HIP III HANDBOOK

Abbreviated Guidance of General and Specific Conservation Measures, Biological Opinion Requirements and RRT Guidance

Version 2.3

TABLE OF CONTENTS

Introduction

This handbook represents a concise summary of the requirements of two biological opinions (BOs) 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 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 categories of action presented in this handbook represent construction related activities within the Fish Passage Restoration and the River, Stream, Floodplain and Wetland Restoration activity categories. Please refer to the BOs for information on other activity categories (such as invasive weed treatments) not mentioned here.

Projects that cannot meet the conservation measures presented in this handbook will require a project specific variance or a separate section 7 consultation.

For USFWS terrestrial species, species specific conservation measures may apply. Please refer to the USFWS BO for additional requirements.

If at any time there are uncertainties in implementing the proposed action's conservation measures or interpreting the reasonable and prudent measures and terms and conditions of the HIP III BOs, or doubts about the consistency with the HIP III BOs, the project sponsor, in conjunction with BPA staff, and if necessary the RRT, will coordinate with the Services to address these concerns and resolve any outstanding issues. If the project sponsor or BPA EC staff determines that a proposed action is not consistent with the HIP III BOs, or 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.

Both BOs can be downloaded from BPA's Environmental Compliance Overview Webpage:
http://efw.bpa.gov/contractors/eccomplianceoverview.aspx

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 variations from criteria specified herein. 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 covered by the opinion. Minor variances must be authorized by both the NMFS Branch Chief and USFWS Field Office Supervisor. Contact your EC lead for more information.

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 considered in the Services BOs. Variance requests can be made on the PNC form, which can then be submitted and approved by the Services via email correspondence.

Variance requests may be submitted and approved by email correspondence and will include:

1) Name and brief description of project, location of project and 6th field HUC number.
2) Define the requested variance and the relevant criterion by page number.
3) Current environmental conditions (current flow and weather conditions).
4) 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
5) Include as attachments any necessary approvals by state agencies.

Changes from HIPII to HIPIII

The HIP III represents a reorganization and expansion of the original HIP II activity categories. By using existing Biological Opinions on similar restoration based programmatic actions BPA has sought to take advantage of existing successful approaches and to promote regional consistency in design criteria for similar project types. The documents used: USFWS Partners for Fish and Wildlife, USFS - BLM Aquatic Restoration Biological Opinion (ARBO 1), USFS - BLM Aquatic Restoration Biological Opinion (ARBO 2 Draft BA), NOAA Restoration Center's Biological Opinion, USACE Standard Local Operating Procedures for Endangered Species (SLOPES 4) (Restoration and Transportation) (in Oregon), USACE Washington State Fish Passage and Habitat Enhancement Restoration Programmatic Consultation (SPIF), and the BPA HIP II.

Using project design criteria, conservation measures, and language from these existing programs, BPA has added activities that are new to the HIP such as piling removal, low flow consolidation, headcut and grade stabilization, boulder structures, engineered logjams, and channel reconstruction. BPA also widened the action area for HIP III beyond the Columbia River Basin in Oregon, Washington and Idaho to include western Montana and Oregon coastal river basins from the Columbia River south to Cape Blanco in southwestern Oregon, to reflect anticipated HIP expenditures in these geographic areas.

To mitigate the risk from these new activity categories, BPA has proposed to form an internal review team (RRT) who shall provide a design review high risk project in accordance with design complexity and significance. Projects shall be evaluated to (a) meet the obligations set forth in any of the BOs within the action area, (b) ensure consistency between projects, (c) maximize ecological benefits of restoration and recovery projects (d) provide technical assistance (e) provide a forum for interagency communication, and (d) ensure consistent use and implementation throughout the geographic area covered by the BOs.

1. **General Aquatic Restoration Measures Applicable to All Actions**
    - Added inwater work window information for Bull Trout and Oregon Chub.
    - Updated work area isolation and fish salvage with latest NMFS guidelines.
    - Updated general conservation measures to correspond with existing opinions on similar restoration-based programmatic actions.
2. **General and Species Specific Conservation Measures for Terrestrial Plants, Wildlife, and Aquatic Invertebrates.**
    - Added general conservation measures for Terrestrial species and critical habitats.
    - Added species specific herbicide limitations in areas where ESA-listed terrestrial species may occur.
3. **Fish Passage Restoration.**

    Profile Discontinuities.

    a. **Dams, Water Control or Legacy Structure Removal.**
        - Increased Dam removal activities from max of 3 feet to max of 10 feet.

- Added additional conservation measures.

b. Consolidate, or Replace Existing Irrigation Diversions.

- Added replacement of diversions with engineered riffles (including cross vanes, W weirs, or A frame weirs).
- Small instream rock structures to facilliate pump station operations are now allowed. Added additional conservation measures.

c. Headcut and Grade Stabilization.

- New category that includes boulder weirs, roughened channels, and engineered log jams installed for the primary purpose of grade control.

d. Low Flow Consolidation.

- New category added for temporary placement of sandbags, hay bales, and ecology blocks to provide depths and velocities passable to upstream migrants.
- Added modification of dam aprons with shallow depths.

e. Providing Fish Passage at an Existing Facility.

- Little or no change.

Transportation Infrastructure.

a. Bridge and Culvert Removal or Replacement.

- Added additional conservation measures and technical specifications.

b. Bridge and Culvert Maintenance.

- Little or no change.

c. Installation of Fords.

- Added additional conservation measures and restrictions.

4. River, Stream, Floodplain, and Wetland Restoration.

a. Improve Secondary Channel and Wetland Habitats.

- Added additional conservation measures and technical specifications.
- Replaced removal amount of 25 CY to <10% of naturally accumulated sediment.

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

- Made this its own category with additional conservation measures and technical specifications.

c. Protect Streambanks Using Bioengineering Methods.

- Added additional conservation measures and technical specifications for rock, wood, and gravel.
- Allowed for use of structural connections for special circumstances.
- Removed restriction of a maximum of 250 linear feet.

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

- Added additional conservation measures and technical specifications.

e. Riparian Vegetation Planting.

- Little or no change.

f. New Channel Reconstruction.

- Entirely new category of action.

5. Invasive and Non-Native Plant Control.

a. Manage Vegetation using Physical Controls.

- Simplified conservation measures to resemble NMFS Partners Programmatic.

b. Manage Vegetation using Herbicides.

- Simplified conservation measures to resemble NMFS Partners Programmatic. Added restrictions to herbicide lists when ESA-listed terrestrial species are present.

6. **Piling Removal.**
   - Entirely new category of action.
7. **Road and Trail Erosion Control, Maintenance, and Decommissioning.**
   - **c. Maintain Roads.**
     - Little or no change.
   - **d. Decommission Roads.**
     - Little or no change.
8. **In-channel Nutrient Enhancement.**
   - No Change
9. **Irrigation and Water Delivery/Management Actions.**
   - Added restriction that irrigation efficiency actions will only be funded with some guarantee that water savings are protected as instream water rights.
   - **e. Convert Delivery System to Drip or Sprinkler Irrigation.**
     - No change.
   - **f. Convert Water Conveyance from Open Ditch to Pipeline or Line Leaking Ditches or Canals.**
     - No change.
   - **g. Convert from Instream Diversions to Groundwater Wells for Primary Water Sources.**
     - No change.
   - **h. Install or Replace Return Flow Cooling Systems.**
     - No change.
   - **i. Install Irrigation Water Siphon Beneath Waterway.**
     - No change.
   - **j. Livestock Watering Facilities.**
     - No change.
   - **k. Install New or Upgrade/Maintain Existing Fish Screens.**
     - Added provision that state agencies can submit a streamlined report for coverage under HIP3.
10. **Fisheries, Hydrologic, and Geomorphologic Surveys.**
    - No Change
11. **Special Actions (for Terrestrial Species).**
    - **a. Install/develop Wildlife Structures.**
      - No Change
    - **b. Fencing construction for Livestock Control**
      - No Change
    - **c. Implement Erosion Control Practices.**
      - No Change
    - **d. Plant Vegetation.**
      - No Change
    - **e. Tree Removal for LW Projects.**
      - New requirements that apply only in areas occupied by spotted owl and marbled murrelete.

The categories of action addressed in the HIP III BO are summarized on the following page.

HIP III BO Categories of Action

Found in this Handbook

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 and Non-Native 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 LW Projects.

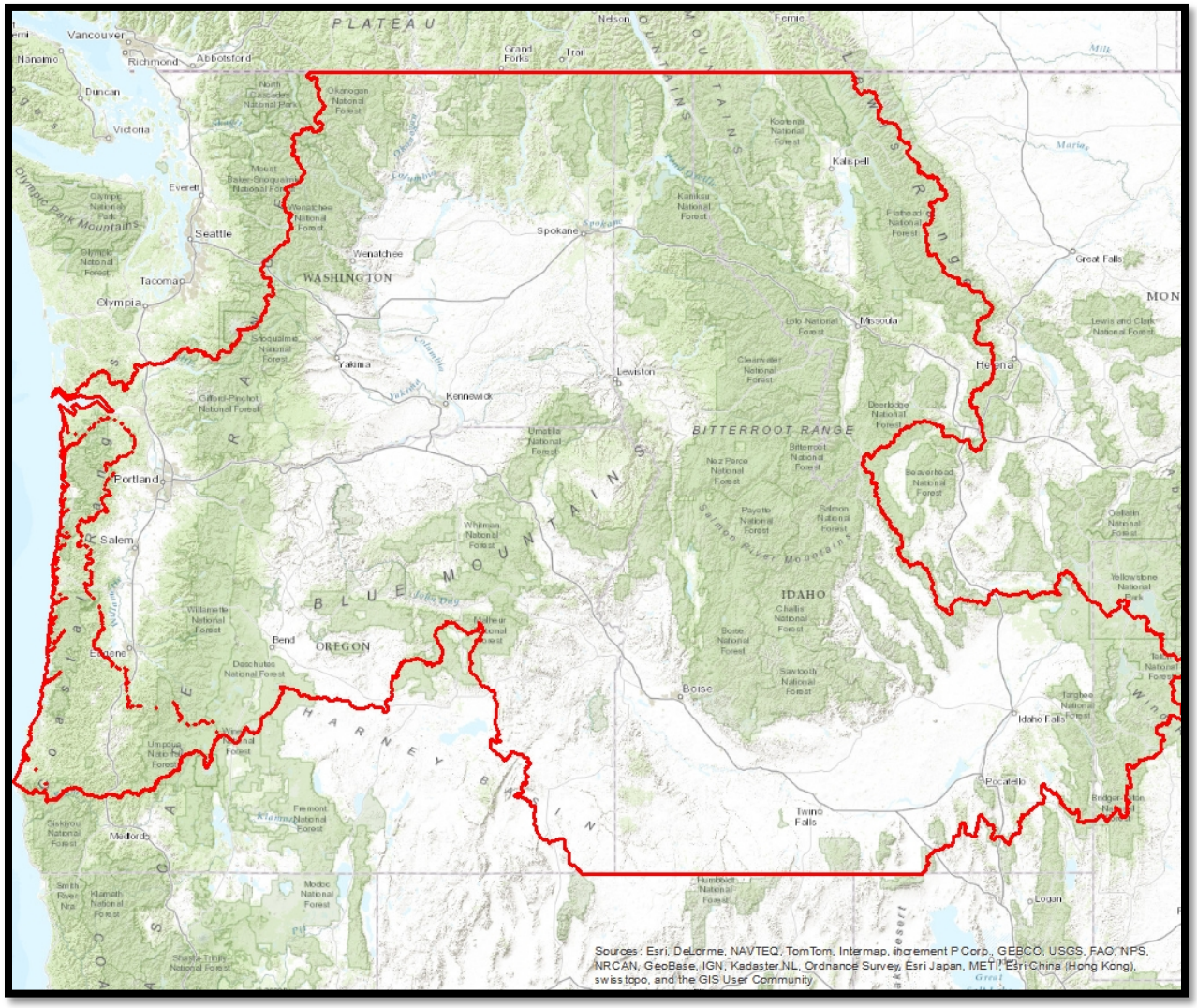
ESA-Listed Species Covered Under HIPIII

ANADROMOUS SALMONIDS	
Lower Columbia River Chinook salmon	*Oncorhynchus tshawytscha*
Upper Willamette River spring-run Chinook salmon	*Oncorhynchus tshawytscha*
Upper Columbia River spring-run Chinook salmon	*Oncorhynchus tshawytscha*
Snake River spring/summer-run Chinook salmon	*Oncorhynchus tshawytscha*
Snake River fall-run Chinook salmon	*Oncorhynchus tshawytscha*
Columbia River chum salmon	*Oncorhynchus keta*
Lower Columbia River coho salmon	*Oncorhynchus kistuch*
Oregon Coast coho salmon	*Oncorhynchus kistuch*
Snake River sockeye salmon	*Oncorhynchus nerka*
Lower Columbia River steelhead	*Oncorhynchus mykiss*
Upper Willamette River steelhead	*Oncorhynchus mykiss*
Middle Columbia River steelhead	*Oncorhynchus mykiss*
Upper Columbia River steelhead	*Oncorhynchus mykiss*
Snake River Basin steelhead	*Oncorhynchus mykiss*
ANADROMOUS FISHERIES	
Pacific Eulachon	*Thaleichthys pacificus*
Green Sturgeon	*Acipenser medirostris*
FRESHWATER FISH	
Bull Trout	*Salvelinus confluentus*
Oregon Chub	*Oregonensis crameri*
MAMMALS	
Canada lynx - Contiguous US DPS	*Lynx canadensis*
Columbia 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	*Spermophilus brunneus brunneus*
Pygmy rabbit	*Brachylagus idahoensis*
Woodland caribou - Selkirk Mtn	*Rangifer tarandus caribou*
BIRDS	
Marbled murrelet	*Brachyramphus marmoratus*
Northern spotted owl	*Strix occidentalis caurina*
Streaked horned lark	*Eremophila alpestris strigata*
Western snowy plover	*Charadrius alexandrinus nivosus*
INVERTEBRATES	
Banbury Springs limpet	*Lanx sp.*
Bliss Rapids snail	*Taylorconcha serpenticola*
Bruneau Hot springsnail	*Pyrgulopsis bruneauensis*
Snake River Physa snail	*Haitia (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 lomatium	*Lomatium bradshawii*
Cook's lomatium	*Lomatium cookii*
Gentner's fritillary	*Fritillaria gentneri*

New Species Consulted Upon

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

Action Area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Spokane
Grand Forks
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Cranbrook
Kalispell
Great Falls
Missoula
Helena
Lewiston
Portland
Salem
Eugene
Bend
OREGON
Medford
Boise
IDAHO
Idaho Falls
Pocatello
Twin Falls
Logan
BITTERROOT RANGE
BLUE MOUNTAINS
HARNEY BASIN
Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

General Aquatic Conservation Measures Applicable to all Actions

The activities covered under the HIPIII are intended to protect and restore fish and wildlife habitat with long-term benefits to ESA-listed species. However, project construction may have short-term adverse effects on ESA-listed species and associated critical habitat. To minimize these short-term adverse effects and make them predictable for the purposes of programmatic analysis, the BPA will include in all projects implemented under this HIP III proposed action the following general conservation measures (developed in coordination with USFWS and NMFS) applicable to.

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 in stream flows and water temperatures, will be considered during project design.

2) **State and Federal Permits.** All applicable regulatory permits and official project authorizations will be obtained before project implementation. These permits and authorizations include, but are not limited to, National Environmental Policy Act, National Historic Preservation Act, and the appropriate state agency removal and fill permit, USACE Clean Water Act (CWA) 404 permits, and CWA section 401 water quality certifications.

3) **Timing of in-water work.** Appropriate state (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)) guidelines for timing of in-water work windows (IWW) will be followed.
   a) Oregon chub – if work occurs in occupied habitat, in-water work will not occur between June 1 and August 15.
   b) Bull trout - While utilizing the appropriate State designated in-water work period will lessen the risk to bull trout, this alone may not be sufficient to adequately protect local bull trout populations. This is especially true if work is occurring in spawning and rearing areas because eggs, alevin, and fry are in the substrate or closely associated habitats nearly year round. Some areas may not have designated in-water work windows for bull trout or if they do, they may conflict with work windows for salmon and steelhead. If this is the case, or if proposed work is to occur within bull trout spawning and rearing habitats, project proponents will contact the appropriate USFWS Field Office (see Appendix B in this BO) to insure that all reasonable implementation measures are considered and an appropriate in-water work window is being used to minimize project effects.
   c) Lamprey – the project sponsor and/or their contractors will avoid working in stream 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 in stream 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 procedures outlined in US Fish and Wildlife Service (2010)[1].

d) Exceptions to ODFW, WDFW, MFWP, or IDFG in-water work windows will be requested from NMFS and the FWS. An IWW variance request (pre-coordinated with staff biologists) will be e-mailed from an appropriate representative of the action agency to the NMFS Habitat Branch Chief and the FWS Field Office Supervisor for the project area. Work will not proceed outside of the IWW until the exception is approved by e-mails from NMFS and/or the FWS.

4) **Oregon Chub Restrictions.** Restoration projects, covered under this Section 7 programmatic consultation, which involve in-water work, will not occur within habitats known to be occupied by Oregon chub or within Oregon chub critical habitat. This information is available in GIS form and is updated annually by the ODFW Native Fish Program (current point-of-contact is Brian Bangs 541-757-4263, extension 224). Only one in-water work project per year may occur within 2 stream miles upstream of connected off-channel habitat occupied by Oregon chub or its critical habitat. These projects will be evaluated by the Oregon Fish and Wildlife Office in order to design the project to avoid or minimize effects to Oregon chub habitats downstream. If the project is likely to cause more than a 30 percent reduction (e.g. reduced water volume causing desiccation of vegetation used for spawning habitat, sedimentation reducing habitat area, increased flows resulting in habitat becoming unsuitable for chub) in a downstream habitat occupied by Oregon chub or its critical habitat, that project will not be covered by this programmatic section 7 consultation and will require an individual consultation.

At restoration project sites with suitable habitat for Oregon chub, pre-project sampling will be conducted by qualified fisheries biologists as early as possible in the planning process to determine whether Oregon chub may be present. If Oregon chub are found at the proposed project site during this sampling, a separate individual Section 7 consultation will be initiated for that project.

It is possible that a previously unknown population of Oregon chub may be captured at a project site during pre-construction in-water work-site isolation. In the event this occurs, the USFWS and ODFW will be contacted immediately in order to recommend additional site-specific conservation measures. Additionally, the following conservation measures will be implemented if Oregon chub are captured during in-water work-site isolation:

a) All live Oregon chub captured shall be released as soon as possible, and as close as possible to the point of capture.
b) If it necessary for Oregon chub to be held, a healthy environment for the stressed fish must be provided, and the holding time must be minimized.

[1] U.S. Fish and Wildlife Service. 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

5) **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 5(a) through 5(c).

6) **Site layout and flagging.** Prior to construction, the action area will be clearly flagged to identify the following:
   a) Sensitive resource areas, such as areas below ordinary high water, 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-spray areas and buffers.

7) **Temporary access roads and paths.**
   a) Existing access roads and paths will be preferentially used whenever reasonable, and the number and length of temporary access roads and paths through riparian areas and floodplains will be minimized to lessen soil disturbance and 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%, then 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).
   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 surface and ditch, 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.

8) **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.

c) Equipment and vehicles will cross the stream 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) 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.

9) **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 water body 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.

10) **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 placed 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 placed 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 should be used, if possible, 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, and as often as necessary during operation, to remain grease free.

11) **Erosion control.** Erosion control measures will be prepared and carried out, commensurate in scope with the action, that may include the following:

a) Temporary erosion controls.
   i. Temporary erosion controls 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 controls once it has reached 1/3 of the exposed height of the control.
   vi. Once the site is stabilized after construction, temporary erosion control measures will be removed.

b) Emergency erosion controls. 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.

12) **Dust abatement.** The project sponsor will determine the appropriate dust control measures (if necessary) 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 water or a stream channel 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 materials to a waterbody (typically these would be areas within 25 feet of a waterbody or stream channel; 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 aquatic food

organisms 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.
c) 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. 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 electroshocked 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 in-stream 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 US Fish and Wildlife Service (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.
   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 four hours for fish impingement on the net. Less frequent intervals must be approved through a variance request.

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[2] National Marine Fisheries Service. 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] U.S. Fish and Wildlife Service. 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) 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 stream bank 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:
   a) The NMFS's electrofishing guidelines (NMFS 2000).
   b) Only direct current (DC) or pulsed direct current (PDC) will be used and conductivity must be tested.
      i. If conductivity is less than 100 µs, voltage ranges from 900 to 1100 will be used.
      ii. For conductivity ranges between 100 to 300 µs, voltage ranges will be 500 to 800.
      iii. For conductivity greater than 300 µs, voltage will be less than 400.
   c) Electrofishing will begin with a minimum pulse width and recommended voltage and then gradually increase to the point where fish are immobilized.
   d) The anode will not intentionally contact fish.
   e) 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.
   f) 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 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 coffer dam 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[4], or most recent version). If the pumping rate exceeds 3 cubic feet 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 or stream channel.
   d) Safe reentry 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) **Re-watering.** Upon project completion, the construction site will be slowly re-watered to prevent loss of surface flow downstream and to prevent a sudden increase in stream turbidity. During re-watering, the site will be monitored to prevent stranding of aquatic organisms below the construction site.

6) **Salvage Notice.** Monitoring and recording of fish presence, handling, and mortality must occur during 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.

[4] National Marine Fisheries Service. 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 for Aquatic Species

1) **Fish passage.** Fish passage will be provided for any adult or juvenile fish likely to be present in the action 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 aquatic species of interest or their habitat, a variance can be requested from the NMFS Branch Chief and the FWS Field Office Supervisor (Appendix B of this BO). 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 applicable to 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 in stream channels, riparian areas, and wetlands will be completed as quickly as possible. Mechanized equipment will be used in streams 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, 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 to ensure compliance with the applicable biological opinion, including:
   a) General conservation measures are adequately followed; and
   b) Effects to listed species are not greater than predicted and incidental take limitations are not exceeded.

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.

General Conservation Measures for Terrestrial Plants, Wildlife and Aquatic Invertebrates

This section describes general conservation measures (CMs) and practices included in the proposed action to minimize or avoid the exposure of certain endangered, threatened, and proposed species managed by USFWS to any effects of the underlying restoration activities. These standards include practices that would minimize or avoid any such effects on designated critical habitat for those species. Restoration projects are unlikely to occur within the range of some of the listed species included herein, but due to the programmatic approach to this consultation, and the fact that specific project locations are unknown at this time, we are providing the benefit of the doubt to the species and have included project design measures for all species that occur within the proposed action area.

An FWS biologist will review the Project Notification/Completion form for each project to confirm the project design meets the conditions for *no effect* or *not likely to adversely affect* to listed species 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 action agency or project proponent 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. Maps for some species have also been provided at the end of this Appendix to assist in identifying suitable habitat that may be occupied by listed species. For additional assistance, contact the appropriate state FWS 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.

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

2) **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.

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

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

1) **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 listed terrestrial wildlife occur will be limited to the chemicals and application rates as shown in **Table 1**. Additional species-specific herbicide limitations are also defined below in each species CMs section.

TABLE 1: Maximum Herbicide Application Rates in or Within 1 Mile of Habitat Where ESA-listed Terrestrial Species Occur[5]

	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*

[5] This list of chemicals is based on the analyses in the Syracuse Environmental Research Associates (SERA) risk assessments maintained by the U.S. Forest Service and available at http://www.fs.fed.us/foresthealth/pesticide/risk.shtml. The herbicides and application rates listed in this table include only those that were found in the SERA assessments to be below both the acute and chronic NOAELs for terrestrial wildlife.

Fish Passage Restoration (Profile Discontinuities)

The BPA proposes to review and fund fish passage projects for ESA-listed salmon, steehead and bull trout (hereafter 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. 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 bull trout or Oregon chub exposure to non-native species must be approved by the appropriate FWS Field Office Supervisor (see appendix B).

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 and effects due to physical fish barriers, classified by water velocity, water depth, and barrier height (profile discontinuities).

The BPA proposes to fund removal, modification, construction and maintenance of instream structures to improve fish passage. The objective of this activity category is to allow all life stages of ESA-listed salmonids access to historical habitats from which they have been excluded by non-functioning structures or instream profile discontinuities resulting from insufficient depth, or excessive jump heights and velocities.

The 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.

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 that are 10 feet in height or less for streams with an active channel width of less than 50-feet and a slope less than 4%, or up to 16.4 feet in height 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 48).

Guidelines for Review.

The following proposed activities are considered ***low risk*** and will not require RRT review: Removal of subsurface drainage features, tide gates, outfalls, pipes, small dams with a maximum total head measurement equal to or less than 3 feet, and instream flow redirection-structures.

The following proposed removal activities for the following structures are considered ***medium*** to ***high risk*** and will require RRT and NMFS Hydro review: small dams with a maximum total head measurement greater than 3 feet, channel spanning weirs, earthen embankments and spillway systems.

Prior to going to the RRT, Medium to High Risk projects shall address the **General Project and Data Summary Requirement** (**Page 55)** in addition to the following:

1) 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.

2) 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) to characterize the channel morphology and quantify the stored sediment.

3) Sediment characterization to determine the proportion of coarse sediment (>2mm) in the reservoir area.

4) A survey of any downstream spawning areas that may be affected by sediment released by removal of the water control structure or dam. 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.

Conservation Measures.

1) Restore all structure banklines and fill in holes with native materials to restore contours of stream bank 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 may result in significant disruption to riparian vegetation and/or the floodplain, consider leaving the buried structure sections within the streambank.

2) 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 29)).

3) 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 commensurate with representative upstream and downstream sections (within the same channel type).

4) Tide gates can only be removed not modified or replaced. Modification or replacement of tidegates will require a separate individual consultation with the Services.

[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

Consolidate, or Replace Existing Irrigation Diversions

Description. The 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. Infiltration galleries and lay-flat stanchions are not part of the proposed action. Periodic maintenance of irrigation diversions will be conducted to ensure their proper functioning, *i.e.*, cleaning debris buildup, and replacement of parts.
The BPA 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.

Guidelines for Review.

The following proposed activities are considered ***low risk*** and will not require RRT review:
Irrigation diversion structures less than 3 feet in height that are to be removed only.
This proposed activity is considered ***medium*** to ***high risk*** and will require RRT and NMFS Hydro review. Irrigation diversion structures greater than 3 feet in height that are to be removed or replaced. Prior to going to the RRT, medium to high risk projects shall address the **General Project and Data Summary Requirements (Page 55)** in addition to the following:

1) 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.

2) 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) to characterize the channel morphology and quantify the stored sediment.

Conservation Measures

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

[7] 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

2) Placement of rock structures or engineered riffles shall follow criteria outlined in the **Headcut and Grade Stabilization** activity category (Page 29)).

3) Diversions will be designed so that diverted water withdrawal is equal to or less than the irrigator's state water right, or equal to the current rate of diversion, whichever is less.

4) Project design will 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.

5) 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.

6) 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.

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, 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 (ELJ)'s should be considered as an alternative.

Grade control ELJs are designed to arrest channel downcutting or incision and 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 broadcrested structure that dissipates energy more gradually.

Guidelines for Review.

The following proposed activities are considered ***low risk*** and will not require RRT review: Installation of boulder weirs, roughened channels and grade control structures that are less than 18 inches in height and include all of the conservation measures listed below.

This proposed activity is considered ***medium*** to ***high risk*** and will require RRT and NMFS hydro review. Installation of boulder weirs, roughened channels and grade control structures that are above 18 inches in height.

Prior to going to the RRT, medium to high risk projects shall address the **General Project and Data Summary Requirements (Page 55)** in addition to the following:

1) 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.

2) 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) to characterize the channel morphology and quantify the stored sediment.

Conservation Measures.

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

2) Construction of passage structures over dams is limited to dams of less than seven feet in height.

3) Construction of passage structures is limited to facilitate passage at existing diversion dams, not in combination with new dams.

4) 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).

5) Boulder weirs are to be placed diagonally across the channel or in more traditional upstream pointing "V" or "U" configurations with the apex oriented upstream. The apex should be lower than the structure wings to support low flow consolidation.

6) 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" in height, allowing for juvenile fish passage at all flows.

7) Key weirs into the stream bed to minimize structure undermining due to scour, preferably at least 2.5x their exposure height. The weir should also be keyed into both banks, if feasible greater than 8 feet.

8) 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.

9) Rock for boulder weirs shall be durable and of suitable quality to assure permanence in the climate in which it is to be used. Rock sizing depends on the size of the stream, maximum depth of flow, planform, entrenchment, and ice and debris loading.

10) Full spanning boulder weir placement shall be coupled with measures to improve habitat complexity (LW placement etc.) and protection of riparian areas.

11) The use of gabions, cable or other means to prevent the movement of individual boulders in a boulder weir is not allowed.

12) 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 passage (jump height) barrier.

13) Headcut stabilization shall incorporate the following measures:
    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 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.
f) Structures will be constructed with stream simulation materials and fines added and pressure washed into the placed matrix. Successful washing will be determined by minimization of voids within placed matrix such that ponding occurs with little to no percolation losses to minimize low flow fish passage effects immediately following construction.

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 techniques.

Guidelines for Review.

All of the proposed activities under the **Low Flow Consolidation** activity category are considered ***medium*** to ***high risk*** and will both require 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 55)** in addition to the following:

Conservation Measures.

1) Fish Passage will be designed to the design benchmarks set in (NMFS 2011 or more recent version)[8].

2) Conceptual Design Review process with NMFS Hydropower Division will be implemented.

3) All 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 (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

Provide Fish Passage at an Existing Facility

Description: BPA proposes to fund and review projects that; (a) re-engineer improperly designed fish passage or fish collection facilities; (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.

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

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 for 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.

[10] 2010 (USFWS) 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

Fish Passage Restoration (Transportation Infrastructure)

The 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.
The 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.

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 bed elevation, and provides bed and bank roughness similar to the upstream and downstream channel. In general, bridges will be implemented over culverts because they typically do not constrict a stream channel to as great a degree as culverts and usually allow for vertical movement of the streambed (see #3 below). Bottomless culverts may provide a good alternative for fish passage where foundation conditions allow their construction and width criteria can be met.

Guidelines for Review.

The following proposed activities are considered ***low risk*** and will not require RRT review: Removal or replacement of culverts and bridges that meet all of the following conservation measures.

The following proposed activities are considered ***medium* to *high risk*** and will require RRT review: Removal and replacement of culverts and bridges that do not meet all of the following conservation measures will require a RRT review and a variance from NMFS and/or FWS. Prior to going to the RRT, medium to high risk projects shall address the **General Project and Data Summary Requirements (Page 55)** in addition to the following:

1) Designs shall include site sketches, drawings, aerial photographs, or other supporting specifications, calculations, or information that is commensurate with the scope of the action, that show the active channel, the 100-year floodplain, the functional floodplain, any artificial fill within the project area, the existing crossing to be replaced, and the proposed crossing.

Conservation measures.

1) Stream crossings shall be designed to the design benchmarks set in (NMFS 2011 or more recent version)[11] and restore floodplain function.

[11] 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

2) A crossing 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 that is at least as wide as 1.5 times the active channel width; (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 active channel width.[12] This criteria will restore any physical or biological processes associated with a fully functional floodplain that was degraded by the previous crossing.

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

4) 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; and (d) reshape exposed floodplains and streambanks to match upstream and downstream conditions.

5) If the crossing will occur within 300 feet of active spawning area, only full span bridges or streambed simulation will be used.

6) Projects in stream channels with gradients above six percent will utilize a bridge or if a bridge is determined to not be feasible, the crossing will be designed using the stream simulation option.

7) Culverts shall not be longer than: 150 feet for stream simulation, 75 feet for no-slope and 500 feet for any other option. Maximum culvert width shall be 20 feet, for widths greater than 20 feet a bridge will be used.

8) Designs must demonstrate that the vertical and lateral stability of the stream channel are taken into consideration when designing a crossing.

9) Designs must demonstrate that culverts and bridges shall mimic the natural stream processes and allow for fish passage, sediment transport, and flood and debris conveyance.

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[12] For guidance on how to complete bridge scour and stream stability analysis, see Lagasse *et al*. 2001a (HEC-20), Lagasse *et al*. 2001b (HEC-23), Richardson and Davis 2001 (HEC-18), ODOT 2005, and AASHTO 2007.

Active channel width means the stream width measured perpendicular to stream flow between the ordinary high water lines, or at the channel bankfull elevation if the ordinary high water lines are indeterminate. This width includes the cumulative active channel width of all individual side- and off-channel components of channels with braided and meandering forms, and measure outside the area influence of any existing stream crossing, e.g., five to seven channel widths upstream and downstream.

10) Designs must demonstrate that the crossings: (a) avoid causing local scour of streambanks and reasonably likely spawning areas; (b) allow the fluvial transport of large wood, up to a site potential tree height in size, through the project area without becoming stranded on the bridge structure; (c) allow for likely channel migration patterns within the functional floodplain for the design life of the bridge; and otherwise align with well-defined, stable channels; and (d) allow for the passage of all aquatic organisms.

11) The proponent 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 29).

Bridge and Culvert Maintenance

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 16)**.

4) Culverts or bridge abutments will not be filled with vegetation, debris, or mud.

Installation of Fords

Description. In many streams, crossings have degraded riparian corridors and in-stream 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.

The following proposed activities are considered ***low risk*** and will not require RRT review: Fords that meet all of the following conservation measures, occur in intermittent streams, or occur in reaches not occupied by listed salmonids (salmon, steelhead, bull trout).

The following proposed activities are considered ***medium* to *high risk*** and will require RRT review: Fords that do not meet all of the following conservation measures will require a RRT review and a variance from NMFS and/or FWS.

Prior to going to the RRT, medium to high risk projects shall address the **General Project and Data Summary Requirements (Page 55)** in addition to the following:

1) Information detailing locations of ESA-listed salmonid spawning areas within the reach.

2) Designs must demonstrate that the ford accommodate 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.

Conservation Measures:

1) Stream crossings shall be designed to the design benchmarks set in (NMFS 2011 or more recent version)[13].

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

3) Ford stream crossings will involve the placement of river rock along the stream bottom.
4) 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.

[13] 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

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

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

7) 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 CM applies to areas identified as spawning and rearing habitat.

8) 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.

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

10) 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 large wood and other debris.

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

River, Stream, Floodplain and Wetland Restoration

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

Projects utilizing habitat restoration actions outlined within this activity category shall be linked to Limiting Factors identified within the appropriate sub basin plan, recovery plan or shall be prioritized by recommended restoration activities indentified within a localized region by a technical oversight and steering committee (i.e. the Columbia River Estuary). Individual projects may utilize a combination of the activities listed in the **River, Stream, Floodplain and Wetland Restoration** activity category.

The BPA proposes the following activities to improve fish passage: (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; and (f) Channel Reconstruction.

Improve Secondary Channel and Wetland Habitats

Description. The 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, 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 and access to rearing habitat; increase hydrologic capacity, provide resting areas for fish and wildlife 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 channels habitats that have been blocked includes the removal of plugs, which impede water movement through off- and side-channels. Excavating pools and ponds in the historic floodplain/channel migration zone to create connected wetlands; Reconnecting existing side channels with a focus on restoring fish access and habitat forming processes (hydrology, riparian vegetation); 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 basin specified limiting factors. Up to two project adjustments, including adjusting the elevation of the created side channel habitat are included under this proposal. The long-term development of a restored side channel will depend on natural processes like floods and mainstem migration.

Guidelines for Review.

Secondary channel and wetland habitats projects are considered ***medium to high*** risk and will require that all conservation measures are met in addition to RRT review. If all conservation measures cannot be met then a variance and review from NMFS and/or FWS will be required. Prior to going to the RRT, medium to high risk projects shall address the **General Project and Data Summary Requirements (Page 55)** in addition to the following:

1) Designs must demonstrate a clear linkage to limiting factors identified within the appropriate sub basin plan, recovery plan or recommendations by a technical oversight and steering committee within a localized region.

2) Evidence of historical channel location, such as land use surveys, historical photographs, topographic maps, remote sensing information, or personal observation.

3) If new side channel habitat is proposed, 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.

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

5) 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.

Conservation Measures:

1) Off- and side-channel improvements can include minor excavation ($\leq$ 10%) of naturally accumulated sediment within historical channels. There is no limit as to the amount of excavation of anthropogenic fill within historic side channels as long as such channels can be clearly identified through field and/or aerial photographs.

2) Excavated material removed from off- or side-channels 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.

3) Excavation depth will never exceed the maximum thalweg depth in the main channel.

4) Restoration of existing side channels including one-time dredging and an up to two times project adjustment including adjusting the elevation of the created side channel habitat.

5) Side channel habitat will be constructed to prevent fish stranding by providing perennial flow through the constructed channel.

6) All side channel and pool habitat work will occur in isolation from waters occupied by ESA-listed salmonid species until project completion, at which time a final opening may be made by excavation to waters occupied by ESA-listed salmonid or water will be allowed to return into the area.

7) Adequate precautions will be taken to prevent the creation of fish passage issues or stranding of juvenile or adult fish.

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

Description: The 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 streams or wetlands. This action includes the removal of fill, such as dredge spoils from past channelization projects, road, trail, and railroad beds, dikes, berms, and levees to restore natural estuary and fresh-water floodplain functions. Such functions include overland flow during high flows, dissipation of flood energy, increased water storage to augment low flows, sediment and debris deposition, growth of riparian vegetation, nutrient cycling, and development of side channels and alcoves. Techniques that are covered by this programmatic need to have the sole purpose of restoring floodplain and estuary functions or to enhance fish habitat. Covered 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.

Set-back or removal of existing berms, dikes, and levees projects are considered ***medium to high*** risk and will require that all conservation measures are met and will require RRT review. If all conservation measures cannot be met then a variance and review from NMFS will be required. Prior to going to the RRT, medium to high risk projects shall address the **General Project and Data Summary Requirements (Page 55)** in addition to the following:
Designs must demonstrate a clear linkage to limiting factors identified within the appropriate sub-basin plan, recovery plan or recommendations by a technical oversight and steering committee within a localized region.

Conservation Measures:

1) To the greatest degree possible, nonnative fill material, originating from outside the floodplain of the action area will be removed from the floodplain to 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, openings will be created with breaches.

3) Breaches shall be equal to or greater than the active channel width (as defined above) 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 the flows will naturally recede back into the main channel thus minimizing fish entrapment.

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

6) Overburden or fill comprised of native materials, which originated from the project area, may be used within the floodplain to create set-back dikes and fill anthropogenic holes provided that does not impede floodplain function.

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

Protect Streambanks Using Bioengineering Methods

Description. The BPA proposes to review and fund projects that restore eroding streambanks by bank shaping and installation of coir logs or other soil reinforcements – bioengineering techniques as necessary to support development of riparian vegetation and/or planting or installing large wood, trees, shrubs, and herbaceous cover as necessary to restore ecological function in riparian and floodplain habitats.

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 of the stream side riparian vegetation and land use practices that have removed riparian woody species. Historically, as the river migrates into the adjacent riparian areas, LW would be recruited from the banks resulting in reduced near bank velocities and increased 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 banklines allowing for vegetation establishment.

The primary proposed structural streambank stabilization action is the use of large wood and vegetation to increase bank strength and resistance to erosion in an ecological approach to engineering streambank stabilization.

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 LW rows, live siltation fences, brush traverses, brush rows and live brush sills in floodplains, used to reduce the likelihood of avulsion in areas where natural floodplain roughness is poorly developed or has been removed and (g) floodplain flow spreaders, consisting of one or more rows of trees and accumulated debris used to spread flow across the floodplain; and (h) use of LW as a primary structural component.

Guidelines for Review.

Projects protecting streambanks using bioengineering methods are considered ***low risk*** and will not require RRT review if the following conditions are met: Streambank projects with 1)

[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

bankfull flow less than 500 cfs; 2) height of bank less than 5 feet; and, 3) bankfull velocity less than 5 ft/sec.

The following proposed activities are considered ***medium*** to ***high risk*** and will require RRT review: Streambank projects with 1) bankfull flow greater than 500 cfs; 2) height of bank greater than 5 feet; and, 3) bankfull velocity greater than 5 ft/sec.

Prior to going to the RRT, medium to high risk projects shall address the **General Project and Data Summary Requirements (Page 55)** in addition to the following:

Designs must demonstrate a clear linkage to limiting factors identified within the appropriate sub basin plan, recovery plan or recommendations by a technical oversight and steering committee within a localized region.

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, thus 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 action 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) LW will be placed to maximize near bank hydraulic complexity and interstitial habitats through use of various LW sizes and configurations of the placements.

5) Structural placement of LW should focus on providing bankline roughness for energy dissipation vs. flow re-direction that may affect the stability of the opposite bankline.

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 LW 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) LW 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 high energetic systems such as (high gradient systems with lateral confinement and limited floodplain). 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 or 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 woody debris. Scour holes may be filled with rock to prevent damage to structure 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) Any action that requires additional excavation or structural changes to a road, culvert, bridge foundation or that may affect fish passage is covered under the **Fish Passage Restoration** (Page 24)activity category.

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

13) Riparian buffer strips associated with streambank protection shall extend from the project bankline towards the floodplain a minimum distance of 35 feet.

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

Description. The 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 LW (e.g., whole conifer and hardwood trees, logs, root wads); decrease flow velocities; and deflect flows into adjoining floodplain areas to increase channel and floodplain function. In areas where natural gravel supplies are low (immediately below reservoirs, for instance), 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, hiding 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 gravelbar. 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 are naturally and/or historically have had boulders.

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

[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

gravel and result in gravel starved reaches. Channelization, hard streambank stabilization, and diking restrict a stream from meandering and recruiting gravel. Elimination of riparian buffers and grazing up to the stream's edge 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 projects, such as simulated 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 linkage to basin defined limiting factors. 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 LW, boulders, or spawning gravel.

Guidelines for Review.

The following proposed activities are considered ***low risk*** and will not require RRT review: Installation of habitat forming structures that meet all of the following conservation measures. The following proposed activities are considered ***medium*** to ***high risk*** and will require RRT review: Installation of habitat forming structures that do not meet all of the following conservation measures will require a RRT review and a variance from NMFS.
Prior to going to the RRT, medium to high risk projects shall address the **General Project and Data Summary Requirements (Page 55)** in addition to the following:

1) Designs must demonstrate a clear linkage to limiting factors identified within the appropriate sub basin plan, recovery plan or recommendations by a technical oversight and steering committee within a localized region.

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

3) Designs must demonstrate that boulder placements will be limited to stream reaches with an intact, well-vegetated riparian area, including trees and shrubs where those species would naturally occur, or that are part of riparian area restoration action; and a stream bed that consists predominantly of coarse gravel or larger sediments.

4) Designs must demonstrate that boulder sizing is appropriate for the size of the stream, maximum depth of flow, planform, entrenchment, and ice and debris loading.

5) For systems where boulders were not historically a component of the project stream reach, it must be demonstrated how this use of this technique will address limiting factors and provide the appropriate post restoration habitats.

6) Designs must demonstrate that LW and boulder placements will not result in a fish passage barrier.

7) Designs must demonstrate that spawning gravel augmentation is limited to areas where the natural supply has been eliminated or significantly reduced through anthropogenic means.

Conservation Measures (Large Wood).

1) LW placements for other purposes than habitat restoration or enhancement are excluded from this consultation.

2) LW will be placed in channels that have an intact, well-vegetated riparian buffer area that is not mature enough to provide large wood, or in conjunction with riparian rehabilitation or management.

3) LW may partially or completely span the channel in first order streams if the active channel top width is less than 20 feet.

4) When available and if the project is located within the appropriate morphology and sized stream, trees with rootwads attached should be a minimum length of 1.5 times the bankfull channel width, while logs without rootwads should be a minimum of 2.0 times the bankfull width.
5) 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.

6) The partial burial of LW and boulders may constitute the dominant means of placement and key boulders (footings) or LW can be buried into the stream bank or channel.

14) LW 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 high energetic systems such as (high gradient systems with lateral confinement and limited floodplain). Need for structural anchorage shall be demonstrated in the design documentation.

7) Rock may be used for ballast but is limited to that needed to anchor the LW.

Conservation Measures (Boulder Placement)

1) Boulder placements for other purposes than habitat restoration or enhancement are excluded from this consultation.

2) The cross-sectional area of boulder placements may not exceed 25% of the cross-sectional area of the low flow channel, or be installed to shift the stream flow to a single flow pattern in the middle or to the side of the stream.

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

4) Boulders will be installed low in relation to channel dimensions so that they are completely overtopped during channel-forming flow events (approximately a 1.5-year flow event).

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

Conservation Measures (Spawning Gravel)

1) Spawning gravel to be placed in streams must be obtained from an upland source outside of the channel and riparian area and properly sized gradation for that stream, clean, and non-angular. When possible use gravel of the same lithology as found in the watershed. After spawning gravel placement, allow the stream to naturally sort and distribute the material.

2) A maximum of 100 cubic yards of spawning sized gravel can be imported or relocated and placed upstream of each structure when in combination with other restoration activities that address the underlying systematic problem. For example a combined project consisting of: planting streambank vegetation, placing instream LW and supplementing spawning gravel.

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

Riparian Vegetation Planting

Description. The 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, project proponents 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.

The proposed activities are considered low risk and will not require RRT review: Riparian vegetation planting that meet all of the following conservation measures

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 flood plains, and where such plants are abundant.

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

5) Concentrate plantings above the bankfull elevation.

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

Channel Reconstruction

Description. The 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 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 that 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.

Due to the complexity of channel reconstruction projects, there shall be separate procedural guidelines, data and information requirements, that will be refined, amended, and updated through an iterative collaborative process with BPA, NMFS, and USFWS.

The channel reconstruction activity is considered ***high risk*** and will require RRT and NMFS Hydro review.

High Risk projects in the Channel Reconstruction activity shall address the **General Project and Data Summary Requirements (Page 55),** the following **Conservation Measures**, and include a **Monitoring and Adaptive Management Plan (Page 56).**

Conservation Measures:

Because of the complexity of channel reconstruction projects, there shall be an interdisciplinary design team minimally consisting of a biologist, engineer, and hydrologist.

Data requirements for RRT & NMFS review and analysis include:

1) Designs must demonstrate a clear linkage to limiting factors identified within the appropriate sub-basin plan, recovery plan or recommendations by a technical oversight and steering committee within a localized region.

2) Detailed construction drawings

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

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

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

6) 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.

7) 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.

General Project and Data Summary Requirements

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 design and resulting construction plans, specifications and details. The GPDSR serves as the submittal design submittal framework that is needed to assess and evaluate the adequacy of the proposed project.

The BPA RRT will review submitted GPDSR documents to determine if the technical deliverables provided are adequate for functionality (adherence to HIP 3 Conservation Measures) and technical quality (competent execution of design and project plans – contract documents).

The GPDSR criteria were developed using the River Restoration Analysis Tool and address the 16 overarching questions proposed within the RiverRAT Framework.

For the Channel Reconstruction activity category a project specific Monitoring and Adaptive Management Plan must be included.

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 and assessment of risk of failure to perform, potential consequences and compensating analysis to reduce uncertainty.
7. Description of disturbance including timing and areal extent and potential impacts associated with implementation of each 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 existing riparian condition and historical riparian impacts.
5. Description of lateral connectivity to floodplain and historical floodplain impacts.
6. Tidal influence in project reach and influence of structural controls (dikes or gates).

Technical Data

1. Incorporation of HIP 3 specific Activity 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, including data sources and period of record including a list of design discharge (Q) and return interval (RI) for each design element.
4. Summary of sediment supply and transport analyses conducted, including data sources including sediment size gradation used in streambed design.
5. Summary of hydraulic modeling or analyses conducted and outcomes – implications relative to proposed design.
6. Stability analyses and computations for project elements, and comprehensive project plan.
7. Description of how preceding technical analysis has been incorporated into and integrated with the construction – contract documentation.

Construction – Contract Documentation

1. Incorporation of HIP 3 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 govern competent execution of project bidding and implementation.
3. List of all proposed project materials and quantities.
4. Description of best management practices that will be implemented and implementation resource plans including:
    a) Site Access Staging and Sequencing Plan with description
    b) Work Area Isolation and Dewatering Plan with description of how aquatic organisms within the action area will be treated / protected.
    c) Erosion and Pollution Control Plan.
    d) Site Reclamation and Restoration Plan
    e) List proposed equipment and fuels management plan.
5. Calendar schedule for construction/implementation procedures.
6. Site or project specific monitoring to support pollution prevention and/or abatement.

The Monitoring and Adaptive Management Plan[16]

1. Introduction
2. Existing Monitoring Protocols
3. Project Effectiveness Monitoring Plan
    a) Objective 1
    b) Objective 2
4. Project Review Team Triggers
5. Monitoring Frequency, Timing, and Duration
    a) Baseline Survey
    b) As-built Survey

[16] For actions under the Channel Reconstruction activity category.

   c) Monitoring Site Layout
   d) Post-Bankfull Event Survey
   e) Future Survey (related to flow event)
6. 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
   g) Other
7. Data Storage and Analysis
8. Monitoring Quality Assurance Plan
9. Literature Cited

HIPIII Turbidity Monitoring Protocol

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 HIPIII compliance. Records shall be reported in the HIPIII Project Notification Completion (PNC) Form.

If the geomorphology of the project area (silty or claylike materials) or the nature of the action (large amounts of bare earth exposed below the waterline) shall preclude the successful compliance with these triggers, a variance should be pursued before in-water work begins.

1. Take a background turbidity sample using an appropriately and frequently calibrated turbidimeter in accord with manufacturer's instructions, or a visual turbidity observation, every 4 hours while work is being implemented, or more often if turbidity disturbances vary greatly, to ensure that the in-water work area is not contributing visible sediment to the water column. The background samples or observations should be taken at a relatively undisturbed area approximately 100 feet upstream from the project area. Record the observation, location, and time before monitoring at the downstream point.

2. Take a second sample or observation, immediately after each upstream sample or observation, approximately 50 feet downstream from the project area in streams 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 areas 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. Continue to monitor every 4 hours as long as instream activity continues.

4. If the exceedance continues after the second monitoring interval (after 8 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, corrective measures taken, 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.

HIP III Programmatic - Consultation
Project Notification/Completion Form

Lead Action Agency: BPA		
NMFS Tracking #: **2013/9724**	**Statutory Authority:** ☐ ESA & EFH ☐ ESA	**USFWS Tracking #:** **01EOFW00-2013-F-0199**

Date of Request: _____

Project Title: _____

BPA Project #: _____ **BPA Contract #:** _____

BPA EC Contact: _____ **Phone:** _____

Project Sponsor Contact: _____ **Phone:** _____

Project Design Contact: _____ **Phone:** _____

NMFS Branch Office: _____

USFWS Field Office: _____

Lat/Long: (in decimal degrees) _____ **Datum:** _____

6th Field HUC: _____ **HUC Name:** _____

Project Start Date: _____ **Project End Date:** _____

(Project Completion Form due ≤60-days after this date)

Is the Project Herbicide Application only?	Yes ☐ No ☐
Does the project require near- and/or in-water construction?	Yes ☐ No ☐
Does the project require near- and/or in-water work (no construction)?	Yes ☐ No ☐
Does the project require work area isolation?	Yes ☐ No ☐
Does the project require fish salvage?	Yes ☐ No ☐
Will the project increase the amount of impervious surfaces?*	Yes ☐ No ☐
Does the project require a variance?	Yes ☐ No ☐

**** A stormwater management plan will be required.***

Project Description (include O&M Plan if required)

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.

Minor 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.
2) Environmental conditions anticipated at the time of the proposed work (flow and weather conditions).

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.
4) Include as attachments any necessary approvals from state agencies.

NMFS Species/Critical Habitat Present in Action Area:

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
- ☐ Oregon Chub

Mammalian Species:

- ☐ Canada lynx
- ☐ Gray wolf
- ☐ North American wolverine
- ☐ Pygmy rabbit
- ☐ Columbia White-tailed Deer
- ☐ Grizzly Bear
- ☐ Northern Idaho ground squirrel
- ☐ Woodland caribou

Avian Species:

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

Invertebrate Species:

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

Plant Species:

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

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

NMFS Hydro Division Review

Does the project require approval from NMFS Hydro Division for:

Fish Passage Restoration

Yes ☐ Date of NMFS approval: No ☐

Bridge and Culvert Removal and Replacement

Yes ☐ Date of NMFS approval: No ☐

Install New or Upgrade/Maintain Existing Fish Screens

Yes ☐ Date of NMFS approval: No ☐

RRT REVIEW

Does the project contain any Medium or High Risk WEs that require RRT review? Yes ☐ No ☐

Date of RRT submittal: Date of RRT Approval: 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:

Project Completion reporting

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 Activity Start and End Dates: **Start**:12/31/31 **End**:12/31/31

Work Element	In-water Activities	Start Date	End Date
G	LWD	12/31/31	12/31/31

☐ **Check Box if project included instream work, but not in-water or near-water construction.**
☐ **Check Box if project included work area isolation.**

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 and life stage.

Supervisory Natural Resource Specialist (name, contact info, address)		
Type of take	**Interior Columbia Basin**	**Lower Columbia (Hood River downstream) and Willamette**
Number of salmonids Captured		
Number of salmonids Injured		
Number of salmonids Killed		

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.

Work Element	Upstream			Downstream				
					0 hrs	+4 hrs	+8 hrs	+12 hrs
	Distance from turbidity source (ft)	Time	Measured Turbidity (NTUs)	Distance from turbidity source (ft)	Measured Turbidity (NTUs)	Measured Turbidity (NTUs)	Measured Turbidity (NTUs)	Measured Turbidity (NTUs)
G	100 ft	10:45	100	-50 ft	300	200	150	110
Linear extent of observed turbidity downstream								

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:

- For any action involving RRT review, a copy of information used to satisfy the data requirements and analysis as described below in the design criteria for the proposed activity.
- Photos of habitat conditions before, during, and after action completion.
- Any dates work ceased due to high flows.
- 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.
- The number, type, and diameter of any pilings removed or broken during removal.
- 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.

The Restoration Review Team (RRT) process

What is the RRT?

Under the new HIP III, Bonneville Power Administration (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 (a) meet the obligations set forth in the National Marine Fisheries Service (NMFS)/United States Fish and Wildlife Service (USFWS) Biological Opinions within the action area, (b) promote interagency collaboration, (c) maximize ecological benefits of restoration and recovery projects, and (d) ensure consistent use and implementation throughout the geographic areas covered by the NMFS/USFWS BO.

Risk for the purposes of the RRT is defined primarily as risk to Endangered Species Act (ESA)-listed species and their habitats, but can be applied to include, but is not limited to: (a) Precedent- and/or policy-setting actions, such as the application of new technology, (b) actions that are not necessarily new, but are new to a geographic area or stakeholder group, and (c) actions with which the project manager, sponsor, or ECL Lead is unfamiliar, regardless of the relative risk.

Another purpose of the RRT is to provide updates and clarifications of the USFWS/NMFS HIP III BOs to all users to ensure consistent use, and to resolve inconsistencies and obtain clarification from the Services when needed.

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

What types of projects require review by the RRT?

The BPA Environmental Compliance Lead (ECL), 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 compliance.

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. The following is a *general* guidance as to what constitutes a low-, medium-, or high-risk project.

1. Fish Passage Restoration:

<u>Profile Discontinuities Category:</u>

a. Dams, Water Control or Legacy Structure Removal.

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 that meet all 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.*

High Risk: *Removal of small dams > 3 feet and <10 feet high in height for streams with 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%.*

b. Consolidate, or Replace Existing Irrigation Diversions.

Low Risk: *Removal of Irrigation diversion structures less than 3 feet in height that meet all conservation measures.*

Medium Risk: *Removal or replacement of irrigation diversion structures greater than 3 feet in height. Any irrigation project that does not meet all of the conservation measures.*

c. Headcut and Grade Stabilization.

Low Risk: *Boulder weirs, roughened channels and grade control structures that are less than 18 inches in height and meet all conservation measures.*

Medium Risk**:** *Boulder weirs, roughened channels and grade control structures that are above 18 inches in height. Any headcut or grade stabilization project that does not meet all of the conservation measures).*

d. Low Flow Consolidation.

Medium or High Risk**:** *All of the sub-activities under the Low Flow Consolidation activity category.*

e. Providing Fish Passage at an Existing Facility.

Low Risk: *Periodic Maintenance of Fish passage or Fish Collection Facilities and meet all conservation measures.*

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 upkeep or maintenance.

<u>Transportation Infrastructure:</u>

f. Bridge and Culvert Removal or Replacement.

Low Risk: *Culverts and bridges that meet all conservation measures.*

Medium Risk: *Culverts and bridges that do not meet all conservation measures.*

g. Bridge and Culvert Maintenance.

Low Risk: *Culverts and bridge maintenance that meet all that meet all conservation measures.*

Medium Risk: *Culverts and bridge maintenance that do not meet all conservation measures.*

h. Installation of Fords.

Low Risk: *Fords that meet all conservation measures.*

Medium Risk: *Fords that do not meet all conservation measures.*

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

a. Improve Secondary Channel and Wetland Habitats.

Medium or High Risk: *All of the sub-activities under the Secondary Channel and Wetland habitats projects subcategory.*

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

Medium or High Risk: *All of the sub-activities under Set-back or removal of existing berms, dikes, and levees projects subcategory.*

c. Protect Streambanks Using Bioengineering Methods.

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 ft/sec., and that meet all 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 ft/sec. Installation of any streambank project that does not meet all of the conservation measures.*

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

> ***Low Risk:*** *Installation of habitat forming structures that meet all conservation measures.*
>
> ***Medium Risk:*** *Installation of habitat forming structures that do not meet all conservation measures.*

e. Riparian Vegetation Planting.

> ***Low Risk:*** *Riparian vegetation planting is considered low-risk.*

f. Channel Reconstruction.

> ***High Risk:*** *Channel Reconstruction is a high risk activity.*

Who is on the RRT?

The following members are all internal BPA team members:

- Restoration Review Team Leader
- Core Team Members
  - KEC
  - KEW
- Technical Team: (KEC, KEW Subject Matter Experts)
  - Biology
  - Aquatics
  - Terrestrial
  - Contaminants
  - Engineering
  - Environmental

What is the RRT review process for medium-risk projects, and how long does this take?

Sponsor provides conceptual designs to EC Lead.

EC Lead makes risk determination.

EC Lead provides to sponsor:

- Project Notification/Completion (PNC) Form
- General and specific conservation measures checklist
- List of information requirements needed for RRT review

Sponsor signs checklists, submits information requirements, and fills out PNC Form.

EC Lead submits project to RRT.

- RRT functional review begins (total duration 2-4 weeks)
- If RRT does not approve design, resubmit with changes.
- When RRT approves design,
- RRT member sends approval email to EC Lead.
- RRT review is complete.
- EC Lead or sponsor gets NMFS Hydro approval [where needed]. This can be concurrent with RRT review.
- EC Lead submits completed PNC Form to USFWS and/or NMFS.
- HIPIII coverage is complete.

What is the review process for high-risk projects, and how long does it take?

Sponsor provides conceptual designs to EC Lead.

EC Lead makes risk determination.

EC Lead provides to sponsor:

- Project Notification/Completion (PNC) Form
- General and specific conservation measures checklist
- List of information requirements needed for RRT review

Sponsor signs checklists, submits information requirements, and fills out PNC Form.

EC Lead submits project to RRT.

RRT technical review begins (total duration: 8-12 months).

- ECL or RRT to schedule site visit at 10% (or conceptual) design
- ECL or RRT will provide interagency comments to sponsor (approximately 6 weeks).
- Sponsor incorporates comments into design and resubmits at 30% (2 months).
- ECL or RRT POC will provide interagency comments to sponsor (approximately 6 weeks).
- Sponsor incorporates comments into design and resubmits at 80% (2 months).
- ECL or RRT POC will provide interagency comments to sponsor (approximately 6 weeks).
- Sponsor incorporates comments into design (if needed).
- Final approval from Services is granted.
- RRT member sends approval email to EC Lead.
- RRT review is complete.

EC Lead or sponsor gets NMFS Hydro approval [where needed]. This can be concurrent with RRT review.

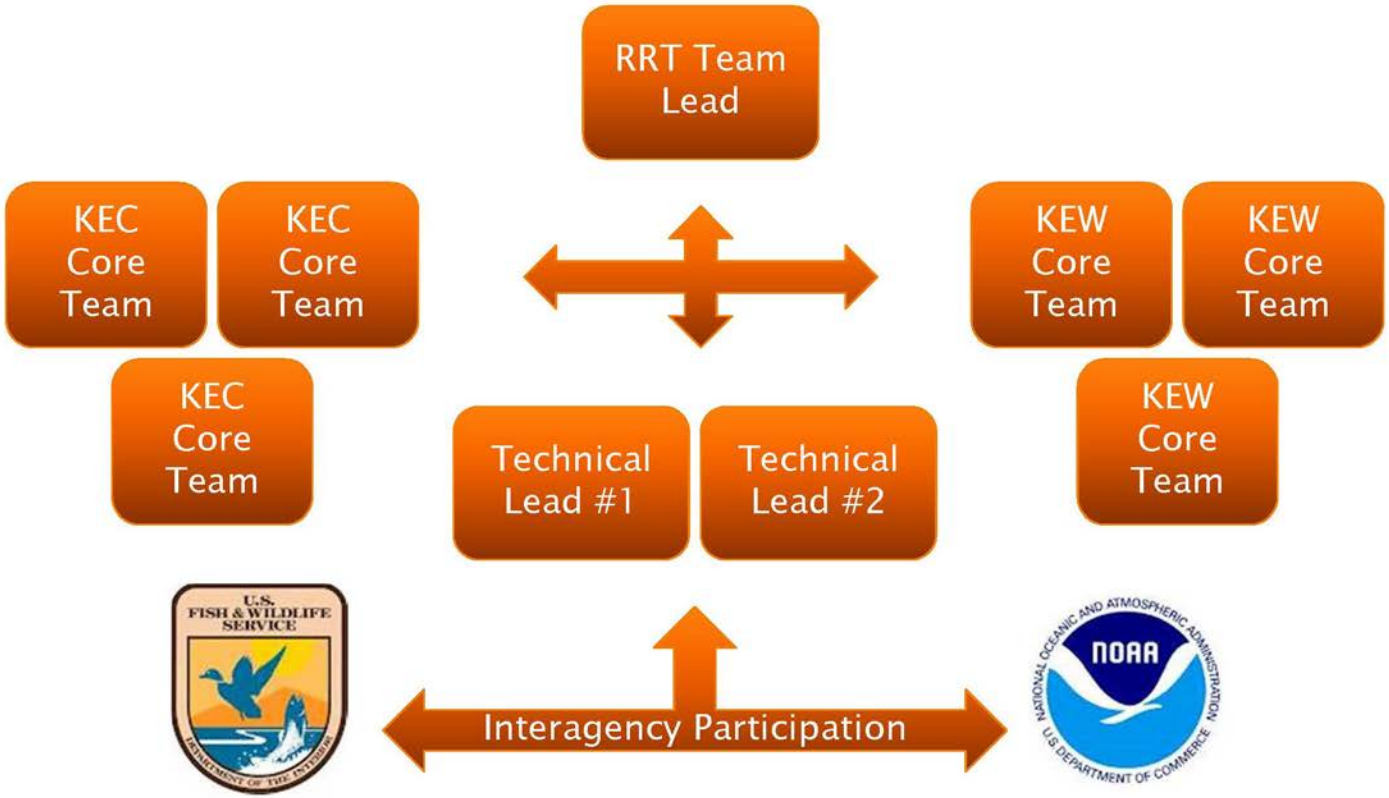
EC Lead submits completed PNC Form to USFWS and/or NMFS.

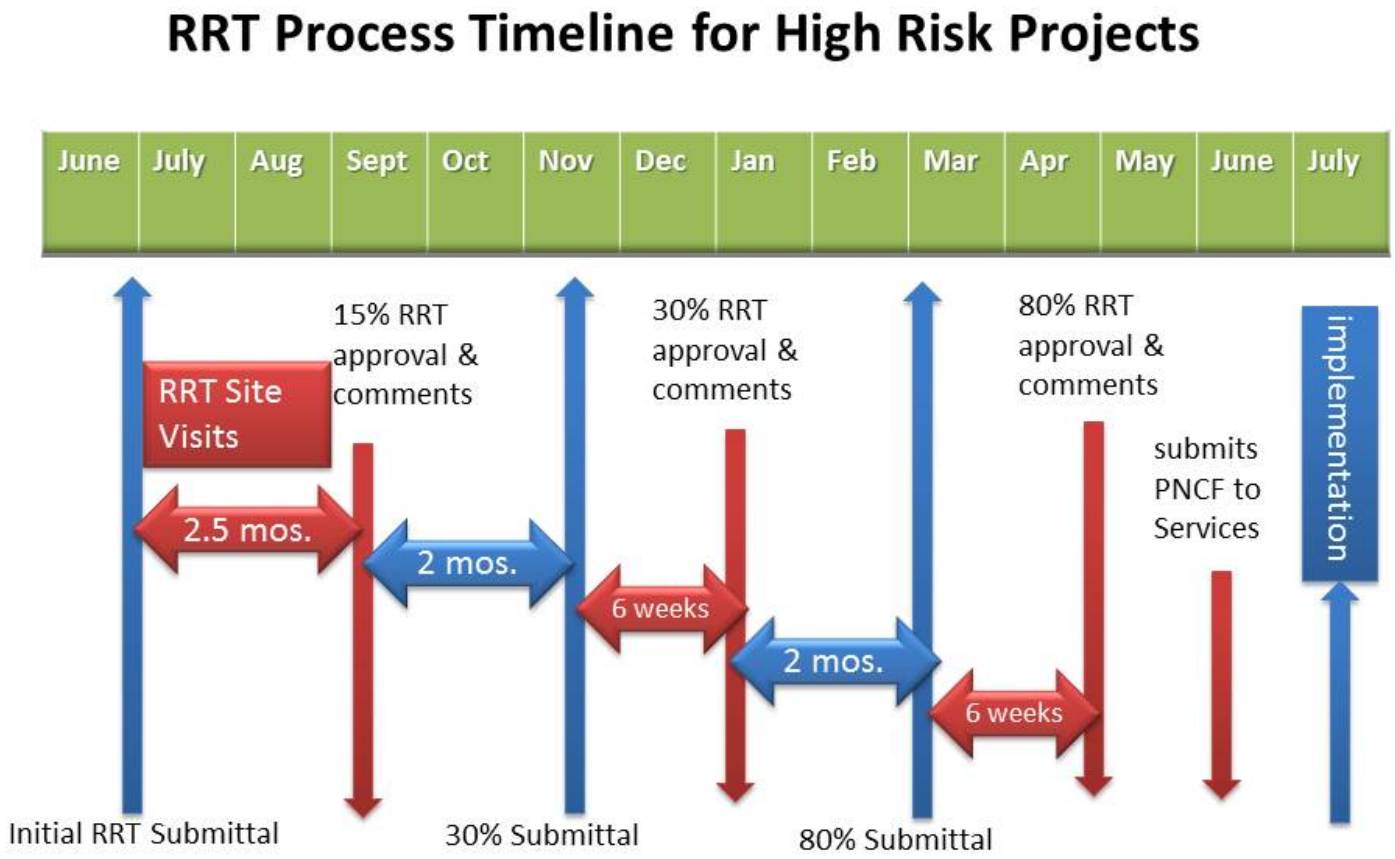
HIPIII coverage is complete.

Is RRT review the same as NMFS Hydro Review?

No. NMFS Hydro review is required for a slightly different subset of projects, generally for any project that affects fish passage or involves channel-spanning instream structures.

RRT Interim Organization





*Blue indicates project sponsor action, red indicates BPA RRT action.

Work Element by HIPIII Risk Category

ID	Work Element Name	Definition	HIPIII Category	RRT Review Needed	HIPIII 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 woody debris (LWD). Can include work to stabilize or maintain a streambank, such as 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	Develop 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	Includes the 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. This 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, sediment slumps, or landslides.	9c		Low
180	Enhance Floodplain/Remove, Modify, Breach Dike	Refers to the 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	Refers to the 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 (browse repellents, tree tubes). This 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
80	Install Siphon	Covers 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. This includes dams, weirs, fish ladders, tidegates, culverts, bridges, and road crossings.	1a	✓	Med-High
184	Install Fish Passage Structure	Install, replace, or modify 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	Install well to enable groundwater to be used for irrigation as an alternative to instream flow.	7c		Low
149	Install Pipeline	Includes activities related to installing a pipeline . This work element is only for work designed to provide irrigation efficiencies which result in increased instream flow	7b		Low
150	Install Sprinkler	Includes activities related to installing a sprinkler system. This work element is only for work designed to provide irrigation efficiencies which result in increased instream flow.	7a		Low

151	Line Diversion Ditch	Includes activities related to lining a ditch. This work element is only for work designed to provide irrigation efficiencies which result in increased instream flow.	**7b**	**Low**