys hirtus*), showy stickseed (*Hackelia venusta*), slickspot peppergrass (*Lepidium papilliferum*) and their proposed critical habitat, Spalding's catchfly (*Silene spaldingii*), Umtanum desert buckwheat (*Eriogonum codium*) and their critical habitat, Ute ladies' tresses (*Spiranthes diluvialis*), water howellia (*Howellia aquatilis*), Wenatchee Mountains checkermallow (*Sidalcea oregana* var. *calva*) and their critical habitat, western lily (*Lilium* occidentale), Willamette daisy (*Erigeron decumbens*) and their critical habitat, and White Bluffs bladderpod (*Physaria douglasii* ssp. *tuplashensis*) and their critical habitat.

Surveys:

If an ESA- listed plant is located within the county where a project is proposed (based on a review of the most recent USFWS county species list), contact the appropriate USFWS field office to determine whether there are known ESA-listed plants or suitable unsurveyed habitat for ESA-listed plants in the project area. If a known site of an ESA-listed plant is within 0.4 km (0.25 mi) of the project action area, or suitable or potential habitat may be affected by project activities, then a BPA contract botanist will conduct a site visit/vegetation survey to determine whether ESA-listed plants are within the project area. This visit and survey will be conducted at the appropriate time of year to identify the species and determine whether individual listed plants or potential habitat are present and may be adversely affected by project activities (**Table 10**). If listed plants are present and likely to be adversely affected by the project, then an individual consultation with the USFWS under Section 7 of the ESA must be initiated.

Table 10. Optimal Survey Times for Flowering Periods of Listed Plants in Oregon and Washington.

Species	Optimal Survey Time Period*
Bradshaw's desert-parsley (*Lomatium bradshawii*)	April to mid-May
Cook's lomatium (*Lomatium cookii*)	Mid-March through May (varies with spring moisture)
Gentner's fritillary (*Fritillaria gentneri*)	April to June
Golden paintbrush (*Castilleja levisecta*)	April to September

Howell's spectacular thelypody (*Thelypodium howellii* ssp. *spectabilis*)	June through July
Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*)	May through July
Large-flowered wooly meadowfoam (*Limnanthes floccosa* ssp. *grandiflora*)	Mid-March to May (varies with spring moisture)
Malheur wire-lettuce (*Stephanomeria malheurensis*)	July through August
MacFarlane's four o'clock (*Mirabilis macfarlanei*)	May through June
Nelson's checkermallow (*Sidalcea nelsoniana*)	Late May to Mid-July
Rough popcornflower (*Plagiobothrys hirtus*)	Mid-June to early July
Showy stickseed (*Hackelia venusta*)	May to July
Slickspot peppergrass (*Lepidium papilliferum*)	Mid-May to Mid-July
Spalding's satchfly (*Silene spaldingii*)	June to September
Umtanum desert buckwheat (*Eriogonum codium*)	June through July
Ute ladies'-tresses (*Spiranthes diluvialis*)	July to late August
Water howellia (*Howellia aquatilis*)	May through August
Wenatchee Mountains checkermallow (*Sidalcea oregano* var. *calva*)	June to Mid-August
Western lily (*Lilium occidentale*)	May to July
Willamette daisy (*Erigeron decumbens* var. *decumbens*)	Mid-June to early July
White Bluffs bladderpod (*Physaria douglasii* ssp. *tuplashensis*)	Mid-May to Mid-June

Conservation Measures:

For all of the above mentioned ESA-listed plant species that may occur in project areas within the scope of this proposed action, the following criteria will be applied:

1) Prior to restoration activities at areas with listed plants, all project staff will be familiarized with identification of any ESA-listed plants in the area and will be aware of ESA-listed plant locations within the project area.

2) Access points and tracks within occupied or suitable habitats for ESA-listed plant species must be limited and clearly marked to avoid soil compaction and damage to ESA-listed plant species from vehicles and/or foot traffic.
3) Revegetation activities in habitats where ESA-listed plants may occur or within their critical habitat must be approved by the USFWS field office prior to implementation.
4) Dust-abatement additives and stabilization chemicals will not be applied within 10 m (33 feet) of listed plants or critical habitat for listed plants.
5) Restoration activities will avoid actions that cause soil compaction, erosion, or deposition, or change the hydrology or drainage of a site with listed plants or critical habitat for listed plants.
6) Vehicle and equipment staging areas will be located at least 15 m (50 feet) from listed plants or critical habitat for listed plants.

Invasive Plant Control.

1) Listed plants must be clearly flagged or fenced prior to restoration activities to avoid inadvertently affecting listed plants.
2) When using manual methods at project sites occupied by a federally listed plant species, a buffer of 3 m (10 feet) will be required around green growing plants until after senescence. Manual control and removal activities may occur year round in occupied habitat or critical habitat for listed plants except at sites occupied by listed butterflies (see above for information on Fender's blue butterfly). Chips, sawdust, brush accumulations, and other plant waste materials will be removed from project site to the extent possible.
3) Mowing, tilling, disking, plowing, excavation, raking or sod rolling (i.e., larger scale sub-surface ground disturbances) will not occur within 10 m (33 feet) of known federally listed plant species or critical habitat for listed plants at any time. Listed plants must be clearly flagged or fenced prior to restoration activities to avoid inadvertently affecting listed plants. Additional requirements for mechanical treatments include the following.
    a) Use of low ground impact (e.g., rubber tired or tracked) and appropriately sized equipment to prevent soil compaction.
    b) Mower deck heights must be set to prevent soil gouging.
    c) Chips, sawdust, brush accumulations, and other plant waste materials must be removed from project site to the extent possible.
    d) Mechanical treatments must not alter the existing hydrology at a project site.
    e) All equipment must be cleaned of invasive and non-native plant materials before entering a project site occupied by a listed plant species to prevent the dispersal of seeds or other reproductive plant parts.
    f) Ground-disturbance activities (*e.g.* tilling, disking, and plowing) must be followed with native seed or plant introductions to minimize or eliminate the establishment of invasive and non-native vegetation.
4) Herbicides applications may be used to control or remove invasive native and non-native vegetation in accordance with the conservation measures identified in the proposed action of the biological assessment.
5) Herbicides will not be applied at locations where nearby listed plants may be in the path of surface runoff from the project.

6) Hand applications of herbicide will maintain a minimum distance of 5 m (16 feet) from listed plants or critical habitat. Spraying will only take place during calm periods (wind velocities less than 3 mph). Listed plants will be physically shielded (e.g., covered with buckets or some other barrier that will not harm the plants) as needed to protect them from spray or drift, unless they are dormant; plants will be uncovered immediately after spraying has been completed.
7) Broadcast applications of herbicide will not occur within 275 m (900 feet) of occupied habitat or critical habitat for listed plants.
8) Herbicide treatments must be followed with native seed or plant introductions to minimize or eliminate the establishment of invasive and non-native vegetation.
9) The following conservation measures are specific for the type of herbicide application to be used at project sites when listed plant species are nearby.
    a) Wick and wipe applications
        i) The appropriate type and size of equipment will be used to apply herbicides onto the target foliage and stems.
        ii) Herbicide applications will be made in a manner that prevents herbicide runoff onto the ground.
    b) Basal bark applications
        i) Applicators will avoid unnecessary run-off when applying herbicide to stems of target vegetation.
        ii) Herbicide applications will be applied using the lowest nozzle pressure that will allow adequate coverage.
        iii) Applicator will apply herbicides while facing away from listed plants.
    c) Spot and patch applications
        i) Herbicides applications may be used with hand applicators.
        ii) Herbicide will be applied in a manner where the spray is directed towards the application area and away from listed plants.
        iii) The spray nozzle will be kept within three feet of the ground when herbicide is being applied within 50 feet of listed plants. Beyond 50 feet, the nozzle may be held up to six feet above ground if needed to treat taller clumps of competing vegetation.
    d) Cut surface and hack and squirt/injection applications. Herbicide applications will be made in a manner that prevents herbicide runoff onto the ground.
    e) Spot applications of dry granules, pellets, and dust. A 5-m (16-foot) buffer will be maintained between listed plants and application areas to prevent exposure to listed plants.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