FAHP* Programmatic User's Guide

FOR OREGON'S PROGRAMMATIC ENDANGERED SPECIES ACT CONSULTATION ON THE FEDERAL-AID HIGHWAY PROGRAM

(*FEDERAL-AID HIGHWAY PROGRAM)

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Abbreviations and Acronyms

ACW	-	active channel width
ADT	-	average daily traffic
BMP	-	best management practice
BO	-	biological opinion
CH	-	designated critical habitat

CIA	-	contributing impervious area
CM	-	conservation measure
CSS	-	combined sewer system
DBH	-	diameter at breast height
DEQ	-	Oregon Department of Environmental Quality
DPS	-	distinct population segment
DSL	-	Oregon Department of State Lands

Abbreviations and Acronyms (cont.)

EPA	-	Environmental Protection Agency
ERU	-	ODOT Environmental Resources Unit
ESA	-	Endangered Species Act
FAHP	-	Federal-Aid Highway Program
FHWA	-	Federal Highway Administration
LCR	-	lower Columbia River
MSA	-	Magnuson Stevens Act
NEPA	-	National Environmental Policy Act
NMFS	-	National Marine Fisheries Service
ODFW	-	Oregon Department of Fish and Wildlife
ODOT	-	Oregon Department of Transportation
OHW	-	ordinary high water
O&M	-	Operations and Maintenance (referring to ODOT O&M manual)
QC	-	quality control
QPL	-	qualified products list
REU	-	An employee in the ODOT Region Environmental Unit, such as the Environmental Coordinator, Biologist or other individual as assigned by the Manager
Services	-	ESA regulatory authority for FAHP; NMFS and USFWS
SLOPES	-	Standard Local Operating Procedures for Endangered Species
SR	-	Snake River
SP	-	Special Provision
UCR	-	upper Columbia River
UIC	-	underground injection control
USACE	-	U.S. Army Corps of Engineers
USFWS	-	U.S. Fish and Wildlife Service
UWR	-	upper Willamette River
WQDS	-	water quality design storm

1.0 Overview

The Federal-Aid Highway Program (FAHP) Programmatic User's Guide describes procedures and tools for implementing the Federal Highway Administration (FHWA) statewide programmatic Endangered Species Act (ESA) Section 7 consultation and Magnuson Stevens Act (MSA) consultation with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS). The consultation documents include the Oregon Department of Transportation (ODOT) – FHWA Programmatic Biological Assessment for the Oregon Statewide Transportation Improvement Program (October 10, 2011), supplemental consultation information provided to the Services, and the associated NMFS Biological Opinion (BO) (November 28, 2012) and USFWS BO (March 31, 2014). To avoid cross-referencing multiple documents to understand the FAHP programmatic, this User's Guide summarizes key information from each component of the ESA consultations. The FHWA is the lead Action Agency for the FAHP programmatic. Some federally-funded transportation projects have multiple federal partners, such as the U.S. Army Corps of Engineers (USACE) when a Section 404 permit is required, or the U.S. Forest Service or Bureau of Land Management when a project crosses their lands. However, even when a transportation project funded by the Federal-Aid Highway Program requires a USACE permit, FHWA remains the lead Action Agency and the FAHP programmatic must be used for ESA coverage. The USACE Standard Local Operating Procedures for Endangered Species (SLOPES V) Programmatic BO (NMFS 2014 or current version) cannot be used, except for emergency actions completed outside of the ODFW in-water work window. Appendix 1 provides more information on other ESA consultations most relevant to transportation projects in Oregon.

1.1 Programmatic Scope

The FAHP programmatic covers the majority of highway construction projects funded by the FAHP and administered by ODOT, including local government and state sponsored projects, as long as they are within the scope of the Programmatic. To qualify for the FAHP programmatic, the project must:

- Result in an ESA determination of "may affect" (likely or not likely to adversely affect) for one or more of the federally-listed species or designated critical habitat (CH) shown in Table 1. The FAHP programmatic provides "take" for species most likely to be directly impacted by highway projects including all ESA-listed fish species and associated CH in Oregon. "Take" is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct" (ESA § 3 [18])[1].
- The FAHP programmatic also provides informal consultation for one listed marine mammal.
- Result in a determination of "may affect" fisheries resources governed by the MSA.

1 "Harm" is further defined as "significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering". "Harass" is "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering."

- Result in a National Environmental Policy Act (NEPA) classification of Categorical Exclusion or Environmental Assessment.
- Not involve the excluded activities presented in Section 1.2.

Table 1. Federally-listed species, designated and proposed critical habitat and Essential Fish Habitat (EFH) covered by the FAHP programmatic.

Species	Effect[a]	Authority
All federally-listed salmonids[b] & CH within action area	LAA	ESA
Southern Distinct Population Segment (DPS) green sturgeon *(Acipenser medirostris*) & CH	LAA	ESA
Southern DPS eulachon (smelt) (*Thaleichthys pacificus)*& CH	LAA	ESA
Southern resident killer whale (*Orcinus orca*) & CH	NLAA	ESA
All EFH for Chinook salmon and coho salmon	MAA	MSA
All EFH for groundfish and coastal pelagic species	MAA	MSA
Marbled murrelet (*Brachyramphus marmoratus*) & CH	LAA	ESA
Northern spotted owl (*Strix occidentalis caurina*) & CH	LAA	ESA
Oregon Chub (*Oregonichthys crameri*) & CH	LAA	ESA
Bull trout Columbia River DPS (*Salvelinus confluentus*) & CH	LAA	ESA
Bull trout Klamath River DPS (*Salvelinus confluentus*) & CH	LAA	ESA
Lost River sucker (*Deltistes luxatus*) & PCH	LAA	ESA
Short-nosed sucker (*Chasmistes brevirostris*) & PCH	LAA	ESA
Fender's blue butterfly (*Icaricia icarioides fender*i) & CH	LAA	ESA
Nelson's checkermallow (*Sildacea nelsoniana*)	LAA	ESA
Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*) & CH	LAA	ESA
Bradshaw's lomatium (*Lomatium bradshawii*)	LAA	ESA
Willamette daisy (*Erigeron decumbens* var. *decumbens*) & CH	NLAA	ESA
Western lily (*Lilium occidentale*)	NLAA	ESA
Applegate's milk-vetch (*Astragalus applegatei*)	NLAA	ESA
Cook's lomatium (*Lomatium cookii*) & CH	NLAA	ESA
Gentner's Fritillary (*Fritillaria gentneri*)	NLAA	ESA
Howell's spectacular thelypody (*Thelypodium howellii spectabilis*)	NLAA	ESA
Large-flowered woolly meadowfoam (*Limnanthes floccose* spp. *grandiflora*) & CH	NLAA	ESA
MacFarlane's four-o'clock (*Mirabilis macfarlanei*)	NLAA	ESA
Rough popcornflower (*Plagiobothrys hirtus*)	NLAA	ESA
Spalding's catchfly (*Silene spaldingii*)	NLAA	ESA

a. LAA = likely to adversely affect, with an allowance for "take"; NLAA = not likely to adversely affect and take is not allowed under the FAHP; MAA = may adversely affect.
b. Chinook Salmon (*Oncorhynchus tshawytscha*) Lower Columbia River (LCR), Chinook Salmon Upper Willamette River (UWR), Chinook Salmon spring-run Upper Columbia River (UCR), Chinook Salmon spring/summer Snake River (SR), Chinook Salmon fall-run SR; Chum Salmon (*O. keta*) Columbia River; Coho Salmon (*O. kisutch*) LCR, Coho Salmon Oregon Coast, Coho Salmon Southern Oregon Northern California; Steelhead (*O. mykiss*) LCR, Steelhead UWR, Steelhead UCR, Steelhead Middle Columbia River (includes the experimental population in the Upper Deschutes River basin), Steelhead SR Basin; Sockeye Salmon (*O. nerka*) SR.
c. See Section 3.7.3 for avoidance measures during impact pile driving.

The action area for the FAHP programmatic includes all geographic areas in Oregon where transportation projects directly or indirectly affect ESA-listed species currently covered by the FAHP programmatic (see Appendix 2). On a project scale, this includes all upland (*e.g.,* non-wetland/aquatic), riparian, and aquatic areas that support covered species and are directly affected by site preparation, construction, and site restoration, and areas indirectly affected by an action. For many aquatic species, the effects of stormwater management may extend downstream to the Pacific Ocean.

1.2 Exclusions

As shown on Table 1, the FAHP programmatic does not provide ESA coverage for adverse effects (*i.e.,* take) some listed species and their designated CH. Best management practices (BMPs) are provided in this User's Guide to avoid take of these species. Currently, the FAHP programmatic does not provide ESA coverage for the majority of federally-listed marine mammals (except Southern resident killer whale) and marine turtles because they are unlikely to be affected by highway improvement projects in Oregon. Nor does it provide coverage for all USFWS-trust species, including Oregon spotted frog and greater sage grouse. Project proponents are responsible for developing and implementing whatever measures may be needed to avoid take of species not covered under the FAHP programmatic or proceed with another ESA consultation option if take cannot be avoided (see Appendix 1 for alternative ESA consultation options).

Generally, the following activities are excluded and may require separate ESA consultation:
(a) tidegate replacement, installation or repair (tidegate removal is allowed, as a type of waterway enhancement);
(b) NEPA Class 1 projects (requiring an Environmental Impact Statement [EIS]);
(c) any project that is solely related to mass transit or rail transportation systems (rail crossings or retrofits needed for highway projects are allowed);
(d) new permanent roads constructed within the riparian zone (except bridge approaches or as needed to restore historic stream channels; for "riparian zone" definition, see Glossary in Section 4.0);
(e) in-water work in the Willamette River downstream of Willamette Falls Dec. 1 - Jan. 31;
(f) any project with new general purpose lanes, new interchanges, or new lanes from interchange to interchange, which result in or contribute to other land use changes that trigger effects, including indirect effects;
(g) new permanent stream crossings (except to restore historic crossings; replacement crossings are allowed);
(h) drilling or other earthwork at an Environmental Protection Agency (EPA)-designated Superfund Site, a state-designated clean-up area, or in the likely impact zone of a significant contaminant source as identified by historical information; or
(i) stream channel realignment (except to restore former channels or eroding banks).

Excluded activities are based on the potential effects to resources that were evaluated for the programmatic ESA consultation. However, the FAHP programmatic has flexibility to allow activities that may be within an excluded category, but whose effects are within than those evaluated for the consultation. For example, a new bicycle/pedestrian bridge may be allowed if the structure has minimal encroachment into the riparian zone, and new interchanges may be allowed if the action is not expected to result in land-use or infrastructure changes that could

have indirect effects not considered under this consultation. Project proponents are encouraged to coordinate with Services representatives and the FHWA Biologist (see Section 2.1.3) as needed to clarify a possible exclusion.

1.3 Emergencies

A highway emergency or major hazard is an event declared by the managing agency or owner that requires a response that is immediate, or before the next in-water work window, to repair or rehabilitate a road, culvert, bridge or utility line as necessary to prevent imminent loss of human life, property or a natural resource. Emergency repairs often need to be completed outside the established in-water work window and can affect ESA- listed species, their designated critical habitat and other protected resources.

The FAHP programmatic can provide ESA coverage for emergency repairs to highway infrastructure if the work is funded by FHWA at the time of implementation and otherwise can be completed within scope of the FAHP programmatic. Typically, however, the work is implemented by maintenance forces using state or local funding, and if federal funding is applied, it is for subsequent follow-up repairs, not the initial emergency response. In this situation, other programmatic consultations are available for ESA coverage of NMFS-trust species, namely SLOPES V STU (Stormwater Transportation, and Utilities) or the ODOT 4(d) rule (see Appendix 1). SLOPES V is available only if the work involves a USACE permit, otherwise, the ODOT Routine Road Maintenance manual (Blue Book) is available for ODOT emergencies. If the emergency work must be completed outside of the in-water work period, then the project must use SLOPES V STU. Additional reporting under the FAHP programmatic is not needed if an emergency repair is completed under SLOPES V STU, even if federal funding is later secured. In some situations, a follow-up repair funded by FHWA will not be covered by the original SLOPES V STU permit or Blue Book if it is a distinct action (coordinate with the USACE or Service representative for projects-specific questions).

1.4 Impacts and Metrics of Take

The NMFS and USFWS BOs account for a variety of potential impacts, both adverse and beneficial, to terrestrial and aquatic species from the range of transportation actions considered under the Programmatic. The FAHP programmatic incorporates conservation measures, design standards and enhancements aimed at decreasing the magnitude of potential adverse impacts and benefiting species and habitat. Metrics of take were developed by NMFS and USFWS in the BOs to address adverse impacts, or "take", that could not be reduced or for which insufficient background information was available to justify negligible programmatic effects (Tables 2 and 3).

Table 2. Metrics of take in habitats that support covered aquatic ESA-listed species, allowed under the NMFS biological opinion each year.

	Take Allowed Per Recovery Domain[a]			
Resource	**WLC**	**IC**	**OC**	**SONCC**
ESA-listed fish captured (number salvaged)	1,300	580	720	400
Riparian habitat disturbed (acres)	66	29	36	20
Trees removed from riparian zone (number of trees >	957	429	528	198

Resource	Take Allowed Per Recovery Domain[a]			
	WLC	**IC**	**OC**	**SONCC**
18 inches diameter at breast height)				
Streambank hardening below OHW (linear feet)[b]	5,493	2,462	3,030	1,705
Net new impervious surface area (acres)	117	53	65	36
Steel pile, driven (impact hammer), below OHW, ≤24-inches in diameter (number)[c]	900	380	500	220

a. WLC = Willamette/ Lower Columbia; IC = Interior Columbia; OC = Oregon Coast; SONCC = Southern Oregon California Coasts; "n" = the number of projects in a given recovery domain per year.
b. Total length of streambank armoring, per side of stream.
c. ODOT may be able to apply a ratio of 2:1 to pile installed primarily by vibed/augured but "proofed" with driving.

Table 3. Metrics of take in habitats that support covered ESA-listed species, allowed under the USFWS biological opinion (through 2018).

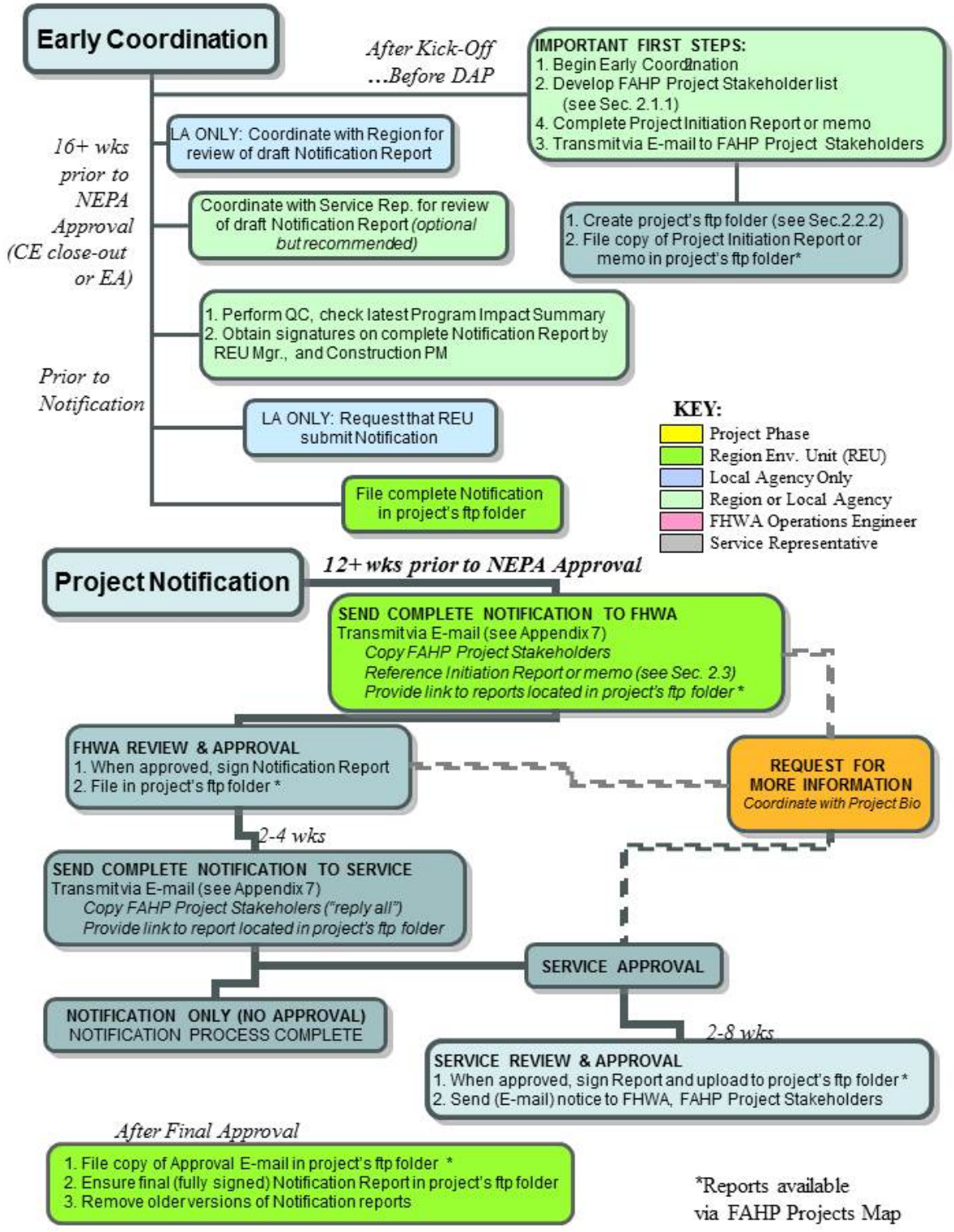
Species	Acres of Suitable Habitat Removed or Degraded	Critical Habitat Acres Removed or Degraded	Individuals Harmed or Harassed	Number of Projects Resulting in Impacts
Northern spotted owl	10	0	0	22
Marbled murrelet	0	0	Birds associated with up to 5 nests and 26 acres (disturbance effects)	7
Bull trout	16 (Columbia 4 (Klamath)	Per previous column Per previous column	5 (including 1 mortality)	11-22 1-2
Oregon chub	4	Per previous column	20 (including 2 mortalities)	3-6
Lost River sucker and Short-nose sucker	4	Per previous column	20 of each species, including 2 mortalities of each species)	2-4
Fender's blue butterfly	0.2	0.5 (inclusive of previous column)	N/A	2
Kinkaid's lupine	0.2	0.5 (inclusive of previous column)	125	2
Bradshaw's lomatium	0.1	N/A	50	2
Nelson's checkermallow	0.1	N/A	50	2

Through the reporting and data management aspects of the FAHP programmatic, over time, ODOT and FHWA will make a more accurate assessment of impacts of transportation projects than ODOT has been able to achieve in the past. This information will guide future ESA consultations. Some of the justification for the programmatic approach and the methods for calculating take were based on the concept that the average highway project results in minor and predictable impacts to listed species and their habitats. Therefore, large projects with considerable impacts may be required to initiate individual ESA consultation. The FAHP programmatic has no specific project limit at this time. Instead, ODOT will provide ongoing

tracking of cumulative programmatic impacts, and address large projects or potential exceedances on a case-by-case basis.

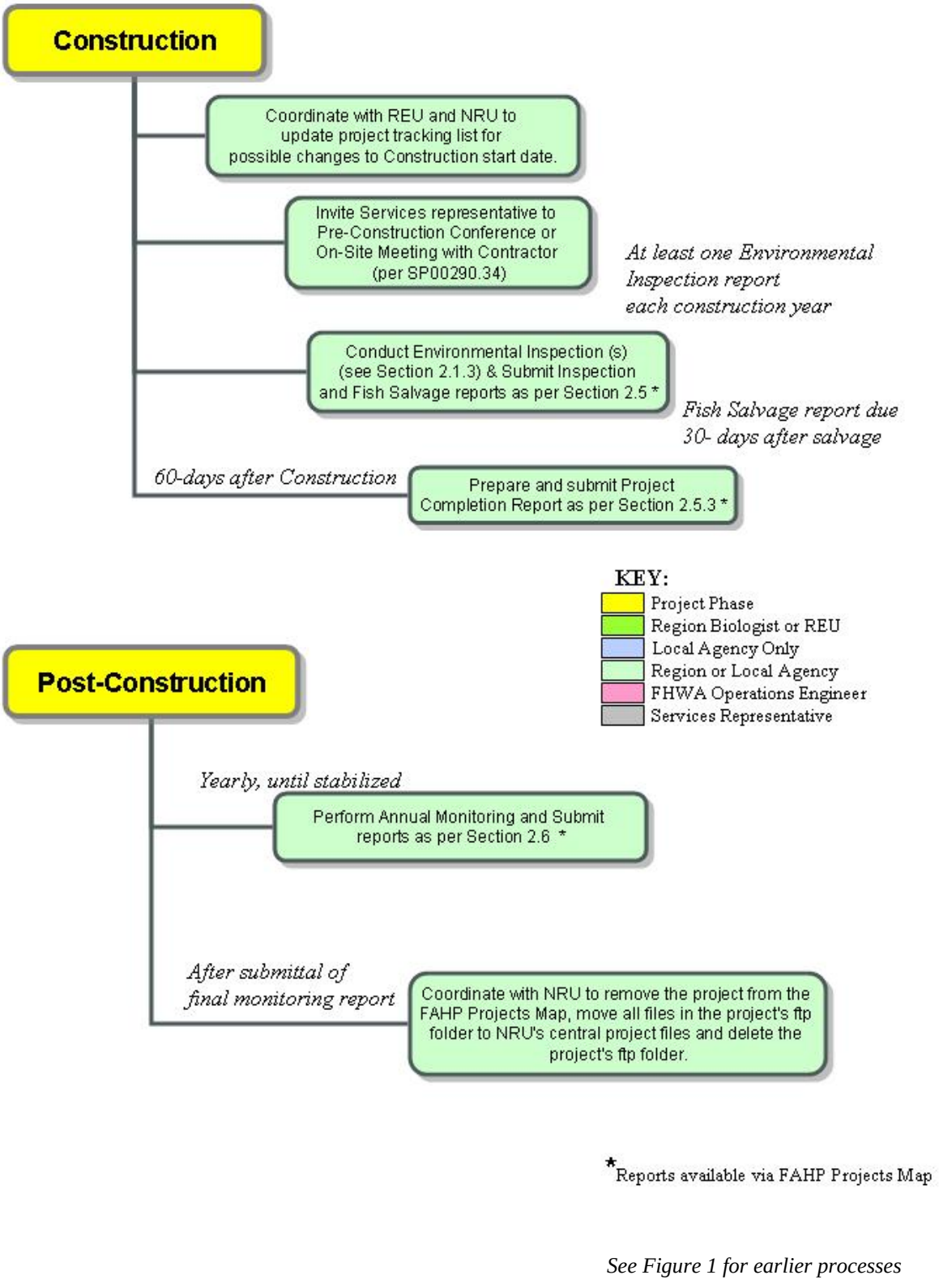
2.0 Implementation Process

There are four main phases of project implementation under the FAHP programmatic: early coordination, notification, construction, and post-construction. Each phase requires communication and reporting, as summarized on Figures 1 and 2 and described in the following subsections. The implementation process described below is based on currently available tools. ODOT is continually updating the data management software and tools for use with the FAHP programmatic. This guide will be revised when significant changes in the data management tools occur. The guide includes several links to key websites and electronic tools – these are summarized in Appendix 3.



See Figure 2 for additional processes

gure 1. FAHP project coordination through project notification.



See Figure 1 for earlier processes

Figure 2. FAHP project coordination during and after construction.

2.1 Roles and Responsibilities

2.1.1 Region Environmental Unit

Each ODOT Region manages environmental duties and local agency projects differently. Therefore, in the tasks described throughout this guide, Region Environmental Unit (REU) refers to the Region Environmental Coordinator, Region Biologist, or other individual in the REU that the Unit Manager assigns to the task. As shown in Figure 1, the REU Manager also signs the Project Notification Report before it is transmitted to FHWA. The primary responsibilities for the REU are:

- Develop Project Stakeholder lists (see Section 2.1.2).
- Manage Project Folders (see Section 2.2.2).
- Ensure quality control reviews of project reports.
- Submit Project Notification and Completion reports, and Project Change requests on behalf of Local Agency projects.
- Determine level of effort for environmental inspections and coordinate with Construction Project Managers and/or Local Agency representatives to determine staffing resources for completing the inspection (see Section 2.5.1).

2.1.2 Project Stakeholders

Each project will have ESA consultation stakeholders who will coordinate project reporting to ensure compliance with the FAHP programmatic (Table 3). The list of project stakeholders will be customized for each project, developed by the REU, with input from the Region Local Agency Liaison when applicable.

Table 3. Typical project stakeholders.

ODOT Projects	Local Agency Projects[a]
• FHWA Biologist (currently cindy.callahan@dot.gov)	• FHWA Biologist
• FHWA Operations Engineer	• FHWA Operations Engineer
• ODOT Region Environmental Coordinator	• ODOT Region Environmental Coordinator
• ODOT Region Biologist	• ODOT Region Biologist
• Service representative[b]	• Service(s) representative
• ODOT GE Section Natural Resources Unit	• ODOT GE Section Natural Resources Unit
• ODOT REU Manager (optional)	• ODOT REU Manager (optional)
	• ODOT Local Agency Liaison
	• Local Agency Biologist (Agency or Consultant)
	• Local Agency Project Leader and/or Manager[c]

a. Gray = Local agency projects only.
b. At time of publication, the NMFS representative is Tom Loynes (tom.loynes@noaa.gov), the USFW representative is Joe Zisa (joe_zisa@fws.gov). Confirm with ERU or the REU as needed.
c. This will be an agency-representative, such as project coordinator or project leader, or a consultant if designated by Agency and the designation is clearly described in Region project tracking systems.

2.1.3 Project Biologist

For ODOT-administered projects (including local agency projects), the project Biologist makes ESA determinations of effect, coordinates with project teams to develop projects that comply with the FAHP programmatic, completes project reports using ODOT template reports (*e.g.*, Project Notification, Project Completion, Annual Monitoring), and may perform environmental

inspections during construction. The Biologist must be ODOT-qualified as per ODOT Technical Services Bulletin GE-0801(B) (ODOT 2008a or updated). Additional qualifications are needed for fish biologists (see Section 2.1.4). During project development, the Biologist will make determinations of effect for each federally-listed species potentially affected by a project. If the determination is "may affect," the Biologist ascertains the most appropriate mechanism for ESA consultation (*e.g.*, programmatic, individual consultation). The next step is to review this guide to determine if the project qualifies for the FAHP programmatic (Sections 1.1-1.2), and if so, the Biologist will follow processes shown in Figures 1 and 2 and described in Sections 2.2-2.7.

If a project will result in "no effect" to one or more listed species or designated CHs, the Biologist will complete a No Effect Memorandum for FHWA following ODOT guidelines (refer to the ODOT Biology program website for the current template, http://www.oregon.gov/ODOT/HWY/GEOENVIRONMENTAL/biology.shtml). Although the FAHP programmatic applies to projects that require ESA consultation, many of the design standards in Section 3.0 are also appropriate for projects with "no effect" determinations.

To ensure compliance, local agency agreements and consultant contracts must require that ESA effects determinations are made by Biologists qualified by ODOT, and that sufficient time and materials are provided to adequately implement FAHP programmatic standards during project development, construction, and post-construction (see Section 2.1.8).

2.1.4 Fish Biologist

According to several standards in the NMFS BO, a qualified fish biologist must be on site to ensure that projects do not interfere with spawning behavior, or impact or remove eggs or pre-emergent juveniles in occupied redds. In particular, the fish biologist must inspect streams if hydraulic and topographic measurements are completed outside the in-water work period, if construction equipment must temporarily cross through streams for construction access, and to capture and remove fish from isolated in-stream work areas. A fish biologist is an individual who has the experience and competence to ensure the safe capture, handling and release of fish, and can supervises the fish salvage process as per requirements of the project proponent's state fish salvage permit (for ODOT, contact ERU). A fish salvage permit is required by the state of Oregon. ODOT obtains an annual fish salvage permit for its employees and projects; local agencies or consultants must coordinate this independently with ODFW.

2.1.5 Environmental Inspector

All projects implemented under the FAHP must undergo periodic environmental inspections completed by an ODOT REU employee, a non-Region ODOT-qualified Biologist, or a certified Environmental Construction Inspector (see ODOT Environmental Inspection Manual; http://www.oregon.gov/ODOT/HWY/CONSTRUCTION/pages/erosion_control_manual.aspx). See Section 2.5.1 for more information on the timing of environmental inspections and the reporting process. For each project, the REU will coordinate with the Construction Project Manager and Local Agency representative (when applicable) to determine who will complete environmental inspections. For Local Agency projects, contracts may need to be prepared in advance to ensure that the inspection tasks are sufficiently covered (see Section 2.1.8). Please ensure that a sufficient quantity of inspections is scheduled as items in the task order.

2.1.6 FHWA Operations Engineer

FHWA is the federal lead agency and recipient of the FAHP programmatic ESA take authorization and FHWA maintains overall responsibility for compliance. FHWA has Operations

Engineers who oversee project delivery for the FAHP at the ODOT Region level. The primary role of the Operations Engineer is to review, with assistance from the FHWA Biologist, project reports prepared by the project proponent and to transmit them to the Services, either for their review and approval or for their information (notification only). This includes the Project Notification Report and Project Change Request. Before forwarding to the Services, the FHWA Operations Engineer will sign the Project Notification Report or Project Change Request indicating review and approval.

2.1.7 Environmental Resources Unit

The Environmental Resources Unit (ERU) of the ODOT Geo-Environmental Section is managing the FAHP programmatic statewide, and providing technical support and quality assurance of project reports prepared by Regions. All FAHP programmatic projects will be documented and tracked in a centralized data management system coordinated by ERU. ERU will track take, impacts, restoration and enhancements through the use of key metrics that are captured in project reports and the FAHP database. Because of this, the Environmental Resources Unit (ERU) must receive notices and copies of all required project reports to ensure accurate tracking of statewide take for the required FAHP annual report. ERU will assist FHWA with annual meetings with the Services, and provide overall programmatic management and support.

2.1.8 Local Agency and Consultant Agreements and Contracts

ODOT creates agreements with City and County agencies throughout the state to manage and disperse Federal-Aid Highway funds for transportation projects. The FAHP will cover the costs of project development and construction, but currently does not pay for permit compliance after the construction contract has closed. The FAHP programmatic, however, as well as most USACE and DSL permits, requires management and monitoring of constructed features (particularly aquatic enhancements, streambank restoration, stormwater treatment, and site restoration) after construction to ensure that they are stable, functioning as designed, and in compliance with performance standards. To ensure that post-construction management and monitoring take place as required, local agency agreements should specify that the Local Agency will be responsible for permit compliance after construction, including site management and monitoring as required by environmental permits, using their non-federal share of the project budget.

Many local agencies use consultants for engineering and environmental services, as does ODOT for many in-house projects. When a project with FAHP funding “may affect” ESA-listed species and is within the scope of the FAHP programmatic, consultant contracts must reflect compliance with FAHP requirements for reporting, environmental inspections, monitoring, design standards and mitigation. The ODOT Geo-Environmental Section has template scopes of work for environmental services, and these have been updated to reflect this new Programmatic, and are available on the ODOT FAHP programmatic website. Because the generic templates will only cover the major types of professional environmental services, the hiring agency must still review and customize each contract to ensure compliance.

2.2 Information Sharing and Management

All projects will be documented and tracked in a centralized data management system (a Microsoft Access database) coordinated by ODOT ERU. The ERU will maintain a website for users to view programmatic updates and to download current template reports, and a Projects

Map for project stakeholders to view the status of projects and download project reports. Users can find current guidance, template reports, and program updates in the FAHP programmatic website:

- http://www.oregon.gov/ODOT/HWY/GEOENVIRONMENTAL/Pages/FAHP.aspx

The ERU will compile and track anticipated impacts, enhancements, and take (Section 1.4) based on information provided in project reports. ERU will maintain a running total of metrics of take, by Recovery Domain (for NMFS) and construction-start year. Quarterly take status reports and annual program reports, summarizing all key program data, will be available for all stakeholders on the website.

2.2.1 Project and Program Information

Project reports (*e.g.*, Project Notification) can be prepared using template reports, and should be saved using file naming conventions presented in Appendix 4. Unless major issues are discovered or significant changes occur, templates and guidance documents will not be updated more frequently than once every six months (likely January and June).

The FAHP programmatic database is the primary mechanism for documenting project information, tracking impacts, mitigation and enhancements, and generating project updates and programmatic reports. Currently, the database is available only to ODOT employees. Local agency projects must use the template reports, but Regions have the option of using either the template reports or uploading project information directly into the ESA database to create their project reports. ERU will enter project information when template reports are used.

The ERU will use the database to create programmatic summary reports for cumulative measures of take, which will be available to project stakeholders via the website at quarterly intervals and upon request. If at any time, a project approaches the cumulative take limit, ERU will alert REUs and coordinate with FHWA and the Services for an interim solution, as needed.

2.2.2 Project Coordination and Communication

Key project milestones must be coordinated with project stakeholders at each of the four project phases, as described in Section 2.0. The timing of several of these milestones, particularly project notification, can be critical to project delivery (Figure 1). The primary tools for communicating project information among project stakeholders are E-mail and the Projects Map, described in Section 2.2.3. Project stakeholders will transmit project reports and share key project milestones primarily via E-mail, maintaining records of communications in the projects files (Figures 1 and 2).

Currently, project files are maintained on the following ODOT ftp server:

- ODOT (internal intranet): \\s0442c\ftp\NRUTrans\FAHP
- External access: ftp://ftp.odot.state.or.us/NRUTrans/FAHP/

The REU will create and maintain project-specific folders on the ftp server. The project's ftp folder will be linked to the Projects Map for easy access to project information by Service employees or other project stakeholders (Section 2.2.3). Rather than sending copies of reports directly with E-mail transmittals, an externally accessible link to the project's ftp folder will be included in the E-mail communication. All official E-mail messages containing final reports and information on key milestones must be copied to ERU (via FAHP_ESA@odot.state.or.us) to ensure necessary programmatic reporting and tracking.

2.2.3 FAHP Projects Map

The general location and phase of all projects implemented under the FAHP programmatic will be available to stakeholders for easy tracking purposes via ODOT's Projects Map, available via:

- The FAHP website: https://www.oregon.gov/ODOT/HWY/GEOENVIRONMENTAL/Pages/FAHP.aspx
- Direct link: https://gis.odot.state.or.us/fahpesaprogrammatic/

The map is based on ODOT's trans GIS maps (see Appendix 5 for user guidance). ERU program coordinators add projects to the Projects Map when early coordination documentation is transmitted as per Section 2.3. Each project is symbolized by its status, either early coordination, project notification, in-construction, construction complete, restoration complete, likewise updated by ERU as related reports are transmitted. Pop-up boxes provide basic project information as well as a hyperlink to the project's FTP folder under "Detailed Reports" (Figure 3).

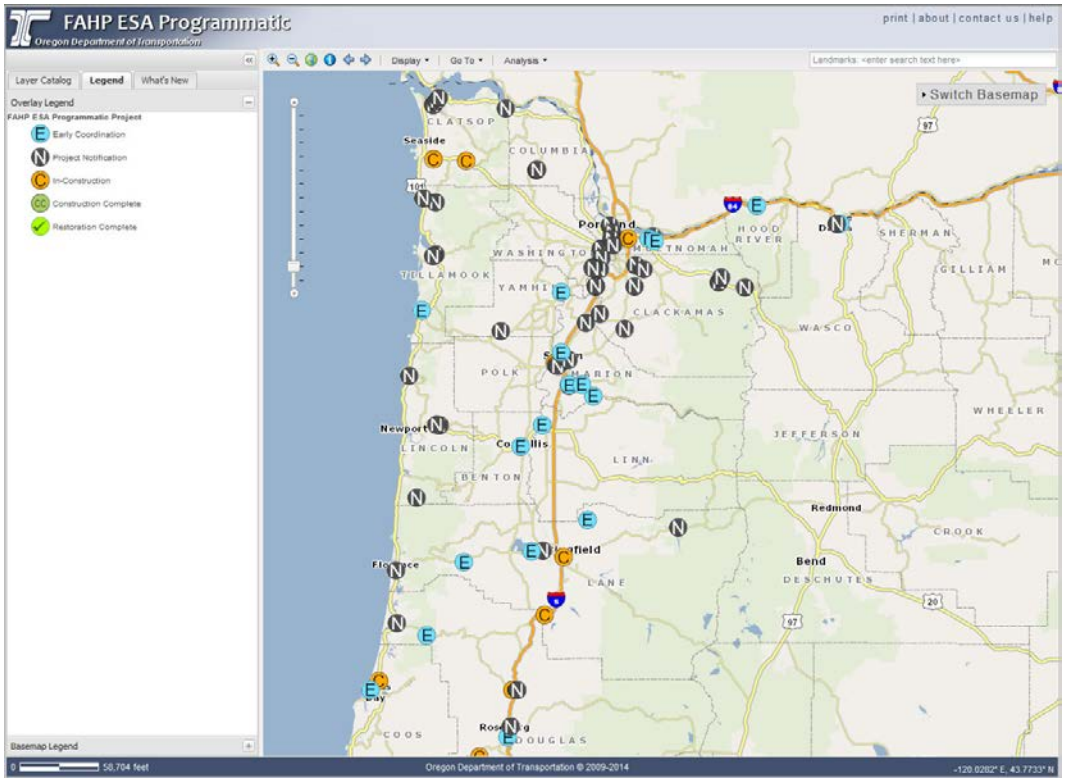


Figure 3. Example of Projects Map.

2.3 Early Coordination

One of the most important milestones to ensure timely processing of Project Notification Reports is early coordination. This required step occurs during project development, shortly after project kick-off or at least by the Design Acceptance Package (DAP) stage of project development. The purpose of early coordination is to present basic project information to the Services so that they can provide feedback and guidance in advance of project notification, particularly for actions that require review/approval or will need special information (*e.g.*, a Fish Passage Plan or NMFS fish passage review). Thorough early coordination well in advance of

project notification will minimize the risk that FHWA or the Service will return a Project Notification Report with a request for additional information, potentially impacting project schedules.

The project proponent (REU or local agency) must document early coordination by completing a Project Initiation Report (template available on the website) or other memorandum or E-mail, which include the following basic project information: project name and key number, location (latitude/longitude must be provided so that ERU can add the new project to the Projects Map), possible activities that may affect ESA-listed species covered by the FAHP programmatic, key milestones, and project stakeholders. If some of this information is not known at the time of early coordination, provide a description of the proposed coordination steps and the anticipated project development schedule. Local agency project proponents should submit the early coordination documentation to their REU.

Shortly after early coordination begins, the REU will create a new Project folder on the ftp server under the appropriate Region's section, upload an electronic copy of the early coordination documentation, and send an E-mail notice to project stakeholders alerting them to the start of a new project and providing a link to the documentation in the project's ftp folder.

2.4 Project Notification

The most streamlined approach to implementation is to meet the FAHP programmatic design standards presented in this guide (Section 3.0). All projects require review by FHWA to ensure that the project falls within the scope and otherwise adheres to it, and may be reviewed by the Services. However, in many cases, the Project Notification Report can be processed without the need for approval from the Services. Even if a project cannot meet all design standards as stated, most FAHP projects can still use the programmatic for ESA consultation if particular design modifications occur. Section 2.4.2 outlines the types of actions that require Services approval. The Project Notification Report is intended to describe activities that may affect ESA-listed species and supporting habitat covered by the FAHP programmatic and provide FHWA, the Services, and ERU information needed to evaluate and document compliance (see FAHP Programmatic website for the most updated template reports). The report should relate to project activities that may affect ESA-listed species, components of the project that will not affect species should not be included (*e. g.,* for aquatic species, do not include habitat impacts outside of the riparian zone, as defined in Section 4.0). Depending on the project, certain attachments should be included with the Project Notification Report (Table 4). The ERU will obtain information for tracking take, impacts, and enhancements from Project Notification reports.

Table 4. Attachments or additional information for the Project Notification Report.

Project Activities	**Attachment Type or Additional Information**
Actions with required mitigation (see Section 3.4)	Relevant plans to illustrate mitigation features
Blasting in or near aquatic habitats (only allowed when listed species are not present)	Attach relevant plans or special provisions that clearly explain the blasting action; coordinate with the Service representative to determine if a Blasting Plan is required for inclusion with the Project Notification or Completion reports
Bridge (as defined in Section 4.0) replacement	Bridge Supplement

Project Activities	Attachment Type or Additional Information
or repair that involves pile driving (associated with affects to ESA-listed species)	
Buffer distances associated with Design Standards (*e.g.*, "Store, fuel and maintain all equipment in a staging area 150 feet or more from any waterbody…")	Reduction in buffer distance may be warranted based on site conditions, and should be described in the Project Description
Extensions to in-water work period	Pre-approved In-Water Work Window Variance/Project Change Request
Fish passage structures and/or fishways, including ladders, culvert retrofits, pool-riffle structures, and roughened chutes	Fish Passage Plan or relevant plans to illustrate enhancement features; coordinate with the Service representative for additional data requirements and analysis that may be required
Other modifications to FAHP design standards	Describe in Project Description
Stormwater management	Stormwater plans or drawings depicting relevant stormwater management features (see Section 3.5)
Stream channel or waterway enhancements	Relevant plans and special provisions that best illustrate features; coordinate with the Service representative for additional data requirements and analyses that may be required
Weed control that does not meet herbicide treatment standards	Describe in the Project Description

2.4.1 Project Notification, Services Review/No Approval

The following activities[2] require notification to, but *do not* require approval by the Services:

(a) Work below ordinary high water (OHW) completed during the in-water work period.
(b) Weed control near aquatic habitat that occurs manually or otherwise meets FAHP herbicide treatment design standards (see Section 3.11.8).
(c) Bridge replacement that meets fluvial performance and pile driving standards (see Section 3.7).
(d) Projects without stream channel or waterway enhancements, or projects with stream channel or waterway enhancement that meet design standards (see Section 3.9).
(e) Projects that include stormwater flow management in drainage basins larger than 100 mi^2 that meet design standards (see Section 3.5).
(f) Project may or may not include minor modifications[3] to buffer distances, riparian habitat impacts; or otherwise can be designed as per the FAHP.
(g)

For projects impacting aquatic species that require NMFS approval, USFWS will not require approval.

2.4.2 Project Notification, Services Approval Needed

The following activities[4] require notification to, *and* approval by NMFS or USFWS:

(a) Actions with required mitigation such as: on-site stormwater treatment deficit, net increase in artificial fill or abandoned fill in the functional floodplain (as defined in Section 4.0),

2 Activities within scope of the FAHP (see Section 1.1).

3 Minor modifications must be described in the Project Notification, including justification for lack of impacts. If the modification may cause adverse impacts to ESA-listed species covered by the FAHP, it is not considered "minor" and therefore requires Services Approval.

unvegetated streambank riprap, any streambank riprap above OHW, in-stream flow control structures. See Section 3.4 for more information.

(b) In-water work extension requests.
(c) Fisheries restoration structures and/or fishways, including ladders, culvert retrofits, pool-riffle structures, and roughened chutes.
(d) Weed control that does not meet herbicide treatment standards.
(e) Blasting in/near aquatic habitats (only allowed when listed species will not be present[4]).
(f) Bridge replacement that cannot meet fluvial performance or pile driving standards.
(g) Stream channel modifications or waterway enhancements that do not meet design standards, such as fish passage retrofits, channel restoration, set-backs, and water control.
(h) Stormwater flow management in a drainage basin that is less that 100 mi^2.
(i) UUSFWS may require approval for projects that have adverse effects to USFWS aquatic species (no NMFS species present) and that fall into categories defined in the NMFS process as "need approval."

For projects that include removal of listed plants and butterfly habitat and high noise within 300 ft of murrelet habitat, review and approval from USFWS is required.

Table 5. Current Service guidance on auditory and visual harassment thresholds for marbled murrelets.

Project Activities	Harassment Threshold Distance
Blasting (greater than 2 lb. charge)	1.0 mi (1.6 km)
Blasting (Less than 2 lb. charge)	360 ft. (110 m)
Effect pile driving, jackhammer, or rock drill	180 ft. (55 m)
Helicopter or single-engine Aircraft	360 ft. (110 m)
Chainsaws	135 ft. (40 m)
Heavy equipment	105 ft. (32 m)
Visual activity	300 ft. (90 m)

Removal of trees from owl and murrelet habitat will be mitigated using ODOT's 87-acre habitat bank along the lower Umpqua River. As of January 4, 2016, there is approximately 1 acre of credit remaining for use. Please check with the FAHP coordinators to ensure adequate acreage is still available during the early coordination process.

(j) Other modifications to design standards that may result in direct impacts to listed aquatic resources.

2.4.3 Project Notification Submittal Process

As shown on Figure 1, the Notification must be sent to FHWA at least 12 weeks prior to when the project's CE close-out report is needed. The timing of these steps is based on FHWA's requirements for final NEPA documentation (*e.g.*, Categorical Exclusion [CE] close-out) and to allow sufficient time for review and processing by FHWA and the Service. Extra lead time may be necessary for complex projects that may require more intensive reviews within the Service (*e.g.*, fish passage or aquatic enhancements).

Project Notification Reports must be prepared by an ODOT Biologist or an ODOT-qualified Biologist (Section 2.1.3), and transmitted as follows (also summarized on Figure 1):

4 The goal is "No Effect" to ESA fish. Arizona Department of Fish and Game blasting guidelines may be a useful tool (see FAHP website).

1. The Project Notification Report requires digital signatures (see Appendix 6 for instructions) from the Biologist, REU Manager and construction Project Manager (or another manager who can attest to the accuracy of project information in the report) before being transmitted to FHWA.
2. As shown on Figure 1, when those signatures have been obtained, the REU will upload the complete Project Notification Report to the project's ftp folder, using the file naming conventions in Appendix 4, then communicate that the Notification is ready for FHWA approval by E-mailing the FHWA Operations Engineer (and cc project stakeholders), using recommended E-mail language presented in Appendix 7.
3. When approved by FHWA, the Operation Engineer will sign the report, and upload the file to the ftp folder (the document must be saved as new file before uploading, distinguished from the earlier version by adding "_FHWA" to the file name as per naming conventions in Appendix 4), and then E-mail either the request for Service approval, or the copy of the final Notification if it does not require Service approval, to the Service representative using recommended E-mail language presented in Appendix 7 (copying the same project stakeholders).
4. When applicable and approved by the Service, they will sign the report, save the file by adding "NMFS" to the file name, upload the file to the project's ftp folder, and alert FHWA by E-mail (copying the same project stakeholders). ERU will confirm that the file is saved correctly on the project's ftp folder and correct it if need be.
5. The REU will distinguish the fully approved Notification Report (with all applicable signatures) from earlier versions by saving the file as "FINAL" as follows: add "FINAL" to the file name, upload it to the project's ftp, and delete earlier versions.

2.4.4 Fill/Removal Permit Applications

The USACE/DSL fill/removal permit application requires that the applicant identify how they are in compliance with the ESA. A completed Project Notification Report must be provided with the fill/removal application when the FAHP programmatic is used for ESA compliance. However, the entire Project Notification Report need not be attached. The USACE have indicated that they only need a scanned copy of the fully signed signature page.

2.5 Construction

When a project moves from development to construction, ERU will update the Projects Map to reflect the change in project status, using information provided in the Project Notification Report and updates provided by REU (Figure 2). The Service representative may be invited to attend pre-construction conferences. As per ODOT boiler plate special provisions, certain activities (such as work area isolation and fish salvage) require an on-site meeting between construction and biological project representatives (*e.g.*, SP00290.34).

There are three primary types of reporting associated with the construction phase of project implementation: Environmental Inspection, Fish Salvage, and Project Completion reports. There is also a special reporting scenario for isolated incidents where effects experienced during construction are beyond those anticipated in the FAHP Programmatic BO. This is described in Section 2.5.4. Requests for extensions of in-water work periods or notifications of project changes are discussed in Section 2.7.

2.5.1 Environmental Inspection Reports

The purpose of environmental inspections (*i.e.*, construction monitoring) and Environmental Inspection Reports is to document compliance with the Programmatic, including effectiveness of BMPs and avoidance/minimization measures, challenges encountered, and corrective actions. These reports will inform programmatic adaptive management strategies and may influence changes in the types of activities requiring Service review and approval.

A *minimum* of one environmental inspection per project per construction year is required under the FAHP programmatic. Additional inspections are required depending on complexity of the project. Due to the variety of projects, inspections are not mandated for specified activities or at certain frequencies. Rather, the individual authorized to perform the environmental inspection will determine the appropriate time for inspections and the nature of the inspections based on the complexity of the project, the timing of activities that affect regulated resources, and best professional judgment. For example, if a project has over-water work, inspections should occur during installation of containment structures and with sufficient frequency to check/report on the efficacy of the containment.

Environmental inspections may be warranted and scheduled to ensure that FAHP programmatic requirements are being met. The REU will determine appropriate level of effort for inspection site visits for each project, and coordinate this with Construction Project Managers and Local Agency representatives. Such times may include but are not limited to:

- Pollution and erosion controls – are they in-place and appropriately installed as specified?
- Native materials designated for avoidance – are they sufficiently marked and avoided?
- Cleared vegetation – is it clipped rather than grubbed whenever possible?
- Native materials designated for restoration – are Contractors implementing requirements to conserve the materials?
- Herbicide treatment buffers – are they being maintained?
- Fish screens and work area isolation – are they being properly implemented and do they work effectively?
- High stream flow events – is work that may impact protected resources halted?
- In-water work – is it being completed as specified?
- Containment practices and structures – are they functional at minimizing risk of pollutants entering habitat for ESA-listed species?
- Treated wood – is it being implemented as specified?
- Hydro-acoustic specifications – are they being followed? Note, hydroacoustic monitoring is not required, unless a specific condition of a design standard modification, determined during coordination with the Service representative.
- Bank stabilization and/or site restoration – are they being implemented as specified?

If an inspection identifies issues or deficiencies during construction, a follow-up inspection is expected after the issue is corrected. The Service and FHWA understand the complexity of highway construction projects and the Inspection Report should be viewed as a learning tool. Project proponents will not be penalized by reporting problems or issues. The template Environmental Inspection Report includes a place for describing follow-up repairs. Such repairs or corrections need not be completed at the time of submittal of an Inspection Report, but can be addressed in a later Inspection Report. However, if not addressed at the time of report submittal, the inspection report should describe the anticipated schedule for addressing the problem.

Diligent inspections, honest and clear reporting, and easy access to Environmental Inspection reports are vital for the future of the FAHP programmatic. A project is required to submit at least one inspection report per construction year, which may be based on a single inspection site visit, or multiple. When the reports are completed, the investigator will upload the report to the project's ftp folder and send an E-mail notice to the project stakeholders. Once added to the ftp folder, they are available to project stakeholders via the Projects Map (see Section 2.2.3). The REUs and ERU will perform quality assurance reviews and tracking of submittals. ODOT's template Environmental Inspection Report may also be used if required by other permits, such as individual consultations, fill/removal permits, etc.

2.5.2 Fish Salvage Reports

Fish exclusion, capture and removal must be completed in any area that will be isolated from the active channel or as approved by the Service representative during the project notification process. A Fish Salvage Report is required under the FAHP programmatic whenever work area isolation occurs in a water body that may have ESA-listed fish species. For all FAHP projects, **the lead fish Biologist must complete and E-mail the Oregon Department of Fish and Wildlife (ODFW) Fish Salvage Report** to the Service representative, ODFW (fish.research@state.or.us) and ODOT ERU (NRU-Trans@odot.state.or.us), within two weeks of each salvage/rescue effort. These standards will meet the conditions of both the NMFS BO and ODOT's fish salvage permit with ODFW. Note that Fish Salvage Reports also must be submitted to ODFW and ODOT when salvage occurs in water bodies with native fish that are not protected under the ESA.

Additional reporting is required under the NMFS BO "if a sick, injured, or dead specimen of a threatened or endangered species is found in the project area. This may occur during fish salvage or if otherwise observed in the project area. The finder must notify NMFS through Marc Liverman, Willamette Basin Branch Chief, in the Oregon State Habitat Office (503-231-2336), or through the NMFS Office of Law Enforcement (1-800-853-1964), and follow any instructions." Furthermore, according to the BO "if the proposed action may worsen the fish's condition before NMFS can be contacted, the finder should attempt to move the fish to a suitable location near the capture site while keeping the fish in the water and reducing its stress as much as possible. Do not disturb the fish after it has been moved. If the fish is dead, or dies while being captured or moved, report the following information: (a) NMFS consultation number; (b) the date, time, and location of discovery; (c) a brief description of circumstances and any information that may show the cause of death; and (d) photographs of the fish and where it was found."

2.5.2.1 Electrofishing

Electrofishing is one of the methods used to salvage fish and minimize take on our projects. The FAHP Programmatic Opinion specifically refers to the NMFS Electrofishing Guidelines (NOAA 2000) Appendix 8 of this document, as the guidance to follow. There are some important protocols, training, and techniques that need to be followed to be in compliance with the FAHP.

Mistakes can occur during fish salvage, either because the contractor has work element changes or there is a hurry to get the fish salvaged so the contractor can continue work. Unfortunately, fish salvage is the most common construction activity that results in fish mortality. Careful

planning needs to occur to ensure that a proper in-water work area isolation occurs, water gets by-passed properly, proper fish passage is maintained, and proper handling of fish occurs.

Due to a number of factors, the fish handled are vulnerable and procedures must be in place to ensure 95 percent survival prior to their release. A few of these factors are water temperature, water conductivity, electrofishing equipment settings, duration in buckets, density in buckets, location of fish release, and proper team staffing.

Each electrofishing team should be properly staffed with clear roles defined. The most important role is the person responsible for observing the fish in the bucket or container. They must be able to recognize when fish are in distress. This person is also responsible for ensuring that a container does not get overcrowded. Depending on the site and stream reach, a project may need to have several people responsible for getting the fish to the release point. If necessary, electrofishing must cease to accomplish this. A block net can be used to delineate where electrofishing has already occurred. It can also assist in capturing stunned fish that drift downstream. The block net must be checked prior to releasing the fish. Aerators are required to be connected to any fish holding container that is outside of the stream. These are inexpensive and significantly minimize mortality during handling.

Maintenance and storage of equipment is also important. If your equipment is stored in a shared area, make sure all equipment is clean prior to use. Buckets for fish salvage should be clearly marked in large red lettering “Fish Use Only”. Nets should be checked for holes each spring prior to construction season. A good time to have electrofishing equipment serviced and checked is in the winter.

The 2000 NMFS Electrofishing guidelines outline the following procedures:

- A crew leader having at least 100 hours of electrofishing experience in the field using similar equipment must train the crew prior to electrofishing.

- Initial site surveys and equipment settings
- Electrofishing techniques and protocols
- Sample processing and recordkeeping – fish release, species identification, and field data.

Anyone that is on an electrofishing team should be familiar with these guidelines and the electrofishing crew leader should ensure proper electrofishing guidelines are followed. Anytime there numerous ESA-listed fish captured during a fish salvage, communication should be made to ODOT Geo-Environmental soon after the salvage is complete. On behalf of FHWA, ODOT is monitoring the take metrics for the FAHP Programmatic to ensure that the annual Take limits are not exceeded.

2.5.3 Project Completion Report

The NMFS BO requires submittal of a Project Completion Report within 60 days of the end of construction, which is defined as the final installation of project components relating to the ESA consultation. For most projects, this coincides with the end of project construction. If the project involves ground disturbing work, the Project Completion Report is required within 60 days after seeding and planting, but before the contract establishment period. The purpose of the Project Completion Report is to describe actions that occurred during construction as they relate to the ESA consultation, particularly the actual impacts, enhancements and offsetting measures. For example, the Project Notification Report may have indicated that 20 trees would be removed from the riparian zone, but if impact minimization measures implemented by the contractor resulted in removal of only 10 trees, that change should be reflected in the Project Completion Report.

Typical information provided in the Project Completion Report (reflected in the template Project Completion Report available via the FAHP programmatic website) includes (as applicable to the project):

- Actual amounts of disturbance (*e.g.*, acres of habitat degraded, number of piles installed, length of streambank armored)
- Types of enhancements
- As-constructed (AKA "as-built") plans (could be final marked up plans as long as they show any changes) for offsetting measures
- Confirmation of stormwater management that was implemented including photographs and a map depicting the outfalls
- A description of work area isolation measures implemented
- Total numbers of salvaged ESA-listed species
- Channel modifications
- Information on site restoration, when relevant, including submittal of the Habitat Restoration Plan and relevant part of as-constructed roadside development plans (Section 3.10)
- If a Bridge Supplement was submitted with the Project Notification Report, an As-Constructed Bridge Supplement should be submitted to confirm the bridge design and construction (particularly important with pile driving).

As-constructed (AKA "as-built") plans are project plans that have been amended by the Contractor to reflect Agency-approved design changes that occurred during construction. Typically, they are hand-written annotations on contract plan sheets that are signed by a licensed designer. Agency construction offices compile as-constructed plans after the contract is complete. This may take several months, sometimes before the Project Completion Report must be submitted. If this is the case, submit the Project Completion Report without the plans and describe the reason in the report and when the as-constructed plans will be available (*e.g.*, submitted with the first Annual Monitoring Report). It will be up to the project proponent to obtain the relevant as-constructed plans and provide copies to the project's ftp folder, or, if the plans can be available to the Service from an Agency-managed ftp or file sharing site, provide a link to this site in the report.

If some piles could not be removed and if a dredging action is likely to occur where broken piles are buried (*e.g.*, the shipping channel in the Columbia River), for compliance with the BO,

NMFS would like the locations of broken piles (latitude/longitude obtained from global positioning system).

The most appropriate person to complete the Project Completion Report is the Biologist or the Environmental Inspector who was present during construction. Procedures for submittal and tracking are the same as Environmental Inspection Reports (Section 2.5.1).

2.5.4 Unanticipated Effects During Construction

If effects occur during construction that are either significantly outside of the scope or the scale indicated in the FAHP Programmatic BO, the ODOT project biologist, within 24 hours of the event, should contact via email the Project Stakeholders, the ODOT Geo-environmental Section Chief (Susan Hapt - Susan.HAUPT@odot.state.or.us) and the FHWA Program Development Team Leader (Michelle Eraut - Michelle.Eraut@dot.gov). The email should describe the nature of the event and detail what, if any, immediate corrective actions were taken. Also, any relevant reporting forms should be attached. For example, if there is a significant take exceedance for fish salvage, the email should include the fish salvage report and a description of the actions leading up to the mortality. Following the email transmittal, the project biologist should also contact by telephone the ODOT Geo-environmental Section Chief and the FHWA Program Development Team Leader. Additionally, the project biologist shall follow the salvage notice procedures stated in the FAHP Programmatic BO.

2.6 Post-Construction Monitoring

Post-construction biological monitoring is required for all projects that clear vegetation or grade within riparian zones and streams, or involve streambank restoration, site restoration, or other habitat enhancements. Biological monitoring is required to evaluate the progress of site restoration and to assess the performance of enhancements. Monitoring should **start the calendar year after project completion and continue each year until the target final performance standards are met** or until alternative treatments or conservation measures are completed based on the Project Change Request described in Section 2.7 and subsequent regulatory approval. Performance standards are project-specific and relate to design standards, offsetting measures, and enhancement or site restoration goals (see Sections 3.9 and 3.10).

As applicable to the project, the following typical information will be presented in Annual Monitoring Report (as reflected in the template, available via the website):

- The performance and status of offsetting measures
- Bank restoration
- Channel modifications
- Waterway enhancements and habitat restoration
- Maps and photographs of these features
- Information on prior improvements or maintenance performed
- Plans for future improvements or maintenance
- Use of stormwater credits developed on projects.

If key habitat features or offsetting measures are failing or not expected to meet target final performance standards, the project proponent should coordinate with FHWA, ERU and the Service representative to determine acceptable alternatives, develop a Corrective Action Plan

(following ODOT biology mitigation monitoring standards, available via the Biology Program website, http://www.oregon.gov/ODOT/HWY/GEOENVIRONMENTAL/biology.shtml), and follow the procedures in Section 2.7 for reporting project changes.

For most projects, a specified duration of monitoring will be required for other regulatory permits; these temporal specifications could guide the duration of post-construction monitoring under the FAHP programmatic. The project proponent is responsible for completing annual monitoring and site management to meet performance goals. The most appropriate person to complete post-construction biological monitoring is same Biologist or Environmental Inspector who was present during construction because they would be familiar with design features, although it can be done by any ODOT-qualified biologist (see Section 2.1.3). Procedures for submittal and tracking are the same as Environmental Inspection Reports (Section 2.5.1). ODOT's template Annual Biology Mitigation Monitoring Report may be used for other permit situations as well, like SLOPES V, individual consultations, fill/removal permits, etc.

2.7 Project Changes and In-Water Work Variances

Project schedules and designs often change during project development or after the Project Notification Report has been submitted. Minor changes determined after project notification that do not change the nature or degree of species impacts (such as changes in types or amounts of stormwater management or habitat impacts) do not need a Project Change Request because they will be described in the Project Completion Report (Section 2.5.3). However, any change minor or major needs to be discussed with the ODOT REC and/or ODOT-NMFS liaison. If the change is on a local agency project the local agency or their consultant needs to discuss this with the Local Agency Liaison and the Region Environmental coordinator. The project proponent must complete a Project Change Request (available on the FAHP programmatic website) in the following situations:

- In-water work variance requests, **even those identified in advance of project notification**.
- If a Project Notification Report that was approved by FHWA as "No Service Approval Needed" changes to the point of triggering the need for Service approval (as per Section 2.4.2).
- Any project change that could negatively impact fish passage short-term or long-term.
- Any project change that causes the need for an off-setting action.
- Any project change identified after project notification that has the potential to exceed the overall program's annual limit for take (determined through coordination with NMFS representative).
- Proposals for alternative mitigation, even if after the Project Completion Report has been submitted.

FAHP programmatic Project Change Requests require review and approval by the FHWA, the Services and likely other regulatory agencies (*e.g.,* ODFW, USACE), depending on resources affected and project permits. The individual completed the Project Change Request must ensure they are using the most current version of the form, the version that includes FHWA and Services signature blocks. Typically, a Project Change Request is initiated by the construction Project Manager, although it may be initiated by the Biologist or REU. The Project Change Request will require ODFW concurrence for in-water work variance requests **before it is submitted to for FHWA and the Services for approval**. As part of their concurrence, ODFW must provide information on life stage(s) of ESA-listed species present during the variance,

impacts to ESA-listed species and additional conservation measures required by ODFW, and ODFW may either directly sign the Project Change Request or the project proponent may attach an E-mail from ODFW to the request (E-mail must include similar information).

Once ODFW concurrence has been obtained (when applicable), the Project Change Request is signed and transmitted to FHWA and the Services following the same process as the project notification (see Section 2.4.3). ODOT's template Project Change Request may be used for other permit situations as well, like SLOPES V, individual consultations, fill/removal permits, etc., but signatures and processing would follow whatever is required by the permit holder (*e.g.,* for SLOPES V, the USACE will transmit for NMFS approval).

Some project changes can result in the avoidance of impacts to ESA-listed species and habitat and result in a subsequent determination of "No Effect." If a change results in an effect determination change to "No Effect" after early coordination, the Region Biologist and/or Project Coordinator should send an E-mail notice to FAHP project stakeholders to withdraw the project from FAHP programmatic coverage and remove any reports from the FAHP ftp site that are no longer applicable. The withdrawal does not need to be approved by FHWA. The E-mail notice must have clear subject heading and the text must clearly state the reason for the change in determination of effect, summarize the status of project documentation (*e.g.,* "NMFS approved the project notification"), and include any specific requests for project stakeholders (*e.g.,* NMFS representative: please inform the Service that the project has been withdrawn"). The withdrawal may also be completed after project notification; at that point, it may trigger further discussions with FHWA or the Services.

3.0 Design Standards

3.1 General Information

As described in Section 1.1, the FAHP programmatic will be used for ESA consultation for the vast majority of FAHP projects. This includes not only projects with riparian impacts and in-water work, such as culvert or bridge replacements, but also projects that affect the quality and magnitude of stormwater runoff into waterways with ESA-listed species. Section 3.5 provides design standards for stormwater management.

Most highway construction projects that impact covered species involve clearing and grading activities. ODOT's Standard Specifications for construction contracts, that are required of every STIP project, include many measures to minimize disturbance to environmental resources, particularly pollution and erosion control measures in Standard Specification Section 02080 and 02090. The FAHP programmatic incorporates the relevant Sections of the Standard Specifications (e.g. 00280, 00290, 01030, 01040) that relate to aquatic species and riparian restoration, as impact minimization measures for all projects. The User's Guide therefore only includes activities that require special consideration or for certain types of project activities, such as the fluvial performance standards for bridge replacement projects (see Section 3.7.1).

Sections 3.1-3.10 contain implementation standards that are most relevant to project design or actions required by the proponent agency during project development. Section 3.11 contains additional design and construction standards that are more relevant to the development of contract specifications. However, because design and contract management overlap, all of Section 3.0 pertains to both aspects of a project.

3.2 Project Development

The Biologist will coordinate with the project team and designers to avoid and minimize direct and indirect impacts to protected species and habitats by implementing the following measures:

- Plan and designate No Work Zones when applicable.
- If impacts are unavoidable, minimize net impacts by providing habitat improvements or enhancements elsewhere (off-setting) within the appropriate service area for the activity/impact (Sections 3.3 and 3.4).
- Determine if material sources are needed, and if so, will the sources be Agency- or Contractor-furnished (refer to Section 3.11.1 for additional information).
- For projects with high environmental sensitivity, plan and designate staging areas and disposal sites according to ODOT Bulletin GE08-04(B) (ODOT 2008b; refer to Section 3.11.2 for additional information).
- Develop and utilize Agency-furnished materials sources, staging areas, and disposal sites only if the work is within the scope of the FAHP programmatic.
- Determine if geo-tech drilling or survey work is needed below OHW. If so, coordinate as needed to comply with FAHP programmatic which allows hydraulic and topographic measurements and encased geotechnical drilling to be completed at any time, if a fish Biologist determines that the affected area is not occupied by adult fish congregating for spawning, or where redds are occupied by eggs or alevins. For pre-project activities (*e.g.*, geo-tech drilling), separate Project Notification Reports may be required if the activities occur prior to final project development and the work is funded by FHWA or it is an interrelated/interdependent activity of such project.
- Determine if temporary access roads, stream crossings, work bridges or containment are needed and implement appropriate impact minimization measures (Sections 3.7–3.10).

3.3 Enhancements

One of the program goals for the FAHP programmatic is to improve the environmental baseline of biological resources most impacted by transportation development. Additionally, ODOT is a partner in the Oregon Conservation Strategy (ODFW 2006) which seeks to protect all native species and prevent them from becoming threatened or endangered. Whenever feasible and reasonable, ODOT includes enhancements into project designs and site restoration plans. Typical enhancement goals (if practicable for site conditions and project constraints) include (Section 3.9 provides additional information on fish habitat improvements):

- increase riparian buffer widths to more closely match historical conditions
- replace non-native vegetation with native species
- increase tree cover to more closely match historical conditions, provided that the trees do not interfere with highway safety (*e.g.*, trees are not appropriate within 20 feet of the roadway clear zone, bridges, culverts, guardrail, or other permanent roadway structures)
- remove unnecessary man-made features from habitat areas
- improve stream complexity to more closely match historical conditions.
- incorporate enhancements identified in the Jobs-in-Transportation Act (draft, ODOT 2011a) environmental performance standards.

Describe proposed habitat enhancements in the Project Notification Report (Section 2.4) and completed enhancements in the Project Completion Report (Section 2.5.3). The ERU will summarize enhancements as part of annual programmatic review for FHWA and the Services.

3.4 Modifications and Offsetting Measures

The design standards were developed to avoid and minimize impacts to ESA-listed species and supporting habitat. Modifications to, or inability to meet design standards that affect covered species will require offsetting measures, or mitigation. Table 6 lists typical activities that require offsetting measures for NMFS trust species. However, the Services may request offsetting for other modifications to design standards as well, depending on magnitude of effects. For example, some types of impact pile driving that do not meet standards may trigger the need for bubble curtain effectiveness monitoring. **All offsetting measures must be negotiated with the Services during early coordination.** General guidelines for offsetting standards have been developed, but they are flexible. Offsetting measures do not supplant the requirement that projects must implement impact minimization measures presented throughout this guide to the maximum extent practicable.

Table 6. Typical activities that trigger offsetting measures.

Activities	**General Guidelines for Offsetting Standards**[a]
Project cannot fully meet NMFS fish passage design standards[b]	Remove a similar fish passage barrier in a location that will benefit the impacted population. Project may not create a new barrier to spawning and migration of listed species
Inability to fully treat all of the stormwater from the project's CIA, or inability to fully meet the flow control requirement.	Provide treatment/flow control as close to the project as possible, for stormwater from a comparable contributing impervious area (CIA) with similar traffic volumes (annual daily traffic volumes, ADT) (see Section 3.5 for more information)
A net increase in hard armoring or artificial fill, or abandoned fill, in the functional floodplain	Remove the same quantity of artificial fill in a location that will benefit the impacted population. Since the other agencies will require mitigation for floodplain fill, the same mitigation will likely suffice.
Net increase in riprap above ordinary high water (OHW) or unvegetated riprap below OHW except as necessary for scour protection of structures (*e.g.*, bridges, culverts, roads)	Remove the same quantity of hard armoring in a location that will benefit the impacted population
Instream flow control structures	Remove other barriers in same population
Certain modifications to pile driving type/size standards (see Section 3.7.3)	

a. These are general guidelines. All offsetting measures must be developed in coordination with the Services representative, on a case-by-case basis.
b. ODFW fish passage standards/processes also apply to projects but, they are not required by the FAHP programmatic.

The general guideline about the location of an offsetting measure is where it will benefit the population of species impacted. Unfortunately, geographic boundaries of populations do not necessarily correlate to watersheds or hydrologic units. They are unique for each species and

ESU or DPS, and may not be well defined for each. Some of the recent recovery plans from NMFS use biologically-based boundaries such as strata and independent population (see example in Figure 4, from the recovery plan, ODFW 2010). This is one of the many reasons why offsetting measures must be coordinated with the NMFS or USFWS representative.

3.5 Stormwater Management

The FAHP programmatic includes stormwater management requirements that address both water quality and flow control. These are based on criteria initially developed by the ODOT Interagency Stormwater Action Team (SWAT), which were incorporated in SLOPES V and recent NMFS BOs. These requirements are consistent with the Environmental Performance Standards developed for the Jobs and Transportation Act, and generally apply to all ODOT projects. Minor modifications and clarifications have been incorporated into the FAHP programmatic. Refer to the Glossary in Section 4.0 of this Guide for definitions of stormwater management terms.

These requirements apply to projects that discharge or could be expected to discharge stormwater to waters of the state or United States, including rivers, streams, wetlands, estuaries and the ocean.

3.5.1 Triggers for Stormwater Management

Water quality treatment is required for projects that contain elements that would increase the amount of stormwater discharged, reduce the level of treatment currently existing, or that are of a scale and scope such that including the treatment of highway runoff is reasonable. Flow control is triggered by the increase in flow discharged into streams vulnerable to hydrologic impacts.

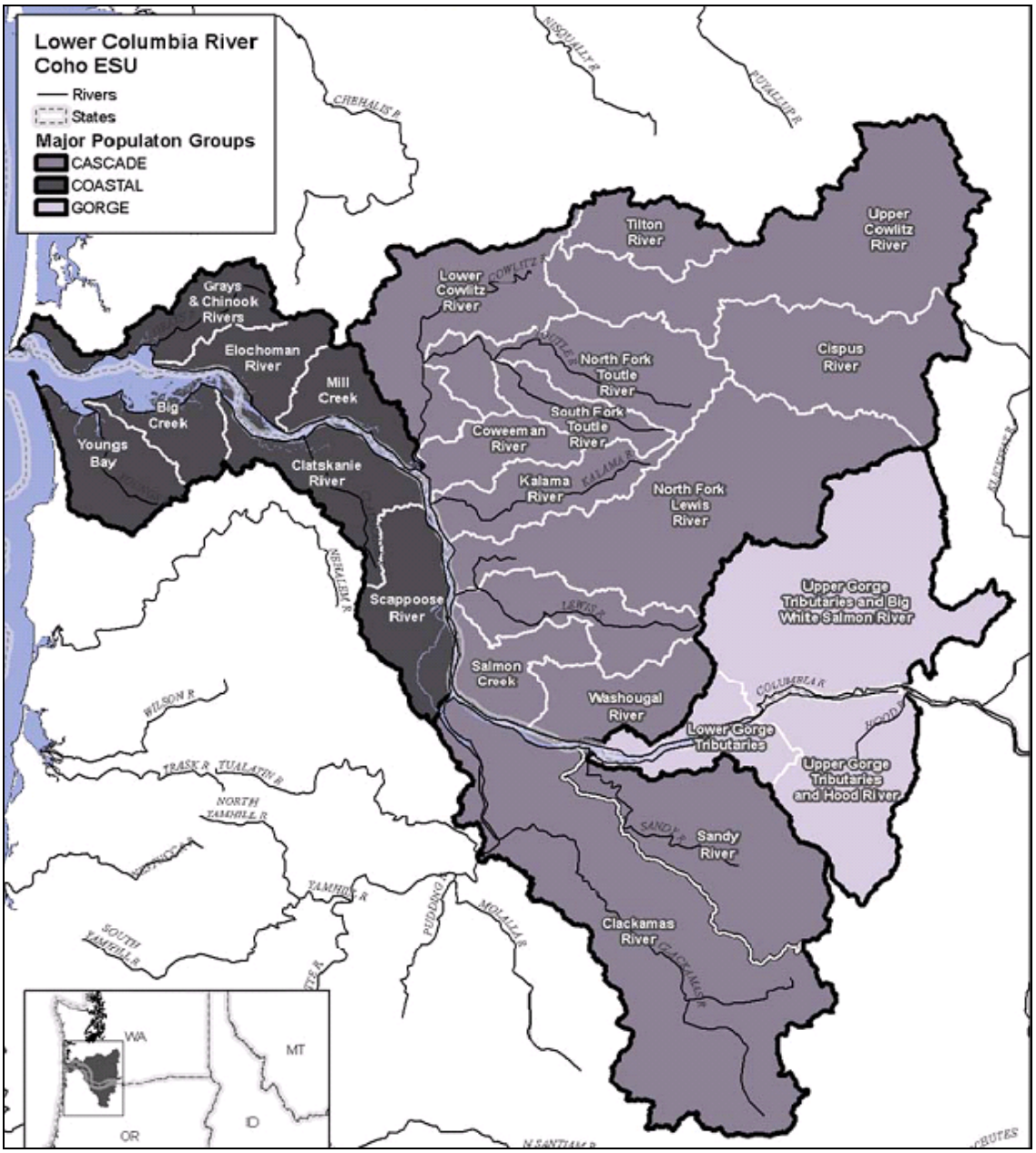
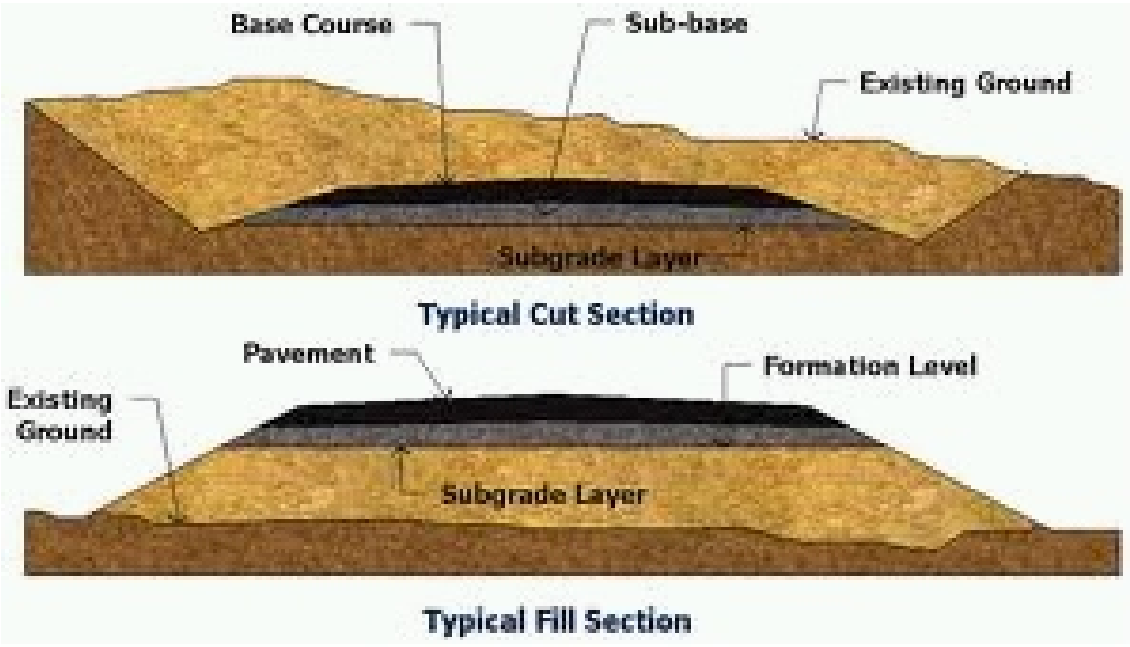


Figure 4. Major population groups ("strata") and independent populations of the Lower Columbia River coho salmon.

Water Quality: Stormwater management for water quality is required for all projects that:

- Construct new pavement that increases capacity, widens the road prism, or relocates the roadway. Examples include adding travel lanes, passing lanes or turn refuges, shoulder widening, and highway or intersection realignments.
- Realign the roadway, even if there is a reduction in Contributing Impervious Area (CIA, see Section 3.5.2).

- Increase the CIA within the project area. Along with adding new pavement, this could result from grade changes that cause highway runoff to flow into the project area that previously did not do so.



- Reconstruct a section of roadway pavement down to subgrade (Figure 5). This covers projects where the intent is to rebuild the roadway, not minor, localized repairs of the roadbed.

Figure 5. Typical pavement layers.

- Rehabilitate, restore or widen a bridge to repair structural or functional deficiencies that are too complicated to be corrected through normal maintenance (*e.g.,* external post-tensioning, supplementary dampening). The primary trigger is expanding the width of the bridge deck. Seismic retrofits that make a bridge more resistant to earthquake damage are not triggers so long as the bridge deck is not expanded nor the drainage system substantially modified.
- Replace a stream crossing. This includes both bridges and culverts. Early coordination can refine the CIA.
- Change the location, type or size of stormwater conveyance. This includes placing curbing where previously not present. Changing inlet locations does not require stormwater management unless stormwater from outside the pre-project CIA is captured as a result of the relocation.

Stormwater management for water quality is not required for the following:

- Minor repairs
- Resurfacing (*i.e.,* non-structural pavement preservation, a single lift or inlay), including
- Patching
- Chip seal
- Grind/inlay
- Overlay
- Guardrail flares or safety pullouts (*e.g.,* bus stops, police car pads, mail box pullouts)

- Bike-ped bridges not associated the highway
- Adding Sidewalks and bike paths where there is existing curbing, or where the bike-ped path is separated from the roadway by pervious ground (Figure 6)

Figure 6. Construction of a bike path separated from the roadway does not trigger the water quality treatment requirement.

Flow Control: Stormwater management for flow control (quantity) is required for all projects that:

a. Discharge into an intermittent or perennial water body with an upstream drainage basin that is less than 100 mi^2 (measured upstream from the project's point of discharge into the receiving water), and

b. Increase the peak discharge into receiving waters by more than 0.5 cubic feet per second (cfs) during the 10-year, 24-hour storm compared to pre-project conditions.

Flow control is not required if the project discharges directly into a lake, reservoir, estuary, or the ocean, even if the drainage basin is less than 100 mi^2. The drainage area can usually be determined by using the StreamStats program (http://water.usgs.gov/osw/streamstats/oregon.html).

The increase is that from the project as a whole into a given stream, not each individual discharge point. In the case of a project that discharges into two creeks that join a short distance downstream, the increase in flow into each stream should be determined, and then the total at the confluence.

As a rule of thumb, projects with an increase in impervious area of more than 10,000 ft^2 should be checked for the 10-year storm peak flow. A check should also be done for smaller increases in impervious surface area for very wet parts of the state – those with 10-year, 24-hours storms greater than about 8 inches on the west side and more than 2 inches on the east side.

3.5.2 Water Quality Treatment Standards

Projects that trigger the stormwater management requirements must treat the stormwater generated from the CIA by the Water Quality Design Storm (WQDS), using BMPs that are highly effective at removing the full range of highway runoff pollutants. These elements are described below.

Contributing Impervious Area:

A project's CIA has two components, the pavement within the project limits, and impervious surfaces owned or controlled by the transportation agency outside of the project limits from which stormwater flows into the project (see Figure 7). Off-site flow can be surface flow onto the project pavement, or conveyed by the drainage system serving the project when that system has been installed or modified as part of the project. If the drainage system isn't touched, then upstream sources of stormwater are not in the CIA.

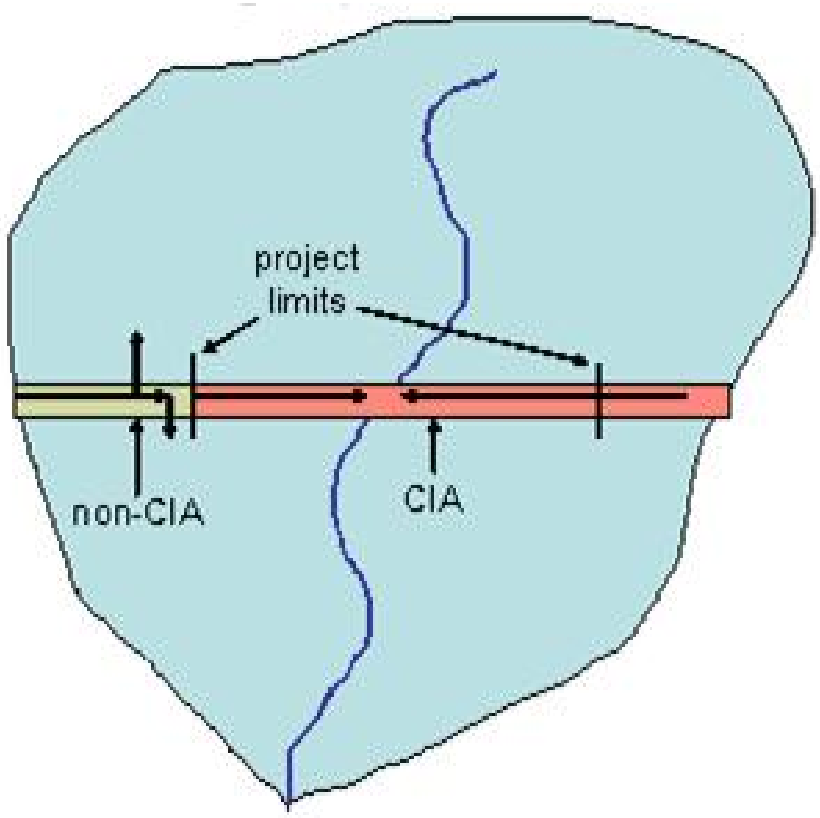


Figure 7. Example of contributing and non-contributing impervious areas.

Non-highway related impervious area is not part of the CIA. This category includes commercial development, residences and agricultural land. Transportation operated facilities such as rest

areas, on the other hand, are covered. Sidewalks and bike paths, though on their own not triggers for water quality treatment, are part of the CIA for purposes of sizing BMPs.

The change in the CIA from pre to post-project may be different than the change in the project's impervious surface area. This can occur when changes in grade result in the capture of additional off-project runoff, or if a roadway realignment results in the highway having a completely different CIA. In the latter case the post-project CIA may actually be smaller than the pre-project CIA, even though the project's impervious area increases.

In some situations the CIA may be less than described above. For example, a project that for most of its length is a pavement overlay may include a passing lane. The CIA would consist of the passing lane and whatever parts of the project and intersecting roads that drains to the passing lane. In the case of culvert replacements, the CIA encompasses the pavement disrupted, replaced or expanded as part of the work to remove and replace the culvert. Turn refuges are responsible for runoff from the refuge and from adjacent impervious surfaces that flow across the refuge (ODOT may require a developer to construct a turn refuge as a condition for access). Finally, a project may have a CIA that is out of scale compared to the project footprint. Because there is no intention on the part of the Resource agencies to have excessive stormwater costs cause the cancelation of worthwhile projects, a modified CIA can be negotiated. Early coordination with Services representative is imperative for any project where a reduced CIA may be appropriate.

The CIA is bounded by runoff from Agency-controlled surfaces that flow into the project (Figure 7), or if the stormwater treatment is outside project limits, the CIA includes surfaces that flow into the treatment facility (Figure 8).

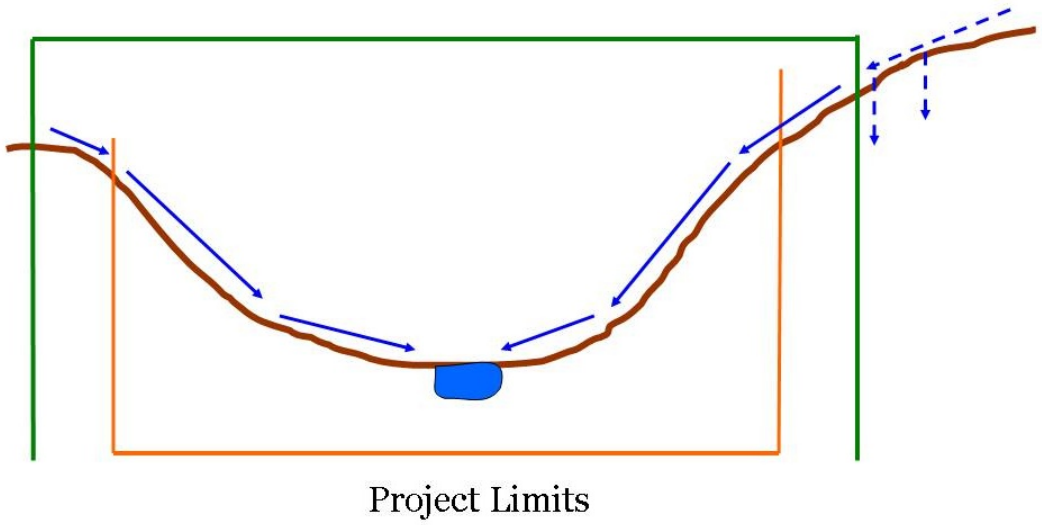


Figure 8. Longitudinal cross section showing the relation of the project area to the CIA.

Water Quality Design Storm:

The Water Quality Design Storm is used to calculate the volume and peak flow that must be treated. Storm size is designated as a percentage of the 2-year, 24-hour storm, with the percentage varying depending on the climate region (see Figure 9) and expressed in inches. All of the west side (zones 1, 2 and 3) and most of central and eastern Oregon (zones 6, 7 and 8) have a design storm of 50% of the 2-year event. Zones 4 and 9 have 67% of the 2-year event as

the design storm. Zone 5 has a design storm of 75% of the 2-year event. Regardless of the size of the 2- year storm the minimum WQDS size is 0.7 inches, and the maximum is 2.5 inches.

See Chapter 7 of the ODOT Hydraulics Manual (http://www.oregon.gov/ODOT/HWY/GEOENVIRONMENTAL/Pages/hyd_manual_info.aspx) for information on calculating design storm size and treatment discharges and volumes. NMFS has a preference for the use of a continuous rainfall/runoff model to determine peak flows and volumes, but a calibrated model is not available for most of Oregon. It is therefore necessary to use a different model, the Santa Barbara Unit Hydrograph being the most common method. The ODOT Precipitation Viewer provides site specific storm depths for a variety of recurrence intervals and durations (ftp://ftp.odot.state.or.us/tdb/trandata/GIS_data/precipitation.zip). Access to the ODOT precipitation Viewer is limited to internal ODOT computers, but the data is available for downloading for use by others. Contact the ODOT Stormwater Engineer in the Geo/Environmental Section for details.

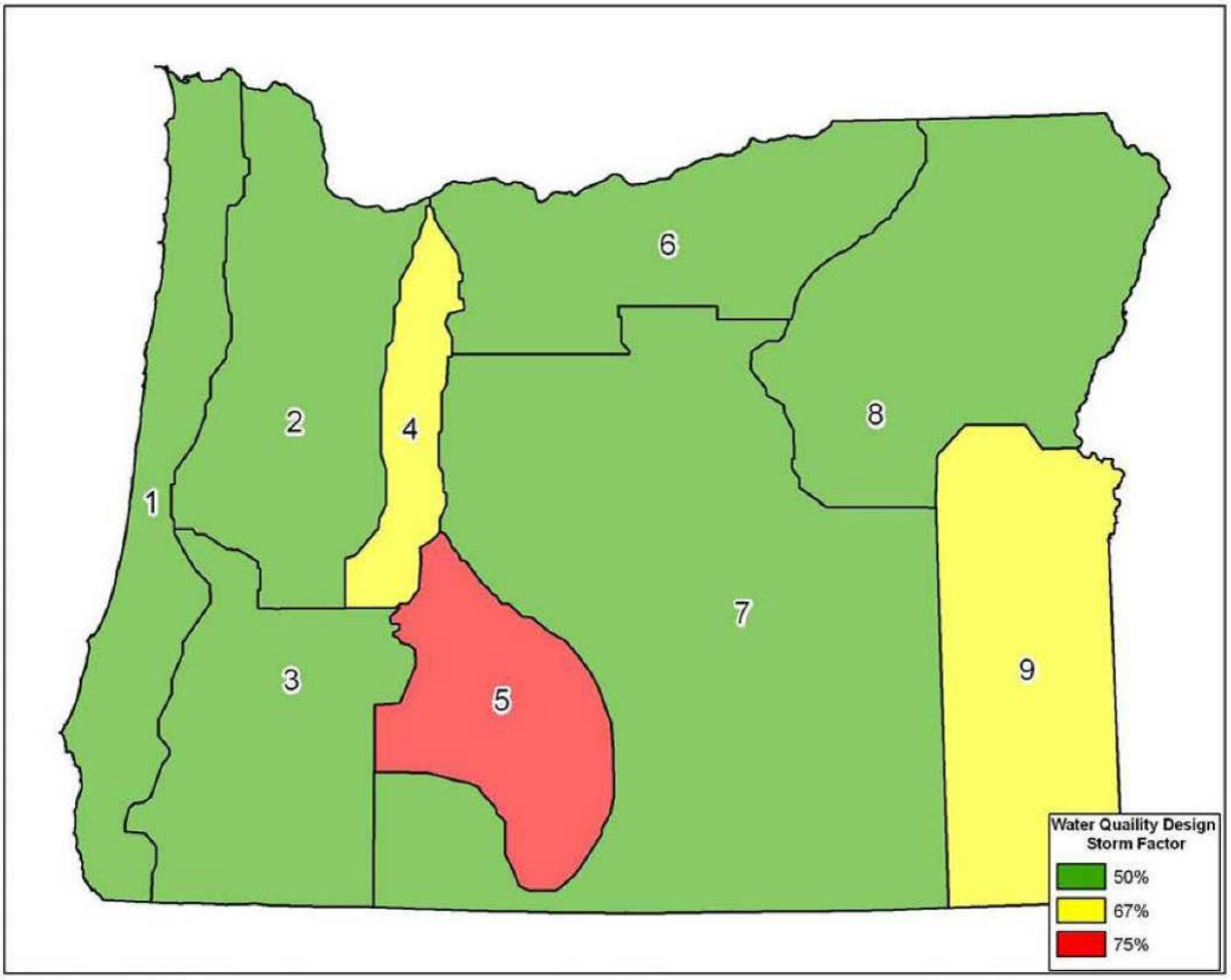


Figure 9. Generalized climate zones in Oregon as they relate to stormwater management.

For flow-through BMPs such as bioswales, the facility must be able to handle the peak discharge from the design storm. Detention and retention facilities, including infiltration basins need to have the capacity to contain the volume of the design storm.

Water Quality Best Management Practices:

Treatment of highway runoff requires the use of best management practices (BMPs) that are capable of effectively removing both particulate bound and dissolved pollutants. BMPs that are capable of treating the whole range of pollutants are often referred to as "preferred", and all have share a common element that a substantial portion of the stormwater infiltrates or filters through organic material or other media that treat dissolved pollutants. A treatment train made of several narrowly focused BMPs is as acceptable as a "preferred" BMP if together they are equally capable as a single BMP. The primary water quality BMPs used by ODOT are shown on Table 7 and described in Chapter 14 of the ODOT Hydraulics Manual, which provides guidance on selecting the most appropriate ones for a project. Proprietary BMPs are acceptable if they are on the ODOT Qualified Products List (QPL). Alternative designs or innovative practices can be used if they receive approval through the ODOT Hydraulic Design Deviation process.

Table 7. Common water quality BMPs and their classification.

BMP	Infiltration	Surface Discharge	Treatment Train Necessary	Comments
Bioretention facility	X	X		Surface discharge with underdrain or overflow at less than the WQDS
Bioswale		X		Swale, natural or man-made
Bioslope		X		
Filter strip	X	X		ROW, regular slope or modified for improved filtration
Constructed wetland		X		
Infiltration basins	X			
Porous pavement	X	X	X	If surface discharge, secondary BMP needed
Underground injection control system	X		X	Pretreatment always required
Media filter device		X		
Detention dry pond			X	
Other			As appropriate	

The Project Notification Report classifies BMPs as Infiltration or Surface Discharge facilities, but as shown on Table 7, a certain BMP can function as either depending on design and site conditions. Infiltration BMPs are those designed to infiltrate the WQDS to the groundwater, although flows from larger events may still discharge to surface waters. BMPs that entail a substantial portion of the WQDS infiltrating into the soil (including infiltration basins, bioretention facilities and underground injection control [UIC] systems) must include elements that protect groundwater quality. Surface discharge facilities are those that discharge at least some stormwater from the WQDS to surface waters, even if a substantial portion of the runoff does infiltrate. Bioretention facilities with underdrains are considered surface discharge BMPs even though the stormwater filters down through amended soil or other media. Filter strips may be either infiltration or surface discharge facilities, depending on the presence of a conveyance or water body at the downslope end of the strip.

Selection of BMPs for a project is based effectiveness, site suitability, maintainability, safety and construction and life cycle cost. The ODOT Hydraulics Manual Chapter 14 has a BMP selection tool to assist the designer in choosing appropriate treatment techniques. The requirement to treat stormwater does not mean that a treatment facility must be constructed. In many locations, particularly in rural areas, the unpaved roadside may, with little or no enhancement, provide adequate treatment. Consideration of treatment strategies should proceed in the following order:

1. Highway right-of-way (roadside area) without special modifications.
2. Highway roadside area with enhancement (*e.g.*, amended soil, compost, re-grading, revegetation etc.).
3. Multiple dispersed BMPs that use infiltration, media filtration, vegetation and small scale detention, as appropriate.
4. Consolidated BMPs that treat stormwater collected from an extended section of a highway.

Low impact development approaches should be prioritized. These consist of the first two strategies listed above, and non-proprietary BMPs in the third category. Cost effectiveness

should be taken into account when selecting project BMPs, and low impact development approaches are not always the most appropriate.

Infiltration facilities (including infiltration basins, bioretention cells and UICs) must include elements that protect groundwater quality. UICs, which are subject to the requirements of the Safe Drinking Water Act (administered by Oregon DEQ), must include adequate pretreatment.

On rare occasions a project may discharge stormwater into a Combined Sewer System (CSS); one that carries both stormwater and septic sewage (Figure 10). Permission must be granted by the owner of the CSS. Overflows must not occur from events smaller than the WQDS. The stormwater must either be treated before discharge, or the owner of the CSS must certify that the sewage treatment system is capable of removing highway runoff pollutants, particularly metals.

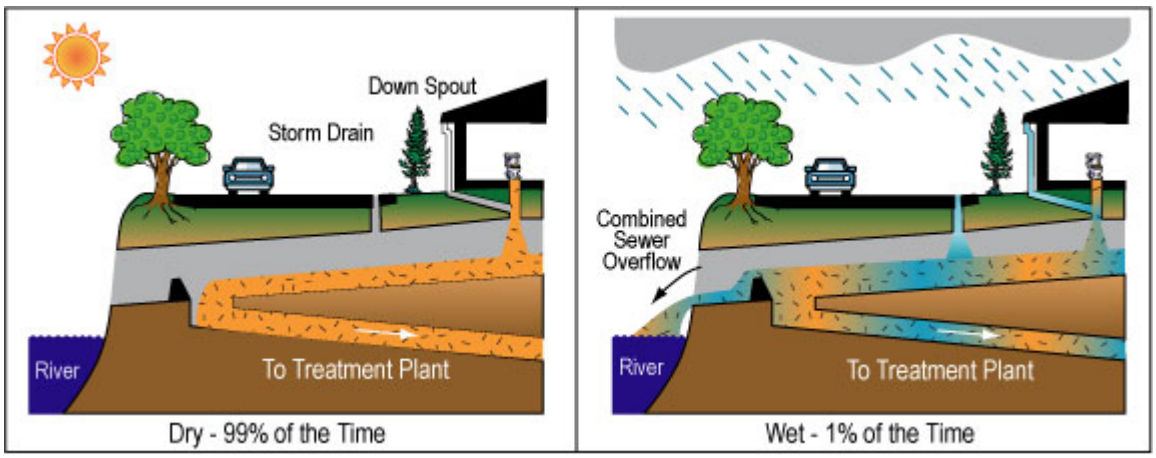


Figure 10. Example of highway runoff discharged into a Combined Sewer System.

BMPs are to be sized to treat the WQDS. For flow-through facilities sizing is based on the peak discharge. For retention or detention facilities, including infiltration BMPs, the size is based on the volume of the design storm. While sidewalks and bike paths are not, on their own, triggers for water quality treatment, if they drain to the highway's drainage system, that volume must be included in the amount of stormwater to be treated. When constraints prevent a BMP from being large enough to treat the entire WQDS, mitigation must be provided for an equivalent annual volume of stormwater.

3.5.3 Flow Control Standards

The flow control requirement in the FAHP programmatic is intended to protect the receiving water's form and fluvial processes. Therefore the range of flows subject to management is that most responsible for channel morphology, sediment transport and erosion, with the objective of maintaining pre-project conditions. Flood control is not an element of the program conditions. Local flood control requirements, which generally address larger events, are in addition to the FAHP programmatic requirements.

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

- Lower discharge endpoint, by USGS flood frequency region (see Figure 11):
    - Western Oregon = 42% of 2-year, 24-hour event
    - Central and Eastern Oregon:
    - Southeast, Northeast, North Central Oregon = 48% of 2-year, 24-hour event

- Eastern Cascade = 56% of 2-year, 24-hour event

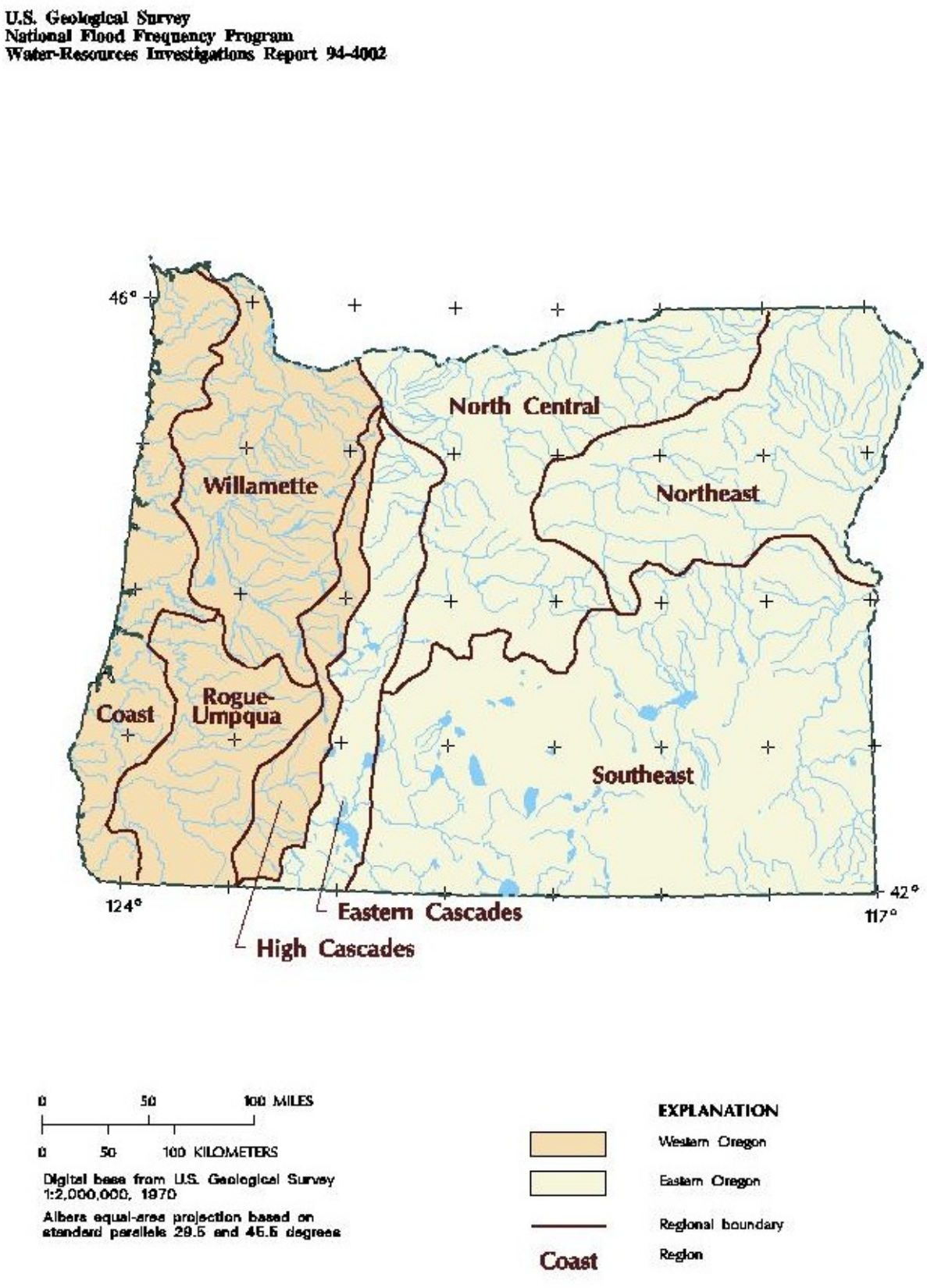


Figure 11. USGS Flood-frequency region map for Oregon.

- Upper discharge endpoint:
    - For incised streams (those with an Entrenchment Ratio >=2.2): The 10-year event, 24-hour storm
    - For unincised streams (those with an Entrenchment ratio <2.2): The 24 hour storm event with a return frequency equivalent to the bank overtopping event.

The precipitation depths for 2-year and 10-year, 24-hour storms are available on the ODOT Precipitation Viewer (ftp://ftp.odot.state.or.us/tdb/trandata/GIS_data/precipitation.zip).

The entrenchment ratio is that defined by Rosgen (1996), and is the ratio between the width of the flood prone area and the channel width at bankfull discharge. Determination of the entrenchment ratio is not required; the 10-year 24-hour storm can always be used as the default upper discharge point. The 2 year and 10 year 24 hour storm depths at specific sites are both available on the ODOT Precipitation Viewer. A simple spreadsheet program that can be used to calculate the flows from a project from specific sized storms is available from ODOT.

Management of flows is usually accomplished with detention facilities. Guidance on the design and sizing of flow control facilities is available in the ODOT Hydraulics Manual, Chapter 12. Infiltration may also be used to control the increase in flow, so projects using infiltration water quality BMPs should check to see to what extent those BMPs can reduce the volume of stormwater that must be detained.

3.5.4 Conveyance System Requirements

Most stormwater management facilities will include conveyance to a receiving water, if only for overflow from events larger than the design storm. The FAHP programmatic imposes the following three conditions on the conveyance system:

- Maintain natural drainage patterns. Do not route the stormwater to a stream or wetland that would not naturally receive it.
- Prevent erosion of the flow path from the project to the receiving water and, if necessary, provide a discharge facility made entirely of manufactured elements (*e.g.*, pipes, ditches, discharge facility protection) that extends at least to ordinary high water. There should be no erosion of drainage ditches or swales, nor rilling on side slopes. Outfalls must be designed to prevent erosion of the banks of the receiving water.
- The goal is to provide water quality treatment for highway runoff from all contributing impervious area before commingling with stormwater runoff from outside the CIA (i.e. non-highway stormwater) for conveyance. Comingling complicates BMP design, and can introduce non-highway related pollutants into the treatment facility, increasing maintenance issues. If it is unavoidable, BMPs must be designed to be fully effective during the WQDS.

3.5.5 Off-Site Management and Mitigation

Projects that are not able to completely meet the water quality or flow criteria of the FAHP programmatic must offset the impact by providing an equivalent amount of management of stormwater off-site. On-site management of a project's own stormwater is the preferred approach, so the determination that full management on-site is not practical must be coordinated with the Services. Factors that lead to off-site mitigation may include:

- Unfavorable topography
- Site hazards (geologic, haz-mat, safety, etc.)
- Conflicting resources (wetlands, listed species, cultural site, Environmental Justice etc.)
- Excessive cost to benefit (ROW, Maintenance/Life Cycle, Construction)

These should be explicitly described in the Project Notification Report. It is not sufficient to simply state that the topography is unfavorable, the actual condition (cliff, for example) needs to be described. Because archaeological sites are sensitive, the Project Notification Report should not mention the presence of archaeological sites (coordinate with the project Archaeologist on how to communicate archaeology constraints). Determining that on-site treatment is not cost effective will be very project specific, and involves not just consideration of construction and lifecycle costs, but also the value of the impacted resource, the size and impact of the project, the cost compared to that borne by other similar projects, and the cost of off-site mitigation.

As a "mitigation measure" off-site treatment always requires approval from the Services during project notification (see Section 3.4). The mitigation can involve treatment of stormwater from outside a project's CIA using the project's facilities or other facilities outside the project area. Even when a project is using off-site mitigation, as much on-site treatment as is practical must still be provided.

The search for mitigation sites should begin at or upstream of the project. If no suitable sites are available there, look progressively farther out from the project, taking into account the habitat quality of the potential sites and the length of stream benefiting from the mitigation compared to the length impacted by lack of treatment at the project site. As with all offsetting measures, the Services prefers mitigation within the same population as the impact.

Evaluation of potential water quality mitigation sites must take into account the equivalence in traffic volumes. The mitigation site should be in the same or higher ADT category as the project site (see Table 8). If the impact and mitigation site are in different classes, but the actual ADTs are fairly close they can be considered equivalent, but an explanation should be provided on the Project Notification Report. Treatment of additional area can compensate for a disparity in ADT if the only available sites are otherwise suitable.

Table 8. General ADT ranges for evaluating off-site mitigation.

Category	ADT Range	Classification
1	<2,000	Very Low
2	2,000-10,000	Low
3	10,000-30,000	Medium
4	30,000-100,000	High
5	>100,000	Very High

Opportunistic Stormwater Treatment Credit Approach

FHWA and ODOT are in the process of coordinating with NMFS to provide incentive to create extra stormwater treatment on projects that would then be used on projects with treatment shortfalls, as long as they meet certain criteria. The database is currently tracking this extra treatment as credits for use once the approach is approved. Many factors will be considered to determine if a project qualifies to use credits. If you have a project where you are either considering excess treatment or that you expect will have a need for offsite credit use, discuss it early in the project development process with NMFS and FHWA.

Currently this program has been implemented for over a year on projects for development of credits. Until these credits are used, the species will benefit from the improved water quality provided. As a general rule, if a project has no constraints limiting stormwater treatment, then appropriate BMP's should be implemented. There are a few things to consider determining if a

project would be appropriate to use existing credits. If the site is so constrained that there is no room to install low maintenance BMP's then it would be proper to consider using available credits. Sometimes the only option (maybe due to elevation or ROW boundaries) is to install high maintenance proprietary BMP's. This would be a likely scenario that would use existing credits or off-set by treating an area outside of the CIA.

Even though this approach is still in development, all parties involved are in favor of implementation, recognizing increased project flexibility and species conservation. We expect to have final approval by early 2016 and will update FAHP Users' Guide at that time.

3.5.6 Reporting on Stormwater Management

The stormwater management section of the Project Notification and Completion reports must be completed for all projects that trigger the stormwater management. The Notification Report will describe anticipated types and quantities of stormwater impacts and management, while the Completion Report will explain actual, constructed conditions. However, the project proponent may need to submit a Project Change Request if a change in design would necessitate Services approval when it was originally a "No Approval" stormwater management design, or if a different location or type of off-site management is needed (see Section 2.7).

Unlike SLOPES V, not all types of stormwater management actions need approval from the Services during project notification. Approval will be needed if:

a. Flow control is required and the project discharges into a watershed smaller than 100mi^2, or
b. Full treatment is not possible on-site and off-site mitigation is required (see Section 3.5.5).

Both reports will explain how roadway runoff from all CIA (associated with public roads and infrastructure), within or contiguous with the project area, will be managed using site sketches, drawings, specifications, calculations, or other information commensurate with the scope of the action. Figure 12 depicts an example stormwater management drawing. In this example, the road is crowned, has curbing on both sides and a sag just south of the bridge. Runoff is discharged into bioswales on each side of highway, and from each bioswale into the river. Important elements in Figure 12 are the width and configuration of the highway, the project limits, the delineation of each sub-basin of the contributing impervious area (*i.e.*, the portion of the highway flowing to a specific BMP or discharge point), the direction of flow to the BMPs, the location and approximate size of the BMPs, the flow path to the receiving water, scale, and cross section of detail of the proposed BMP. Stationing should be included in the figure or in a text box so a reviewer can identify the location of the stormwater BMPs on other plan sheets and in the field.

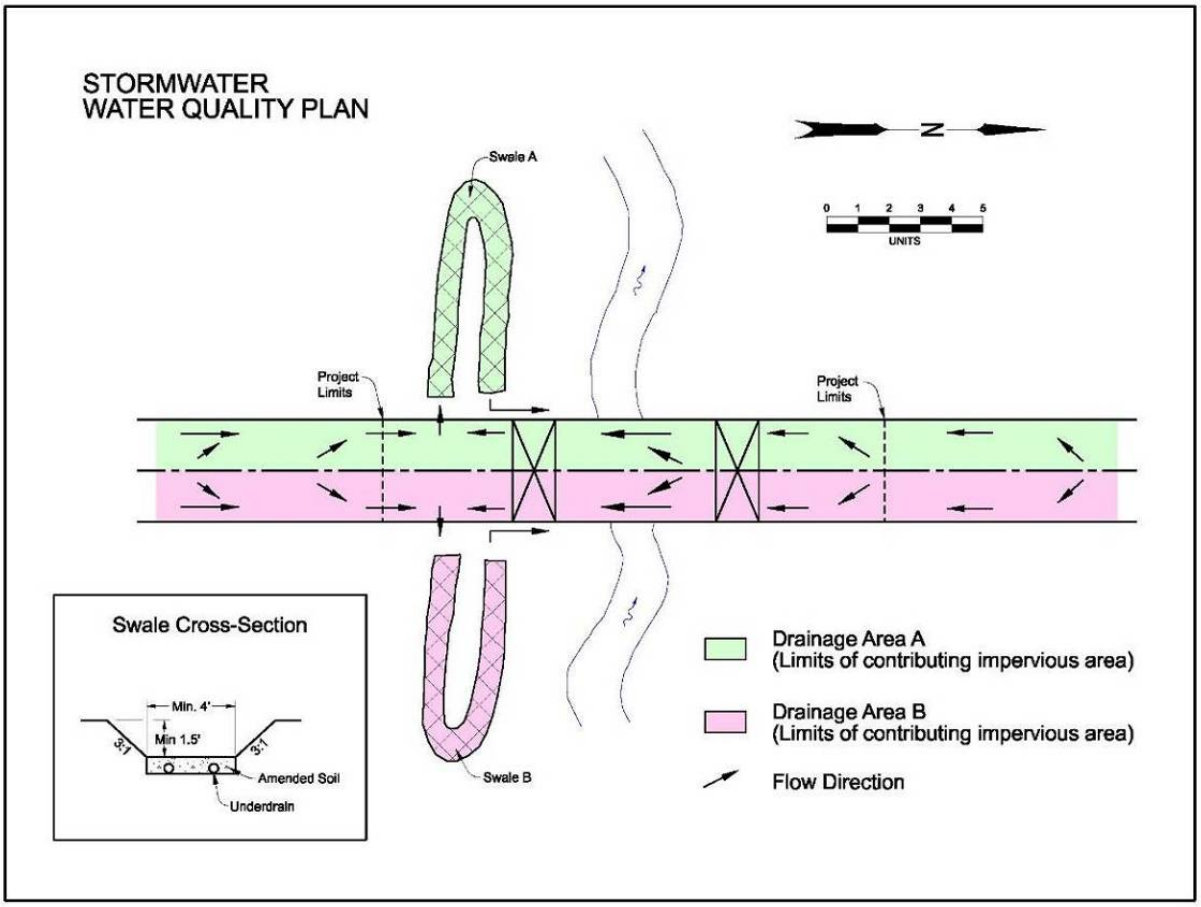


Figure 12. Example stormwater management drawing for a bridge project with water quality treatment provided on the south side of the stream.

All projects with water quality or flow control BMPs will also need to describe the proposed maintenance schedule by either referencing one of ODOT's standard maintenance schedules (in the Operation and Maintenance (O&M) Manual, see link on template Project Notification Report), or not maintained according to one of ODOT's standards, attach a copy of the applicable O&M schedule.

Additional information may be needed with the Project Completion Report, including a description of BMPs that were constructed, location of all BMPs and outfalls into receiving waters (shown on a drawing, similar to Figure 12), photographs of outfalls, and updates to the maintenance requirements and schedule (O&M Manual) for each BMP. Projects with hydraulically designed BMPs should attach the Stormwater Hydraulics Report (see ODOT Hydraulics Manual for the contents).

3.5.7 No-Effect Determinations and Take

If a project has no impacts to ESA-listed species covered by the FAHP other than potential stormwater effects, a determination of No Effect may be justified in the following situations:

- The project dos not trigger the need for stormwater management (see Section 3.5.1 above).
- The project infiltrates ***all*** runoff from its CIA, not just the WQDS or the flow control design storms. There must be no conveyance system, pipe, ditch or swale that could collect stormwater from any sized event and discharge it into surface waterway that flows into a stream with covered aquatic species. Nor can the project be immediately adjacent to waterway that flows into a stream with covered aquatic species, since runoff could flow downslope into the surface water. Enough distance must separate the road from the surface water to ensure infiltration. This will depend upon the soil type, slope, vegetation and the intensity of storms. No-Effect determinations based on total infiltration should include information to support the call, not merely state that infiltration will occur.

Projects with stormwater triggers that infiltrate all of their runoff, but have other impacts to covered species (i.e. are not no-effects) must still complete the Stormwater section of the Project Notification Report. The BMP will be classified as infiltration.

Directly measuring impacts to aquatic species from stormwater discharge is nearly impossible, therefore a surrogate is necessary. As shown on Table 2 (see Section 1.4), the metric for take for stormwater effects is the net increase in impervious surface area, and is evaluated at the program-scale for each recovery unit, not on a project basis. If a project has a net reduction in impervious surface, such as from a curve correction, the project must still treat the runoff from its CIA. Any increase in impervious surface area will usually be equal to the increase in the CIA. On rare occasions a project may modify the drainage to pick up runoff from areas outside the pre-project CIA, thereby having an increase in the CIA greater than any increase in impervious surface area. Increases in the CIA that are a result of such drainage changes and not new pavement do not count towards the allowed take.

3.6 Clearing and Site Preparation

ODOT's standard contract specifications require removal of all vegetation, debris, and down timber from the construction limits, and this material then becomes the property of the contractor for disposal. This is also the case for excess soil. However, the FAHP programmatic requires conservation, salvage and re-use of native materials whenever possible, including large wood, vegetation, topsoil and channel materials (*e.g.*, gravel, cobble, boulders). The project team will determine if certain habitat elements or topsoil can be stockpiled and re-used in site restoration or habitat enhancements, or provided to external restoration organizations for habitat restoration projects. The biologist will coordinate this, and development of relevant plans and special provisions (see Section 3.11.7).

To comply with FAHP programmatic, prior to mobilization, the Environmental Inspector will ensure the following actions are completed, as applicable to the project:

- Flag the boundaries of clearing limits associated with site access and construction to prevent ground disturbance of critical riparian vegetation, wetlands, areas below ordinary high water, and other sensitive sites beyond the flagged boundary.
- All temporary erosion controls must be in-place and appropriately installed downslope of project activity until site restoration is complete.
- During site preparation, minimize removal of native materials, or if removal is necessary, stockpile and re-use native materials, as specified.

- In areas cleared but not graded and to be temporarily disturbed, clip vegetation at ground level to retain root mass and encourage reestablishment of native vegetation.

3.6.1 Tree and Down Timber Removal

Unless otherwise specified by project plans and special provisions, ODOT's Standard Specifications require that cleared trees and down wood (also referred to as logs, large woody material or large woody debris) be removed off site. Because trees and down wood are valuable to many aquatic and terrestrial species, ODOT should strive to minimize their removal from project sites. If removal is necessary, native tree and down wood resources should be salvaged and placed in off-site enhancement areas. See Section 3.11.7 for related Contract Special Provisions.

If native trees (as defined in Section 4.0) at least sapling size (*e.g.*, one to three inches), or down timber at least 18 inches in diameter and six feet in length, are removed from the riparian zone (as defined in Section 4.0):

- Native coniferous trees greater than 18 inches in diameter at breast height (DBH) should be salvaged and used for aquatic habitat enhancements whenever applicable and feasible. It may be feasible when suitable on-site uses are available or when salvaged materials have been designated for specific off-site uses and off-site storage is available, if needed. If off-site use will be by others, ODOT may be responsible for transportation costs up to 60 miles from the project.
- Remove and replace the functional equivalent of the number and sizes of native trees and down wood removed; replacement should occur on-site if feasible, or off-site when suitable protected lands are available. There is not specific replacement ratio, but instead should be determined during early coordination with the Services.

3.7 Bridges and Culverts

The FAHP programmatic applies to the repair, modification and replacement of bridges and culverts (as defined in Section 4.0), including those across or within the floodplain or streams. New stream crossings (bridges or culverts) in/over aquatic habitat that supports ESA-listed species are not covered, except to restore a historic stream channel. The FAHP programmatic incorporates all of the activities associated with bridge repair and rehabilitation that were covered by the ODOT-FHWA Programmatic Biological Assessment for Bridge Preservation and Rehabilitation Projects (ODOT-FHWA 2010). Most of the design standards for bridge and culvert work are pollution and impact minimization measures already part of ODOT's standard practices (see related specifications in Section 3.11). More distinctive design standards are associated with bridge replacements and floodplain or fluvial performance, pile removal and pile driving, as presented below. Refer to the Glossary in Section 4.0 for more information on terms presented in this section.

Specifications for acceptable types and sizes of bridge piles allowed below OHW are provided in Section 3.11.5. To comply with the NMFS BO, bridge piles below OHW may be installed or replaced with concrete, steel round pile, 24-inches in diameter or smaller; steel H-pile designated as HP24 or smaller; or untreated wood. Larger steel pile may be approved if calculated impacts do not exceed those anticipated in the BO based on the 24-inch limit. Modifications to this standard may require additional information with the Project Notification Report, as determined by the Services representative during early coordination.

The Washington Department of Transportation's method for comparing hydroacoustic effects of different size piles may be used to justify larger pile (https://www.wsdot.wa.gov/environment/technical/fish-wildlife/esa-efh/noise).

Bridge replacement projects or projects that involve temporary or permanent pile installation will require the Bridge Supplement with the Project Notification Report to describe how the bridge will: (a) not impair the physical and biological processes associated with a fully functional floodplain, and (b) restore any physical or biological process that were degraded by the previous crossing.

3.7.1 Fluvial Performance Standards

- All permanent stream crossing replacements over aquatic habitat that support ESA-listed species covered by the FAHP programmatic must span the functional floodplain by meeting the fluvial performance standards listed below: Maintain a clear unobstructed opening above the general scour prism (see Figure 13). Streambank and channel stabilization may be applied outside and below the general scour elevation.
- For a single span structure (including culverts), the structure should span 1.5 times the active channel width, or wider.
- For a multiple span structure (including culverts), the structure should span 2.2 times the active channel width, or wider, except for piers and interior bents.
- Install relief conduits, if necessary, within existing road fill at potential flood flow pathways based on an analysis of flow patterns or floodplain topography.
- Remove all artificial constrictions within the functional floodplain that are not otherwise a component of the new structure's design, including vacant bridge supports to three feet below subgrade and abandoned roadway fill, embankment fill, approach fill, or other fill.
- Reshape streambanks and newly exposed floodplains to match upstream and downstream conditions. See Section 3.8 for stabilization options.

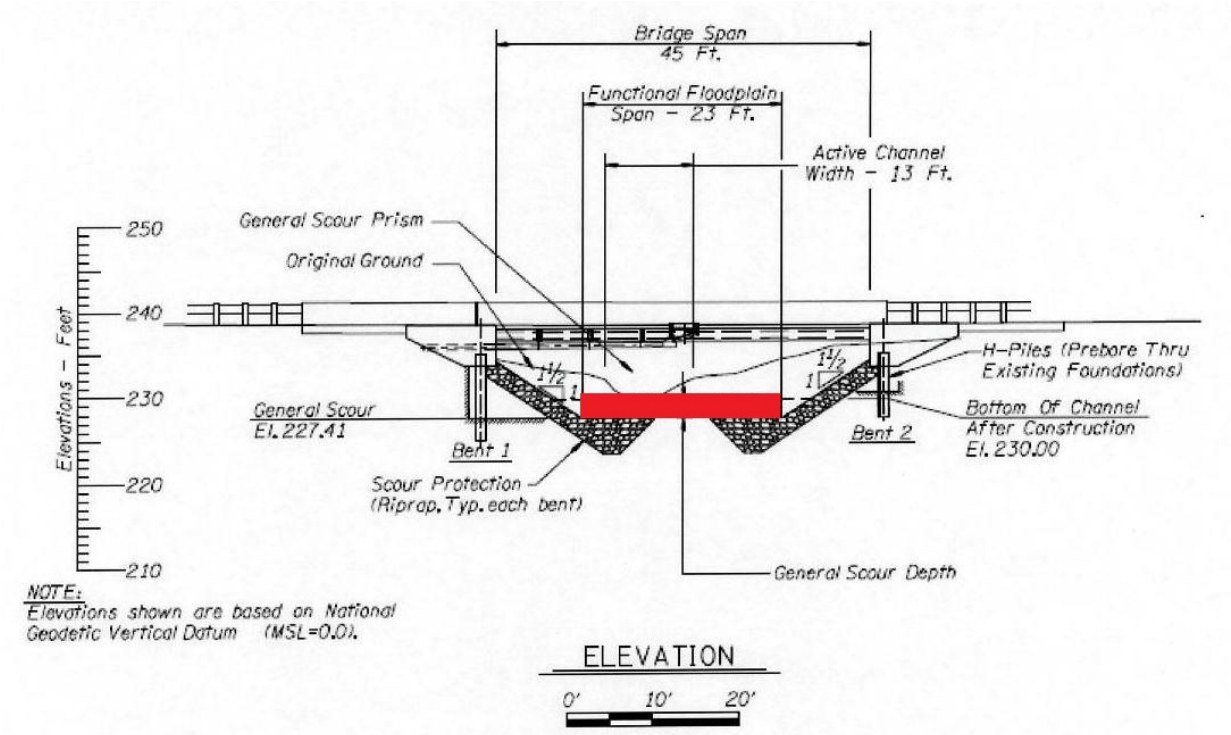


Figure 13. Example of a bridge design that maintains the general scour prism

Projects may still use the FAHP programmatic for ESA consultation if the project cannot be designed to meet the fluvial performance standards (see Sections 2.4.2 and 3.4). Modification to these standards will require approval from the Services during project notification and additional supporting information may be required (such as hydraulic or geomorphic data), to be determined during Early Coordination. Offsetting measures (mitigation) may be required, also to be determined during Early Coordination. Examples of acceptable mitigation include reestablishing or enhancing floodplain connectivity elsewhere along the stream by removing artificial fill, removing abandoned in-stream structures outside the project area, or possibly enhancing fish passage. However, in certain situations, narrower spans may be approved without the need for offsetting measures, including:

- The conditions at the stream crossing do not require an opening of the width described above to maintain or restore the natural stream and floodplain configuration (*i.e.*, the floodplain is naturally constrained as with narrow gorges or hillslope constrained channels).
- Permanent artificial infrastructure and development (such as cities) make reestablishing a functional floodplain completely unrealistic.

3.7.2 Active Channel Width Determination

The active channel width (ACW) is, by definition, the width of the stream measured perpendicular to stream flow between the OHW lines, or at the channel bankfull elevation if the OHW lines are indeterminate (see Figure 13). Figure 14 illustrates the placement of ACW measurements. Measurements should be taken at distances of approximately five to ten ACWs from the inlet (upstream) and outlet (downstream) of the crossing, and ideally two or three more measurements at 20-foot intervals up and downstream from these locations. These are combined for an average ACW. However, measurements should only be taken outside of the influence of existing artificial obstructions (*e.g.*, bridge piers, culvert outlet) and prior to adjoining tributaries.

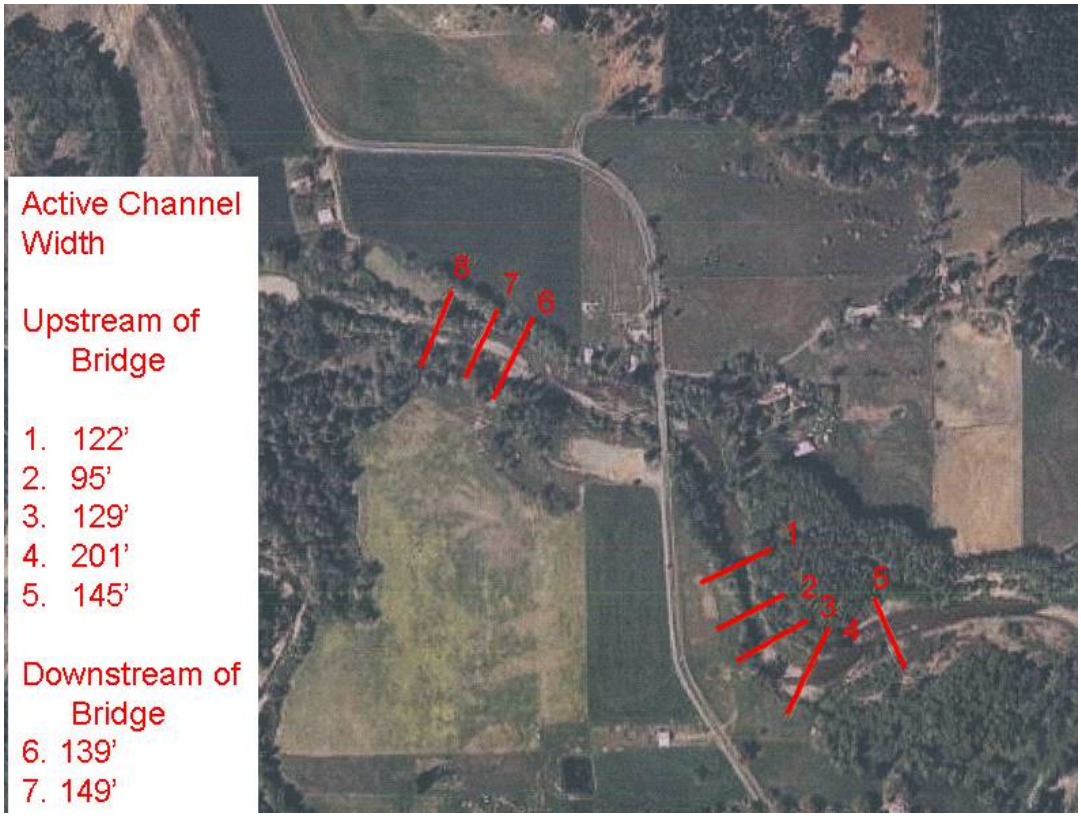


Figure 14. Example of determining active channel width.

If the project involves modifications to the fluvial performance standards, the NMFS representative may request a map depicting the location of the measurements, to be submitted with the Project Notification Report

3.7.3 Pile Driving

The FAHP programmatic includes several design standards related to the type and construction of bridge piers and piles in aquatic habitats supporting ESA-listed species. Highway construction contracts typically do not specify how temporary work bridges will be constructed or how bridge piles are installed. However, because these activities can substantially affect aquatic species, compliance will mean that the project team must consider materials and construction methods during project development. A Bridge Supplement must be added to the Project Notification Report for all bridge construction projects that may involve installation or removal of bridge piles in aquatic habitat supporting ESA-listed species.

Section 3.11.5 provides contract specifications relating to minimizing impacts to aquatic species during pile driving, use of treated wood in aquatic habitat, and removal of bridge piles. Many of these measures must be considered during project development.

3.8 Streambank Stabilization and Scour Protection

The FAHP programmatic distinguishes streambank stabilization from streambank restoration based on project purpose. The former is an engineered project to prevent streams eroding into roadway facilities, while the latter is a habitat improvement project, as described in Section 3.9.6. Streambank stabilization must be engineered in accordance with the ODOT Hydraulics

design manual (ODOT 2011b). An ODOT Hydraulics Design Deviation must be submitted for approval for innovative, special or other design solutions not addressed in the Hydraulic Design Manual.

According to the NMFS BO, the following streambank stabilization methods may be used individually or in combination:

- Streambank restoration methods described in Section 3.9.6.
- Biotechnical streambank stabilization methods, engineered log jams, or avulsion prevention techniques (see examples in Appendix 8).
- Vegetated riprap with large wood when a qualified engineer determines that biotechnical streambank stabilization methods will not provide an acceptable factor of safety.
- Rock armoring, however, the amount of rock used must be limited to the minimum necessary to protect the integrity of the structure and, whenever feasible, include soil and woody vegetation as a covering and throughout the structure.
- Unvegetated riprap when necessary to:
    - Fill a local scour threatening a culvert, road, or bridge foundation.
    - Stabilize a footing, facing, head wall, or other structure necessary to prevent scouring, downcutting, fill slope erosion, or other failure at an existing culvert or bridge.

Stream barbs, non-porous partially spanning weirs, full-spanning weirs and other instream flow control structures are not allowed except on a case-by-case basis, as part of fisheries restoration or possibly with offsetting measures (coordinate with Services representatives).

Acceptable streambank stabilization techniques under the FAHP are similar to those allowed under SLOPES V, shown in Appendix 8. However, other designs that meet the standards listed above are allowed. Modification to these standards will require approval from the Services during project notification, and some may also require offsetting measures (see Section 3.4). Offsetting measures are only required for riprap or hard armoring used for scour protection if there is a net increase (in area) in unvegetated riprap above the OHW and within the functional floodplain or riparian zone. Offsetting is not needed for increases in riprap below OHW of streams with ESA-listed species covered by the FAHP programmatic when necessary for bank stabilization or scour protection (highway structures).

3.9 Channel Modifications and Waterway Enhancements

The FAHP programmatic covers similar types of in-stream habitat enhancements as SLOPES V Restoration (NMFS 2013) but modified for more relevance to Highway projects. The enhancements presented below are specifically allowed. Other enhancements may be allowed if they fall within scope of the FAHP programmatic and are approved by FHWA and the Services.

3.9.1 Fisheries Restoration

Fisheries restoration includes culvert or stream channel restoration and modifications to remove or improve fish passage barriers caused by flow velocity, shallow water depth, increased turbulence, perched outlets, or similar problems. It also includes projects that improve in-stream habitat with boulders or large wood, off- and side-channel improvements, setting back existing berms, dikes or levees, augmenting spawning gravel, restoring damaged streambanks, or removing water control structures. Weirs are allowed if they are in compliance with other FAHP programmatic design standards and offsetting requirements. To comply with the FAHP

programmatic, highway projects must provide passage for adult and juvenile fish that meets NMFS criteria[5] (NMFS 2011 or current version; available at http://www.westcoast.fisheries.noaa.gov/publications/hydropower/fish_passage_design_criteria.pdf), except during installation/removal of work area isolation and if fish passage did not exist before the project. This activity will require approval from the Services during project notification and additional habitat conditions and design information submitted with the Notification Report, to be identified by the Services representative during early coordination.

3.9.2 Invasive and Non-native Plant Control

This activity is necessary for compliance with applicable laws (*e.g.,* Oregon Noxious Weed Policy, ORS 569; ORS 2011) and to improve the composition and abundance of native riparian plant communities through manual, mechanical, biological, and chemical methods. Section 3.11.8 of this document contains contract requirements for the use of herbicides.

3.9.3 Off- and Side-Channel Habitat Restoration

This activity focuses on reconnecting floodplains with their historic stream channels by restoring or modifying hydrologic and other essential habitat features of historic floodplain swales, floodplain channels, and abandoned side channels. Reconnection of blocked historic off- and side-channel habitats may involve removal of plugs which impede water movement through the channels, and excavation within historic channels that does not exceed the main channel thalweg depth. The purpose of channel sediment removal is to minimize fish entrapment by providing unimpeded flow through the side-channel.

To comply with the FAHP programmatic, the following design and construction standards apply to this activity:

- Excavation depth may not exceed the maximum thalweg depth in the main channel.
- Excavated material removed from off- or side-channels must be hauled to an upland site (non-wetland/aquatic and outside of the floodplain) or spread across the adjacent floodplain in a manner that does not restrict floodplain capacity.

This activity will require approval from the Services during project notification (including fluvial geomorphologic review) and additional habitat conditions and design information submitted with the Notification Report, to be identified by the Services representative during early coordination. Typically, the project proponent will be required to provide evidence of historic channel location (*e.g.*, land use surveys, historic photographs, topographic maps, and remote sensing information).

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

This activity results in the reconnection of stream channels with floodplains, increased habitat diversity and complexity, the moderation of flow disturbances, and the creation of refugia for fish during high flows. This activity will require approval from the Services during project notification (including fluvial geomorphologic review) and additional habitat conditions and design information submitted with the Notification Report, to be identified by the Services representative during early coordination.

5 ODFW fish passage standards/processes also apply, although not part of FAHP.

To comply with the FAHP programmatic, the following design and construction standards apply to this activity:

- To the greatest degree possible, non-native fill material in the floodplain of the action area that originated from outside the floodplain will be removed to an upland site non-wetland/aquatic and outside of the floodplain).
- When it is not possible to remove or set-back all portions of dikes and berms, or when existing berms, dikes, and levees support abundant riparian vegetation, openings will be created with breaches.
    - Breaches shall be equal to or greater than the active channel width.
    - In addition to other breaches, it is a FAHP programmatic requirement that the berm, dike, or levee must be breached at the downstream end of the project and/or at the lowest elevation of the floodplain to ensure that flows will naturally recede back into the main channel, thus minimizing fish entrapment.
    - When necessary, compacted soils should be loosened once the overburden material is removed.
    - 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 to fill anthropogenic holes provided that the materials do not impede floodplain function.

3.9.5 Streambank Restoration

This activity involves restoring eroding streambanks by bank shaping and installation of coir logs or other soil reinforcements as necessary to support riparian vegetation, or by planting or installing large wood (as defined in Section 4.0), trees, shrubs, and herbaceous cover as necessary to restore ecological function in riparian and floodplain habitats. The following design and construction standards apply to both enhancement projects and restoring streambanks damaged during construction for compliance with FAHP programmatic:

- Without changing the location of the streambank toe, restore damaged streambanks 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.
- Complete all soil reinforcement earthwork and excavation in the dry. Whenever feasible, use soil layers or lifts that are strengthened with biodegradable fabrics that are penetrable by plant roots.
- Include large wood in each streambank restoration action when appropriate to the system, and to the maximum extent feasible.
- Large wood 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. Wood that is already within the stream or suspended over the stream may be repositioned to allow for greater interaction with the stream.
- Rock will not be used for streambank restoration, except as ballast to stabilize large wood. *Note: this does not apply to streambank stabilization or scour protection, which are presented in Section 3.8.*

Modification to these standards will require approval from the Services during project notification, and some may also require offsetting measures (see Section 3.4).

3.9.6 Water Control Structure Removal

This activity includes reconnecting stream corridors, reestablishing wetlands, improving fish passage, and restoring more natural channel and flow conditions by removing 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. This activity will require approval from the Services during project notification. To comply with the FAHP programmatic, the following pre-construction data collection and design standards apply to this activity:

- Removal of small dams that are less than 16.4-feet high, do not impound contaminated sediments, and are not likely to initiate head-cutting; channel-spanning weirs; subsurface drainage features; tide gates; or instream flow redirection structures. Data requirements and analysis for structure removal include:
    - 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.
    - 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.
    - Sediment characterization to determine the proportion of coarse sediment (>0.08 inches) in the reservoir area.
    - A survey of any downstream spawning areas that may be affected by sediment released by removal of the water control structure. Reservoirs with a d35 greater than 0.08 inches (*i.e.*, 65% of the sediment by weight exceeds 0.08-in diameter) may be removed without excavation of stored material, if the sediment contains no contaminants; reservoirs with a d35 less than 0.08 inches (*i.e.*, 65% of the sediment by weight is less than 0.08-in diameter) will require partial removal of the fine sediment to create a pilot channel, in conjunction with stabilization of the newly exposed streambanks with native vegetation.

3.9.7 Wetland Restoration

Degraded wetlands may be restored by excavation and removal of fill materials, contouring to reestablish more natural topography, setting back existing dikes, berms and levees, reconnecting historical tidal and fluvial channels, or planting native wetland species. This activity will require approval from the Services during project notification.

3.10 Site Restoration

Site restoration is required for all temporary disturbances in regulated habitats, typically with the goal of returning the habitat to pre-construction conditions, although designs for site restoration should incorporate enhancements whenever possible. Natural habitat restoration and particularly streambank and roadside revegetation are unique types of landscaping that require specialists familiar with these practices and experienced with project-specific site conditions. The goal of all habitat restoration should be a self-sustaining system within five years after construction. Habitats should be designed that not only retain or return native vegetation and habitat features

to the system, but that work with the site's constraints. One of the best tools for designing and building successful habitat restoration of transportation projects is the FHWA Roadside Revegetation manual (FHWA 2007).

Special Provisions presented in Section 3.11.9 should be considered during development of restoration plans. To maintain compliance with the FAHP programmatic, the following measures should be implemented for all projects with temporary ground disturbances within the functional floodplain and riparian zone (as defined in Section 4.0) of listed aquatic species:

1. As part of the project's roadside development plans and specifications, develop a Habitat Restoration Plan and project Special Provisions (see Section 3.11.9) that meet the requirements listed below. Although the Plan is no longer required to be submitted with the Project Notification Report, it should be submitted with the Project Completion Report, particularly to depict As-Construction conditions and provide site restoration goals and revegetation standards for success (per #5, below).
2. Do not install trees or shrubs within the 20 feet of roadway clear zone (the area adjacent to the roadway needed for sight distance and safety), bridges, culverts, behind guardrail or adjacent to other permanent roadways structures[6].
3. Design site restoration to meet the following goals, as applicable to site conditions:
    - Human and livestock disturbance, if any, are confined to small areas necessary for access or other special management situations.
    - Areas with signs of significant past erosion are completely stabilized, bare soil spaces are small and well-dispersed.
    - Soil movement, such as active rilling and soil deposition around plants or in small basins, is absent or slight and local.
    - Native woody and herbaceous vegetation, and germination microsites, are present and well distributed across the site.
    - Plants have normal, vigorous growth form, and a high probability of remaining vigorous, healthy and dominant over undesired competing vegetation.
    - Plant litter is well distributed and effective in protecting the soil with little or no litter accumulated against vegetation as a result of active sheet erosion ("litter dams").
    - A continuous corridor of shrubs and trees appropriate to the site are present to provide shade and other habitat functions for the entire streambank.
4. ODOT recommends basing species composition on pre-construction data or reference sites[7], differentiated among revegetation units as appropriate for slope and aspect, hydrology, and soils, and will include a range of successional stages (early, mid, and late) following guidance in FHWA's Roadside Revegetation manual (FHWA 2007). Locate the reference site within the same watershed, ecoregion, or recovery zone (depending on species).
5. Develop achievable performance standards for revegetation success separately in each revegetation unit to be evaluated each monitoring period. The FAHP programmatic has no specific standards for measuring the success of revegetation. Instead, it is up to the project proponent to develop whatever standards are necessary to meet the goals listed above. Often,

[6] This is an ODOT standard to minimize potential conflicts with routine maintenance and safety needs, and may not apply to local agency projects.

[7] Reference sites should have similar site characteristics as the corresponding revegetation unit.

other regulatory permits will have revegetation standards, which can be implemented for the FAHP programmatic as long as they achieve the same goals listed above (most will). If the project has the flexibility, ODOT recommends basing success criteria on the average percent cover of each stratum in the pre-construction or reference site revegetation unit, minus 20 percent, or as otherwise described in the Habitat Restoration Plan. For an example calculation: reference site revegetation unit has 30 percent average herbaceous cover and 70 percent average tree and shrub canopy cover; success will then be measured as at least 10 percent herbaceous cover and 50 percent tree and shrub canopy cover.

6. During construction, coordinate with construction office to ensure seeding and plantings are installed properly and during the appropriate planting season, as per Standard Specifications.
7. Perform annual monitoring of habitat restoration areas until site restoration goals and success criteria have been met, following ODOT Biology Mitigation Monitoring standards (available at http://www.oregon.gov/ODOT/HWY/GEOENVIRONMENTAL/biology_mon.shtml).

3.11 Contract Specifications

The following activities are organized by sections in the ODOT Construction Specifications. Standard Specifications are annotated simply as the section number, whereas Special Provisions (SPs) are annotated as "SPxxxx". All measures comply with the Programmatic Biological Assessment and the programmatic BO from NMFS. Refer to the ODOT Specifications website (http://www.oregon.gov/ODOT/HWY/SPECS/Pages/index.aspx) for standard and boiler plate special provisions referenced below and Appendix 10 for an overview of how specifications are incorporated into projects and contract documents. These are in order of ODOT specification headings.

3.11.1 Material Sources and Disposal Sites – Section 00160 and SP00235

Standard specifications require the contractor to obtain aggregate materials unless sources have been specified in the SPs or Plans as Prospective or Mandatory Sources. Prospective sources/sites are optional, while mandatory are required. The development and utilization of Agency-furnished material source or disposal sites may be covered if the work falls within scope and follows other applicable impact avoidance and minimization measures.

- For projects with high environmental sensitivity, plan and designate Agency-furnished material sources or disposal sites and add SP00235 when these are to be included in the project.

3.11.2 Mobilization and Staging – Section 00210 and 00290.10

Standard Specifications Section 00210 and 00290.10 require the contractor to locate "staging and disposal sites in previously improved or disturbed sites, including existing roadways, pullouts, turnouts, parking lots, and storage yards that have been compacted, graveled and paved, unless otherwise approved in writing by the Engineer." For locations of disposal, Contractors may dispose of clean fill at Agency-furnished sites, and any other construction waste at public facilities (Agency property, municipal recycling or landfills) or private property. When the Contractor utilizes private sites, they are responsible for obtaining all the required permits and environmental clearances. However, the Agency may reduce the risk of potential regulatory violations by proactively evaluating environmental constraints and designating sites that are to be used for the Contract.

- For projects with high environmental sensitivity, plan and designate staging areas and disposal sites as per ODOT Technical Services Bulletin GE08-04(B) (ODOT 2008b), and add SP00290.10.

3.11.3 Temporary Water Management and Fish Salvage – SP00245

To comply with the FAHP programmatic, work area isolation (also referred to as temporary water management, is required of any project element that involves substantial excavation, backfilling, embankment construction, or similar work below OHW where adult or juvenile fish are reasonably certain to be present, or 300 feet or less upstream from spawning habitats.

- When applicable, add SP00245 for site conditions, and develop a concept Temporary Water Management Plan to effectively isolate fish from in-water work areas (meaning that the work area is inaccessible to fish and does not allow a visible release of pollutants or sediment into the water). SP00245 also requires the contractor to coordinate with the Agency for fish capture and removal, which is also requirement of the FAHP programmatic.
- See Section 2.5.2 for fish salvage reporting requirements.
- *Note: although the FAHP programmatic does not require review/approval of the* Temporary Water Management *Plan, it is recommended that project teams request the expertise and services of the Service and/or ODFW representatives to help develop plans and/or review Contractor-updated plans*.

3.11.4 Pollution and Erosion Controls – Sections 00280 – 00290.30

Most of the design standards in the NMFS BO regarding general construction BMPs are sufficiently covered under Standard Specifications (00280, 00290.30(a))

- Include applicable parts of SP00290.30(a), including part (8) which complies with the turbidity standard in the FAHP.

3.11.5 Protection of Fish and Fish Habitat – Section 00290.34

When construction activities are in or near protected habitat resources, add boiler plate SP00290.34 about the contractor meeting with Agency Biologist on site before commencing project work. Modify this SP as needed for site-specific conditions, including the option for more than one meeting in advance of specific activities or adding requirements that certain subcontractors attend the meeting.

- The Biologist should coordinate closely with the construction project manager to determine the best timing and scheduling this meeting. *Note: this would be a good meeting to invite your Services representative to attend (see Section 2.5).*

<u>In-Water Work (Parts a, b):</u>

- Standard specification 00290.34 meets applicable FAHP programmatic design standards if in-water work is not allowed.
- If in-water work within streams with native fish is allowed, all projects must include SP00290.34(a, b), edited for project location.
- If your project is in the Willamette River below Willamette Falls, ensure in-water work window is in compliance with the FAHP programmatic: The winter in-water work period between Dec 1 and Jan 31 for the Willamette River downstream of Willamette Falls is not approved.
    - *Note: unless work can be completed in the dry, this last item is an automatic exclusion from the FAHP programmatic and individual consultation is needed if in-water work is*

needed at that location/time (coordinate with the Services representative for more information).

General Equipment Requirements (Part c-1):

- If applicable to the project, include SP00290.34(c-1) and add the following bulleted item for compliance with the FAHP programmatic:
    - Store, fuel and maintain all equipment in a staging area 150 feet or more from any waterbody, or in an isolated hard zone such as a paved parking lot. *Note: this distance may be modified based on site conditions, and justified/described in the Project Notification Report (approval is not needed if the modification would not increase the likelihood of take).*
- To comply with the FAHP programmatic, add the following to project SP if applicable to project/site conditions:
    - Whenever possible, eliminate the need for a temporary access road by using low impact equipment (spider crane) or existing routes that will minimize soil disturbance and compaction within 150 feet of any water body, or lower drilling equipment to the site using a crane.
    - If temporary access roads are needed within 150 feet of any waterbody, use existing routes unless shown or approved. *Note: this distance may be modified based on site conditions, and justified/described in the Project Notification Report (approval not needed if the modification would not increase the likelihood of take).*
- Edit the fourth bulleted item of Boiler Place Part c-1 for the project SPs if applicable to project/site conditions for compliance with the FAHP programmatic:
    - Do not cross directly through a stream for construction access, unless shown or approved. If allowed, cross perpendicular to the waterway and do not block stream flow. When a crossing is no longer needed, block the area, obliterate the route, and restore the soils and vegetation.
    - *Note: The FAHP programmatic only allows temporary stream crossings if a fish biologist inspects the crossing to ensure it will not interfere with spawning behavior, eggs or pre-emergent juveniles in an occupied redd, or native submerged aquatic vegetation.*

Work Area Isolation (Part c-2):

If applicable to the project, include this SP to maintain compliance with the FAHP programmatic. Project may not block fish passage unless it did not exist prior to the project, and except temporarily during deployment of work area isolation. To comply with FAHP programmatic, when a temporary stream crossing is necessary, a fish biologist must be consulted to ensure the proposed crossing will not interfere with spawning behavior, eggs or pre-emergent juveniles in an occupied redd, or native submerged aquatic vegetation. Fish must be moved from isolated work areas, as per SP00245 (Section 3.11.3) and NMFS (2000).

Water Intake Screening (Part c-3):

If applicable to the project, include SP00290.34(c-3).

Special Aquatic Habitats (Part c-4):

The FAHP programmatic is more inclusive than the current boiler plate SPs. As applicable to the project, edit project SPs to only disallow the following:

- The following exploration or construction activities are not allowed in special aquatic habitats:
    - Use of pesticides or herbicides. *Note: do not include "herbicides" if allowed, as described in Section 3.11.8* .
    - Temporary roads or drilling pads built on steep slopes, where grade, soil type, or other features suggest a likelihood of excessive erosion or slope failure.
    - Exploratory drilling in estuaries that cannot be conducted from a work barge, or an existing bridge, dock, or wharf.
    - Installation of a fish screen on any permanent water diversion or intake that is not already screened.
    - Drilling or sampling in an EPA-designated Superfund Site, a state-designated clean-up area, or the likely impact zone of a significant contaminant source, as identified by the Agency (an exclusion in the FAHP programmatic).

Site Restoration (Part c-5):

If applicable to the project, include SP00290.34(c-5).

Surface Water Diversions (Part c-6):

If applicable to the project, include Boiler Plate SP00290.34(c-6).

Hydro-Acoustic (Part c-7):

If ESA-listed fish are known or likely to be present during pile installation, as applicable to the project, include the following project SPs (edit as needed based on site conditions and alternatives as negotiated/approved by the NMFS):

- The following requirements apply to piles located within the ordinary high water elevation or xx distance from the xx *[to be completed for project SP]* of the active stream channel. *Note: the distance depends on site conditions and effects to ESA-listed species, and should be discussed with the NMFS representative during Early Coordination. Also, larger pile may be approved, particularly if it means fewer numbers of piles or lower hydraulic impacts. In this case, NMFS approval will be required during the project notification process, and the NMFS may require additional hydraulic data to be submitted with the Project Notification Report. Potential allowances and additional requirements should be coordinated with the NMFS representative during Early Coordination.*
- Pile may be installed or replaced with concrete, steel round pile 24-inches in diameter or smaller, steel H-pile designated as HP24 or smaller, or untreated wood unless shown or approved.
- Whenever possible, use a vibratory hammer to install pile. An impact hammer may not be used when juvenile ESA-listed fish weighing less than 2 grams are likely to be present (as directed).
- When using an impact hammer to drive or proof steel piles, unless otherwise approved, one of the following sound attenuation methods must be used to effectively dampen sound:
    - Completely isolate the pile from flowing water by dewatering the area around the pile.
    - If water velocity is 1.6 fps or less, surround the pile being driven with a bubble curtain that must distribute small air bubbles around 100% of the pile perimeter for the full depth of the water column, as shown or approved.

    - If water velocity is greater than 1.6 fps, surround the pile being driven by a confined bubble curtain that must distribute air bubbles around 100% of the pile perimeter for the full depth of the water column, as shown or approved.
    - *Note: to comply with either above, provide plans and/or additional bubble curtain SPs that comply with NMFS and USFWS 2006 (Appendix 10).*
- For all pile installed or removed, maintain a pile installation and removal log, to be submitted upon completion of the related work. The log shall include types, sizes, locations and installation or removal methods, and dates.

Drilling, Boring or Jacking (Part c-8):

If applicable to the project, include SP00290.34(c-8) for compliance with the FAHP programmatic.

Treated Wood (Part c-9):

If applicable to the project, include SP00290.34(c-9), but with the following changes for compliance with FAHP programmatic:

- Delete the third bulleted item ("Piles treated with ammoniacal copper zinc arsenate, chromated copper arsenate, or creosote may be installed below OHW provided that no more than 50 piles are used. No other use for treated wood or preservative type is allowed below or over the OHW") and replace with "Treated wood includes any temporary or permanent wood structures treated with chromated copper arsenate, ammoniacal copper zinc arsenate, alkaline copper quat, ammoniacal copper citrate, copper azole, copper dimethyldithiocarbamate, borate preservatives, or oil-type wood preservatives, such as creosote, pentachlorophenol, or copper naphthenate"

Pile Removal (Part c-10):

If applicable to the project, include SP00290.34(c-10), and add the following:

- Remove bridge piles according to SP00510.
- If a pile in uncontaminated sediment is intractable or breaks, cut the pile or stump off at least three feet below the surface of the sediment.
- If a pile in contaminated sediment is intractable or breaks, cut the pile or stump off at the sediment line or, if it breaks within contaminated sediment, make no further effort to remove it and cover the hole with a cap of clean substrate appropriate for the site.
- To remove a creosote pile, use the following steps to minimize creosote release, sediment disturbance and total suspended solids.
    - Install a floating surface boom to capture floating surface debris.
    - Keep all equipment (*e.g.*, bucket, steel cable, vibratory hammer) out of the water, grip piles above the waterline, and complete all work during low water and low current conditions.
    - Dislodge the pile with a vibratory hammer, when possible – never intentionally break a pile by twisting or bending.
    - Slowly lift the pile from the sediment and through the water column.
    - Place the pile in a containment basin on a barge deck, pier, or shoreline without attempting to clean or remove any adhering sediment.
    - Fill the hole left by each pile with clean, native sediments immediately after removal.
    - Dispose of all removed piles, floating surface debris, any sediment spilled on work surfaces, and all containment supplies at a permitted upland disposal site.

- If a pile is intractable or breaks, cut the pile or stump off at the sediment line or, if it breaks within contaminated sediment, make no further effort to remove it and cover the hole with a cap of clean substrate appropriate for the site.

Utility Lines (Part c-13):

If a project involves installing or relocating Agency-controlled utilities across a stream or wetland, whenever possible, design the utility as aerial lines, including lines hung from existing bridges. If it is not possible, add the following SP for compliance with the FAHP:

- Install Agency-controlled utility lines across waterways by directional drilling, boring and jacking that span the channel migration zone (as defined in Section 4.0) and any associated wetlands. Except in the case of intermittent streams, utilities may be trenched in the dry and all trenches must be backfilled below the ordinary high water line with native material and capped with clean gravel, as shown or approved.
- *Note: if this is anticipated, provide appropriate plans and specifications for saving/re-using large wood, streambed gravel or importing gravel suitable for fish use and congruent with site conditions (Section 3.11.10).*

3.11.6 Work Containment - SP00290.42

Several FAHP programmatic design standards require preventing construction material and debris from entering protected habitats. If the boiler plate SPs have not already been changed to move these to SP00290.34(c), include Boiler Plate SP00290.42 as needed to ensure compliance with the NMFS BO, with the following edits:

Work Containment Plan (Part a):

- Delete the 4th bulleted item: Prohibit the use of treated timber.
- Replace 4th bulleted item with the following: treated wood must adhere to SP00290.34(c-9)

Work Containment System (Part b):

- Add the following: All other project SPs apply to installation and removal of temporary piles.
- Currently there are no SPs for barge use, but barges are allowed in the FAHP programmatic for temporary construction access, following design standards listed below. As applicable to the project, add the following subsection 00290.42(c) for compliance with the FAHP programmatic: If a barge will be used as a work platform to support construction, the following conditions apply:
    - It must be large enough to remain stable under foreseeable loads and adverse conditions.
    - Before arrival, inspect and clean to ensure vessel and ballast are free of invasive species.
    - Secure, stabilize and maintain to ensure no loss of balance, stability, anchorage, or other condition that can result in release of contaminant or construction debris.
    - If a portable fuel tank is stationed on a barge to refuel equipment, the fuel tank must be double-walled and an absorbent containment boom shall be placed around the tank while it is on the barge.
    - When not in use, store fuel tanks on land in a specified containment area if within 150 feet of any waters of Oregon or the United States or storm inlet.
    - Refill fuel vessels on shore within secondary containment vessels of sufficient capacity to hold the entire volume of liquid available should an emergency spill occur.

- All equipment on the barge must have its own containment, including containment pans or absorbent booms to locally contain minor spills.
    - Remove waste material (such as spent abrasives, paint chips) from the barge before any pause in work (*i.e.*, one day without active work), every three work days, or before reaching the calculated safe load weight of the barge.

3.10.7 Clearing, Grubbing and Earthwork – Sections 00320-330

Several measures in the FAHP programmatic require implementation of avoidance and minimization measures in streams, riparian zones and other protected habitat areas, and Standard Specifications Sections 00320.02, 00320.40, 00320.42, and 330.41 may be in conflict with FAHP. Depending on site conditions, add the following SPs:

- 00320.40(b) Preserving and Trimming Vegetation - Standard specifications 00320.02 require removal of down timber and other vegetation and construction debris in clearing or construction limits, except in areas designated to remain in place as shown on plans.
- As applicable, to maintain compliance with the FAHP programmatic, include boiler plate SP00320(b-4) to protect trees, but edit the Boiler Plat SP to include down timber.
- As applicable, add Boiler Plate SP00320(b-5) Stockpile Vegetation and Material – As specified on plans and as directed, stockpile native vegetation and down timber for use in site restoration. Do not salvage material dominated by weedy species, as directed. If shown on plans, remove conifer trees that are greater than 18-inch DBH with root wad intact, as directed. Mulch vegetation less than 18-inch DBH, into pieces no more than 2-inches in size. Store salvaged material in a clean/dry place until site restoration. Allow for material to remain on site rather than being mulched, as negotiated with the biologist and project team.
- As applicable, add SP00320.42 Ownership and Disposal of Matter – Vegetation, trees and material designated for preservation and salvage are the property of Agency. Dispose of all other matter according to Standard Specification Section 00290.20.
- Standard Specification Section 00330.41(a-2) allows for stockpiling native topsoil according to Standard Specification Section 01040.43, but there is no existing standard or boilerplate SP for stockpiling of boulders for use in site restoration or native streambank material. As applicable, add a new SP00330.41(a-13), for salvaging/stockpiling boulders or streambed material as shown on plans and as directed.

3.10.8 Weed Control - Section 01030

Unlike SLOPES IV and most other NMFS BOs for transportation projects, the FAHP programmatic allows for use of herbicide treatment within the riparian zone (as defined in Section 4.0), although the use involves considerable impact minimization measures. In fact, standard specification Standard Specification Section 01030.42 (c) allows only hand or light mechanical removal of weeds within 50-feet of “sensitive areas” (which must be shown on plans).

If hand or mechanical control is not considered cost effective, herbicide treatment in the riparian zone can be allowed by adding Boiler Plate SP01030.42(c) (Herbicide Treatment) and editing as follows:

The following weed control methods are allowed within 50-feet of aquatic habitat or the riparian zone associated with ESA-listed species covered by the FAHP programmatic:

- ***Non-herbicide methods.*** Limit vegetation removal and soil disturbance within the riparian zone by limiting the number of workers there to the minimum necessary to complete manual

and mechanical plant control (*e.g.*, hand pulling, clipping, stabbing, digging, brush-cutting, mulching or heating with radiant heat, pressurized hot water, or heated foam).

- ***Herbicide Label.*** Herbicide applicators must comply with all label instructions.
- ***Power equipment.*** Gas-powered equipment with tanks larger than 5 gallons will be refueled in a vehicle staging area placed 150-feet or more from any natural waterbody, or in an isolated hazard zone such as a paved parking lot.
- ***Maximum herbicide treatment area.*** The total area treated with herbicides within the riparian zone will not exceed totals of 10-acres above bankfull elevation and 2 acres below bankfull elevation, per 1.6-mile reach of a stream, per project per year.
- ***Herbicide applicator qualifications.*** Herbicides will be applied only by an appropriately licensed applicator using an herbicide specifically targeted for a particular plant species that will cause the least impact. The applicator will be responsible for preparing and carrying out the herbicide transportation and safely plan, as follows.
- ***Herbicide transportation and safety plan.*** The applicator will prepare and carry out an herbicide safety/spill response plan to reduce the likelihood of spills or misapplication, to take remedial actions in the event of spills, and to fully report the event.
- ***Herbicides.*** The only herbicides allowed are (some trade names are shown in parentheses):
    - aquatic imazapyr (*e.g.*, Habitat)
    - aquatic glyphosate (*e.g.*, AquaMaster, AquaPro, Rodeo)
    - aquatic triclopyr-TEA (*e.g.*, Renovate 3)
    - chlorsulfuron (*e.g.*, Telar, Glean, Corsair)
    - clopyralid (*e.g.*, Transline)
    - imazapic (*e.g.*, Plateau)
    - imazapyr (*e.g.*, Arsenal, Chopper)
    - metsulfuron-methyl (*e.g.*, Escort)
    - picloram (*e.g.*, Tordon)
    - sethoxydim (*e.g.*, Poast, Vantage)
    - sulfometuron-methyl (*e.g.*, Oust, Oust XP)
- ***Herbicide adjuvants.*** The only adjuvants allow are shown in Table 9, with mixing rates described in label instructions. Polyethoxylated tallow amine (POEA) surfactant and herbicides that contain POEA (*e.g.*, Roundup) will not be used.

Table 9. Allowed herbicide adjuvants, trade names, and application areas.

Adjuvant Type	Trade Name	Application Areas
Surfactants	Agri-Dex	Riparian
	LI 700	Riparian
Drift Retardants	41-A	Riparian
	Vale	Upland

- ***Herbicide carriers.*** Herbicide carriers (solvents) are limited to water or specifically labeled vegetable oil. Use of diesel oil as an herbicide carrier is prohibited.
- ***Herbicide mixing.*** Herbicides will be mixed more than 150-feet from any natural waterbody to minimize the risk of an accidental discharge.
- ***Dyes.*** A non-hazardous indicator dye (*e.g.*, Hi-Light or Dynamark) is required to be used with herbicides within 100-feet of live water. The presence of dye makes it easier to see where the herbicide has been applied and where or whether it has dripped, spilled, or leaked.

Dye also makes it easier to detect missed spots, avoid spraying a plant or area more than once, and minimize over-spraying (SERA 1997).

- ***Spill Cleanup Kit.*** A spill cleanup kit will be available whenever herbicides are used, transported, or stored. At a minimum, cleanup kits will include Material Safety Data Sheets, the herbicide label, emergency phone numbers, and absorbent material such as cat litter to contain spills.
- ***Herbicide application rates.*** Herbicides will be applied at the lowest effective label rates.
- ***Herbicide application methods.*** Liquid or granular forms of herbicides will be applied as follows:
    - Broadcast spraying – hand held nozzles attached to back pack tanks or vehicles, or by using vehicle mounted booms.
    - Spot spraying – hand held nozzles attached to back pack tanks or vehicles, hand-pumped spray, or squirt bottles to spray herbicide directly onto small patches or individual plants using.
    - Hand/selective – wicking and wiping, basal bark, fill ("hack and squirt"), stem injection, cut-stump.
    - Triclopyr – will not be applied by broadcast spraying.
    - Keep the spray nozzle within 4-feet of the ground; 6-feet for spot or patch spraying more than 15-feet of the high water mark if needed to treat tall vegetation.
    - Apply spray in swaths parallel towards the project area, away from the creek and desirable vegetation (*i.e.*, the person applying the spray will generally have their back to the creek or other sensitive resource).
    - Avoid unnecessary run off during cut surface, basal bark, and hack-squirt/injection applications.
- ***Washing spray tanks.*** Spray tanks shall be washed 300-feet or more away from any surface water.
- ***Minimization of herbicide drift and leaching.*** Herbicide drift and leaching will be minimized as follows:
    - Do not spray when wind speeds exceed 10 miles per hour, or are less than 2 miles per hour.
    - Be aware of wind directions and potential for herbicides to affect aquatic habitat area downwind.
    - Keep boom or spray as low as possible to reduce wind effects.
    - Increase spray droplet size whenever possible by decreasing spray pressure, using high flow rate nozzles, using water diluents instead of oil, and adding thickening agents.
    - Do not apply herbicides during temperature inversions, or when ground temperatures exceed 80 degrees Fahrenheit.
    - Wind and other weather data will be monitored and reported for all broadcast applications.
- ***Rain.*** Herbicides shall not be applied when the soil is saturated or when a precipitation event likely to produce direct runoff to salmon bearing waters from the treated area is forecasted by the NOAA National Weather Service or other similar forecasting service within 48 hours following application. Soil-activated herbicides can be applied as long as label is followed. Do not conduct hack-squirt/injection applications during periods of heavy rainfall.

- ***Herbicide buffer distances.*** The following no-application buffers, which are measured in feet and are based on herbicide formula, stream type, and application method, will be observed during herbicide applications (Table 10). Herbicide applications based on a combination of approved herbicides will use the most conservative buffer for any herbicide included. Buffer widths are in feet, measured as map distance perpendicular to the bankfull elevation for streams, the upland boundary for wetlands, or the upper bank for roadside ditches. Before herbicide application begins, the upland boundary of each applicable herbicide buffer will be flagged or marked to ensure that all buffers are in place and functional during treatment.

Table 10. Herbicide buffer distances by herbicide formula, stream type, and application method.

Herbicide	No Application Buffer Width (feet)					
	Perennial Streams and Wetlands, and Intermittent Streams and Roadside Ditches with flowing or standing water present			Dry Intermittent Streams, Dry Intermittent Wetlands, Dry Roadside Ditches		
	Broadcast Spraying	Spot Spraying	Hand Selective	Broadcast Spraying	Spot Spraying	Hand Selective
Labeled for Aquatic Use						
aquatic glyphosate	100	waterline	waterline	50	none	none
aquatic imazapyr	100	15	waterline	50	none	none
aquatic triclopyr-TEA	**Not Allowed**	15	waterline	**Not Allowed**	none	none
Low Risk to Aquatic Organisms						
Imazapic	100	15	bankfull	50	None	none
Clopyralid	100	15	bankfull	50	None	none
metsulfuron-methyl	100	15	bankfull	50	None	none
Moderate Risk to Aquatic Organisms						
Imazapyr	100	50	bankfull	50	15	bankfull
sulfometuron-methyl	100	50	5	50	15	bankfull
Chlorsulfuron	100	50	bankfull	50	15	bankfull
High Risk to Aquatic Organisms						
Picloram	100	50	50	100	50	50
Sethoxydim	100	50	50	100	50	50

3.11.9 Planting – Section 01040

Woody plantings will be a design feature, included in Roadside Development Plans. Standard Specifications (Section 01040) describe approved methods and acceptance criteria for plantings. Project Plans and Specifications will describe planting locations, preparation, species and plant sizes, soil amendments, and requirements for herbicide or pesticides. The Contractor is responsible for maintaining plantings during the specified plant establishment period (typically one year after installation). For full payment, the Contractor must replace dead plantings.
SPs will be required to limit plant materials and construction options to those that are most likely to benefit natural habitat restoration. Examples are listed below, although others may be applicable to site-conditions.

Soil Fertility Test (SP01040.13):

In most cases, this should have been conducted prior to construction to determine if topsoil should be salvaged, and if amendments would need to be specified. Therefore, this typically is not a required item.

Topsoil (SP01040.14):
Use option (a) if topsoil is to be stockpiled and reused.

Soil Amendments (SP01040.16):
Require soil amendments as specified by Roadside Development Plans. Conditioners or amendments may be helpful in cut slopes or other areas with poor quality soil.

Soil Bio-Amendments (SP01040.17):
Use option (e) if imported topsoil is used. Check with the Agency's qualified products list for acceptable types.

Fertilizer (SP01040.18):
Although it is in the Standard Specification Section 00290 specifications, landscaping subcontractors often only read the 01040 contract provisions. Therefore, add the following SP for all projects that would require reseeding or plantings near a stream with covered aquatic species:

- Do not apply surface fertilizer within 50-feet of any stream channel.

Mulch (SP01040.20):
Use option (e) if vegetation is specified to be cleared and mulched, as per SP00320 above, or other mulches as recommended by the site restoration designer.

Herbicides (SP01040.21):
If vegetation or topsoil is specified for re-use, do not allow any of the herbicides presented in Section 3.11.8 for natural habitat restoration.

Watering (SP01040.22 and 01040.54b):
The use of time release water pellets is not recommended, as they are only effective when adequately maintained, and this is a step that is all too often not implemented. When not properly maintained the pellets draw moisture away from the plant. Deep irrigation tubes may be specified, although because these too require maintenance that typically is not implemented, they are generally not recommended.

Miscellaneous (SP01040.23):
Specify browse protectors(c) if animal damage may be a concern. Tree shelters are another type of protector that may be beneficial in some situations, and would need to be specified via project SPs. Use option (b) or (j) if boulders or course woody debris are specified to be stockpiled for re-use in site restoration.

Construction (SP01040.43):
One of the many challenges of roadside revegetation is that construction activities and equipment leave the planting areas too heavily compacted for successful plant establishment. Heavily compacted and 'smoothed' soils severely limit water infiltration, a leading cause for planting failure, and may lead to erosion and loss of imported topsoil. Currently, there are no specifications or boiler plate SPs for proper preparation of restoration surfaces. Heavily compacted soil surfaces should be tilled or ripped (at least two feet deep is ideal) to help loosen

compacted soils and provide a better substrate for seeding. Soil amendments may be added at that time. Add option (d) of the Boiler Plate SPs, edited as follows:

- Grade and finish areas that are to receive seeding and planting areas to proper grade, contour and cross section, including cultivating areas that have been compacted by construction activities by scarifying, tilling, or ripping to a depth of at least 24 inches before placing topsoil, and imprinting parallel to contours for erosion control and seeding. Do not utilize track-walking to create imprinted surfaces, unless otherwise directed.

3.10.10 Waterway Enhancements - Section 01091

Although design plans are typically required for installation of in-stream enhancements, such as fish rocks (boulders), streambed substrate and large wood, SPs are also required to provide further design specifications and for payment of bid items. ODOT's boiler plate SP01091 already has several common types of waterway enhancements, but these need to be carefully reviewed and edited to meet project-specific design goals. Furthermore, the Boiler Plate SP language and bid items need to be modified if the on-site materials are to be stockpiled and re-used (see Section 3.11.7).

4.0 Glossary

Most glossary terms were defined by the NMFS for the FAHP BO and do not necessarily match other highway design manuals.

Active channel width (ACW) is the width of a stream measured perpendicular to stream flow between the ordinary high water elevations, or at the channel bankfull elevation if the ordinary high water elevation is indeterminate. This width includes the cumulative active channel widths of all individual side- and off-channel components of channels with braided and meandering forms. The measurement should be outside the area influence of any existing stream crossing (*e.g.*, average of measurements taken five to ten channel widths upstream and downstream).

Bankfull elevation is the elevation at which a stream first reaches the top of its natural banks and overflows, and is indicated by the topographic break from a vertical bank to a flat floodplain or the topographic break from a steep slope to a gentle slope. Bankfull width is measured perpendicular to stream flow between the bankfull elevations. Compared with active channel width, it is typically measured between ordinary high water elevations and therefore narrower than active channel width.

Best management practices (BMPs) are facilities or which result in the best practical environmental outcome by avoiding or reducing the discharge of pollutants or other adverse environmental impacts. Included are structural (engineered or constructed) water quality facilities, non-engineered facilities (for example the roadside area) that remove pollutants or moderate flow, and actions such as schedules of activities, prohibitions of activities and prescribed maintenance procedures.

Bioretention means retaining stormwater to remove pollutants by maximizing contact between the stormwater and vegetation and media,

Bioslope, or ecology embankment is a linear flow-through stormwater runoff treatment facility parallel to the highway that routes runoff over a gravel no-vegetation zone, a vegetated filter strip, into a "ecology-mix" bed, and out through a gravel-filled underdrain trench.

Bioswales are vegetated, flow-through drainages with amended soil designed to treat stormwater using vegetative filtration and contact with organic material and amended soil.

Bridge means the structure, including supports erected over a depression or an obstruction, such as water, roadway, or railway, and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20-feet between under copings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes; it may also include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening.

Channel migration zone means the area where a stream or river is susceptible to channel erosion, and often include typically encompass floodplains and some portions of terraces.

Constructed wetlands are engineered systems designed to simulate the water quality improvement functions of natural wetlands to remove pollutants from stormwater. These are not the same as created wetlands built to compensate for impacts to state and federally regulated wetlands. Constructed wetlands cannot be used as mitigation for wetland impacts.

Contraction scour is the scour resulting from a constriction of the flow area at the bridge which causes an increase in velocity and shear stress on the bed at the bridge. The contraction can be caused by the bridge or from a natural narrowing of the stream channel. The scour will occur across all or most of the channel width.

Contributing impervious area (CIA) means all impervious surfaces associated with public highways, roads, streets, roadside areas, and auxiliary features (*e.g.*, rest areas, roadside parks, viewpoints, heritage markers, park and ride facilities, pedestrian and bicycle facilities) that occur within the project area, or are contiguous to the project area that discharge runoff into the project area, before being discharged directly or indirectly into a stream, wetland, or subsurface water through a ditch, gutter, storm drain, dry well, other underground injection system.

Culvert (as defined by the NMFS for the FAHP BO) means a structure, as distinguished from bridges, with a span of less than 20-feet measured perpendicular to the centerline of the hydraulic opening that is usually covered with embankment, including pipes, arches, box culverts, and rigid frames.

Discharge facility means the stormwater conveyance that discharges to an upland area, a regulated water body, a wetland, or an underground injection control.

Entrenchment ratio is the ratio between the flood prone width and bankfull channel width; streams with a ratio that is less than 1.4 are highly entrenched and have a relatively small floodplain while streams with a ratio greater than 2.2 are slightly entrenched and have broader floodplains.

Flood frequency zone means an area that has a specific probability of flooding, expressed as an average interval in years.

Flood prone area is defined as the area adjacent to the stream that is inundated or saturated when the elevation of the water is at twice the maximum depth at bankfull stage or three times the average bankfull depth.

Flood prone width means the horizontal distance along transect, measured perpendicular to stream flow, from the edge of the flood prone area on one side of the floodplain to edge of the flood prone area on the opposite side of the floodplain.

Functional floodplain is the flood prone area up to 2.2 times the active channel width for streams with an entrenchment ratio of 2.2 or greater, and the entire width of the flood prone area for streams with an entrenchment ratio less than 2.2. This area may be reduced by the presence of natural constrictions, flow regulation, or encroachment of built infrastructure.

The functional floodplain is interconnected with the main channel through physical and biological processes such as periodic inundation, the erosion, transport and deposition of sediments, nutrient cycling, groundwater recharge, hyporheic flows, the production and transport of large wood, aquatic food webs, and fish life history. Together, these processes interact to create and maintain geomorphic features such as alcoves, backwaters, backwater deposits, braided channels, flooded wetlands, groundwater channels, meander scrolls (arc-shaped features that can occur on either side of meander bends but are common on the concave side of bends formed as the channel migrated laterally down valley and toward the concave bank), natural levees, overflow channels, oxbows or oxbow lakes, point bars) areas of deposition typically on the concave side of river curves), ponds, sand splays (deposits of flood debris usually of coarser sand particles in the form of splays or scattered debris), side channels, and sloughs (areas of dead water formed in a meander scroll depression or along the valley wall as flood flows move directly down valley, scouring beside the valley walls), although these features may be difficult to distinguish on smaller streams, where floodplain deposits are subject to rapid removal and alteration. These permanent or intermittent geomorphic features are extensions of the main stream channel and are critical to the survival and recovery of ESA-listed salmon and steelhead.

General scour is a lowering of the streambed across the stream or waterway at the bridge. This lowering may be uniform across the bed or non-uniform. That is, the depth of scour may be deeper in some parts of the cross section. General scour is the sum of contraction scour (see above), and/or local scour that may cause a non-uniform lowering of the bed due to conditions such as pier scour, changes in flow velocity around a bend, at the confluence of two tributaries, downstream of a bar or island, or short-term (daily, weekly, yearly, or seasonal) changes in the downstream water surface elevation that control backwater. It does not include scour caused by downcutting of the stream due to base level adjustment or the advance upstream of knick points.

General scour elevation means a cross section reference line showing the probable vertical distance that a streambed will be lowered by general scour below a reference elevation during the scour design discharge or scour check discharge, whichever is more severe, including

commonly accepted minimum safety factors. For evaluating scour processes, general scour depth is analyzed by determining the lowest potential water-surface elevation downstream of the bridge.

General scour prism is defined by the width of the functional floodplain and the general scour elevation. It includes all floodplain, bank, and streambed material above the general scour depth or general scour elevation within the functional floodplain. The general scour prism should be shown on plan drawings for bridge replacement projects.

Infiltration means the flow or movement of water through the soil surface and into the ground.

In-water work includes any part of an action that occurs within the wetted channel when water is present, *e.g.*, excavation of streambed materials, fish capture and removal, flow withdrawal, streambank protection, and work area isolation. Can also include work in the dry below the regulated ordinary high water elevation.

Large wood means a tree, log, root wad, or engineered logjam that is large enough to dissipate stream energy associated with high flows, capture bedload, stabilize streambanks, influence channel characteristics, and otherwise support aquatic habitat function, given the slope and bankfull channel width of the stream in or near which the wood occurs. Generally, this is 18-inch diameter at breast height or greater and a conifer species.

Local scour means removal by flow of material from the channel bed or banks which is restricted to a relatively minor part of the width of a channel, such as scour in a channel or on a floodplain that is localized at a pier, abutment, or other obstruction to flow. Local scour is caused by the acceleration of the flow and the development of a vortex system induced by the obstruction to the flow and does not include the additional scour caused by any contraction, natural channel degradation, or bendway.

Low impact development (LID) means site design using natural processes to minimize and treat stormwater runoff and decentralized, micro-scale controls that intercept, evaporate, transpire, filter, or infiltrate runoff to avoid or minimize off-site discharge. For transportation projects, LID is defined as stormwater management techniques within the linear right-of-way that incorporate infiltration, filtration through soil or amended soil, and vegetation. Proprietary and other devices that are confined and depend on mechanical separation or installed filters are not considered LID BMPs.

Maintenance (as defined by the NMFS for the FAHP BO) means to perform work on a planned, routine basis, or to respond to specific conditions and events, as necessary to maintain and preserve the condition of a transportation feature at an adequate level of service. For the purposes of the FAHP, pavement repair is considered a type of maintenance.

Native tree, for the purposes of the FAHP, is plant species that is indigenous to the project's geographic region and which, under natural circumstances, originates from the ground as a single-trunked woody plant and matures to a height of at least 15 feet. Most tree species in Oregon are self-evident, with the exception of alder, dogwood and willow species, some of

which are shrubs (not trees) because they have multiple trunks and do not exceed 15 feet in height.

Natural levees are means raised berms or crests above the floodplain surface beside the channel, usually containing coarser materials deposited as flood flows over the top of the stream bank - more frequently found on concave banks; where most of the sediment load in transit is fine grained, natural levees may be absent or nearly imperceptible.

Ordinary high water (OHW) is the elevation to which the high water ordinarily rises annually in season, excluding exceptionally high water levels caused by large flood events. It is indicated in the field by one or more of the following physical characteristics: (a) a clear natural line impressed on the bank or shore; (b) destruction of terrestrial vegetation; (c) change in vegetation from riparian to upland; (d) textural change of depositional sediment or changes in the character of the substrate, *e.g.*, from sand to cobbles, or alluvial material to upland soils; (e) the elevation below which no needles, leaves, cones, seeds, or other fine debris occurs; (f) the presence of litter and debris, water-stained leaves, water lines on tree trunks; or (g) other appropriate means that consider the characteristics of the surrounding areas. The ordinary high water elevation is typically below the bankfull elevation. The ordinary high water elevation is considered equivalent to the bankfull elevation if the ordinary high water lines are indeterminate. Ordinary high water elevation is not the same as the wetted width and is typically determined by changes on the bank in vegetation, changes in sediment size and/or color, water lines on the bank, trees, or leaves, or the point where debris (*e.g.*, needles, leaves, twigs, cones) accumulation begins.

Partially spanning weir means a low-profile structure consisting of loosely arranged boulders that does not exceed 25% of the cross-sectional area of the low flow channel; used to protect streambanks by redirecting the flow away from the bank, increase aquatic habitat diversity, and provide refuge for fish during high flows.

Pavement preservation means actions to maintain or rehabilitate pavement in good condition and before the onset of serious damage, including routine and preventative maintenance and minor rehabilitation using non-structural enhancements to correct age-related, top-down surface cracking due to environmental exposure.

Pavement reconstruction means replacement of the entire pavement structure by the placement of equivalent of increased pavement structure. Major elements may include flattening of hills and grades, improvement of curves, and widening of the roadbed. Normally, this either changes the location of the existing subgrade shoulder points, or removes all of the existing pavement and base course 50% or more of the project length. Additional right-of-way is normally required.

Pavement resurfacing means placing a new surface, or overlay, on an existing roadway to provide a better all-weather surface, a better riding surface, and to extend or renew the pavement life. The overlay must be placed directly on top of existing pavement, with no intervening base course, no change in the subgrade shoulder points, and no improvement in capacity or geometrics. Resurfacing may include some elimination or shielding of roadside obstacles, culvert replacements, signals, marking, signing and intersection improvements.

Pile means a long column driven into the ground to form part of a foundation or substructure.

Pollutants of Concern are those contaminants commonly found in highway runoff that are expected to be in concentrations high enough to cause violations of water quality standards, or contribute to elevated loads in designated water quality limited streams or streams with total maximum daily loads for those pollutants.

Preservation means to restore a transportation feature that is still in good condition to almost original condition.

Riparian zone is biologically defined rather than a certain distance from the stream. It includes terrestrial areas adjacent to streams where the vegetation complex and microclimate conditions are products of the combined presence and influence of perennial or intermittent water, associated high water tables, soils that exhibit some wetness characteristics, and distinctly different vegetation than adjacent areas, or vegetation that is similar to adjacent areas but more vigorous or robust.

Riprap means rock or stones used as a part of a foundation or revetment, or to construct with or strengthen with rock or stones, either loose or fastened with mortar.

Scour means the displacement and removal of channel bed material due to the erosive action of flowing water which excavates and carries away material from the channel bed, usually considered as being localized as opposed to general bed degradation or headcutting. For information on scour analysis and delineation of scour depth, scour elevation, and scour prism, see Lagasse *et al*. 2001, Richardson and Davis 2001.

Sound exposure level means a measure of sound energy dose that is defined as the constant sound level acting for one second that has the same acoustic energy as the original sound (Hastings and Popper 2005). SEL is calculated by summing the cumulative pressure squared over time as decibels re 1 micropascal^2-second.

Stormwater, or runoff, means water from precipitation that flow across the ground or in artificial conveyance systems before it discharges into a surface water or groundwater.

Streambank toe means the part of the streambank below ordinary high water.

Streamflow means the rate at which a volume of water flows past a point over a unit of time.

Subgrade means the roadway grade established in preparation for top surface of asphalt, concrete, gravel, or other material.

Tree, as defined for the FAHP, means a woody plant that can grow to be 15 feet or higher and usually has a single stem and a crown (branched-out area) at the top.

Vegetated riprap means riprap in which the voids have been filled with soil and planted using seed, plant cuttings or rooted plants. Attempts should be made to add a layer of soil behind the riprap before it is placed.

Water quality and flow control design storms mean the depth of rainfall predicted from a storm event of a given frequency and duration used to size water quality treatment and flow control facilities.

Watershed means a designated hydrologic unit, or drainage area, typically at the 5th or 6th field, for identification and hierarchical cataloging purposes. Often the 5th and 6th fields are also referred to as the 10- or 12-digit HUC (hydrologic unit code), respectively.

5.0 References

Federal Highway Administration (FHWA). 2007. Roadside Revegetation, an Integrated Approach to Establishing Native Plants, FHWA-WFL/TC-07-005. U.S. Department of Transportation, Federal Highway Administration, Western Federal Lands Highway Division, Vancouver, WA. Available at https://flh.fhwa.dot.gov/resources/design/library/roadside-revegetation-manual.pdf (last accessed September 10, 2015).

Lagasse, P.F., L.W. Zevenbergen, J.D. Schall, and P.E. Clopper. 2001. Bridge scour and stream instability countermeasures: Experience, selection, and design guidance, Second Edition. F.H.A. U.S. Department of Transportation, National Highway Institute. Publication No. FHWA NHI 01-003, Hydraulic Engineering Circular No. 23, Arlington, VA.

Hastings, M.C., and A.N. Popper. 2005. Effects of sound on fish. Unpublished report prepared for California Department of Transportation Sacramento, CA.

NOAA Fisheries (National Marine Fisheries Service; NMFS). 2000. Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act. Protected Resources Division, Portland, OR.

_____. 2013a. Programmatic Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Revisions to Standard Local Operating Procedures for Endangered Species to Administer Maintenance or Improvement of Road, Culvert, Bridge and Utility Line Actions Authorized or Carried Out by the U.S. Army Corps of Engineers in Oregon (SLOPES V Roads, Culverts, Bridges and Utility Lines), NMFS Consultation No. 2013/10411. Northwest Region, Seattle, WA.

_____. 2013b. Endangered Species Act Section 7 Formal and Informal Programmatic Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Revisions to Standard Local Operating Procedures for Endangered Species to Administer Stream Restoration and Fish Passage Improvement Actions Authorized or Carried Out by the U.S. Army Corps of Engineers in Oregon (SLOPES V Restoration), NMFS Consultation No. 2013/9717. Northwest Region, Seattle, WA.

_____. 2011. Anadromous Salmonid Passage Facility Design. NMFS, Northwest Region, Portland, OR.

_____. 2012. Endangered Species Act Programmatic Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Federal-Aid Highway Program in the State of Oregon. NMFS Consultation No. 2011/02095. Northwest Region, Seattle, WA.

Oregon Department of Fish and Wildlife (ODFW). 2006. Oregon Conservation Strategy. Oregon Department of Fish and Wildlife, Salem, OR.

_____. 2008. Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources. Oregon Department of Fish & Wildlife, Salem, OR.

_____. 2010. Lower Columbia River Conservation & Recovery Plan for Oregon Populations of Salmon & Steelhead, Final (August 6, 2010). Oregon Department of Fish & Wildlife, Salem, OR.

Oregon Department of Transportation. 2008a. ODOT Technical Services Bulletin GE0801(B), Qualification Program for ESA Effects Determinations. Highway Division, Technical Services Branch, Salem, OR.

_____. 2008b. ODOT Technical Services Bulletin GE08-04(B), Designating and Constructing Staging and Disposal Sites. Highway Division, Technical Services Branch, Salem, OR.

_____. 2008d. SLOPES IV Handbook. Highway Division, Technical Services Branch, Geo-Environmental Section, Salem, OR. Available at ftp.odot.state.or.us/SLOPES_IV (last accessed January 14, 2012).

_____. 2010. Programmatic Biological Assessment Bridge Preservation and Rehabilitation Projects Statewide. Highway Division, Technical Services Branch, Salem, OR

_____. 2011. Oregon Jobs and Transportation Act (JTA) Section 18 Implementation. Highway Division, Technical Services Branch, Salem, OR. http://www.oregon.gov/ODOT/HWY/GEOENVIRONMENTAL/pages/odot_jta_section18.aspx, last accessed January 4, 2016.

_____. 2011. Hydraulics Manual. Geo-Environmental Section, Technical Services Division, Salem, OR. http://www.oregon.gov/ODOT/HWY/GEOENVIRONMENTAL/pages/hyd_manual_info.aspx#Hydraulics_Manual (last accessed January 14, 2013).

Oregon Revised Statutes (ORS). 2011. ORS Chapter 569, Weed Control. Oregon Legislative Council, Salem, OR.

Richardson, E.V., and S.R. Davis. 2001. Evaluating Scour at Bridges, Fourth Edition. U.S. Department of Transportation, Federal Highway Administration, National Highway Institute. Publication No. FHWA NHI 01-001, Hydraulic Engineering Circular No. 18, Arlington, VA.

Rosgen, D. L.. 1996. Applied River Morphology. Wildland Hydrology Books, Pagosa Springs, CO.

SERA (Syracuse Environmental Research Associates). 1997. Use and assessment of marker dyes used with herbicides. Submitted to: Animal and Plant Health Inspection Service, U.S. Department of Agriculture. TR 96-21-07-03b. Syracuse Environmental Research Associates, Inc. Riverdale, MD.

U. S. Fish and Wildlife Service (USFWS). 2010. Endangered Species Act Section 7 consultation and conference on the Oregon Department of Transportation's Bridge Preservation and Rehabilitation Projects Statewide (consultation number 13420-2010-F-0079). U. S. Department of the Interior, Fish and Wildlife Service, Portland ,OR.

APPENDIX 1
Other ESA Consultation Options for Transportation Projects

SLOPES V, STU and SLOPES V Restoration

SLOPES, or Standard Local Operating Procedures for Endangered Species, is a Section 7 programmatic Endangered Species Act (ESA) consultation .between the U.S. Army Corps of Engineers (USACE) and the National Marine Fisheries Service (NMFS). Although it was originally developed to provide ESA coverage for the majority of Corps Section 404 permits in Oregon, updates were developed specifically to address transportation and habitat restoration actions. Since SLOPES V STU is in use, information from the SLOPES IV handbook (ftp://ftp.odot.state.or.us/SLOPES_IV/SlopesIVHandbook(V1.3)Final102508.doc) that is relevant to the FAHP has been incorporated into this guide.

Although the FAHP replaces SLOPES for Federal-Aid Highway projects, it is still relevant to transportation projects that do not have Federal-Aid or the Federal Highway Administration (FHWA) funding or emergency projects that are completed outside of the ODFW in-water work window. SLOPES V may be used if a project requires a USACE permit and it has no Federal-Aid Highway Program funding (*e.g.*, state-funded maintenance actions or local agency projects without Federal-Aid funding). Since SLOPES V is only with the NMFS and the Corps, it does not provide ESA coverage for terrestrial and aquatic species under the jurisdiction of the U. S. Fish and Wildlife Service (USFWS).

Users may obtain copies of the SLOPES V Biological Opinion and the SLOPES IV User's Guide in the ftp folder listed above. SLOPES V Programmatic Biological Opinions can be accessed from the NMFS Biological Opinion database or at the following links:

https://www.nwp.usace.army.mil/Portals/24/docs/regulatory/NMFS/2013_03-19_slopesv_restoration_NWR-2013-9717.pdf

Bridge Preservation and Rehabilitation

ODOT and FHWA have a programmatic Section 7 ESA consultation with the USFWS on bridge preservation and rehabilitation actions. Covered species include terrestrial and aquatic species under the jurisdiction of the USFWS, including (but not limited to), northern spotted owl, marbled murrelet, western snowy plover, Fender's blue butterfly, bull trout, Oregon chub, and federally listed plant species most typically affected by transportation actions in Oregon. Originally developed for NMFS species as well, bridge preservation and rehabilitation activities are included in the FAHP. When the USFWS provides the Biological Opinion for the FAHP, ODOT will no longer use the Bridge Preservation programmatic.

The Biological Assessment and Biological Opinion are available through the Geo-Environmental, Biology Program http://www.oregon.gov/ODOT/HWY/GEOENVIRONMENTAL/Pages/biology.aspx (contact any of the program coordinators).

Vernal Pools (USFWS)

The USFWS and ODFW have a biological opinion for activities related to the conservation and development within vernal pool habitats near Jackson County, Oregon and the impacts of these activities on vernal pool ESA-listed species. The USFWS will cover similar activities by ODOT and other agencies because they consider it inter-related and inter-dependent. A copy of the BO is available through the Geo-Environmental Section (contact any biology program coordinators).

ODOT Maintenance 4d exemption

The ODOT Routine Road Maintenance, Water Quality and Habitat Guide (AKA "The Blue Book"), allows ODOT's routine road maintenance actions to proceed without the need for ESA consultation with the NMFS as long as work follows Best Management Practices in the guide. The ODOT Routine Road Maintenance Program received an exemption to Section 9 prohibition of 'take' from NMFS. By following the BMPs in the Guide, employees, contractors and partners comply with the ESA by minimizing impacts to the protected species and habitat. In addition, by following the BMPs in the Guide, ODOT maintenance employees comply with the ODOT National Pollutant Discharge Elimination System's Municipal Separated Storm Sewer System (MS4) permit, issued by the Oregon Department of Environmental Quality (DEQ) under the Clean Water Act. The Blue Book does not provide an ESA exemption for local agencies, but a few have similar programs (*e.g.*, City of Portland). Although the USFWS has not provided a similar exemption, ODOT's maintenance actions that follow the Blue Book are anticipated to similarly have No Effect to aquatic species managed by the USFWS (*e.g.*, bull trout, Oregon chub).

The Blue Book (current version 2014) is available from the Geo-Environmental Biology Program (see above listed website).

ODOT Routine Maintenance Habitat Conservation Plan (RM-HCP)

ODOT is in the process of developing a habitat conservation plan for routine road maintenance actions and effects to certain terrestrial species (butterflies, plants). It is a specific program of vegetation and right-of-way management to minimize and mitigate for effects to these species. The RM-HCP is not available for local agencies or maintenance projects that are not "routine" as described in the RM-HCP. The RM-HCP will be available from the Geo-Environmental Biology Program when complete (see above listed website).

Individual Consultation

Although there are many programmatics available, some actions may involve impacts to species or habitats that are not covered under any of these and will have to proceed with Individual ESA Consultation. Examples include:

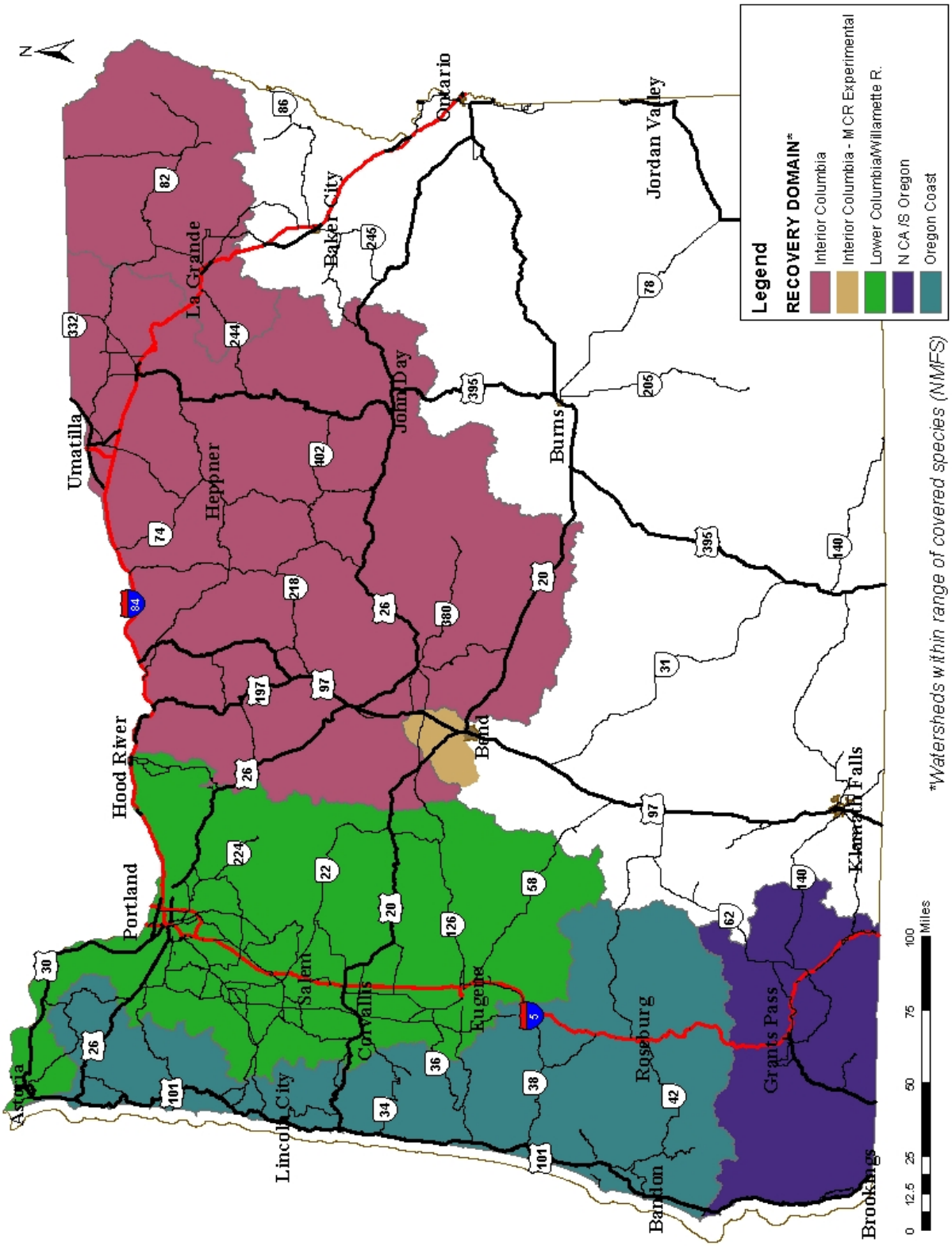
- Projects with adverse effects to species not covered by the FAHP for which a programmatic is not otherwise available
- Replacing a tidegate in a coastal estuary
- A project with an EIS or large-scale impacts to aquatic species.

Users may streamline the Biological Assessment and likely shorten the ESA consultation process by modeling the project according to the design standards in the FAHP. Guidance and templates are available from the Geo-Environmental Biology Program (see above listed website).

Other Programmatics

Transportation projects on U. S. Forest Service or Bureau of Land Management or other federal properties may qualify for one of their programmatics. If a project has both Federal-Aid funding and is located on federal land, the lead Action Agency for ESA Section 7 consultation is currently determined on a case-by-case basis by FHWA and the partner federal agency.

APPENDIX 2
Federal-Aid Highway Programmatic Coverage Area (NMFS)



Appendix 3
Websites and Links for Implementing the FAHP*

Topic	Link	User's Guide Section
ODOT Biology program website	https://www.oregon.gov/ODOT/HWY/GEOENVIRONMENTAL/biology.shtml	2.1.3
certified Environmental Construction Inspector	ODOT Environmental Inspection Manual: https://www.oregon.gov/ODOT/HWY/CONSTRUCTION/erosion_control_manual.shtml	2.1.5
FAHP website	https://www.oregon.gov/ODOT/HWY/GEOENVIRONMENTAL/Pages/FAHP.aspx	2.2
ODOT ftp server (ODOT users)	\\s0442c\ftp\ERUTrans\FAHP	2.2.2
ODOT ftp server (external users)	ftp://ftp.odot.state.or.us/NRUTrans/FAHP/	2.2.2
FAHP E-mail	FAHP_ESA@odot.state.or.us	2.2.2
FAHP Projects Map	https://gis.odot.state.or.us/fahpesaprogrammatic/ (or linked via the FAHP website)	2.2.3
Fish Salvage Reports	ODFW (fish.research@state.or.us) and ODOT ERU (NRU-Trans@odot.state.or.us).	2.5.2
Corrective Action Plan	Biology mitigation monitoring standards, via the ODOT Biology Program.	2.6
StreamStats	https://water.usgs.gov/osw/streamstats/	3.5.1
Stormwater BMPs	ODOT Hydraulics Manual: https://www.oregon.gov/ODOT/HWY/GEOENVIRONMENTAL/Pages/hyd_manual_info.aspx	3.5.2
ODOT Precipitation Viewer	ftp://ftp.odot.state.or.us/tdb/trandata/GIS_data/precipitation.zip	3.5.3
Pile driving hydroacoustic calculator	https://www.wsdot.wa.gov/environment/technical/fish-wildlife/esa-efh/noise	3.7
NMFS fish passage criteria	https://www.westcoast.fisheries.noaa.gov/publications/hydropower/fish_passage_design_criteria.pdf	3.9.2
FHWA Roadside Revegetation guide	https://flh.fhwa.dot.gov/resources/design/library/roadside-revegetation-manual.pdf	3.10
ODOT Specifications website	https://www.oregon.gov/ODOT/HWY/SPECS/Pages/index.aspx	3.11

** Links available as of User's Guide publication date.*

APPENDIX 4
Standardized ERU File Naming Conventions

KEY#_Acronym _Project_Name.pdf

Examples:
Biological Assessment: 11522_BA_Kitson_Ridge_West_Salt_Creek.pdf
DSL Permit: 11522_DSL2003-0172_Kitson_Ridge_West_Salt_Creek.pdf

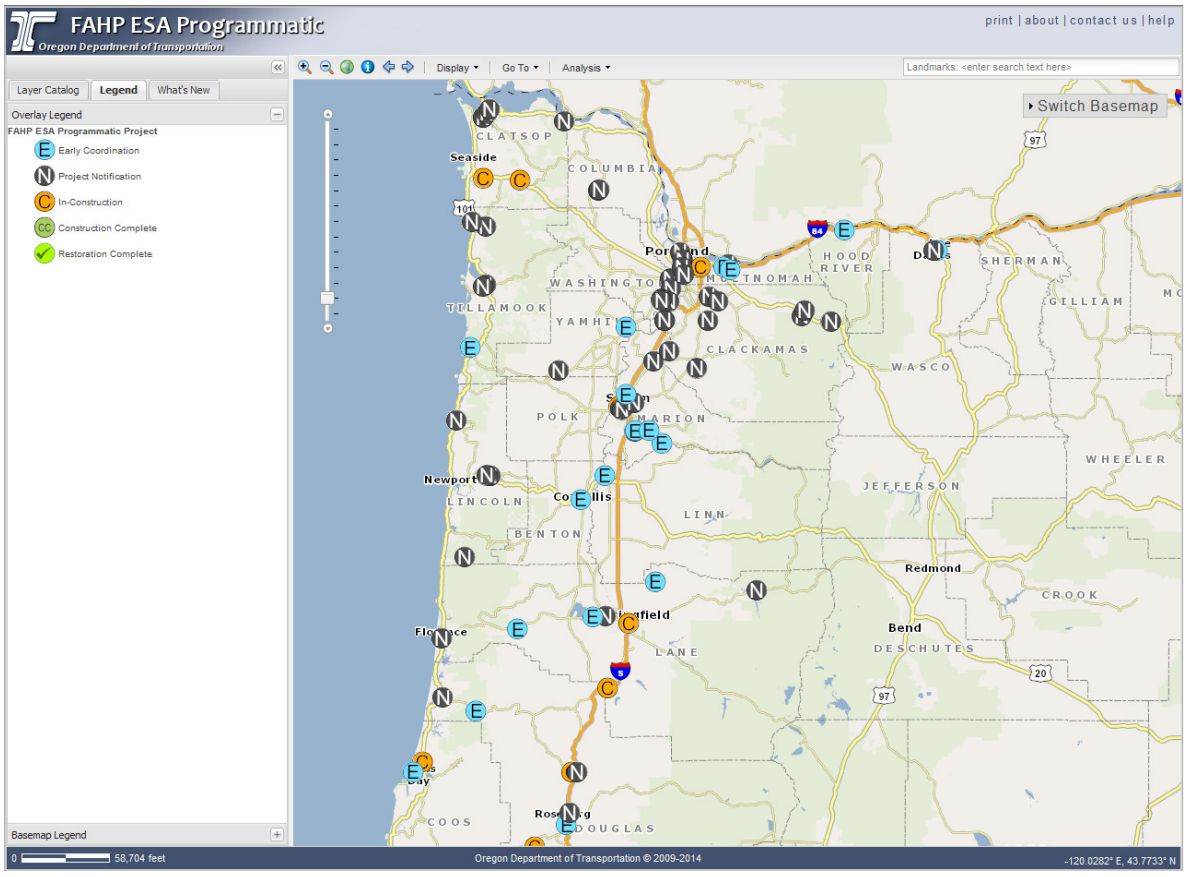
Acronym	Document
BA	Biological Assessment
BANKINST	Bank Instruments
BCR	Botanical Clearance Report
BMP	Bank Management Plans
BMRYR#	Biology Monitoring Report (Year #) (add SLOPES or FAHP permit acronym before 'BMRYR#')
BO	Biological Opinion
CHG	Project Change Request (add permit type acronym before 'CHG', *e.g.*, FAHPCHG or DSLCHG)
CHGA	Approved Project Change Request (add permit type acronym before 'CHGA')
CMP	Compensatory Mitigation Plans
COE*permit#*	Army Corps of Engineers Permit
DELIN	Delineation report
DSL*Permit#*	Department of State Lands Permit
FA	Functional Assessment
FAHPNOTIF_FHWA	FAHP Project Notification Report signed by FHWA
FAHPNOTIF_NMFS	FAHP Project Notification Report signed by NMFS
FAHPNOTIF_FINAL	Fully approved FAHP Project Notification Report (approved by FHWA and/or NMFS, as relevant; final to be created by REU after all approvals, see User's Guide Section 2.4.3)
FAHPCONST	FAHP Construction Inspection Report
FAHPBMRYR#	FAHP Project Monitoring Report
FPEX	Fish Passage Exemption Application (add 'A' after 'FPEX' when approved)
FPP	Fish Passage Plan Application (add 'A' after 'FPP' when approved)
FPWA	Fish Passage Waiver Application (add 'A' after 'FPW' when approved)
FSR	Fish Salvage Reports
JD	Jurisdictional Determination
JPA	Joint Permit Application
LOC	Letter of Concurrence
LPI	Legal Protection Instruments
MHR	Major Hazard Response Form
NE	No Effect

Acronym	Document
NOTIF_R#	Project Notification Report submitted by Region # (add SLOPES or FAHP permit acronym before 'NOTIF')
PCR	Project or Action Completion Report (add SLOPES or FAHP acronym before 'PCR')
PROJAMEND	Project Amendment Form
SLOPESA	E-mail message of SLOPES Approval
SRP	Site Restoration/Rehabilitation Plans
SWMP	Stormwater Management Plan
TECHREPORT	Tech reports for EIS or EA's
WMRYR#	Wetland Monitoring Report (Year #)
MMR	Mitigation Monitoring Release / Close Out

- Files must be saved in **PDF format**.
- No Spaces, please_use_underscore_between_words.
- Cover Letters must be attached with main document; not separated
- All FAHP documents must be uploaded to project's ftp folder (in ftp://ftp.odot.state.or.us/NRUTrans/FAHP) and stakeholders notified via E-mail, copying FAHP_ESA@odot.state.or.us (see User's Guide Section 2.0).
- Others must be copied to NRU-Trans E-mail – NRU-TRANS@odot.state.or.us with an informative subject line. Files larger than 10mb may be uploaded to NRU's ftp (ftp://ftp.odot.state.or.us/NRUTrans) with notification via NRU-Trans that the file has been placed.

APPENDIX 5
Primer on Using ODOT's Trans-GIS (including FAHP Projects Map)

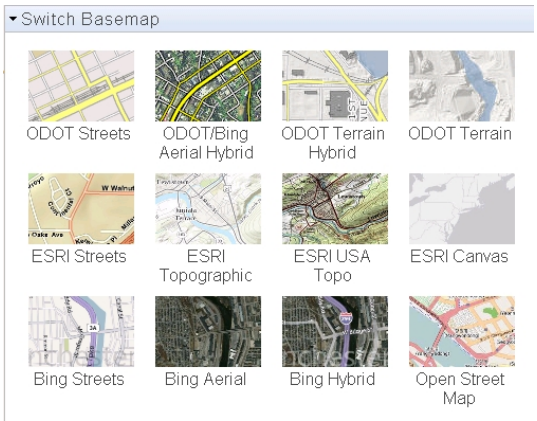
Tool Overview:

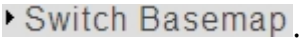


Close the disclaimer window to view the FAHP Projects Map. It has a similar feel to other web maps such as Google Maps and MapQuest with the ability to drag your mouse around to navigate. Key features include the legend, the base map, the toolbar and the map itself.

In the bottom right hand corner is the legend. Each icon listed corresponds to project phase that a project on the map is currently in. For example, each (E) on the map represents a project that is undergoing early coordination. The (N) icon represents a project that has submitted notification documents indicating what the project is doing and how it will impact listed species. You can temporarily hide the legend by hitting the Legend button located in the top left corner Legend.

A variety of base maps are built into this application that allow you to change the way the map looks, including topographical, aerial photographic and even lidar. Different base maps are accessible by clicking on the

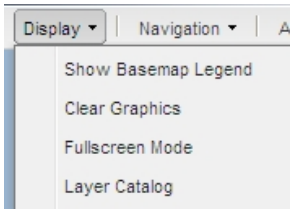


Switch base map icon in the top right corner of the map. 

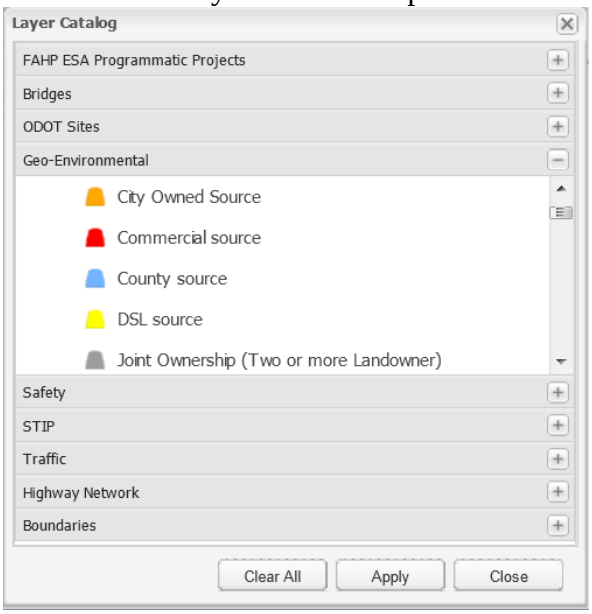
.

The toolbar is at the top of the web map page at all times. This toolbar provides the tools to use the full potential the web map, including:

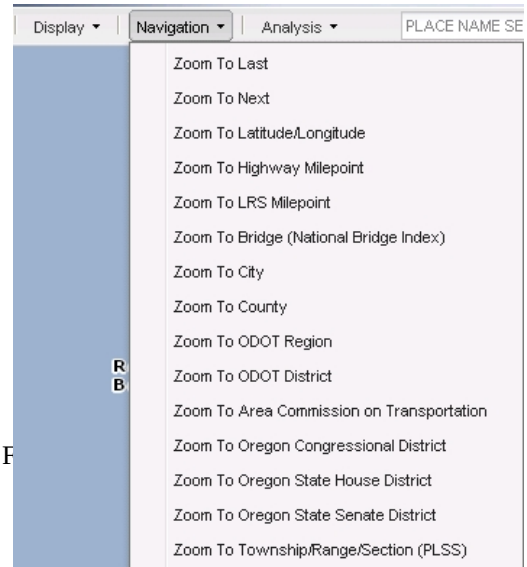
	These buttons let you zoom in and out.
	This button zooms your view out to the full state view
	This button is one of the most important buttons. This is the information button. Click on this button and then click on an icon indicating a project site.
	This allows you to add and remove layers from the layer catalog which will be described in greater detail below.
Dropdown menus	Additional features available in ArcGIS.



The Display menu provides additional navigation as well as access to the Layer Catalog, which can also be accessed by clicking on the  button on the toolbar. The layer catalog contains nearly a hundred different layers of data to overlay on the map for additional information. Layers such as mile points, county outlines and city limits can help locate specific projects. Other layers such as fish passage barriers can be used to show current fish passage problems on a stream where a project is going to take place. Another useful layer is the average daily traffic which can be used for stormwater impact information.

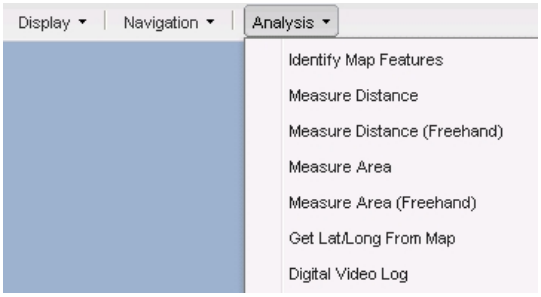


Take the time to explore the various layers to get to know which are most useful for your project work. If at any time you feel you have too many layers loaded on the map, or want to start with a fresh map, you can select “Clear All” and “Apply” from the bottom of the Layer Catalog, or refresh from the internet explorer toolbar.



The Navigation menu provides many different ways to find geographic features on the web map. You can also use the Place Name Search to find common geographic locations. Although there is no search method at this time to navigate to projects by key number or project name, available navigation and search options can help zoom to the project vicinity.

Note that the Place Name Search feature cannot navigate to highways.



The Analysis menu also has some useful features for FAHP projects, including identifying the latitude and longitude for the Project Initiation Report and viewing on-the-ground images from the roadway using the ODOT digital video log.

How to obtain project information

The web map is designed to provide up to date information on all FAHP projects statewide to internal and external stakeholders. The project information can be accessed by using the information button  . After clicking on this button, click on one of the project icons shown on the map. A window will appear that provides basic project information, including contact information, current phase of FAHP project implementation and a detailed information link. Clicking on the detailed information link will open an internet window of the project's ftp folder, for access to all of the FAHP project files that have been submitted to date. A project in early coordination will likely only have the initiation report available for viewing, whereas a project with construction complete will have everything from the Project Initiation Report to Construction Inspection reports and more.

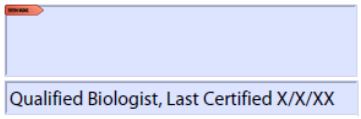
FTP directory /NRUTrans/FAHP/Region2/KN16736_Lewis_Clark_Bridge/ at ftp.odot.state.or.us

To view this FTP site in Windows Explorer: press Alt, click **View**, and then click **Open FTP Site in Windows Explorer**.

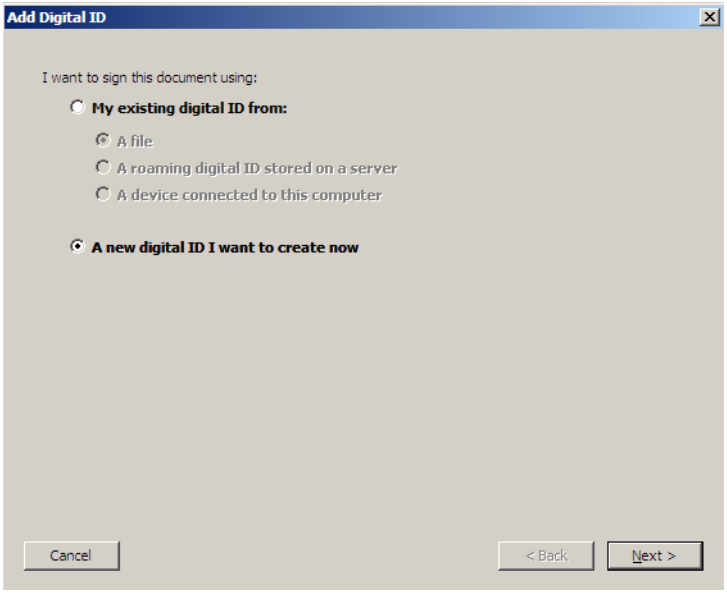
Up to higher level directory

06/05/2013 04:03PM	735,634	16736_Fish_Passage_Approval_Lewis and_ Clark_Br_PA-01-0045.pdf
05/01/2013 04:06PM	1,146,404	16736_Lewis_Clark_FAHP_ESA_Attachments.pdf
05/01/2013 04:00PM	397,729	16736_Lewis_Clark_FAHP_ESA_BridgeSupplement.pdf
08/23/2013 02:59PM	993,132	16736_Lewis_Clark_FAHP_ESA_NotificationForm_signature.pdf
08/23/2013 11:00AM	17,665	16736_Lewis_Clark_FAHP_NMFSApproval.pdf
05/01/2013 04:02PM	610,954	16736_Lewis_Clark_IWWEs.pdf
06/05/2013 04:00PM	80,019	IWWE_ODFW_Approval.pdf
06/05/2013 03:57PM	4,851,499	K16736-SWMP-Lewis_&_Clark_R_Bridge.pdf

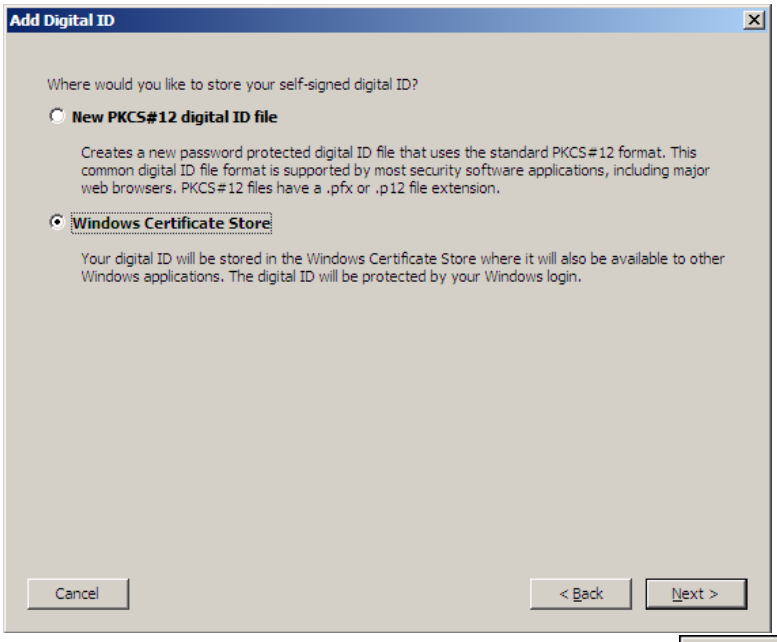
APPENDIX 6
How to User Digital Signatures in Adobe Acrobat



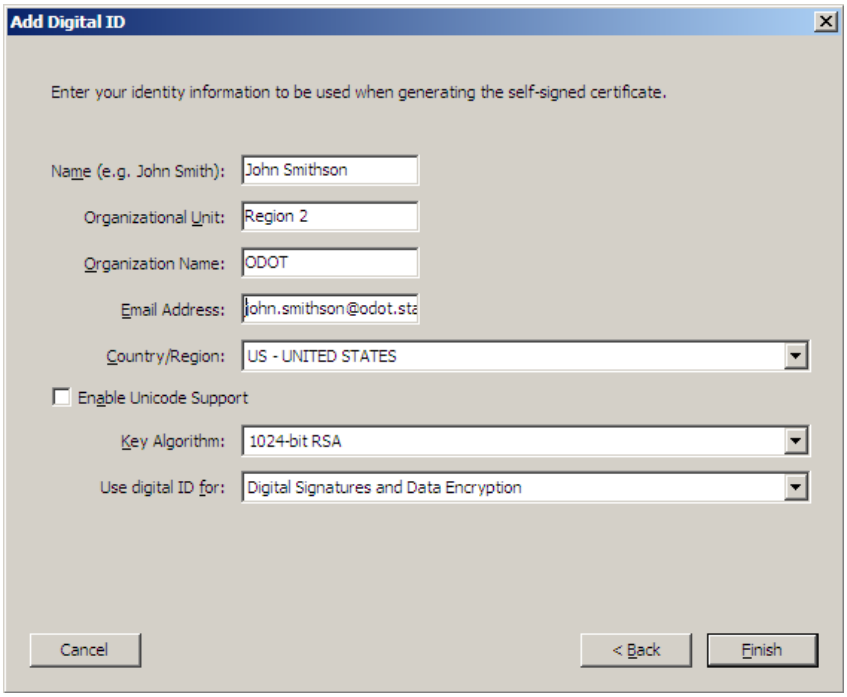
1. Select the signature box with the red “Sign Here” in the upper left corner.

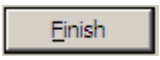


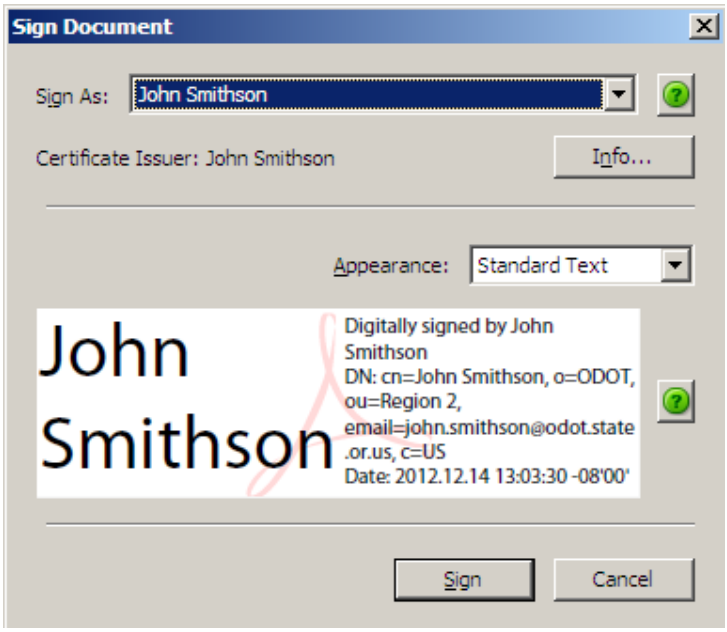
2. Make sure “A New Digital ID I want to create now” is selected. Select Next >

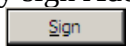


3. Make sure “Windows Certificate Store” is selected and select Next >.



4. Fill in the first 4 fields and select 



5. You are now ready to digitally sign Adobe PDF documents. Make sure your "Sign as" is directed to your name and hit 

to complete your signature. Adobe will then prompt you to save a copy of the document. Your signature is not complete until the document is saved.

Any future documents you need to sign will only need you to complete step 5.

APPENDIX 7
Recommended Content for E-Mail Transmittals (Project Notifications)

(1) Transmittal of draft/final Project Notification Report for local agency projects

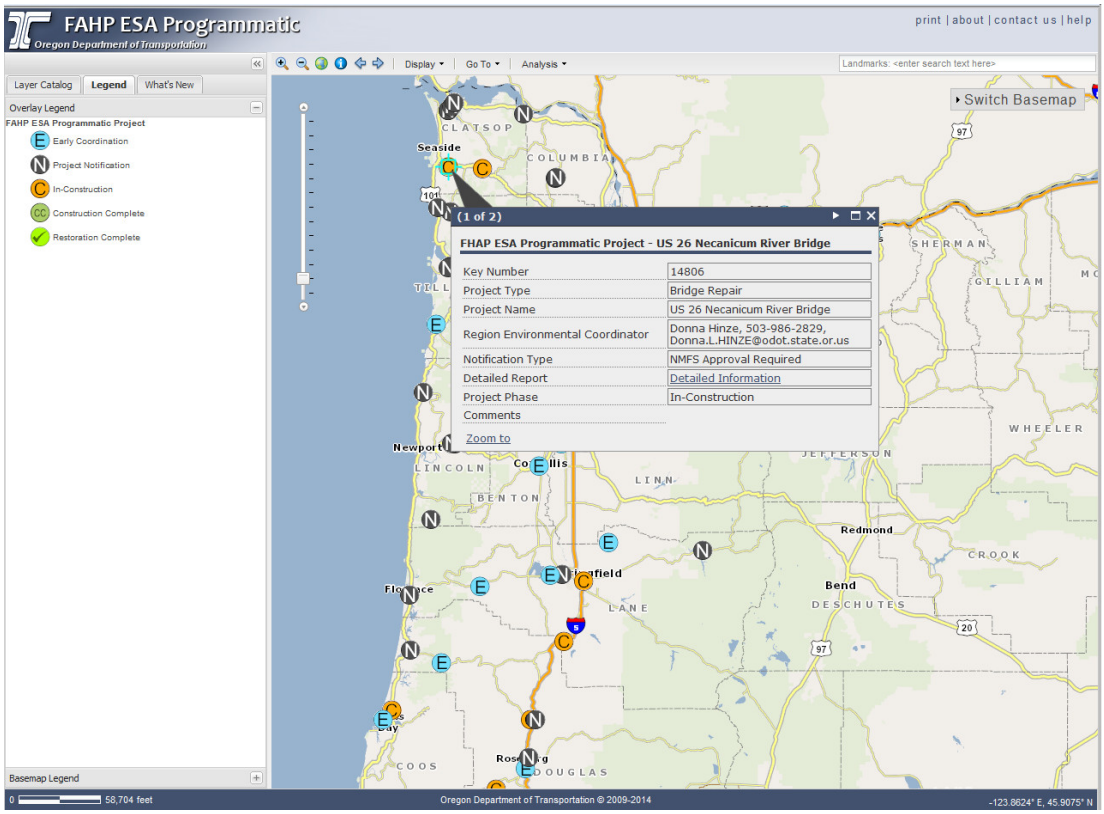
From: Local Agency Project Leader

To: REU (Biologist/Environmental Coordinator/individual assigned by Environmental Unit Manager)

Cc: Biologist, other FAHP project stakeholders as determined by sender

Subject Heading: (Request for draft review/Request for submittal): FAHP Notification, KNxxxxx_Project_Name

E-mail Text: Please review this draft Project Notification Report for a project that we believe (will/will not) require Service



review and approval, and provide feedback by (date) (see attached/link below). Please provide feedback by (date), to may meet (PS&E/CE Close-out/other) anticipated on (date).

We began Early Coordination with the Services representative (name) on (date) (see Project Initiation Report / Early Coordination memo in the folder listed below).

If final: The Project Notification Report incorporates review and feedback from the Region (biologist/REC/whomever).

Attach the Early Coordination documentation (Project Initiation Report or Early Coordination memo), Project Notification Report and relevant attachments, or provide a hyperlink to a ftp folder.

(2) Transmittal of Project Notification Report to FHWA (all projects)

From: REU (Biologist/Environmental Coordinator/individual assigned by Environmental Unit Manager)
To: FHWA Operations Engineer for the region
Cc: FAHP_ESA@odot.state.or.us; cindy.callahan@dot.gov, other FAHP project stakeholders
Subject Heading: Request for transmittal to NMFS: FAHP Notification, KNxxxxx_Project_Name

E-mail Text: Please review this Project Notification Report for a project that (will/will not) require Services review and approval (see link below).

(Agency name) began Early Coordination with the Services representative (name) on (date) (see Project Initiation Report / Early Coordination memo in the folder listed below).

Please provide timely feedback so that it can be transmitted to NMFS by (date), to meet (PS&E/CE Close-out/other) anticipated on (date). When you approve, please sign, save the file to the project's ftp folder, and transmit the Project Notification Report to the (name & E-mail).

The early coordination and project notification documents can be found in: *Provide a hyperlink to the project's ftp folder (use the externally accessible link) that includes the (Project Initiation Report / Early Coordination memo), Project Notification Report and relevant attachments.*

(3) Transmittal of "Service Approval" Project Notification Reports to NMFS

From: FHWA Operations Engineer
To:
Cc: FAHP_ESA@odot.state.or.us; cindy.callahan@dot.gov; other FAHP project stakeholders
Subject Heading: Request for FAHP Notification review/approval by NMFS: KNxxxxx_Project_Name

E-mail Text: The Federal Highway Administration has reviewed and approved the Project Notification Report for the (insert project name) project, and is requesting National Marine Fisheries Service (NMFS) or U.S. Fish and Wildlife Service (USFWS) approval as required by the Federal-Aid Highway Programmatic consultation (see link below). Services approval is needed by (insert date) to meet (state PS&E, CE Closeout ROW, etc.). If you have questions regarding this submittal please contact (appropriate Operations Engineer).

The early coordination and project notification documents can be found in: *Provide a hyperlink to the project's ftp folder (use the externally accessible link) that includes the (Project Initiation Report / Early Coordination memo), Project Notification Report and relevant attachments.*

(4) Transmittal of "No Approval" Project Notification Reports to NMFS

From: FHWA Operations Engineer
To: >
Cc: (ODOT biologist/ Local Agency Project Leader), FAHP_ESA@odot.state.or.us; cindy.callahan@dot.gov; other FAHP project stakeholders
Subject Heading: FHWA approval of FAHP Notification: KNxxxxx_Project_Name

E-mail Text: The Federal Highway Administration has reviewed and approved the attached Project Notification for the (insert project name) project. We are providing it to the National Marine Fisheries Service (NMFS) for your information only, as required by the FAHP. If you have questions regarding this submittal please contact (appropriate Operations Engineer).

The early coordination and project notification documents can be found in: *Provide a hyperlink to the project's ftp folder (use the externally accessible link) that includes the (Project Initiation Report / Early Coordination memo), Project Notification Report and relevant attachments.*

(5) Project Approval from the Services

From: Services representative
To: FHWA Operations Engineer and (ODOT biologist/ Local Agency Project Leader)
Cc: FAHP_ESA@odot.state.or.us; cindy.callahan@dot.gov; other FAHP project stakeholders
Subject Heading: Services approval of FAHP Notification: KNxxxxx_Project_Name

E-mail Text: I read the Project Notification Report submitted to NMFS/USFWS on (date), requesting that NMFS review and approve the action named above as consistent

with the Federal-Aid Highway Program biological opinion issued to the Federal Highway Administration on November 28, 2012 (the FAHP opinion), for project elements related to xxx. Based on information included on the report, including these facts: xxx

I approve this proposed action as consistent with the FAHP opinion.

Please note that FAHP opinion requires FHWA to submit a Project Completion Report for this project within 60-days of end of construction to verify the number and type of stormwater management practices installed, inspected and maintained by ODOT, as described in the FAHP Biological Opinion in section 2(b) at p.120-121, to ensure that this stormwater mitigation is effective.

Reinitiation of consultation on this action is required and shall be requested by the FHWA where discretionary Federal involvement or control over the action has been retained or is authorized by law and (a) the amount or extent of taking specified in the Incidental Take Statement is exceeded, (b) new information reveals effects of the action that may affect listed species or CH in a manner or to an extent not previously considered, (c) the identified action is subsequently modified in a manner that has an effect to the listed species or CH that was not considered in the biological opinion; or (d) a new species is listed or designated CH that may be affected by the identified action (50 CFR 402.16).

Please direct questions regarding this E-mail to xxx, ODOT-Service representative, at xxx.

NMFS will electronically sign the Notification, save as FINAL, and either attach or upload to the project's ftp folder, and if the latter, provide hyperlink.

APPENDIX 8

NMFS Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act

National Marine Fisheries Service

Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act

June 2000

Purpose and Scope

The purpose of this document is to provide guidelines for the safe use of backpack electrofishing in waters containing salmonids listed by the National Marine Fisheries Service (NMFS) under the Endangered Species Act (ESA). It is expected that these guidelines will help improve electrofishing technique in ways which will reduce fish injury and increase electrofishing efficiency. These guidelines and sampling protocol were developed from NMFS research experience and input from specialists in the electrofishing industry and fishery researchers. This document outlines electrofishing procedures and guidelines that NMFS has determined to be necessary and advisable when working in freshwater systems where threatened or endangered salmon and steelhead may be found. As such, the guidelines provide a basis for reviewing proposed electrofishing activities submitted to NMFS in the context of ESA Section 10 permit applications as well as scientific research activities proposed for coverage under an ESA Section 4(d) rule.

These guidelines specifically address the use of backpack electrofishers for sampling juvenile or adult salmon and steelhead that are *not* in spawning condition. Electrofishing in the vicinity of adult salmonids in spawning condition and electrofishing near redds are not discussed as there is no justifiable basis for permitting these activities except in very limited situations (e.g., collecting brood stock, fish rescue, etc.). The guidelines also address sampling and fish handling protocols typically employed in electrofishing studies. While the guidelines contain many specifics, they are not intended to serve as an electrofishing manual and do not eliminate the need for good judgement in the field.

Finally, it is important to note that researchers wishing to use electrofishing in waters containing listed salmon and steelhead are not necessarily precluded from using techniques or equipment not addressed in these guidelines (e.g., boat electrofishers). However, prior to authorizing the take of listed salmonids under the ESA, NMFS will require substantial proof that such techniques/equipment are clearly necessary for a particular study and that adequate safeguards will be in place to protect threatened or endangered salmonids. Additional information regarding these guidelines or other research issues dealing with salmon and steelhead listed under the ESA can be obtained from NMFS' Protected Resources Divisions in:

Washington, Oregon, and Idaho
Leslie Schaeffer
NMFS
525 NE Oregon Street, Suite 500
Portland, Oregon 97232-2737
Phone: (503) 230-5433
FAX: (503) 230-5435
Internet Address: Leslie.Schaeffer@noaa.gov

California
Dan Logan
NMFS
777 Sonoma Ave., Room 325
Santa Rosa, California 95404-6515
Phone: (707) 575-6053
FAX: (707) 578-3435
Internet Address: Dan.Logan@noaa.gov

Appropriateness of Electrofishing

Backpack electrofishing for salmonids has been a principal sampling technique for decades, however, recent ESA listings underscore the need to regulate the technique and assess its risks and benefits to listed species (Nielsen 1998). With over 25 Evolutionarily Significant Units (ESUs) of threatened or endangered salmonids now identified along the U.S. West Coast, researchers can expect to encounter one or more listed species in nearly every river basin in California, Oregon, Washington, and Idaho. There are few if any non-invasive ways to collect distribution, abundance, or morpho-physiological data on salmonids in freshwater. This is reflected in the requirement that all activities that involve intentional take of juvenile salmonids for research or enhancement of an ESA listed species require an ESA Section 10 permit from NMFS. While NMFS has not precluded the use of electrofishing in all cases, researchers must present rigorous study designs and methods for handling fish prior to NMFS authorizing electrofishing to take listed salmonids under the ESA.

NMFS believes there is ample evidence that electrofishing can cause serious harm to fish and the general agency position is to encourage researchers to seek out other less invasive ways to sample listed species. Direct observation by snorkeling is one of the least invasive ways to collect information concerning abundance and distribution, although there can be both practical (e.g., poor viability) and statistical (e.g., large numbers of fish, low observation probability) constraints to direct observation. Preliminary efforts should be directed at study designs that use less invasive methods. If such methods cannot provide the quality of data required or when the benefit exceeds potential mortality risk, then electrofishing can be considered. Electrofishing used on a limited basis to calibrate direct observations (e.g., Hankin and Reeves 1988) is commonly used and methods are currently under development that increase the use of direct observation counts (e.g., bounded counts, "multiple snorkel passes") which, in many cases, will further reduce the need for electrofishing.

Electrofishing Guidelines

Training

Field supervisors and crew members must have appropriate training and experience with electrofishing techniques. Training for field supervisors can be acquired from programs such as those offered from the U. S. Fish and Wildlife Service - National Conservation Training Center (*Principles and Techniques of Electrofishing* course) where participants are presented information concerning such topics as electric circuit and field theory, safety training, and fish injury awareness and minimization. A crew leader having at least 100 hours of electrofishing experience in the field using similar equipment must train the crew. The crew leader's experience must be documented and available for confirmation; such documentation may be in the form of a logbook. The training must occur before an inexperienced crew begins any electrofishing and should be conducted in waters that do not contain ESA-listed fish. Field crew training must include the following elements:

1. A review of these guidelines and the equipment manufacturer's recommendations, including basic gear maintenance.
2. Definitions of basic terminology (e.g. galvanotaxis, narcosis, and tetany) and an explanation of how electrofishing attracts fish.
3. A demonstration of the proper use of electrofishing equipment (including an explanation of how gear can injure fish and how to recognize signs of injury) and of the role each crew member

performs.

4. A demonstration of proper fish handling, anesthetization, and resuscitation techniques.
5. A field session where new individuals actually perform each role on the electrofishing crew.

Research Coordination

Research activities should be coordinated with fishery personnel from other agencies/parties to avoid duplication of effort, oversampling small populations, and unnecessary stress on fish. Researchers should actively seek out ways to share data on threatened and endangered species so that fish samples yield as much information as possible to the research community. NMFS believes that the state fishery agencies should play a major role in coordinating salmonid research and encourages researchers to discuss their study plans with these agencies prior to approaching NMFS for an ESA permit.

Initial Site Surveys and Equipment Settings

1. In order to avoid contact with spawning adults or active redds, researchers must conduct a careful visual survey of the area to be sampled before beginning electrofishing.
2. Prior to the start of sampling at a new location, water temperature and conductivity measurements should be taken to evaluate electroshocker settings and adjustments. **No electrofishing should occur when water temperatures are above 18°C or are expected to rise above this temperature prior to concluding the electrofishing survey. In addition, studies by NMFS scientists indicate that no electrofishing should occur in California coastal basins when conductivity is above 350 µS/cm.**
3. Whenever possible, a block net should be placed below the area being sampled to capture stunned fish that may drift downstream.
4. Equipment must be in good working condition and operators should go through the manufacturer's preseason checks, adhere to all provisions, and record major maintenance work in a logbook.
5. Each electrofishing session must start with all settings (voltage, pulse width, and pulse rate) set to the **minimums** needed to capture fish. These settings should be gradually increased only to the point where fish are immobilized and captured, and generally not allowed to exceed conductivity-based maxima (Table 1). Only direct current (DC) or pulsed direct current (PDC) should be used.

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

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

Electrofishing Technique

1. Sampling should begin using straight DC. Remember that the power needs to remain on until the fish is netted when using straight DC. If fish capture is unsuccessful with initial low voltage, gradually increase voltage settings with straight DC.
2. If fish capture is not successful with the use of straight DC, then set the electrofisher to lower voltages with PDC. If fish capture is unsuccessful with low voltages, increase pulse width, voltage, and pulse frequency (duration, amplitude, and frequency).
4. Electrofishing should be performed in a manner that minimizes harm to the fish. Stream segments should be sampled systematically, moving the anode continuously in a herringbone pattern (where feasible) through the water. Care should be taken when fishing in areas with high fish concentrations, structure (e.g., wood, undercut banks) and in shallow waters where most backpack electrofishing for juvenile salmonids occurs. Voltage gradients may be high when electrodes are in shallow water where boundary layers (water surface and substrate) tend to intensify the electrical field.
5. Do not electrofish in one location for an extended period (e.g., undercut banks) and regularly check block nets for immobilized fish.
6. Fish should not make contact with the anode. Remember that the zone of potential injury for fish is 0.5 m from the anode.
7. Electrofishing crews should be generally observant of the condition of the fish and change or terminate sampling when experiencing problems with fish recovery time, banding, injury, mortality, or other indications of fish stress.
8. Netters should not allow the fish to remain in the electrical field any longer than necessary by removing stunned fish from the water immediately after netting.

Sample Processing and Recordkeeping

1. Fish should be processed as soon as possible after capture to minimize stress. This may require a larger crew size.
2. All sampling procedures must have a protocol for protecting held fish. Samplers must be aware of the conditions in the containers holding fish; air pumps, water transfers, etc., should be used as necessary to maintain safe conditions. Also, large fish should be kept separate from smaller prey-sized fish to avoid predation during containment.
3. Use of an approved anesthetic can reduce fish stress and is recommended, particularly if additional handling of fish is required (e.g., length and weight measurements, scale samples, fin clips, tagging).
4. Fish should be handled properly (e.g., wetting measuring boards, not overcrowding fish in buckets, etc.).
5. Fish should be observed for general condition and injuries (e.g., increased recovery time, dark bands, apparent spinal injuries). Each fish should be completely revived before releasing at the location of capture. A plan for achieving efficient return to appropriate habitat should be developed before each sampling session. Also, every attempt should be made to process and release ESA-listed specimens first.
8. Pertinent water quality (e.g., conductivity and temperature) and sampling notes (e.g., shocker settings, fish condition/injuries/mortalities) should be recorded in a logbook to improve technique and help train new operators. *It is important to note that records of injuries or mortalities pertain to the entire electrofishing survey, including the fish sample work-up.*

Citations and Other References

Dalbey, S. R., T. E. McMahon, and W. Fredenberg. 1996. Effect of electrofishing pulse shape and electrofishing-induced spinal injury on long-term growth and survival of wild rainbow trout. North American Journal of Fisheries Management 16:560-569.

Hankin, D. G., and G. H. Reeves. 1988. Estimating total fish abundance and total habitat area in small streams based on visual estimation methods. Canadian Journal of Fisheries and Aquatic Sciences 45:834-844.

Hollender, B. A., and R. F. Carline. 1994. Injury to wild brook trout by backpack electrofishing. North American Journal of Fisheries Management 14:643-649.

Nielsen, J. L. 1998. Electrofishing California's endangered fish populations. Fisheries 23:6-12.

Nielsen, L.A., and D.L. Johnson, editors. 1983. Fisheries techniques. American Fisheries Society, Bethesda, Maryland.

Reynolds, J. B., and A. L. Kolz. 1988. Electrofishing injury to large rainbow trout. North American Journal of Fisheries Management 8:516-518.

Sharber, N. G., and S. W. Carothers. 1988. Influence of electrofishing pulse shape on spinal injuries in adult rainbow trout. North American Journal of Fisheries Management 8:117-122.

Sharber, N. G., S. W. Carothers, J.P. Sharber, J. D. deBos, Jr., and D. A. House. 1994. Reducing electrofishing-induced injury of rainbow trout. North American Journal of Fisheries Management 14:340-346.

Schreck, C.B., and P.B. Moyle, editors. 1990. Methods for fish biology. American Fisheries Society, Bethesda, Maryland.

APPENDIX 9
Acceptable Streambank Stabilization Techniques

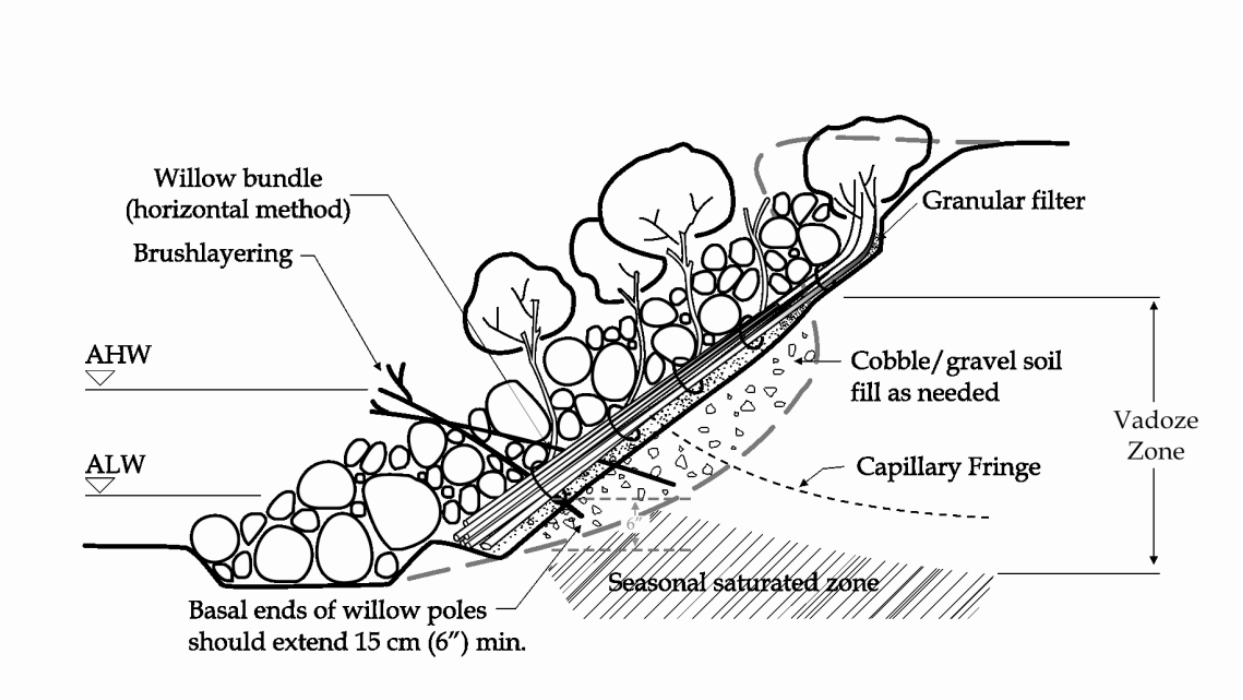
Techniques	Description	Application
FLOW REDIRECTION:		
Engineered Log Jams	Log jams are a collection of large woody debris that redirect flow and provide stability to a streambank	• Best applied on long, uniform bends in alluvial channels. Alluvial channels have erodible boundaries and are free to adjust dimensions, shape, pattern and gradient in response to change in slope, sediment supply or discharge. • Appropriate when the mechanism of failure is toe erosion • Appropriate when the mechanism of failure is scour. Should be placed upstream from the scour to redirect flow away • Not recommended in areas where high risk of failure is unacceptable
Partially Spanning Porous Weir	Partially spanning porous weirs are loosely arranged boulders used to protect streambanks by redirecting the flow away from the bank and toward the center of the channel.	• Best applied in gravel and cobble bed streams with slopes less than three percent
STRUCTURAL:		
Vegetated riprap with large woody debris	It is the combination of bank armoring using rock, filling the voids in the riprap with soil and planting seed, plant cuttings or rooted plants, and installing large woody debris. (see design examples below)	• Best applied in areas where a high risk of failure is unacceptable
Log toe	Log toes are erosion prevention features placed along the toe of a streambank. Log toes can be implemented either as a stand-alone technique or as the toe element for other streambank techniques.	• New technique with limited use and may only want to use in areas where there is less risk to infrastructure Not recommended in areas where high risk of failure is unacceptable
Roughened rock toe	Roughened rock toes are erosion prevention features placed along the toe of a streambank. These features are designed with angular components which provide greater roughness. Large woody debris could be used to add additional roughness.	• Best for toe erosion and permanent foundation for upper bank treatments
BIOTECHNICAL:		
Woody plants	Installing trees and shrubs is a bank-stabilization technique to stabilize banks, provide habitat benefits and improve aesthetics (see design examples below). The most common types of woody plantings used are: • live cuttings such as willows • containerized plants • bare-root stock, and • salvaged plants. This technique makes use of strong, relatively deep roots that provide excellent soil-reinforcement. Also, above ground shoots and stems help prevent surface erosion, encourage	• Best applied in areas with marginal vegetative cover or toe erosion problems • Best applied in wide and shallow channel cross-sections

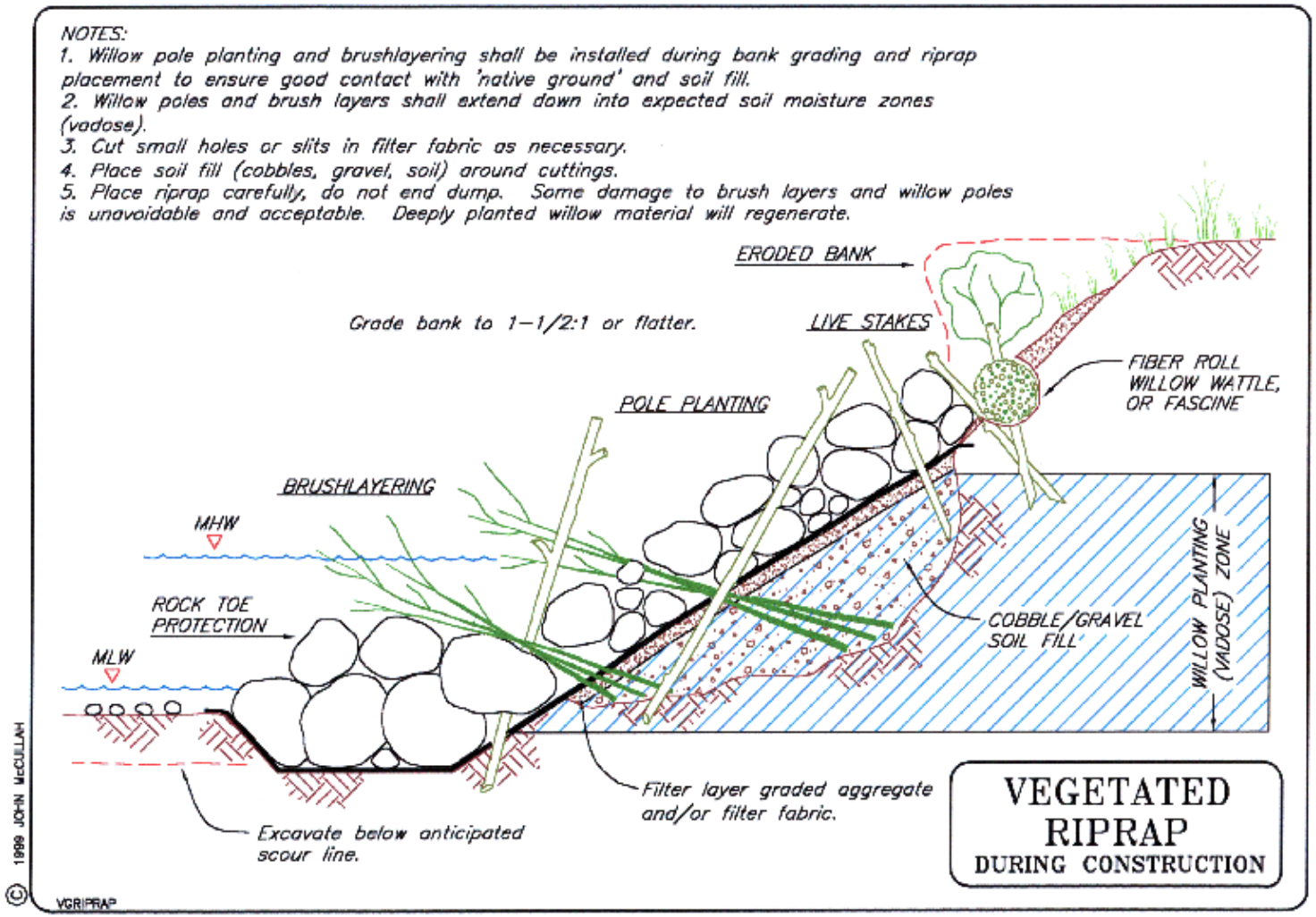
Techniques	Description	Application
	deposition and provide overhanging cover along streambanks.	
Herbaceous cover	Installing herbaceous vegetation is a bank-stabilization technique to stabilize banks, provide habitat benefits and improve aesthetics. The most common types of herbaceous vegetation used are: • rushes • sedges • ferns • legumes • forbs, and wildflowers	• Best applied in upper-bank treatment • Best applied in areas where bank toe is stable but has poor vegetative cover
Deformable soil reinforcement	This is a system of soil layers reinforced with a combination of natural or synthetic materials and vegetation. The soil layers are placed along the face of a bank in a series of stepped terraces. Degradable fabrics provide one to four years of erosion protection. This provides the time needed for vegetation to become established for long term bank protection. Synthetic fabrics can provide short and long term structural integrity when needed. Toe protection is typically applied below the lower limit of vegetation. These systems are also known as fabric encapsulated soil, fabric-wrapped soil, soil burritos, vegetated geogrids or soil pillows.	• Best applied along eroding banks of small creeks • Best applied along large rivers where a resilient and proven biotechnical technique is needed • Nearly all applications of this approach are integrated with structural toe protection
Coir logs	Long log shape bundles of coir (coconut fiber) and bound together with additional coir or synthetic netting. Used with riparian vegetation to provide streambank stabilization.	• Best applied as a temporary measure to stabilize the bank toe while riparian vegetation develops to provide bank support. • Best applied along low (one to three foot high) banks Best applied along small streams
Bank reshaping	Bank reshaping is the reduction of the angle of its slope to stabilize an eroding streambank. The goal is to reshape the bank without changing the location of its toe. This method is usually done in conjunction with other bank protection treatments such as toe protection, revegetation and erosion control fabric.	• Best applied along eroding vertical streambanks and positioned in the outside bends of a stream
AVULSION:		
Floodplain roughness	This s a preventative technique used to decrease overbank flow velocity and related shear stress when there is a potential for a channel avulsion.	• Best applied in areas where the floodplain is newly constructed • Best applied where land management practices have left little natural roughness or leaving the

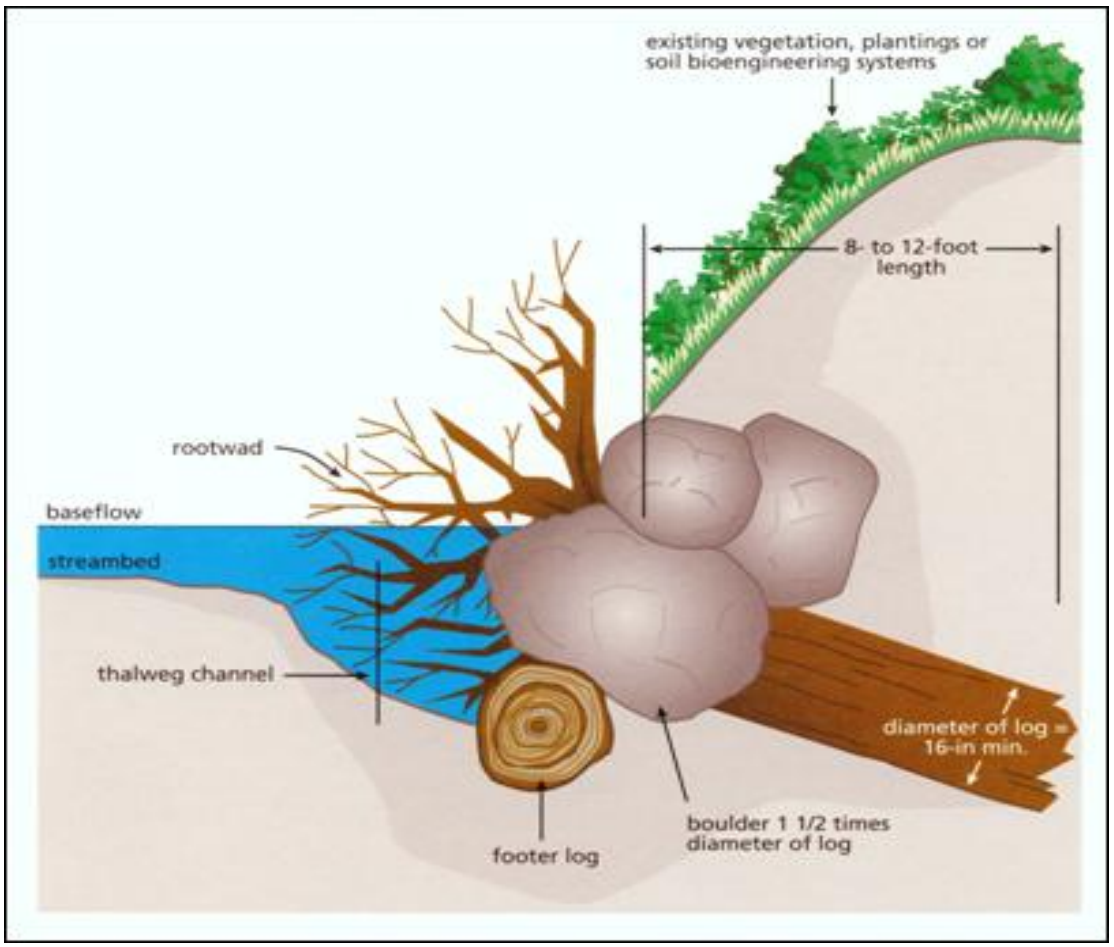
Techniques	Description	Application
	Increased roughness can be achieved with the presence of live trees and shrubs, and large woody debris in the floodplain.	stream susceptible to avulsion.
Floodplain flow spreaders	Floodplain flow spreaders are designed to spread overbank flood flow across the floodplain. Spreading overbank flow should eliminate flow concentrations, high velocities, and the potential for avulsion. Flow spreaders can be created from compacted soil or rock (and be used in combination with planted trees), planting a row or several rows of trees, planting of vegetation, and accumulation of debris delivered by a flood.	• Best applied in areas susceptible to an avulsion • Best applied in aggrading channels resulting in frequent overbank flow

Guide is from the ODOT SLOPES IV Handbook

Design examples:




NOTES:
1. Willow pole planting and brushlayering shall be installed during bank grading and riprap placement to ensure good contact with 'native ground' and soil fill.
2. Willow poles and brush layers shall extend down into expected soil moisture zones (vadose).
3. Cut small holes or slits in filter fabric as necessary.
4. Place soil fill (cobbles, gravel, soil) around cuttings.
5. Place riprap carefully, do not end dump. Some damage to brush layers and willow poles is unavoidable and acceptable. Deeply planted willow material will regenerate.
ERODED BANK
Grade bank to 1–1/2:1 or flatter.
LIVE STAKES
FIBER ROLL WILLOW WATTLE, OR FASCINE
POLE PLANTING
BRUSHLAYERING
MHW
ROCK TOE PROTECTION
MLW
COBBLE/GRAVEL SOIL FILL
WILLOW PLANTING (VADOSE) ZONE
Filter layer graded aggregate and/or filter fabric.
Excavate below anticipated scour line.
VEGETATED RIPRAP
DURING CONSTRUCTION
© 1999 JOHN McCULLAH
VGRIPRAP



Useful references:

Oregon Department of Transportation, 2014. Hydraulics Manual www.oregon.gov/ODOT/HWY/GEOENVIRONMENTAL/hyd_manual_info.shtml

Washington Department of Fish and Wildlife, 2003. Integrated Streambank Protection Guidelines, https://wdfw.wa.gov/publications/00046

Washington Department of Fish and Wildlife, 2004. Stream Habitat Restoration Guidelines https://wdfw.wa.gov/publications/00043

APPENDIX 10
Overview of Contract Specifications

The following information summarizes guidance from ODOT Specifications and Project Delivery manuals. More information on Specifications can be found on the ODOT Specifications website, http://www.oregon.gov/ODOT/HWY/SPECS/Pages/index.aspx .

Contract specifications are detailed and exact statements prescribing scope, materials, workmanship, acceptance criteria, and method of measurement and payment for something to be built, installed, or manufactured.

Standard Specifications

The Oregon Standard Specifications for Construction is the base Construction contract for every highway construction project delivered by ODOT (including local agency projects with ODOT oversight). The current document (2015) was developed with partners from Oregon APWA, to be used on state, county and city projects. This document encompasses all the standard specifications approved for use on ODOT projects by the ODOT Chief Engineer, FHWA, and the Oregon Department of Justice.

Supplemental Standard Specifications

Supplemental Specifications are specifications that are not in the Standard Specifications, new Specifications, or rewritten specifications that are stand-alone Specifications inserted into contract documents by the specification writer.

Project Special Provisions

Every project has special individual needs that are unique to that project, captured in the Special Provisions. All highway construction projects are expected to utilize the Agency's Standard Specifications and Boilerplate Special Provisions unless there are project-specific, special circumstances that warrant modifications to the Boiler Plate Special Provisions. Technical specialists coordinate with the Specifications Writer to incorporate and modify applicable Boiler Plate Special Provisions. The Specification Writer will prepare and compile the final special provisions based on input by each technical discipline.

Boilerplate Special Provisions – The Boilerplate Special Provisions modify the Standard Specifications by adding, replacing or deleting information from them. Sections of the Standard Specifications may have a related Boilerplate Special Provision. Some Boilerplate Special Provisions are also stand-alone Specifications. The Boilerplate Special Provisions are selected and assembled for the Project Special Provisions. All Boilerplate Special Provisions have been reviewed and approved for use by the ODOT Sr. Specifications Engineer, the Department of Justice Business Transactions Section, and FHWA.

Project Special Provisions – Project Special Provisions is a single document consisting of a set of assembled Boilerplate Special Provisions and any project-specific special provisions that modify the Standard Specifications specific to an individual project. The Project Special Provisions and the Standard Specifications together make up the Contract specifications.

APPENDIX 11
NMFS and USFWS
Impact Pile Driving Sound Attenuation Specifications

Western Washington Fish and Wildlife Office
Revised: October 31, 2006

INTRODUCTION

Air bubbles can reduce sound pressure levels (SPLs) at some frequencies by as much as 30 dB (Gisiner et al. 1998). Bubble curtains are essentially perforated pipes or hoses, surrounding the pile being driven, that produce bubbles when air is pumped through the perforations. Bubble curtains can also reduce particle velocity levels (MacGillivray and Racca 2005).

Bubble curtain designs are highly variable, but can generally be grouped in two categories: unconfined and confined. Unconfined systems are simply a frame which allows for transmission of air bubbles around a pile being driven. Confined systems add a sleeve around the pile to contain the bubbles. The sleeve can consist of fabric, hard plastic, or a larger pile (casing). Spacing of the bubble manifolds, air pressure, tidal currents, and water depth are all factors influencing effectiveness. Improper installation or operation can decrease bubble curtain effectiveness (Pommerenck 2006; Visconty 2004).

Reyff et al. (2002) evaluated the effectiveness of a confined system which used a foam-filled casing and bubble curtain. The casing was 12.5 ft (3.8 m) in diameter with the interior coated with 1 inch (2.54 cm) closed cell foam. The casing surrounded the pile being driven, and contained the bubble flow. This system dramatically reduced both peak pressure and rms levels. Peak pressure was reduced by 23 to 24 dB and rms levels were reduced by 22 to 28 dB.

A confined bubble curtain used in driving 24 in octagonal concrete piles at the Port of Benicia in San Francisco Bay, California, attenuated SPLs between 20 and 30 dB (Rodkin, 2003). At the Benicia Martinez Bridge project in California, the project proponents used a casing that was either dewatered, or included an air bubble system. Both techniques yielded substantial reductions in SPLs. The sleeve with an air bubble curtain reduced peak SPLs by up to 34 dB, which the authors note, equates to a 99 percent reduction in the overall energy of the impulse (Reyff et al, 2002). A confined bubble curtain used in driving 30 in (76 cm) steel piles at a Washington State Ferries facility in Eagle Harbor, Washington, attenuated SPLs by an average of 9.1 dB (MacGillivary and Racca, 2005).

During impact installation of steel piles in an embayment on the Columbia River an unconfined bubble curtain built using a design by Longmuir and Lively (2001) achieved a maximum reduction of 17 dB, although the results were variable (Laughlin 2006). Unconfined bubble curtains used in driving very large steel piles for bridges in San Francisco Bay, California, have attenuated SPLs by as much as 20 dB (Abbott and Reyff 2004). An unconfined bubble curtain used during installation of 24 in (61 cm) steel piles in the City of Vancouver, British Columbia, reduced SPLs by 17 dB (Longmuir and Lively, 2001). At Friday Harbor, Washington, the Washington State Ferries monitored steel pile driving with and without a bubble curtain (Visconty 2004).

Initially, the bubble curtain was improperly installed and no sound attenuation was observed. The bubble curtain was not placed firmly on the bottom; therefore, unattenuated sound escaped under the bubble curtain. After the bubble curtain was modified by adding weight and a canvas skirt to conform to the bottom contour of Puget Sound, the sound was reduced by up to 12 dB, with an average of 9 dB reduction. Vagle (2003) reported reductions of between 18 dB and 30 dB when using a properly designed bubble curtain.

In Washington, the effectiveness of both unconfined and confined systems has been variable and below that of other locations. This may be attributable to an incomplete understanding of design, deployment, and performance, and/or to site specific parameters such as substrate and driving depth. With a common set of design and performance specifications, variability should be minimized and limited to site specificity.

Unconfined Bubble Curtain Specifications:

1. General - An unconfined bubble curtain is composed of an air compressor(s), supply lines to deliver the air, distribution manifolds or headers, perforated aeration pipe, and a frame. The frame facilitates transport and placement of the system, keeps the aeration pipes stable, and provides ballast to counteract the buoyancy of the aeration pipes in operation.

2. The aeration pipe system shall consist of multiple layers of perforated pipe rings, stacked vertically in accordance with the following:

Water Depth (m)	No. of Layers
0 to less than 5	2
5 to less than 10	4
10 to less than 15	7
15 to less than 20	10
20 to less than 25	13

3. The pipes in all layers shall be arranged in a geometric pattern which shall allow for the pile being driven to be completely enclosed by bubbles for the full depth of the water column and with a radial dimension such that the rings are no more than 20 in (0.5 m) from the outside surface of the pile.

4. The lowest layer of perforated aeration pipe shall be designed to ensure contact with the substrate without burial and shall accommodate sloped conditions.

5. Air holes shall be 1/16 in (1.6 mm) in diameter and shall be spaced approximately 3/4 in (20 mm) apart. Air holes with this size and spacing shall be placed in four adjacent rows along the pipe to provide uniform bubble flux.

6. The system shall provide a bubble flux of 105 cubic ft (3.0 cubic m) per minute per linear meter of pipe in each layer (32.91 cubic ft [0.93 cubic m] per minute per linear foot [0.3 meter] of pipe in each layer). The volume of air per layer is the product of the bubble flux and the circumference of the ring:

V_t = 3.0 m^3/min/m * Circum of the aeration ring in meters

or

V_t = 32.91 ft^3/min/ft * Circum of the aeration ring in feet

7. Meters shall be provided as follows:
   a. Pressure meters shall be installed at all inlets to aeration pipelines and at points of lowest pressure in each branch of the aeration pipeline.
   b. Flow meters shall be installed in the main line at each compressor and at each branch of the aeration pipelines at each inlet. In applications where the feed line from the compressor is continuous from the compressor to the aeration pipe inlet the flow meter at the compressor can be eliminated.
   c. Flow meters shall be installed according to the manufactures recommendation based on either laminar flow or non-laminar flow.

      Performance: In Washington, unconfined bubble curtains have achieved a maximum of 17 dB attenuation and more typically range between 9 to 12 dB. Should hydroacoustic monitoring reveal that an unconfined bubble curtain is not achieving (to be determined based on site and project specific considerations), the NMFS and/or USFWS staff person on the project should be contacted immediately regarding modifications to the proposed action. Should attenuation rates continue at less than (to be determined based on site and project specific considerations), re-initiation of consultation may be necessary.

Confined Bubble Curtain Specifications:

1. General - A confined bubble curtain is composed of an air compressor(s), supply lines to deliver the air, distribution manifolds or headers, perforated aeration pipe(s), and a means of confining the bubbles.

   a. The confinement (fabric, plastic or metal sleeve, or equivalent) shall extend from the substrate to a sufficient elevation above the maximum water level expected during pile installation such that when the air delivery system is adjusted properly, the bubble curtain does not act as a water pump (*i.e.*, little or no water should be pumped out of the top of the confinement system).

   b. The confinement shaLl contain resilient pile guides that prevent the pile and the confinement from coming into contact with each other and do not transmit vibrations to the confinement sleeve and into the water column (rubber spacers, air filled cushions).

2. In water less than 50 ft (15 m) deep, the system shall have a single aeration ring at the substrate level. In waters greater than 50 ft (15 m) deep, the system shall have at least two rings, one at the substrate level and the other at mid-depth.

3. The lowest layer of perforated aeration pipe shall be designed to ensure contact with the substrate without sinking into the substrate and shall accommodate for sloped conditions.

4. Air holes shall be 1/16 in (1.6 mm) in diameter and shall be spaced approximately 3/4 in (20 mm) apart. Air holes with this size and spacing shall be placed in four adjacent rows along the pipe to provide uniform bubble flux.

5. The system shall provide a bubble flux of 105 cubic ft (3.0 cubic m) per minute per linear meter of pipe in each layer (32.91 cubic ft [0.93 cubic m] per minute per linear foot [0.3 meter] of pipe in each layer). The total volume of air per layer is the product of the bubble flux and the circumference of the ring:

$V_t = 3.0\ m^3/min/m$ * Circ of the aeration ring in meters

or

$V_t = 32.91\ ft^3/min/ft$ * Circ of the aeration ring in feet.

6. Meters shall be provided as follows:
   a. Pressure meters shall be installed at all inlets to aeration pipelines and at points of lowest pressure in each branch of the aeration pipeline.
   b. Flow meters shall be installed in the main line at each compressor and at each branch of the aeration pipelines at each inlet. In applications where the feed line from the compressor is continuous from the compressor to the aeration pipe inlet the flow meter at the compressor can be eliminated.
   c. Flow meters shall be installed according to the manufactures recommendation based on either laminar flow or non-laminar flow.

      Performance: In Washington, few projects have used confined bubble curtains so there is a lack of data. Based on performance in other locations, the effectiveness of a confined system could range from 9 dB to 30 dB. Should hydroacoustic monitoring reveal that a confined bubble curtain is not achieving (to be determined based on site and project specific considerations), the NMFS and/or USFWS staff person on the project should be contacted immediately regarding modifications to the proposed action. Should attenuation rates continue at less than (to be determined based on site and project specific considerations), re-initiation of consultation may be necessary.

LITERATURE CITED

Abbott, R. R., and J. A. Reyff. 2004. San Francisco - Oakland Bay Bridge, East Span Seismic Safety Project: Fisheries and Hydroacoustic Monitoring Compliance Report. Caltrans.

Gisiner, R. C., and coauthors. 1998. Workshop on the Effects of Anthropogenic Noise in the Marine Environment. R. C. Gisiner, editor Effects of Anthropogenic Noise in the Marine Environment. Marine Mammal Science Program, Office of Naval Research.

Laughlin, J. 2006. Underwater Sound Levels Associated with Pile Driving at the Cape Disappointment Boat Launch Facility, Wave Barrier Project (Revised). Washington State Parks.

Longmuir, C., and T. Lively. 2001. Bubble Curtain Systems for use During Marine Pile Driving. Fraser River Pile and Dredge Ltd., Vancouver, BC.

MacGillivray, A., and R. Racca. 2005. Sound pressure and particle velocity measurements from marine pile driving at Eagle Harbor maintenance facility, Bainbridge Island, WA. Washington State Department of Transportation, Victoria, British Columbia.

Pommerenck, K. 2006. Results of Underwater Sound Measurements for the Construction of Utility Crossing at Stockton Regional Wastewater Control Facility. Ilingworth and Rodkin, Inc., 05-187, Petaluma, CA.

Reyff, J. A., P. R. Donavan, and C. R. Greene. 2002. Underwater Sound Levels Associated with Construction of the Benecia-Martinez Bridge - Preliminary Results Based on Measurements Made During the Driving of 2.4 m Steel-Shell Piles.

Rodkin, R.B. 2003. Reconstruction of Pier 95 (Amports), Port of Benicia, Benicia, California, Report of Underwater Sound Level Measurements Resulting from Pile Driving. Illingworth & Rodkin, Inc., 03-021, Petaluma, CA.

Vagle, S. 2003. On the Impact of Underwater Pile-Driving Noise on Marine Life. Ocean Science and Productivity Division, Institute of Ocean Studies, DFO/Pacific.

Visconty, S. 2004. Friday Harbor Bubble Curtain preliminary results and update. Pages Email from Sasha Visconty of Anchor Environmental representing Washington State Ferries *in* N. M. F. Service, editor. WSDOT, Seattle, WA.