REQUEST FOR PROPOSALS
MILL CREEK FISH PASSAGE PROJECT

Bid Submission Deadline: March 1, 2018
Bid Submission Location: Via mail or hand-delivery*
Tillamook Bay Watershed Council
4000 Blimp Blvd. #440
Tillamook, OR 97141

*NO PROPOSAL WILL BE ACCEPTED BY WAY OF FAX OR ELECTRONIC DATA INTERCHANGE

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INVITATION

The Tillamook Bay Watershed Council (TBWC) is seeking proposals from contractors to design replacements for two undersized culverts under two road crossings on an unnamed tributary of Mill Creek, a tributary of the Trask River, located in Tillamook County, Oregon. The uppermost crossing is privately owned, and supports a residential driveway (#1136). The second crossing, approximately 200 yards downstream, is owned by Tillamook County Public Works Department (TCPWD) which has jurisdiction over the right-of-way and maintenance of Brickyard Road (#1137). Additionally, TBWC is seeking conceptual-level design alternatives for aquatic organism passage to address a flanked concrete slab—remnants of a dam-- approximately 400 yards upstream of the culverts (#1136a). The winning contractor will work closely with TCPWD staff throughout the design and construction phases of the project to ensure that the project meets applicable standards. Proposers must have the capacity to deliver designs, specifications and cost estimates with sufficient detail and cost certainty (approximately 60% design drawings and 90% cost estimates) by April 16, 2018 to support implementation-grant applications in the spring 2018 OWEB grant cycle. Firms submitting a proposal must also be available for oversight of construction actions that are anticipated for Summer 2019 (upon funding availability for implementation).

A mandatory pre-proposal meeting is scheduled for February 13, 2018 at 9:00AM at the TBWC offices, 4000 Blimp Blvd. #440, Tillamook, OR 97141. Those interested in attending this meeting are asked to confirm plans to attend by February 12th.

Contact TBWC by e-mail at tillamookbaywatershedcouncil@gmail.com or by phone at 503-322-0002. Electronic (secured PDF) copies of bid documents may be obtained on the “Current RFPs” page on the TBWC website: https://tillamookbay.org/

Proposals will be accepted by mail or hand-delivery at: TBWC, 4000 Blimp Blvd. #440, Tillamook, OR 97141. All proposals must be clearly labeled MILL CREEK FISH PASSAGE PROJECT and received no later than 3:00 pm on March 1, 2018. Proposals shall be submitted following the Instructions included in this RFP, Articles 1 through 4. Proposals received after the due date and time shall be returned unopened. Proposals may be withdrawn at any time, prior to opening, upon written request of the proposer. The contract will be awarded according to the selection procedure outlined in the Instructions, Article 3.

TBWC reserves the right to reject any or all proposals and to waive any informality or irregularity in any proposal received. In addition, the proposer recognizes the right of Council to reject a proposal if proposer failed to submit by the date specified in the proposal documents, or if a proposal is in any way incomplete or irregular.

This contract is NOT subject to Prevailing Wage Rates ORS 279C.800 to 279C.870.
INSTRUCTIONS

ARTICLE 1 PROJECT SPECIFICATIONS

1.1 - Project Site Location and Existing Culvert Descriptions.

Mill Creek and its tributaries make up the largest lowland sub-basin in the Trask River basin, draining an area of approximately 5 square miles, and providing approximately 5 linear miles of stream habitat for migratory fish species and wildlife. The upper half of the Mill Creek sub-basin runs through rural residential neighborhoods where a number of culverts are known to limit access for migratory fish—especially juvenile salmonids (Attachment 2). Of those known barriers, six have been selected by the TBWC and its partners for replacement in order to restore natural stream function and volitional passage for aquatic organisms. The two road crossings addressed in this project (#1136 and #1137) are located within approximately 200 yards of each other at T2S R9W S10. A flanked concrete slab—remnants of a small dam creating an irrigation pond—was discovered approximately 400 yards upstream (#1136a), and will also be considered in this project (Attachment 3). As a result of the close proximity these three obstructions, the TBWC and its partners have chosen to design and construct replacement crossing structures at these sites as a single project, and to seek out a fish-passage design to address the remnant dam. This approach was selected because it provides economy-of-scale and allows for the most efficient use of financial, personnel and equipment resources for both designing and constructing target crossings.

During 2011, the Tillamook Estuaries Partnership (TEP) completed a survey of culverts on fish-bearing streams throughout the Tillamook Bay Watershed. TEP used data collected during that effort to assess and prioritize these culverts and detailed its findings in a report released in September 2012. Both culverts to be addressed by this project were identified in the 2012 report as “High Priority for Replacement.” The following sections briefly summarize the findings of the 2012 study for the Mill Creek culverts addressed in this project, and the included Hydrological Assessment (Attachment 1) provides more detailed information and inlet and outlet photos for each existing culvert.

Culvert #1136 – The existing crossing consists of two round, 36” plastic pipes running approximately 22 linear feet under the private driveway of the Christie family. The pipes are in good condition, although the outlets are perched several inches above the water line during low water, and the pipes often convey no water in summer months. Fill depth where the road prism crosses the culvert is approximately 4 feet. The USFS survey crew measured bank full width (BFW) at 13.9 feet, and recommends using a design BFW of 14 feet, with a structure spanning at least 21 feet (1.5xBFW).

Culvert #1137 - The existing crossing consists of two round, 36” concrete pipes running approximately 41 linear feet under Brickyard Road. The pipes are in fair condition, although the inlets and outlets are badly eroded from the last several winters of high water. The inlets are protected by two steel trash racks, and the outlets are perched
about 6 inches during low water. Fill depth where the road prism crosses the culvert is approximately 6 feet. The USFS recommends using a design BFW of 14.8 feet, with a structure spanning at least 22.2 feet (1.5xBFW).

**Barrier #1136a** – This flanked concrete slab, approximately 400 yards upstream of culvert #1137, is a remnant of a dam which created an irrigation pond. Beavers have dammed the edges on both sides, but biologists suspect that adult salmonids can pass given enough flow. The pond provides habitat for waterfowl, amphibians, and winter rearing potential for juvenile salmonids. Conceptual-level designs to create a fish-passable channel that maintains the pond are requested, with final design and implementation at a later phase.

*See Attachment 4 for federal fish-passage design criteria, and Attachment 5 for Oregon fish-passage administrative rules.*

### 1.2 - Scope of Services.

#### A. General Work Requirements

TBWC is the organization responsible for this project. However, the project is being completed in partnership with the TCPWD and private landowners. As a result, the contractor must be prepared to work closely with County staff, as well as owners of adjacent private properties who may be consulted during the project.

1. A contract resulting from this RFP will include the following for culverts #1136 and #1137:
   a) 60%, 95% and 100% design drawings with partner review at each stage
   b) Incorporation and verification (as needed) of data provided by US Forest Service surveyors and hydrologists (site survey including longitudinal profile and cross sections, pebble counts and hydraulic model)
   c) Scour analysis
   d) Geo-technical investigations, as needed
   e) Construction budget estimates
   f) Engineering cost estimate
   g) Construction-ready bid documents
   h) Bidding assistance
   i) Attendance at a mandatory construction pre-bid meeting (TBD)
   j) Construction oversight estimate

The work will be awarded in one contract consisting of “Engineering Design,” with the potential for one amendment to that contract at a later date (prior to construction) for “Construction Engineering Support.”

2. A contract resulting from this RFP will include conceptual-level design alternatives for providing volitional passage over/around barrier #1136a for aquatic organisms.
3. The “Engineering Design” contract shall be for all work necessary to complete the construction-ready plans, specifications, cost estimates, rights-of-way and easement negotiations (if needed), and other work necessary to allow TBWC and TCPWD to submit and acquire permits, prepare grant requests to fund project implementation, and solicit construction contractors (see Article 3.2, section B, below) for the replacement of culverts #1136 and #1137. The designs and construction specifications shall meet Aquatic Organism Passage guidelines and PROJECTS (NWR-2013-10221) permitting criteria.

4. The “Construction Engineering Support” amendment shall be for all work necessary to support TBWC and TCPWD in day-to-day contract construction management and completion of As-Built surveys and final reporting upon completion of construction efforts for replacement of culverts #1136 and #1137. As part of the on-site, on-call visits by the consultant, they will execute needed surveying, technical inspections, and construction oversight and guidance to ensure that implementation is proceeding consistent with engineered plans. Construction Engineering Support includes answering technical questions, from TBWC or bidders, during the bidding process in order for TBWC to complete contractor selection. TBWC and the project team expect consultant to maintain a regular presence at the construction sites and open lines of communication with the implementation contractor and project team.

5. TBWC and its partners will complete environmental reviews and submit all environmental permits to regulatory agencies. Contractor will provide TBWC with information needed to prepare permit applications. In case of difficulties which may occur during the project, the consultant is expected to formulate a solution and present the proposed solution to TBWC for approval.

6. The contractor, its subcontractors, and all employers working on this project are subject employers under the Oregon Workers’ Compensation Law and shall comply with ORS 656.017, which requires them to provide worker’s compensation coverage for all their subject workers.

7. The contractor shall furnish all labor, equipment, supervision, transportation, supplies and incidentals to perform any necessary topographic surveys, location of right-of-way boundaries, obtain and evaluate information regarding adjacent improvements and utility infrastructure, perform geotechnical analysis of the crossing sites to inform structural designs, and perform any necessary hydrologic/hydraulic/geomorphic analyses of the stream in question within approximately 200 feet upstream and downstream of the culvert crossings. The contractor shall use this information to design stream crossings for the single-lane private drive and the two-lane paved road right-of-way under the jurisdiction of Tillamook County. Designs should meet existing road standards and accommodate local residential traffic, farm traffic (including tractor trailers), and emergency services vehicles. The stream crossings must provide passage for juvenile and adult anadromous fish, protect the water quality of the stream, and meet traffic safety standards under applicable criteria set by the National Oceanic and
Atmospheric Administration (NOAA Fisheries), Oregon Department of Fish and Wildlife (ODFW), Federal Highway Administration (FHWA), Oregon Department of Transportation (ODOT), and TCPWD, as necessary.

B. Specific Tasks

Task 1. Information Gathering & Analysis
The contractor will collect information from the project site area necessary to prepare engineering plans and specifications. At a minimum, this information will include:

a. Geotechnical studies and analyses needed for structural engineering of the crossing structures.
b. Existing right-of-way survey, using USFS survey data and ground control to add necessary field data (USFS will provide topographic survey at pre-bid meeting, and a digital version will be distributed after the meeting).
c. Existing road approaches and road fills.
d. Utility location and information, using USFS survey data and ground control to add necessary field data.
e. Information regarding adjacent improvements (i.e. road approaches, structures, fences, etc.) as they relate to the proposed project.

Task 2. Engineering Plans & Specifications
Single-span engineering solutions are required to provide long term fish passage for adult and juvenile salmonids and other migratory fishes at the two road/stream crossings described above, and accommodate at least a 100-year flood event (90% confidence level, USGS Streamstats). Replacement structures for these locations must meet or exceed fish passage design criteria established under National Marine Fisheries Service (NMFS) Consultation No. NWR-2013-10221 (Attachment 5) and State of Oregon OAR 635-412-0035 (Attachment 6). The Brickyard Road crossing solution also shall meet American Association of State Highway and Transportation Officials (AASHTO) design standards for structures and road geometry, as necessary. Bridges or bottomless arch culverts with streambed simulation channels are preferred at both locations.

The contractor will develop complete design drawings that provide schematic detail of the proposed improvements and related stream channel adjustments. Contractor will be expected to submit 60- and 95-percent plans, as well as a final submittal of 100% plans, for review and approval by TBWC and the landowners (TCPWD for culvert #1137 and Joan Christie for culvert #1136). Final plans will provide detail of the needed improvements and will include, at a minimum, the following information:

a. Roadway and structure plans consistent with applicable standards. For the culvert #1137, that includes TCPWD and AASHTO design standards and requirements; appropriate load bearing and safety standards should be met for culvert #1136.
b. Design of the replacement structures in compliance with NOAA Fisheries and ODFW standards and guidelines for fish passage for new stream crossings (Attachments 4 and 5).

c. Stream channel designs consistent with NOAA Fisheries and ODFW fish passage criteria.

d. Horizontal profiles for the proposed replacements (road centerline section view details).

e. Existing road and road fill information OR cross sections of existing road-fill envelope.

f. Right-of-way location.

g. Location of all utilities and identification of utility conflicts and notice to utility companies.

h. Ready-for-bid technical contract specifications and design plans, including a bid sheet.

i. Any and all details necessary to facilitate construction, including:
   - A traffic control plan for culvert #1137 that has been reviewed and approved by TCPWD.
   - Final itemized, installation cost estimates (accounting for any necessary prevailing wage requirements).
   - Complete project construction management cost estimates, including construction survey staking, engineering oversight services, and post-construction as-built survey and reports.
   - Estimates of any costs associated with temporary relocations of all utilities including but not limited to, water supply systems, electricity, cable television, and telephone.
   - Public/worker safety recommendations.
   - Dewatering plans.
   - Storm drainage and erosion control plans.
   - Staging areas for vehicles, equipment, refueling, chemical materials such as gasoline, oil, etc., and storage that should be at least 150 feet from the stream channel.
   - Construction work-zone safety plan, including pedestrian passage
   - List of permits and right-of-way easement agreements required for implementation.
   - Appropriate permit application support documents for any activities requiring permits (i.e. instream fill/removal activity, utility modifications, etc.). Preparation of permit applications is not included in the consultant's scope of work, however, provision of appropriate supporting maps and other information will be expected upon request. For example, attachments to fill/removal permits must be on 8.5" x 11" paper, and the Project Manager may request schematic designs in this format.

Note: Designs and cost estimates will inform later requests for grants in support of project construction and construction oversight.
The following issues must be addressed in the consultant's response to this announcement:

- Compliance with ODOT and TCPWD requirements for safe passage of peak traffic flows for crossing #1137.
- If fills or cuts related to the project extend past the right of way limits, appropriate easements with the respective property owners will be needed. Contractor will coordinate with TCPWD to determine permanent road right-of-way or fill/cut easements and provide appropriate legal description(s) as needed.
- Contractor shall contact TCPWD regarding content of ready-for-bid technical contract specifications related to the roadway. Details they will reference include, in part:
  - Insurance requirements for contractors operating in County rights-of-way.
  - Restoration of any damaged roadways to original conditions due to contract work/hauling (whether on-site or off-site) including road shoulders and drainage courses.
  - Project excavation materials (including existing culverts) are the property of the contractor and must be removed entirely and disposed of in compliance with fill and material disposal standards of the County or State. These materials are not to be left in the County right of way without authorization of Tillamook County Public Works.
  - Road section thickness measurements and materials standards.
### 1.3 - RFP TIMELINE

<table>
<thead>
<tr>
<th>EVENT</th>
<th>DATE/TIME &amp; LOCATION</th>
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<tbody>
<tr>
<td>Invitation</td>
<td>January 26, 2018&lt;br&gt;Request for Bid will be emailed to select contractors</td>
</tr>
<tr>
<td>Mandatory Pre-proposal Meeting</td>
<td>February 13, 2018</td>
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<tr>
<td>Proposals Due</td>
<td>March 1, 2018 by 3:00PM &lt;br&gt;Via mail or hand delivery:&lt;br&gt;Tillamook Bay Watershed Council&lt;br&gt;4000 Blimp Blvd. #440&lt;br&gt;Tillamook, OR 97141</td>
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<tr>
<td>Proposal Review &amp; Evaluation</td>
<td>March 2 to 5, 2018</td>
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<td>Proposal Selection</td>
<td>March 5, 2018</td>
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<td>Notice of Intent to Award</td>
<td>March 6, 2018</td>
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<td>Award of Contract</td>
<td>March 7, 2018</td>
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<tr>
<td>Execution of Contract</td>
<td>March 12, 2018</td>
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<tr>
<td>Time of Contract Completion</td>
<td>Project work must be completed by <strong>November 30, 2018</strong></td>
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### 1.4 - CONTRACT TIMELINE

<table>
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<tr>
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<tr>
<td>Completion of Task 1</td>
<td>April 6, 2018</td>
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<tr>
<td>Completion of 60% designs</td>
<td>April 16, 2018</td>
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<tr>
<td>Completion of Task 2</td>
<td>November 30, 2018</td>
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ARTICLE 2    PROPOSAL PROCEDURES
2.1  Each responsible proposer shall respond to the “Submittal Requirements” as presented in this RFP. Proposals that are received without the required information may be rejected as incomplete.
2.2  One original and four copies of each proposal, all with original signatures, shall be sealed in an envelope, addressed and delivered/mailed to TBWC, 4000 Blimp Blvd. #440, Tillamook, OR 97141. NO BID WILL BE ACCEPTED BY WAY OF FAX OR ELECTRONIC DATA EXCHANGE.
2.3  Proposals should be prepared simply and economically, providing a straightforward, concise description of proposer capabilities to satisfy the requirements of this RFP.
2.4  Proposals are due on Thursday, March 1, 2018 no later than 3:00PM. Proposals shall be clearly labeled “MILL CREEK FISH PASSAGE PROJECT.”
2.5  A proposal is invalid if it has not been deposited at the designated location prior to the time and date of receipt of proposals indicated in the advertisement or invitation, or prior to any extension thereof issued to the prospective proposers.

ARTICLE 3    ADDENDA AND ACCEPTANCE OF PROPOSAL CONTENT
3.1  In the event it becomes necessary to revise any part of this RFP, addenda will be provided to all prospective proposers who have been directly issued an RFP document by TBWC.
3.2  The contents of the selected proposal will become contractual obligations upon acceptance. Failure of the successful proposer to accept these obligations in a contract may result in cancellation of the award.

ARTICLE 4    CONSULTANT SELECTION PROCESS
4.1  Proposer acknowledges the right of TBWC to reject any or all proposals and to waive any informality or irregularity in any proposal received. In addition, proposer recognizes the right of TBWC to reject a proposal if proposer failed to submit by the date required by proposal documents, or if proposal is in any way incomplete or irregular.
4.2  Proposer acknowledges the right of TBWC to consider competency and responsibility of proposers and their list of proposed subcontractors and to return proposal unopened if only one proposal is received.
4.3  It is the TBWC’s intent to proceed as soon as possible and upon making award of Contract will reject all other proposals. Proposal selection will be made by the TBWC Selection Committee, including a representative from the TCPWD, and will be based on the scoring and ranking outlined in this RFP.
4.4  After completion of the initial scores, TBWC will execute reference checks of the top two evaluated firms.
4.5  It is the intent of TBWC to award a contract to the firm with the best overall project approach, provided that the proposal is submitted in accordance with the Proposal documents and does not exceed $65,000.00.

ARTICLE 5    CONTRACTOR REQUIREMENTS
5.1  Worker’s Compensation Coverage. The successful proposer and all subsequent subcontractors shall comply with ORS 656.017, Oregon Workers’ Compensation Law,
and produce appropriate certificates that they have complied. All subject employers working under this contract shall either be employers that will comply with ORS 656.017 or employers that are exempt under ORS 656.126.

5.2 **Liability.** If a contract is awarded, the successful proposer must provide a certificate of coverage at the time of contract execution indicating proof of insurance coverage with limits not less than $100,000 in property damage per claimant, $200,000 for all other claims per claimant, and $500,000 for all claims. Such insurance shall be evidenced by a Certificate of Insurance provided to TBWC indicating coverages, limits and effective dates by an insurance company licensed to do business in the State of Oregon. Also, an endorsement shall be issued by the company showing TBWC and Tillamook County as additional insured and containing a 30-DAY Notice of Cancellation endorsement of Errors and Omissions (professional liability) Insurance Coverage.

5.3 **Prevailing Wage Rates.** This contract is not subject to ORS 279C.800 to 279C.870.

**ARTICLE 6 INCURRING COSTS**

6.1 TBWC shall not be liable for any cost incurred by proposers prior to the issuance of a contract.

**SUBMITTAL REQUIREMENTS AND EVALUATION SCORING (100 points possible)**

| A. Cover Page: This page serves to primarily identify the proposal and firm information. It should include: | 0 points | 1 page |
| - Title reading, “Tillamook Bay Watershed Council, Mill Creek Fish Passage Project, Culverts Replacement Engineering Services” | |
| - Firm identification | |
| - Project team leader contact information | |

**B. Transmittal Letter:** Provide an introduction to the consultant team that summarizes knowledge and experience with projects similar to the one in this RFP. The letter may include elements mentioned in other parts of the proposal evaluation. **Letter must acknowledge receipt of any and all addenda to this RFP issued by TBWC.**

| 0 points | 1 page |

**C. Staff Qualifications & Relevant Experience:** This section should identify the consultant team that will be involved with the project. List the qualifications and relevant experience of the team. Highest scores will be given to consultants that demonstrate relevant qualifications for key members of the team. In describing the experience of team members, consultants should focus on applicable experience. Highest scores will be given to firms that demonstrate they have a coherent team that has worked together on prior similar projects. For design teams that have not worked together previously, the proposal should clearly demonstrate the project manager’s ability to develop and manage a productive team. This section should identify any experience with stream systems and road networks in Oregon’s North Coast region (Tillamook County preferred).

| 20 points | 3 pages |

**D. Specific Similar Project Experience:** Beginning with the most recently completed project, clearly show experience with fish passage and bridge projects. Emphasize projects similar to this project (setting and scope). Highest scores will be given to consultants demonstrating specific experience for the type of work and road systems.
included in this RFP. Presentation of firm experience should be tied to a time frame and
experience of the project team leader(s).

| E. Project Approach: | Given information provided in this RFP, describe your approach
for this project to cost effectively meet project deliverables and objectives in the
timeframe provided. Describe what you believe are the most critical elements of this
project that the design team must address for a successful outcome. Clearly identify
work that will be done by the prime versus sub-consultants (if applicable). |
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| F. Project Budget: | Provide a one page, itemized budget for the tasks defined in this
RFP and, on no more than two separate additional pages, a brief budget narrative for
each line item. In addition to total cost, we will evaluate the budget based on how well
narratives identify how funds will be spent, how cost efficiencies will be achieved and
the proposer’s ability to provide all scoped services within the anticipated budget. |
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| G: References:  | List references for fish passage and bridge projects. This list should
include a minimum of four contact names, including business names and phone
numbers for TBWC to contact. Title of referenced project(s) should be provided. Topics
likely asked of references include those related to: submission of accurate estimates,
high quality work, meeting deadlines, and ease of interaction with the local jurisdiction,
including responsiveness to on-site problems or requested meetings. |
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| H. Serviceability & Local Preference: | Highest scores will be given to firms having an
office within an approximately 100-mile radius of Tillamook and/or show that they
can/will provide a representative in a timely manner to attend meetings within a half-
day notice or to handle on-site situations. |
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<td>10 points Considered as part of above or additional page(s).</td>
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| I. Workload Capacity: | Include a separate, signed letter that identifies the project title
and the consultant team, defines the services to be provided, and commits the
consultant team to providing sufficient resources to fulfill its responsibilities under the
scope and timeline provided in this RFP. The letter should be signed by the individual
who bears responsibility for the fulfillment of the commitment. |
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<td>0 points Signed letter of commitment</td>
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Summary

- Recommended 100-year peak flow discharge for designs at the Mill Creek County Crossing 1137 is 418 cfs.
- Recommend using a design BFW of 14’ with a structure spanning at least 1.5x BFW (21’) at the Mill Creek private crossing (#1136). We recommend using a design BFW of 14.8’ with a structure spanning at least 1.5x BFW (22.2’) at the Mill Creek County crossing (#1137).
- Site sits on fluvial plain landform, with extensive low lying floodplains. Average stream gradients <2%. Stream channel morphology is a pool riffle system controlled by beaver dams and meander bends from the highly sinuous channel shape. Streambed material is entirely silts and clays (<2 mm grain size) derived from Hebo sility clay loam soils.

Site Location

Streamflow Analysis

Streamstats

Oregon StreamStats (https://water.usgs.gov/osw/streamstats/oregon.html) was used to obtain basin characteristics and flow statistics. Streamstats estimates streamflow based on regional regression analysis, a method of estimating streamflow using basin characteristics (i.e. drainage area, precipitation, etc.) and how they relate to gaged sites within a hydrologically similar region. Streamstats in Oregon uses “Estimating Flow-Duration and Low-Flow Frequency Statistics for Unregulated Streams in Oregon” (USGS 2008) for low-flow analysis and “Estimation of Peak Discharges for Rural, Unregulated Streams in Western Oregon” (USGS 2005) for peak-flow estimates. The regression equations created in both studies are not intended to be used at ungaged sites in which the basin characteristics are outside of the range of those used to create the regression equations. In the case of Mill Creek, all of the basin characteristics are within the appropriate range.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Value</th>
<th>Unit</th>
<th>Prediction Error (percent)</th>
<th>Equivalent years of record</th>
<th>90-Percent Prediction Interval</th>
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</thead>
<tbody>
<tr>
<td>PK2</td>
<td>99.9</td>
<td>ft3/s</td>
<td>27</td>
<td>2.4</td>
<td>64.2</td>
</tr>
</tbody>
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Flow statistics predicted by these equations represent natural unregulated flow conditions based on historic streamflow information. The equations do not take into account future changes to streamflow and climatic basin characteristics as a result of climate change. Peak discharge in particular utilizes two characteristics; 24-Hour 2-Year Precipitation and Mean Maximum January Temperature, which are expected to change on the Oregon Coast in the future. According to the Climate Science Primer: Tillamook Estuaries Trends and Projections by the 2080s temperatures on the North Oregon Coast will likely be 4-7° warmer and precipitation will increase by 5%, with more wintertime precipitation (Koopman 2017).

In order to take into account climate change, we can do a back-of-the-envelope calculation and modify the January temperature and 2-year storm event basin characteristics used as inputs when estimating the 100-year discharge with the equation provided in Cooper et al. 2005. Increasing temperature by 4° and event rainfall by 5% gives a peak discharge of 324 cfs, approximately a 1.3x increase over the estimated 100-year flow of 258 cfs.

\[
Q_{(100)} = 0.003048 \text{Area}^{0.9176} \text{I}^{2.126} \text{M}^{1.345} \text{T}^{1.326} \text{Soil}^{0.5701} \text{SoilP}^{0.3319}
\]

**Gaged Sites:**
Gaged streamflow sites are an important tool for validating streamflow estimates at ungagged sites where we often work. The closest small watershed for which we have a continuous record of over 30 years is the Tucca Creek USGS Site 14303200 site near Blaine, OR. A comparison of Mill Creek at the county crossing and Tucca Creek gage site shows that the Tucca site is much more heavily forested with no residential development. Tucca Creek is also about 2.4x larger than the Mill Creek drainage, receives slightly more rainfall, and sits about 2000’ higher into the coast range.

The 100-year peak flow estimate at the Tucca Creek gaged site is 910 cfs based on 33 years of record, with a 95% confidence interval range of 684 to 1364 cfs. To extrapolate between sites, a similar equation relating the relative size of the two drainage areas is used:

\[
Q_{100\text{ungaged}} = Q_{100\text{gaged}} \left( \frac{\text{Area}_{\text{ungaged}}}{\text{Area}_{\text{gaged}}} \right)
\]

This simple ratio method should only be used when the ungaged basin area is between 0.5 and 1.5 of the gaged drainage area (USGS 2012). As this is not the case on Mill Creek, we will use the analysis only to compare to other flow estimates. Additionally, this equation assumes the drainages are hydrologically similar, which is not the case in terms of elevation and land use. Based on the peak flows experienced at Tucca Creek, the Mill Creek site would experience 100-year floods of approximately 379 cfs, close to the 90% upper confidence level estimate found with the Cooper et al. regression equation. Small watersheds typically have less storage and water moves more quickly to the channel, increasing the peak flow per unit area. For this reason, the Mill Creek peak flows may be higher than estimated. Verification of hydraulic modeling water surface elevations with real data is recommended when possible.
Based on the climate change estimates and comparison to the Tucca drainage, I suggest using the upper limit of the 90% prediction interval for the 100-year flow event. At the Mill Creek county site, this would be 418 cfs for the Q100. This upper confidence level estimate of streamflow will help take into account the likely greater peak discharges that may be experienced at the site under the effects of climate change or underestimated due to the lack of current local streamflow data.

Conversations with the local residents in the area helped to understand the flood frequency experienced spatially near the Mill Creek site. According to adjacent landowners, Brickyard Road near the county crossing overtops on the asphalt roadway regularly (about once every year or two) and floods onto the lawn upstream of the crossing on the south side during most heavy rain events. The private culvert on Joan Cristie’s property works about “90-95%” of the time, but the roadway does overtop (“maybe once a year or so”).

**Geomorphic Setting**

The two crossings under study are on a tributary to Mill Creek (Unnamed trib B according to the TEP 2012 Barrier Assessment) and drain approximately 1.3 square miles at the county crossing #1137. The area sits in a marine coastal climate, comprised of wet winters, marine fog and mild temperatures. The drainage area is dominated by the Western Hemlock natural potential vegetation type, also known as the vegetative landtype association (USDA 1995). The upper
portion of the watershed has a Dissected Mountain landform association while the lower 0.75 miles of the mainstem above the crossings flow through a Fluvial Plain landform before the landscape becomes highly developed (Noller et al. 2014). These fluvial plains are extensive lowland areas produced by migrating channels and floodplains of non-glacial streams.

Average stream gradients above the crossings but before the pond were <1% while average gradients below the crossing were slightly higher, around 1%. The stream bedform is a riffle pool type, with numerous beaver dams and channel banks (sinuosity) controlling the water surface elevation. The stream morphology would probably be classified as a Rosgen stream type E, a slightly entrenched stream with low channel width/depth ratios and high channel sinuosity. This stream channel forms inside the wider entrenched floodplain meander developed historically and visible in the LiDAR image inset below. Although considered highly stable, these stream types are very sensitive to disturbance and can rapidly adjust to other stream channel types. Note: Most attention was given to the stream reaches upstream of the count crossing because of the highly developed nature of the downstream portion.

Summary of landform associations (Noller et al. 2014):

**Dissected Mountains** are mountainous areas with a high degree of dissection. Fluvial erosion and mass wasting over time has resulted in a highly dissected landscape with deep V-shaped valley walls, planar in form, that are contiguous from ridge-top to valley bottom. It is no longer evident what the landscape was like previously. Some slope angles are greater than repose and are bare rock or outcroppings. Thickest soils gather in valley bottoms and collect in tributary gullies.
Fluvial Plains are an extensive, lowland area that ranges from level to gently sloping or undulating. Fluvial Plains are produced by migrating channels and floodplains of non-glacial streams. Locally, older deposits identified as terraces are included in this map unit. The bounds of fluvial plains conform to the surrounding uplands as they confine the streams. Fluvial Plains have relict and abandoned stream landforms. Relict landforms are those formed during a prior hydrologic regime of the glacial or pluvial epochs. As such, they consist of generally higher energy stream deposits – sandy to boulder gravel beds upwards of several meters in thickness. Relict landforms are generally present at the margins of fluvial plains where confined in mountain valleys. Channel, bar and terrace landforms are muted in morphology due to weathering and surface degradation over the thousands of year since their formation. Soil profiles are typically deep and highly differentiated in horizon properties from the parent material. Soil taxa vary according to age and climatic regime, though Alfisols and Mollisols are common. Abandoned stream landforms are generally younger in age and formed under a hydrologic regime similar to that of the present stream. These generally consist of variable energy (except in modern glacial watershed) stream deposits, including lower energy silt to sandy beds and flashy, high-energy debris flow deposits. Thickness of deposits is consequently variable between as well as within catchments. These are relatively young landforms and deposits, located adjacent to the modern stream channel, and soil profile development is immature – Entisols, Inceptisols and Mollisols are typical.

Crossing Conditions

The county crossing (#1137) and private crossing (#1136) are both severely undersized and currently restricting fish passage. Results from the TEP 2012 Barrier Assessment are shown below, as well as site photographs taken in the field Dec 15 2017. Note that the BFW measurements supplied in this report are slightly higher than those recorded in the TEP assessment summaries shown below, but no other discrepancies were observed.

<table>
<thead>
<tr>
<th>LOCATION INFO</th>
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<tbody>
<tr>
<td>Watershed</td>
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</tr>
<tr>
<td>Stream Name</td>
<td>Unnamed tributary of Mill Creek (Trib. B)</td>
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<tr>
<td>Township-Range-Section-1/4</td>
<td>T2S, R9W, Sec. 10, NE1/4 of SW1/4</td>
</tr>
<tr>
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<tr>
<td>Road Name</td>
<td>Brickyard Road</td>
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<tr>
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<td>Tillamook County</td>
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<tr>
<td>Adjacent Landowners</td>
<td>M. &amp; V. Gabel, G. &amp; M. Kimo, M. Barber, and R. &amp; J. Christie</td>
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<th>CULVERT INFO</th>
<th>CHANNEL INFO</th>
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<tr>
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<tr>
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<tr>
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<td>Overall Condition</td>
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<table>
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<tr>
<td>Upstream Habitat Length (mi)</td>
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<tr>
<td>Barrier Class</td>
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<td>Barrier Points</td>
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</tr>
<tr>
<td>Prioritization Total Points</td>
<td>11</td>
</tr>
</tbody>
</table>

Notes: Dual pipes at this location. Trash rack at inlet had not been maintained and had a considerable amount of debris built up.
Photo 1: View of outlet of the County crossing 1137. Note aggraded road fill, landowner said that the rock had deposited in the winter of 2016/17.

Photo 2: View of inlet to county crossing 1137. Note road drainage entering at inlet on right-hand photo.

Photo 3: View of the inlet of the private crossing. Note ponded, over-widened area above culvert.
**LOCATION INFO**

<table>
<thead>
<tr>
<th>Watershed</th>
<th>Trask River</th>
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<tbody>
<tr>
<td>Stream Name</td>
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<tr>
<td>Township-Range-Section-1/4</td>
<td>T2S, R9W, Sec. 10, NE1⁄4 of SW1⁄4</td>
</tr>
<tr>
<td>UTM Easting/Northing (Zone 10, NAD 1983)</td>
<td>439203/5028756</td>
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<td>Road Name</td>
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<td>Road/Culvert Owner</td>
<td>R. &amp; J. Christie</td>
</tr>
<tr>
<td>Adjacent Landowners</td>
<td>M. Barber and R. &amp; J. Christie</td>
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**CULVERT INFO**

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<td>Material</td>
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</tr>
<tr>
<td>Width (in)</td>
<td>36(36)</td>
</tr>
<tr>
<td>Height (in)</td>
<td>36(36)</td>
</tr>
<tr>
<td>Outlet Perch (ft)</td>
<td>0.2(1.0)</td>
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<tr>
<td>Slope (%)</td>
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<tr>
<td>Rustline Height (in)</td>
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<tr>
<td>Overall Condition</td>
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**CHANNEL INFO**

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<tbody>
<tr>
<td>Upstream Gradient (%)</td>
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<tr>
<td>Bankfull-Culvert Ratio</td>
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</tbody>
</table>

*Bankfull-Culvert ratio based on combined width of both pipes.

**PRIORITIZATION ANALYSIS**

| Upstream Habitat Length (mi) | 1.8 | Habitat Points | 4 |
| Fish Species                | Anad. | Fish Points | 3 |
| Barrier Class               | Red   | Barrier Points | 3 |

Prioritization Total Points | 11 |

Notes: Dual pipes at this location. RBA data indicates numerous beaver impoundments, low flows and limited anadromous potential above this crossing. Culverts were not conveying water during summer 2011 field visit.

Photo 4: (L) View of the outlet of the private crossing 1136. (R) Bankfull width measurement reach. See map notes for location.
Photo 5: Views of the beaver dam, one of several, above private crossing. Site B2 on conceptual map.

Photo 6: Upstream of the county crossing approximately 30’ (L) and 100’ (R) upstream of 1137. BFW2 Measurement site. Note beaver dam behind tree branches.
Conceptual Site Map
This conceptual site map describes area conditions as observed by Leah Tai and Adriana Morales Dec 15 2017.
CC1: County culvert. Consists of 2 concrete pipes. Southern pipe is separating. Both 3.1’ diameter and straight. Two trash racks installed on upstream side. Road fill has scoured away on the downstream side of the crossing and aggraded at the center of the channel. Landowner reports that this was previously a prime spawning area.

PC1: Private culvert. Consists of 2 polyethylene corrugated black plastic pipes. Both 3’ diameter, 20.5’ long. Immediately upstream of the culvert is a backwatered area with many fines and wetland obligates.

F1: Lawn area floods regularly during heavy rains per landowner conversation (ex. During Oct 22, 2017 rains area was flooded).

B1: Beaver dams upstream of crossing. Two dams were seen, both built this year. According to the adjacent landowner, they wash out at the big flows and are quickly rebuilt. Cement blocks where noted mixed in with the beaver dams – potentially a low-tech beaver analog or check dam structure.

B2: Beaver dams below the pond on private property. Large ponded area (see photos). Beaver dams appear older, but landowner stated that the beaver are actively using the area. Fish have been seen passing through these structures.

P1: Small pond. Historic road runs along the SW edge of the pond, retaining water. Pond was dredged in the 1940s. Used for irrigation. A bridge once passed over the dammed stream channel, but only some concrete and a small opening blocked with sticks and debris is visible now. This ‘dam’ is approximately 4 feet high. Fish have been seen passing upstream from the creek into the pond. Many obligate plants, rushes and reed canary grass observed.

BFW1 and BFW2: Refer to the locations where bank full width measurements were taken. See section on BFW for more information.

Reach 1: Reach 1 has an abundance of road fill (small angular rock) but also naturally has a gravel streambed, unlike the areas upstream. The stream reach is more developed and confined by landowner activities.

Reach 2: Reach 2 exhibits more classic pool riffle morphology of a meandering stream. Fine sediments comprised the streambed and banks. These silty clay sediments are deep, ~2-3’ in the channel bottom. Note: See landowner map. Barb-wire fencing crosses the stream several times in this stream reach.

Reach 3: Reach 3 is more entrenched than reach 2. It appears to have been channelized historically, likely this was done when the historic road was built to create a dam and irrigation pond. The banks are comprised of root wads and large conifer trees. Some cobble and gravel material were found in the 15 feet downstream of the dam, in this channelized section.

Photo 7: (L) Historic roadbed at pond, site P1 on conceptual map. (R) View from the historic road towards the east.
Photo 8: Reach 3 at the dam, directly downstream of the irrigation pond. Note old concrete infrastructure. Dam appears to be ~4’ high, comprised of earth and wood. Fish have been observed to pass this structure (per landowner conversation).

Photo 9: (L) Tributary between crossing 1137 and 1136. (R) Example of channel sinuosity observed in reach 2.

Photo 10: (L) Tributary downstream of county crossing 1137. Salmonids have been observed here per landowner statement. (R) Downstream of 1137 main channel, deeply incised channel with development abutting streambanks.
Bank full widths (BFW)
The average bank full width (BFW) measurements at the Mill Creek site where taken upstream of the private crossing (noted as BFW in the map) outside of the culvert influence. This area was selected because it was less modified than other reaches along the stream. The reach further upstream from these measurements was extremely sinuous, and not representative of the morphology that was noted closer to the crossings.
Upstream of the sinuous reach are several more beaver dams, a large beaver created pond, and then a more entrenched channelized section of stream that leads to a small irrigation pond. The average BFW measurement was 13.9 feet, and ranged from 7.6 to 21.2 feet. We recommend using a design BFW of 14’ with a structure spanning at least 1.5x BFW (21’) at the Mill Creek private crossing (#1136).

Additional bankfull measurements were taken along the portion of the creek between the two crossings, which had several beaver dams and a small tributary entering. The BFW measurements are likely affected by these dams, which resulted in observed recent changes to the stream banks (deposition of sediment around the dams). The small tributary was not actively flowing during field visits on 12/15/2017, but had stagnant pools of water connected by an entrenched sinuous channel. We recommend using a design BFW of 14.8’ with a structure spanning at least 1.5x BFW (22.2’) at the Mill Creek County crossing (#1137).

Streambed Substrate
Traditionally, a wolman pebble count or other streambed classification method is used to characterize the size of the material in the stream reach of interest. Investigation of the stream channel at Mill Creek proved to be more complicated. The stream channel at Reach 1 has a large aggradation wedge of road fill, presumably washed in during the winter of 2016/17, per conversations with the adjacent landowner. Anecdotal accounts lead us to believe that spawning gravels covered the eastern portion of this reach in the recent past. Reach 1 appears to have a slightly different substrate composition in comparison to Reach 2, but the mix of road fill and human impacts make this uncertain (landowner mentioned possibly working in the stream to improve fish habitat).
Reach 2 is the best example of a non-modified reach in the general vicinity. Wading through this section showed that the entire stream reach is comprised of fines, silts and clay sediments that are smaller than sand (<2 mm). Although at first it appeared that some sand sized particles could be found near the private culvert, upon further inspection these were found to be easily broken down clay particles from the banks that had not yet completely weathered. This would correspond to a d50 of < 2mm. The composition of the stream bed material in Reach 1, 2, and 3 is Hebo sility clay loam (map unt 45B), with parent material of fixed alluvium and/or fluviomarine deposits derived from sedimentary rock. Upstream soil layers include the Chitwood-Hebo complex (17B) and Chitwood-Knappa (59B) medial silt loam and silty clay loams.

Photo 12: Fine silt clay substate throughout Reach 2 (L). Angular road fill aggradation wedge downstream of culvert, growing reed canary grass (R).

Figure 3: NRCS Web Soil Survey Map Unit delineations. Note that most of site lies in 45B and 17B soil map units.
### Appendix

#### Streamstats Basin Characteristics

*Date: Wed Dec 13, 2017 1:28:11 PM GMT-5*

**Study Area:** Oregon  
NAD 1983 Latitude: 45.4097° (45° 24' 35")  
NAD 1983 Longitude: -123.7785° (-123° 46' 43")

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<th>Label</th>
<th>Value</th>
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<td>square miles</td>
<td>Area that drains to a point on a stream</td>
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<tr>
<td>DRNDENSITY</td>
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<td>miles per</td>
<td>Basin drainage density defined as total stream length divided by drainage area.</td>
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<tr>
<td></td>
<td></td>
<td>square mile</td>
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<td>ELEY</td>
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<td>Mean basin slope measured in degrees</td>
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<td>MAXBSLOPD</td>
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<td>Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index</td>
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<td>percent</td>
<td>Percentage of herbaceous from NLCD 2011 classes 71-74</td>
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<td>Percentage of developed open area from NLCD 2011 class 21</td>
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<td>percent</td>
<td>Percentage of developed area, low intensity, from NLCD 2011 class 22</td>
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<td>Percentage of area developed, medium intensity, NLCD 2011 class 23</td>
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<td>LC11DVEHI</td>
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<td>Average percentage of impervious area determined from NLCD 2011 impervious dataset</td>
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<td>FOREST</td>
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<td>percent</td>
<td>Percentage of area covered by forest</td>
</tr>
<tr>
<td>ORREG2</td>
<td>729</td>
<td>dimensionless</td>
<td>Indicator flag for Oregon region 2</td>
</tr>
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</table>

### Peak-Flow Basin Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Regression Equation Valid Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drainage Area (square miles)</td>
<td>1.27</td>
<td>Min 0.28 Max 6.73</td>
</tr>
<tr>
<td>24 Hour 2 Year Precipitation (inches)</td>
<td>3.79</td>
<td>Min 2.52 Max 5.79</td>
</tr>
<tr>
<td>Average Soil Permeability (inches per hour)</td>
<td>3.34</td>
<td>Min 0.72 Max 4.76</td>
</tr>
<tr>
<td>Mean Maximum January Temperature (degrees F)</td>
<td>49.4</td>
<td>Min 42.4 Max 53.9</td>
</tr>
<tr>
<td>Available Water Capacity Of Cooper (inches)</td>
<td>0.18</td>
<td>Min 0.1 Max 0.23</td>
</tr>
</tbody>
</table>

### Annual Low-Flow Basin Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Regression Equation Valid Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drainage Area (square miles)</td>
<td>1.27</td>
<td>Min 0.367 Max 590.347</td>
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<tr>
<td>Mean Annual Precipitation (inches)</td>
<td>99.3</td>
<td>Min 65.5923 Max 122.9841</td>
</tr>
<tr>
<td>Available Water Capacity OR Risley (in per in)</td>
<td>0.18</td>
<td>Min 0.12 Max 0.23</td>
</tr>
</tbody>
</table>

### References


Attachment 3 - Mill Creek Fish Passage Project (Barriers 1136, 1136a and 1137)
Attachment 4
Fish Passage Project Design Criteria: Culverts at Road Crossings

In Reference to: Endangered Species Act - Section 7 Programmatic Conference and Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish habitat Consultation for Programmatic Restoration Opinion for Joint Ecosystem Conservation by the Services (PROJECTS) by the U.S. Fish and Wildlife Service Using the Partners for Fish and Wildlife, Fisheries, Coastal, and Recovery Programs and NOAA Restoration Center Using the Damage Assessment, Remediation and Restoration Program (DARRP), and Community-Based Restoration Program (CRP) in the States of Oregon, Washington, and Idaho

NMFS Consultation Number: NWR-2013-10221

Federal Action Agencies: U.S. Fish and Wildlife Service
Oregon, Washington, and Idaho State Offices
National Marine Fisheries Service,
NOAA Restoration Center

Affected Species and Determinations:

<table>
<thead>
<tr>
<th>ESA-Listed Species</th>
<th>ESA Status</th>
<th>Is the action likely to adversely affect this species or its critical habitat?</th>
<th>Is the action likely to jeopardize this species?</th>
<th>Is the action likely to destroy or adversely modify critical habitat for this species?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Columbia River Chinook salmon</td>
<td>T</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Upper Willamette River Chinook salmon</td>
<td>T</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Upper Columbia River spring-run Chinook salmon</td>
<td>E</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Snake River spring/summer run Chinook salmon</td>
<td>T</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Snake River fall-run Chinook salmon</td>
<td>T</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Puget Sound Chinook salmon</td>
<td>T</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Columbia River chum salmon</td>
<td>T</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Hood Canal summer-run chum salmon</td>
<td>T</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Lower Columbia River coho salmon</td>
<td>T</td>
<td>Yes</td>
<td>No</td>
<td>No*</td>
</tr>
<tr>
<td>Oregon Coast coho salmon</td>
<td>T</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Southern Oregon/Northern California coasts coho salmon</td>
<td>T</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Snake River sockeye salmon</td>
<td>E</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Lake Ozette sockeye salmon</td>
<td>T</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Lower Columbia River steelhead</td>
<td>T</td>
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<td>No</td>
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</tr>
<tr>
<td>Upper Willamette River steelhead</td>
<td>T</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Middle Columbia River steelhead</td>
<td>T</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Upper Columbia River steelhead</td>
<td>T</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Snake River Basin steelhead</td>
<td>T</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Puget Sound steelhead</td>
<td>T</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
Puget Sound/Georgia Basin bocaccio  E  No  No  No
Puget Sound/Georgia Basin canary rockfish  T  No  No  No
Puget Sound/Georgia Basin yelloweye rockfish  T  No  No  No
Southern green sturgeon  T  Yes  No  No
Southern Eulachon  T  Yes  No  No
Southern Resident killer whale  T  No  No  No

*Critical habitat has been proposed for LCR coho salmon.

<table>
<thead>
<tr>
<th>Fishery Management Plan that Describes EFH in the Action Area</th>
<th>Would the action adversely affect EFH?</th>
<th>Are EFH conservation recommendations provided?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coastal Pelagic Species</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Pacific Coast Groundfish</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Pacific Coast Salmon</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Consultation Conducted By: National Marine Fisheries Service
West Coast Region

Project Categories

1. Fish Passage Restoration (Stream Simulation Culvert and Bridge Projects; Headcut and Grade Stabilization; Fish Ladders; Irrigation Diversion Replacement/Relocation and Screen Installation/Replacement)
2. Large Wood (LW), Boulder, and Gravel Placement; Engineered Logjams (ELJ); Constructed Riffles, Porous Boulder Step Structures and Vanes; Gravel Augmentation; Tree Removal for LW Projects
3. Dam and Legacy Structure Removal
4. Fluvial Channel Reconstruction/Relocation
5. Off- and Side-Channel Habitat Restoration
6. Streambank Restoration
7. Set-Back or Removal of Existing Berms, Dikes, and Levees
8. Reduction/Relocation of Recreation Impacts
9. Livestock Fencing, Stream Crossings and Off-Channel Livestock Watering
10. Piling and other Structure Removal
11. Shellfish Bed/Nearshore Habitat Restoration
12. In-channel Nutrient Enhancement
13. Road and Trail Erosion Control and Decommissioning
14. Juniper Removal
15. Bull Trout Protection
16. Beaver Habitat Restoration
17. Wetland Restoration
18. Tide/Flood Gate Removal, Replacement, or Retrofit
1.3.1 Proposed Design Criteria

USFWS and NOAA RC propose to apply the following PDC, in relevant part, to every action authorized under this opinion. Measures described under “Administration” apply to the USFWS and NMFS as they manage the PROJECTS program. PDC described under “General Construction” apply to actions that involve construction. PDC described under “Types of Action” are measures that apply to specific types of actions.

1.3.1.1 Program Administration

1. **Full Implementation Required.** Failure to comply with all applicable conditions for a specific project may invalidate protective coverage of ESA section 7(o)(2) regarding “take” of listed species, and may lead NMFS to a different conclusion regarding the effects of that project.

2. **Integration of PDC, Conservation Measures, and Terms and Conditions into Project Design and Contract Language.** The selected contractor shall incorporate appropriate aquatic and terrestrial conservation measures and PDC, along with any terms and conditions, into contract language, force-account implementation plans, cooperative agreements, or other agency-specific means of ensuring compliance.

3. **On-Site Documentation.** The following documentation will be posted at the project site or accessible in the area of work if not feasible to post:
   a. Name(s), phone number(s), and address(es) of the person(s) responsible for oversight will be posted at the work site.
   b. A description of hazardous materials that will be used, including inventory, storage, and handling procedures will be available on-site.
   c. Procedures to contain and control a spill of any hazardous material generated, used or stored on-site, including notification of proper authorities, will be readily available on-site.
   d. A standing order to cease work in the event of high flows (above those addressed in the design and implementation plans) or exceedance of water quality limits will be posted on-site.

1.3.1.2 Project Design Criteria - General Construction Measures

1. **Project Design**
   a. Use the best available scientific information regarding the likely effects of climate change on resources in the project area, including projections of local stream flow and water temperature, to ensure that the project will be adaptable to those changes.
   b. Obtain all applicable regulatory permits and official project authorizations before beginning construction.
   c. Minimize the extent and duration of earthwork, e.g., compacting, dredging, drilling, excavation, and filling.
i. Avoid use of heavy equipment, vehicles or power tools below bankfull elevation unless project specialists determine such work is necessary, or will result in less risk of sedimentation or other ecological damage than work above that elevation.

ii. Complete earthwork in wetlands, riparian areas, and stream channels as quickly as possible.

d. Cease project operations when high flows may inundate the project area, except for efforts to avoid or minimize resource damage.

2. Site Layout and Flagging

a. Before any significant ground disturbance or entry of mechanized equipment or vehicles into the construction area, clearly mark with flagging or survey marking paint the following areas:

   i. Sensitive areas, e.g., wetlands, water bodies, ordinary high water, spawning areas
   ii. Equipment entry and exit points
   iii. Road and stream crossing alignments
   iv. Staging, storage, and stockpile areas

b. Before the use of herbicides, clearly flag no-application buffer zones.

3. Staging, Storage, and Stockpile Areas

a. Designate and use staging areas to store hazardous materials, or to store, fuel, or service heavy equipment, vehicles and other power equipment with tanks larger than 5 gallons, that are at least 150 feet from any natural water body or wetland, or on an established paved area, such that sediment and other contaminants from the staging area cannot be deposited in the floodplain or stream.

b. Natural materials that are displaced by construction and reserved for restoration, e.g., LW, gravel, and boulders, may be stockpiled within the 100-year floodplain.

c. Dispose of any material not used in restoration and not native to the floodplain outside of the functional floodplain.

d. After construction is complete, obliterate all staging, storage, or stockpile areas, stabilize the soil, and revegetate the area.¹

4. Erosion Control

a. Use site planning and site erosion control measures commensurate with the scope of the project to prevent erosion and sediment discharge from the project site.

b. Before significant earthwork begins, install appropriate, temporary erosion controls downslope to prevent sediment deposition in the riparian area, wetlands, or water body.

c. During construction, if eroded sediment appears likely to be deposited in the stream during construction, install additional sediment barriers as necessary.

d. Temporary erosion control measures may include fiber wattles, silt fences, jute matting, wood fiber mulch and soil binder, or geotextiles and geosynthetic fabric.

¹ Road and path obliteration refers to the most comprehensive degree of decommissioning and involves decompacting the surface and ditch, pulling the fill material onto the running surface, and reshaping to match the original contour.
e. Soil stabilization utilizing wood fiber mulch and tackifier (hydro-applied) may be used to reduce erosion of bare soil if the materials are noxious weed free and nontoxic to aquatic and terrestrial animals, soil microorganisms, and vegetation.

f. Remove sediment from erosion controls if it reaches 1/3 of the exposed height of the control.

g. Whenever surface water is present, maintain a supply of sediment control materials and an oil-absorbing floating boom at the project site.

h. Stabilize all disturbed soils following any break in work unless construction will resume within four days.

i. Remove temporary erosion controls after construction is complete and the site is fully stabilized.

5. **Hazardous Material Spill Prevention and Control**

a. At the project site:
   i. Post written procedures for notifying environmental response agencies, including an inventory and description of all hazardous materials present, and the storage and handling procedures for their use.
   ii. Maintain a spill containment kit, with supplies and instructions for cleanup and disposal, adequate for the types and quantity of hazardous materials present.
   iii. Train workers in spill containment procedures, including the location and use of the spill containment kits.

b. Temporarily contain any waste liquids generated under an impervious cover, such as a tarpaulin, in the staging area until the wastes can be properly transported to, and disposed of, at an approved receiving facility.

6. **Equipment, Vehicles, and Power Tools**

a. Select, operate and maintain all heavy equipment, vehicles, and power tools to minimize adverse effects on the environment, e.g., low pressure tires, minimal hard-turn paths for track vehicles, use of temporary mats or plates to protect wet soils.

b. Before entering wetlands or working within 150 feet of a waterbody, replace all petroleum-based hydraulic fluids with biodegradable products.²

c. Invasive species prevention and control.
   i. Before entering the project site, power wash all heavy equipment, vehicles and power tools, allow them to fully dry, and inspect them to make certain no plants, soil, or other organic material is adhering to their surface.

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² For additional information and suppliers of biodegradable hydraulic fluids, motor oil, lubricant, or grease, see Environmentally Acceptable Lubricants by the U.S. EPA (2011); e.g., mineral oil, polyglycol, vegetable oil, synthetic ester; Mobil® biodegradable hydraulic oils, Total® hydraulic fluid, Terresolve Technologies Ltd.® bio-based biodegradable lubricants, Cougar Lubrication® 2XT Bio engine oil, Series 4300 Synthetic Bio-degradable Hydraulic Oil, 8060-2 Synthetic Bio-Degradable Grease No. 2, etc. The use of trade, firm, or corporation names in this opinion is for the information and convenience of the action agency and applicants and does not constitute an official endorsement or approval by the U.S. Department of Commerce or NMFS of any product or service to the exclusion of others that may be suitable.
ii. Before entering the water, inspect any watercraft, waders, boots, or other gear to be used in or near water and remove any plants, soil, or other organic material adhering to the surface.

d. Inspect all equipment, vehicles, and power tools for fluid leaks before they leave the staging area.

e. Before operation within 150 feet of any waterbody, and as often as necessary during operation, thoroughly clean all equipment, vehicles, and power tools to keep them free of external fluids and grease and to prevent leaks and spills from entering the water.

f. Generators, cranes or other stationary heavy equipment operated within 150 feet of any waterbody will be maintained and protected as necessary to prevent leaks and spills from entering the water.

7. **Temporary Access Roads and Paths**
   a. Whenever reasonable, use existing access roads and paths preferentially.
   b. Minimize the number and length of temporary access roads and paths through riparian areas and floodplains.
   d. When it is necessary to remove vegetation, cut at ground level (no grubbing).
   e. Do not build temporary access roads or paths where grade, soil, or other features suggest slope instability.
   f. Any road on a slope steeper than 30% will be designed by a civil engineer with experience in steep road design.
   g. After construction is complete, obliterate all temporary access roads and paths, stabilize the soil, and revegetate the area.
   h. Temporary roads and paths in wet areas or areas prone to flooding will be obliterated by the end of the in-water work window. Decompact road surfaces and drainage areas, pull fill material onto the running surface, and reshape to match the original contours.

8. **Dust Abatement**
   a. Employ dust abatement measures commensurate with soil type, equipment use, wind conditions, and the effects of other erosion control measures.
   b. Sequence and schedule work to reduce the exposure of bare soil to wind erosion.
   c. Maintain spill containment supplies on-site whenever dust abatement chemicals are applied.
   d. Do not use petroleum-based products.
   e. Do not apply dust-abatement chemicals, *e.g.*, magnesium chloride, calcium chloride salts, ligninsulfonate, within 25 feet of a water body, or in other areas where they may runoff into a wetland or water body.
   f. Do not apply ligninsulfonate at rates exceeding 0.5 gallons per square yard of road surface, assuming a 50:50 solution of ligninsulfonate to water.

9. **Temporary Stream Crossings**
   a. No stream crossing may occur at active spawning sites, when holding adult listed fish are present, or when eggs or alevins are in the gravel.
b. Do not place temporary crossings in areas that may increase the risk of channel re-routing or avulsion, or in potential spawning habitat, e.g., pools and pool tailouts.

c. Minimize the number of temporary stream crossings; use existing stream crossings whenever reasonable.

d. Install temporary bridges and culverts to allow for equipment and vehicle crossing over perennial streams to access construction areas.

e. Wherever possible, vehicles and machinery will cross streams at right angles to the main channel.

f. Equipment and vehicles may cross the stream in the wet only where the streambed is bedrock where the streambed is naturally stable, or where mats or off-site logs are placed in the stream and used as a crossing.

g. Obliterate all temporary stream crossings as soon as they are no longer needed, and restore any damage to affected stream banks or channel.

10. **Surface Water Withdrawal and Construction Discharge Water**

   a. Surface water may be diverted to meet construction needs, but only if developed sources are unavailable or inadequate.

   b. Diversions may not exceed 10% of the available flow and will have a juvenile fish exclusion device that is consistent with NMFS’ criteria (NMFS 2011a).³

   c. Treat all construction discharge water using best management practices to remove debris, sediment, petroleum products, and any other pollutants likely to be present (e.g., green concrete, contaminated water, silt, welding slag, sandblasting abrasive, grout cured less than 24 hours, drilling fluids), to ensure that no pollutants are discharged to any perennial or intermittent waterbody.

11. **Fish Passage**

   a. Provide fish passage for any adult or juvenile ESA-listed fish likely to be present in the action area during construction, unless passage did not exist before construction, stream isolation and dewatering is required during project implementation, or the stream is naturally impassable at the time of construction.

   b. After construction, provide fish passage that meets NMFS’ fish passage criteria for any adult or juvenile ESA-listed fish (NMFS 2011a), for the life of the action.

12. **Timing of In-Water Work**

   a. The inwater work window will be identified as the limit to inwater construction specified in the project notification form. The construction schedule will conform to the windows established in Oregon, Washington, and Idaho by the Oregon Department of Fish and Wildlife (ODFW 2008), Washington Department of Fish and Wildlife (WDFW 2010), and Idaho Department of Fish and Game, respectively. Any exceptions to in-water work windows recommended by ODFW, WDFW, or IDFG will be approved by NMFS. In the Willamette River below Willamette Falls, the winter work window (December 1 – January 31) is not approved for actions under this opinion.

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b. Hydraulic and topographic measurements and placement of LW, boulders, or gravel may be completed anytime, provided the affected area is not occupied by adult fish congregating for spawning, or in an area where redds are occupied by eggs or pre-emergent alevins.

13. **Fisheries, Hydrology, Geomorphology, Wildlife, Botany, and Cultural Surveys in Support of Aquatic Restoration** include assessments and monitoring projects that are associated with planning, implementation, and monitoring of aquatic restoration projects covered by this opinion. Such support projects may include surveys to document the following aquatic and riparian attributes: fish habitat, hydrology, channel geomorphology, water quality, fish spawning, fish presence, macroinvertebrates, riparian vegetation, wildlife, and cultural resources (including excavating test pits less than 1 m² in size). This also includes effectiveness monitoring associated with projects implemented under this opinion, provided the effectiveness monitoring is limited to the same survey techniques described in this section.

a. Train personnel in survey methods to prevent or minimize disturbance of fish. Contract specifications should include these methods where appropriate.

b. Avoid impacts to fish redds. When possible, avoid sampling during spawning periods.

c. Coordinate with other local agencies to prevent redundant surveys.

d. Locate excavated material from cultural resource test pits away from stream channels. Replace all material in test pits when survey is completed and stabilize the surface.

e. Does not include research projects that have or should obtain a permit pursuant to section 10(a) of the ESA.

14. **Work Area Isolation**

a. Isolate any work area within the wetted channel from the active stream whenever ESA-listed fish are reasonably certain to be present, or if the work area is less than 300 feet upstream from known spawning habitats. However, work area isolation may not always be necessary or practical in certain settings; i.e., dry streambeds and tidal zones, respectively.

b. Engineering design plans for work area isolation will include all isolation elements.

c. Dewater the shortest linear extent of work area practicable, unless wetted in-stream work is deemed to be minimally harmful to fish, and is beneficial to other aquatic species.

i. Use a coffer dam and a by-pass culvert or pipe, or a lined, non-erodible diversion ditch to divert flow around the dewatered area. Dissipate flow energy to prevent damage to riparian vegetation or stream channel and provide for safe downstream reentry for fish, preferably into pool habitat with cover.

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4 Capture or enumeration by non-lethal techniques, *i.e.*, snorkel, minnow trapping; not hooking or electrofishing.

5 For instructions on how to dewater areas occupied by lamprey, see *Best management practices to minimize adverse effects to Pacific lamprey (Entosphenus tridentatus)* (USFWS 2010).
ii. Where gravity feed is not possible, pump water from the work site to avoid rewatering. Maintain a fish screen on the pump intake to avoid juvenile fish entrainment (NMFS 2011a).

iii. Pump seepage water to a temporary storage and treatment site, or into upland areas, to allow water to percolate through soil or to filter through vegetation before reentering the stream channel with a treatment system comprised of either a hay bale basin or other sediment control device.

iv. Monitor below the construction site to prevent stranding of aquatic organisms.

v. When construction is complete, re-water the construction site slowly to prevent loss of surface flow downstream, and to prevent a release of suspended sediment.

d. Whenever a pump is used to dewater the isolation area and ESA-listed fish may be present, a fish screen will be used that meets the most current version of NMFS’ fish screen criteria (NMFS 2011a). NMFS approval is required for pumping that exceeds 3 cfs.

15. Fish Capture and Release

a. If practicable, allow listed fish species to migrate out of the work area or remove fish before dewatering; otherwise remove fish from an exclusion area as it is slowly dewatered with methods such as hand or dip-nets, seining, or trapping with minnow traps (or gee-minnow traps).

b. Fish capture will be supervised by a qualified fisheries biologist, with experience in work area isolation and competent to ensure the safe handling of fish.

c. Conduct fish capture activities during periods of the day with the coolest air and water temperatures possible, normally early in the morning to minimize stress and injury of species present.

d. Monitor the nets frequently enough to ensure they stay secured to the banks and free of organic accumulation.

e. Electrofishing will be used during the coolest time of day, and only after other means of fish capture are determined to be not feasible or ineffective.

   i. Follow the most recent version of NMFS (2000) electrofishing guidelines.

   ii. Do not electrofish when the water appears turbid, e.g., when objects are not visible at depth of 12 inches.

   iii. Do not intentionally contact fish with the anode.

   iv. Use direct current (DC) or pulsed direct current within the following ranges:

      1. If conductivity is less than 100 µs, use 900 to 1100 volts.

      2. If conductivity is between 100 and 300 µs, use 500 to 800 volts.

      3. If conductivity greater than 300 µs, use less than 400 volts.

   v. Begin electrofishing with a minimum pulse width and recommended voltage, then gradually increase to the point where fish are immobilized.

   vi. Immediately discontinue electrofishing if fish are killed or injured, i.e., dark bands visible on the body, spinal deformations, significant de-scaling, torpid or inability to maintain upright attitude after sufficient recovery.
time. Recheck machine settings, water temperature and conductivity, and adjust or postpone procedures as necessary to reduce injuries.

f. If buckets are used to transport fish:
   i. Minimize the time fish are in a transport bucket.
   ii. Keep buckets in shaded areas or, if no shade is available, covered by a canopy.
   iii. Limit the number of fish within a bucket; fish will be of relatively comparable size to minimize predation.
   iv. Use aerators or replace the water in the buckets at least every 15 minutes with cold clear water.
   v. Release fish in an area upstream with adequate cover and flow refuge; downstream is acceptable provided the release site is below the influence of construction.
   vi. Be careful to avoid mortality counting errors.

   g. Monitor and record fish presence, handling, and injury during all phases of fish capture and submit a fish salvage report (Appendix A) to NMFS within 60 days of capture that documents date, time of day, fish handling procedures, air and water temperatures, and total numbers of each salmon, steelhead and eulachon handled, and numbers of ESA-listed fish injured or killed.

16. Site Restoration
    a. Restore any significant disturbance of riparian vegetation, soils, stream banks or stream channel.
    b. Remove all project related waste; e.g., pick up trash, sweep roadways in the project area to avoid runoff-containing sediment, etc.
    c. Obliterate all temporary access roads, crossings, and staging areas.
    d. Loosen soil in compacted areas when necessary for revegetation or infiltration.
    e. Although no single criterion is sufficient to measure restoration success, the intent is that the following features should be present in the upland parts of the project area, within reasonable limits of natural and management variation:
       i. Human and livestock disturbance, if any, are confined to small areas necessary for access or other special management situations.
       ii. Areas with signs of significant past erosion are completely stabilized and healed, bare soil spaces are small and well-dispersed.
       iii. Soil movement, such as active rills and soil deposition around plants or in small basins, is absent or slight and local.
       iv. Native woody and herbaceous vegetation, and germination microsites, are present and well distributed across the site; invasive plants are minimal or absent.
       v. Plants have normal, vigorous growth form, and a high probability of remaining vigorous, healthy and dominant over undesired competing vegetation.
       vi. 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”).
vii. A continuous corridor of shrubs and trees appropriate to the site are present to provide shade and other habitat functions for the entire streambank/shoreline.

17. **Revegetation**
   a. Plant and seed disturbed areas before or at the beginning of the first growing season after construction.
   b. Use a diverse assemblage of vegetation species native to the action area or region, including trees, shrubs, and herbaceous species. Vegetation, such as willow, sedge and rush mats, may be gathered from abandoned floodplains, stream channels, etc. When feasible, use vegetation salvaged from local areas scheduled for clearing due to development.
   c. Use species that will achieve shade and erosion control objectives, including forb, grass, shrub, or tree species that are appropriate for the site and native to the project area or region.
   d. Short-term stabilization measures may include use of non-native sterile seed mix if native seeds are not available, weed-free certified straw, jute matting, and similar methods.
   e. Do not apply surface fertilizer within 50 feet of any wetland or water body.
   f. Install fencing as necessary to prevent access to revegetated sites by livestock or unauthorized persons.
   g. Do not use invasive or non-native species for site restoration.
   h. Conduct post-construction monitoring and treatment to remove or control invasive plants until native plant species are well-established.

1.3.1.3 Project Design Criteria – Types of Restoration Actions

Projects within the 18 aquatic restoration activity categories will be designed and implemented to help restore watershed and coastal processes. These projects are designed to improve channel dimensions and stability, sediment transport and deposition, and riparian, wetland, floodplain and hydrologic functions, as well as water quality.

As such, these improvements may help address limiting factors related to spawning, rearing, and migration of ESA-listed fish species. Aquatic habitat restoration and enhancement projects are conducted within stream channels, adjacent riparian/floodplain areas, wetlands, nearshore coastal habitats, and uplands.

18. **Fish Passage Restoration** includes the following: total removal, replacement, or resetting of culverts or bridges; stabilizing headcuts and other channel instabilities; removing, relocating, constructing, repairing, or maintaining fish ladders; and replacing, relocating, or constructing fish screens and irrigation diversions. Such projects will take place where fish passage has been partially or completely eliminated.
   a. **Stream simulation culvert and bridge projects.** All road-stream crossing structures shall adhere to the most recent version of NMFS fish passage criteria (NMFS 2011a) located at:
NMFS engineering review, if required, shall occur at the conceptual, post-modeling, and final design phases, which is approximated by 30%, 60%, and 90% designs.

b. All road-stream crossing structures shall simulate stream channel conditions per industry design standards found in any one of the following:
   i. *Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings* (USDA-Forest Service 2008) or the most recent version, located at: http://stream.fs.fed.us/fishxing/aop_pdfs.html
   ii. *Part XII Fish Passage Design and Implementation, Salmonid Stream Habitat Restoration Manual* (California Department of Fish and Game 2009) or the most recent version, located at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=12512

c. **General road-stream crossing criteria**
   i. Span
      1. Span is determined by the crossing width at the proposed streambed grade.
      2. Single span structures will maintain a clear, unobstructed opening above the general scour elevation that is at least as wide as 1.5 times the active channel width.
      3. Multi-span structures will maintain clear, unobstructed openings above the general scour elevation (except for piers or interior bents) that are at least as wide as 2.2 times the active channel width.
      4. Entrenched streams: If a stream is entrenched (entrenchment ratio of less than 1.4), the crossing width will accommodate the floodprone width. Floodprone width is the channel width measured at twice the maximum bankfull depth (Rosgen 1996).
      5. Minimum structure span is 6ft.
   ii. Scour Prism
      1. Designs shall maintain the general scour prism, as a clear, unobstructed opening (*i.e.*, free of any fill, embankment, scour countermeasure, or structural material to include abutments, footings, and culvert inverts). No scour or stream stability countermeasure may be applied above the general scour elevation.
      2. When bridge abutments are set back beyond the applicable criteria span they may be located above the general scour elevation.
   iii. Embedment
      1. All culvert footings and inverts shall be placed below the thalweg at a depth of 3 feet, or the Lower Vertical Adjustment Potential (LVAP) line, whichever is deeper.
a. LVAP, as calculated in *Stream Simulation: An ecological approach to providing passage for aquatic organisms at road crossings* (USDA-Forest Service 2008)

2. In addition to embedment depth, embedment of closed bottom culverts shall be between 30% and 50% of the culvert rise.

iv. Bridges

1. Primary bridge structural elements will be concrete, metal, fiberglass, or untreated timber. The use of treated wood for bridge construction or replacement is not allowed under this opinion. Old railroad cars, which are commonly used as bridges, may have treated wood decking. Sample for the presence of treatment chemicals and replace treated elements with untreated wood.

2. All concrete will be poured in the dry, or within confined waters not connected to surface waters, and will be allowed to cure a minimum of 7 days before contact with surface water as recommended by Washington State Department of Transportation (2010).

3. Riprap will not be placed within the bankfull width of the stream. Riprap may only be placed below bankfull height when necessary for protection of abutments and pilings. The amount and placement of riprap will not constrict the bankfull flow.

4. Temporary work bridges will also meet NMFS (2011a) (or the latest version).

v. **NMFS fish passage review and approval.** NMFS will review crossing structure designs if the span width is determined to be less than the criteria established above or if the design is inconsistent with criteria in *Anadromous Salmonid Passage Facility Design* (NMFS 2011a).

d. **Headcut and grade stabilization.** Headcuts (vertical off-sets in the streambed) often occur in meadow areas, where floodplain soils are fine textured. Headcuts may develop because of channel straightening, channel avulsion, or loss of riparian vegetation.

i. Methods

1. In streams with current or historical fish presence, provide fish passage over a stabilized headcut through use of morphologically appropriate grade control. This includes constructed riffles for riffle-pool morphologies, rough constructed riffles/ramps for plane bed morphologies, wood jams, rock bands, and boulder weirs for step-pool morphologies, and roughened channels for cascade morphologies as described in part ii below.

2. Grade control materials can include both rock and LW. Material shall not in any part consist of gabion baskets, sheet piles, concrete, articulated concrete blocks, or cable anchors.

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

4. Short-term headcut stabilization (including emergency stabilization projects) may occur without associated fish passage measures. However, fish passage will be incorporated into the final headcut stabilization action and be completed during the first subsequent in-water work period.

ii. Grade Stabilization to Promote Fish Passage

1. **NMFS fish passage review and approval.** NMFS will review all projects containing grade control, stream stability, or headcut countermeasures that are proposed to promote fish passage.

2. Provide fish passage over grade control structures through use of constructed riffles for pool/riffle streams or a series of log or rock structures for step/pool channels. If LW and boulder placement is used for headcut stabilization, refer to Large Wood, Boulder, and Gravel Placement (PDC 34) below.

3. Construct structures in a ‘V’ or ‘U’ shape, oriented with the apex upstream, lower in the center to direct flows to the middle of channel.

4. Key structures into the stream bed to minimize structure undermining due to scour, preferably at least 2.5 times their exposure height. The structures should also be keyed into both banks—if feasible greater than 8 feet.

5. If several structures will be used in series, space them at the appropriate distances to promote fish passage of all life stages of native fish. Incorporate NMFS (2011a) fish passage criteria (jump height, pool depth, etc.) in the design of step structures. Recommended spacing should be no closer than the net drop divided by the channel slope (for example, a one-foot high step structure in a stream with a two-percent gradient will have a minimum spacing of 50-feet [1/0.02]).

6. Include gradated (cobble to fine) material in the rock structure material mix to help seal the structure/channel bed, thereby preventing subsurface flow and ensuring fish passage immediately following construction if natural flows are sufficient.

7. If a project involves the removal of multiple barriers on one stream or in one watershed over the course of a work season, remove the most upstream barrier first if possible.
Attachment 5

Oregon Department of Fish & Wildlife

Fish Passage Administrative Rules
635-412-0005
Definitions
(1) For the purposes of OAR 635-412-0010 through OAR 635-412-0040 the following definitions shall apply.
(2) "Active channel width" means the stream width between the ordinary high water lines, or at the channel bankfull elevation if the ordinary high water lines are indeterminate.
(3) "Artificial obstruction" means any dam, diversion, dike, berm, levee, tide or flood gate, road, culvert or other human-made device placed in the waters of this state that precludes or prevents the migration of native migratory fish.
(4) "Attraction flow" means the flow that emanates from or near a fishway entrance in sufficient quantity, velocity, and location to attract upstream migrants into the fishway, which can consist of gravity flow from the fish ladder and auxiliary water system flow added in or near the lower ladder.
(5) "Bankfull elevation" means the point on a stream bank at which overflow into a floodplain begins.
(6) "Bed" or "bed and banks" means the physical container of the waters of this state, bounded on freshwater bodies by the ordinary high water line or bankfull stage, and on bays and estuaries by the limits of the highest measured tide.
(7) "Channel" means a waterway that periodically or continuously contains moving waters of this state and has a definite bed and banks that serve to confine the water.
(8) "Commission" means the Oregon Fish and Wildlife Commission.
(9) "Construction" means:
(a) Original construction;
(b) Major replacement, which includes:
(A) for dams and diversions, excavation or replacement of 30 percent by structure volume of the dam, including periodic or seasonal replacements, unless:
(i) only checkboards are replaced, or
(ii) fish passage approval has already been obtained in writing from the Department for expected replacement;
(B) for tide gates and flood gates:
(i) cumulative replacement of over 50 percent of the gate material, or,
(ii) cumulative removal, fill, replacement, or addition of over 50 percent of the structure supporting the gate, excluding road-stream crossing structures;
(C) for dikes, berms, levees, roads, or other artificial obstructions that segment estuaries, floodplains, or wetlands:
(i) activities defined under OAR 635-412-0005(9)(d) in all locations where current channels cross the artificial obstruction segmenting the estuary, floodplain, or wetland, or
(ii) the cumulative removal, fill, replacement, or addition of over 50 percent by volume of the existing material directly above an historic channel or historically-inundated area; and
(D) for other artificial obstructions, the cumulative removal, fill, replacement, or addition of over 50 percent of the structure comprising the artificial obstruction to native migratory fish migration;
(c) Structural modifications that increase storage or diversion capacity; or
(d) For purposes of culverts, installation or replacement of a roadbed or culvert, further defined as:
(A) roadbed installation or replacement at culverts includes any activity that:
(i) creates a road which crosses a channel,
(ii) widens a roadfill footprint within a channel, or
(iii) fills or removes over 50 percent by volume of the existing roadbed material directly above a culvert, except when this volume is exclusively composed of the top 1 foot of roadbed material;
(B) culvert installation or replacement includes any activity that:
(i) installs or constructs a new culvert, overflow pipe, apron, or wingwall within a channel,
(ii) extends existing culverts, aprons, or wingwalls within a channel, except one-time placements of culvert ends which do not extend greater than 1 foot beyond the adjacent road footprint in place prior to August 2001,
(iii) cumulatively through time makes significant repairs or patches to over 50 percent of the linear length of a culvert,
(iv) replaces any part of a culvert, except ends which become misaligned or eroded and which are replaced to their original configuration,
(v) at any point along the linear length of a culvert, reduces the entire inside perimeter of the culvert, or
(vi) makes replacements, repairs, patches, or modifications to an existing culvert that are different than the original configuration and which reduce any level of fish passage for native migratory fish with current access, as determined by the Department, to the culvert.
(10) "Dam" means a structure, or group of structures with different functions, spanning or partially-spanning a stream in one location in order to pool water, facilitate the diversion of water, or raise the water surface elevation.
(11) "Department" means the Oregon Department of Fish and Wildlife.
(12) "Director" means the Director of the Oregon Department of Fish and Wildlife.
(13) "Design streamflow range" means the range of flow within a stream, bracketed by the Low Fish Passage Design Flow and the High Fish Passage Design Flow, for which a fishway shall provide fish passage.
(14) "Emergency" means unforeseen circumstances materially related to or affected by an artificial obstruction that, because of adverse impacts to a population of native migratory fish, requires immediate action.
(15) "Estuary" means a body of water semi-enclosed by land and connected with the open ocean within which salt water is usually diluted by fresh water derived from the land. "Estuary" includes all estuarine waters, tidelands, tidal marshes and submerged lands extending upstream to the head of tidewater. However, for the purposes of these rules, the Columbia River Estuary extends to the western edge of Puget Island.
(16) "Exclusion barrier" means a structure placed that prevents fish passage for the benefit of native migratory fish.
(17) "Experimental fish passage structure" means a fish passage structure based on new ideas, new technology, or unique, site-specific conditions determined by the Department to not be covered by existing fish passage criteria but to have a reasonable possibility of providing fish passage.
(18) "Fish passage" means the ability, by the weakest native migratory fish and life history stages determined by the Department to require passage at the site, to move volitionally, with minimal stress, and without physical or physiological injury upstream and downstream of an artificial obstruction.
(19) "Fish passage structure" means any human-built structure that allows fish passage past an artificial obstruction, including, but not limited to, fishways and road-stream crossing structures such as culverts and bridges.
(20) "Fishway" means the set of human-built and/or operated facilities, structures, devices, and measures that together constitute, are critical to the success of, and were created for the sole purpose of providing upstream fish passage at artificial or natural obstructions which create a discontinuity between upstream and downstream water or bed surface elevations.
(21) "Fishway entrance" means the component of a fishway that discharges attraction flow into the tailrace and where upstream migrant fish enter the fishway.
(22) "Fishway pools" means discrete sections within a fishway separated by overflow weirs or non-overflow walls that create incremental water surface elevation gains and dissipate energy.
(23) "Floodplain" means that portion of a river valley, adjacent to the channel, which is built of sediments deposited during the present regimen of the stream and which is covered with water when the waterway overflows its banks at flood stage.
(24) "Forebay" means the water impounded immediately upstream of an artificial obstruction.
(25) "Fundamental change in permit status" means a change in regulatory approval for the operation of an artificial obstruction where the regulatory agency has discretion to impose additional conditions on the applicant, including but not limited to licensing, relicensing, reauthorization or the granting of new water rights, but not including water right transfers or routine maintenance permits unless they involve construction or abandonment of an artificial obstruction.
(26) "High fish passage design flow" means the mean daily average stream discharge that is exceeded 5 percent of the time during the period when the Department determines that native migratory fish require fish passage.
(27) "Historically" means prior to 1859 (statehood).
(28) "Inflow" means surface movement of waters of this state from a lower ground surface elevation to a higher ground surface elevation or away from the ocean.
(29) "In-proximity" means within the same watershed or water basin, as defined by the Oregon Water Resources Department, and having the highest likelihood of benefiting the native migratory fish populations, as defined by the Oregon Department of Fish and Wildlife, directly affected by an artificial obstruction.
(30) "Low fish passage design flow" means the mean daily average stream discharge that is exceeded 95 percent of the time, excluding days with no flow, during the period when the Department determines that native migratory fish require fish passage.
(31) "Mitigation" means alternatives to providing fish passage at an artificial obstruction as per ORS 509.585.
(32) "Native migratory fish" means native fish (as defined under OAR 635-007-0501) that migrate for their life cycle needs. These fish include all sub-species and life history patterns of the following species listed by scientific
name in use as of 2005. Common names are provided for reference but are not intended to be a complete listing of common names, sub-species, or life history patterns for each species.

(a) Acipenser medirostris ...... Green Sturgeon
(b) Acipenser transmontanus ...... White Sturgeon
(c) Amphistichus rhodoterus ...... Redtail surfperch
(d) Catostomus columbianus ...... Bridgelip sucker
(e) Catostomus luxatus/Deltistes luxatus ...... Lost River sucker
(f) Catostomus macrochelius ...... Largescaler sucker
(g) Catostomus microps ...... Modoc sucker
(h) Catostomus occidentalis ...... Goose Lake sucker
(i) Catostomus platyrhynchos ...... Mountain sucker
(j) Catostomus rinculus ...... Klamath smallscale sucker
(k) Catostomus snyderi ...... Klamath largescale sucker
(l) Catostomus tahoensis ...... Tahoe sucker
(m) Catostomus warnerensis ...... Warner sucker
(n) Chasmistes breviostris ...... Shortnose sucker
(o) Hypomesus pretiosus ...... Surf smelt
(p) Lampetra ayresi ...... River lamprey
(q) Lampetra lethophaga ...... Pit-Klamath lamprey
(r) Lampetra minima ...... Miller Lake lamprey
(s) Lampetra similes ...... Klamath River lamprey
(t) Lampetra tridentate ...... Pacific lamprey
(u) Oncorhynchus clarki ...... Coastal, Lahontan and West Slope cutthroat trout
(v) Oncorhynchus keta ...... Chum salmon
(w) Oncorhynchus kisutch ...... Coho salmon
(x) Oncorhynchus mykiss ...... Steelhead, Rainbow and Redband trout
(y) Oncorhynchus nerka ...... Sockeye/Kokanee salmon
(z) Oncorhynchus tshawytscha ...... Chinook salmon
(aa) Prosopium williamsoni ...... Mountain whitefish
(bb) Ptychocheilus oregonensis ...... Northern pikeminnow
(cc) Ptychocheilus umpquae ...... Umpqua pikeminnow
(dd) Salvelinus confluentus ...... Bull trout
(ee) Spirinchus thaleichthys ...... Longfin smelt
(ff) Thaleichthys pacificus ...... Eulachon

(33) "Net benefit" means an increase in the overall, in-proximity habitat quality or quantity that is biologically likely to lead to an increased number of native migratory fish after a development action and any subsequent mitigation measures have been completed.

(34) "Ordinary high water line" (OHWL) means the line on the bank or shore to which the high water ordinarily rises annually in season. (Note: see OAR 141-085-0010 for physical characteristics that can be used to determine the OHWL in the field.)

(35) "Oregon Plan" means the guidance statement and framework described in ORS 541.405.

(36) "Over-crowding" means fish density within a pool's wetted volume is such that there is less than 0.25 cubic feet of water per pound of fish for the maximum number of fish expected to be present within the pool at the same time, as determined by the Department.

(37) "Road" means a cleared or built surface, and associated materials or measures for support and safety, used for the purpose of motorized or non-motorized movement between different locations.

(38) "Roadfill footprint" means the area occupied by soil, aggregate, and/or other materials or structures necessary to support a road, including, but not limited to, appurtenant features such as wing walls, retaining walls, or headwalls.

(39) "Stream" means a body of running waters of this state moving over the surface of the land in a channel or bed including stream types classified as perennial or intermittent and channelized or relocated streams.

(40) "Sub-basin" means a 4th-field hydrologic unit as defined by the U.S. Geological Survey.

(41) "Tailrace" means the water immediately downstream of an instream structure.

(42) "Temporary" means in place less than the in-water work period defined by the Department for a particular location.

(43) "Trap" means the set of human-built and/or operated facilities, structures, devices, and measures that hold fish and prevent them from passing volitionally.
"Unforeseen circumstances" means:
(a) An event that causes an existing human-made structure in the waters of the state which provides fish passage to become an artificial obstruction, or
(b) New fish population information indicating that an existing artificial obstruction is placing a local native migratory fish population in jeopardy.

"Volitionally" means with minimal delay and without being trapped, transferred, or handled by any person, unless specifically allowed under OAR 635-412-0035(6).

"Waters of this state" means natural waterways including all tidal and non-tidal bays, intermittent and perennial streams, constantly flowing streams, lakes, wetlands and other bodies of water in this state, navigable and non-navigable, including that portion of the Pacific Ocean that is within the boundaries of Oregon.

"Wetlands" means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

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635-412-0010
Fish Passage Task Force

(1) The Director shall appoint nine members to constitute the Fish Passage Task Force.
(2) Three members shall represent interests subject to the obligation to install passage at facilities they install, own or operate; three members shall represent fishing, environmental or conservation interests, and three members shall represent the general public.
(3) Members shall serve four-year terms, and shall be eligible for re-appointment to the task force, except that the initial designation of members shall appoint members of each interest group to a three year, four year or five year term to establish a staggered system of new appointments for each interest group’s members.
(4) The Task Force shall:
(a) serve as the public advisory committee and advise the Director and Commission regarding rulemaking to implement the fish passage and waiver requirements;
(b) prioritize projects from the statewide inventory of artificial dams and obstructions for purposes of enforcement;
(c) recommend to the Director and Commission appropriate levels of funding and special conditions applicable to projects installing passage or alternatives to passage resulting in a net benefit to native migratory fish;
(d) select one of its members to serve as chair and one as vice chair of the Task Force;
(e) review and recommend to the Commission which projects should be exempt, and changes to the list of projects exempt from passage requirements under Section 8 of Section 2 of HB 3002 (2001);
(f) report semiannually to the joint legislative committee created under ORS 171.551, or to the appropriate interim legislative committee with responsibility for salmon restoration or species recovery, advising the committee on matters related to fish passage;
(g) review applications for waivers of the fish passage requirement, and advise the Commission as to whether alternative measures result in a net benefit to native migratory fish;
(h) perform such other duties relating to fish passages requested by the Director or Commission;
(i) meet at such times and places as may be determined by the chair or by a majority of members of the task force.
(5) The Department’s Fish Passage Coordinator shall serve as staff for the task force.
(6) The chair of the Task Force shall conduct the meetings of the task force, serve as the main contact point between the Department and Commission and the Task Force and perform such other duties as the Task Force shall set. The vice chair of the task force shall serve as chair if the chair is unavailable to carry out the duties of chair.
(7) Members of the Task Force may not receive compensation for services as a member of the Task Force; however, in accordance with ORS 292.495, a member of the Task Force may receive reimbursement for actual and necessary travel or other expenses incurred in the performance of official duties.

Stat. Auth.: HB 3002
Stats. Implemented: HB 3002
Hist.: Adopted 1-24-02, ef. upon filing
Prioritization

(1) The Department shall establish for enforcement purposes a list of priority artificial obstructions at which fish passage would provide the greatest benefit to native migratory fish.

(2) The priority list shall be based on the needs of native migratory fish.

(a) The prioritization shall consider the following factors relative to each artificial obstruction for all native migratory fish currently or historically present at the artificial obstruction:

(A) the quantity of native migratory fish habitat which is inaccessible,

(B) the quality of native migratory fish habitat which is inaccessible,

(C) unique or limited native migratory fish habitat which is inaccessible, or should remain inaccessible for fish management purposes,

(D) the biological status of the native migratory fish,

(E) the level of fish passage currently provided at the artificial obstruction,

(F) the presence of other artificial obstructions upstream and downstream and the timeframe native migratory fish will be able to utilize restored passage, and

(G) existing agreements with the Department regarding fish passage.

(b) The prioritization may utilize existing Department information or professional judgment in the absence of information specific to a given site.

(c) The priority list shall contain one artificial obstruction per Oregon sub-basin, which shall be ranked across the state.

(d) The Department shall verify the information used for prioritization prior to enforcement actions.

(e) The Department shall re-evaluate the priority list with the most recent information after enforcement occurs at five priority artificial obstructions or as directed by the Commission.

(3) The Commission shall review, approve, or amend the priority list after the initial priority list is developed, when the Department re-prioritizes, and no less frequently than once every five years.

(4) Once the Commission has approved the priority list, the Department may order a person owning or operating an artificial obstruction on the priority list who has been issued a water right, owns a lawfully installed culvert or owns another lawfully installed obstruction to install fish passage or to provide mitigation if:

(a) the Department can arrange for non-owner or non-operator funding of at least 60 percent of the cost for fish passage design, construction, and installation, and

(b) the artificial obstruction is ranked in the top ten for the state or highest within a Department Region on the priority list.

(5) Once the Department has arranged for non-owner or non-operator funding of at least 60 percent of the cost for fish passage design, construction, and installation at an artificial obstruction the owner or operator has two years to:

(a) install a fish passage structure according to a fish passage plan approved by the Department, or

(b) provide mitigation that the Commission determines is a net benefit to native migratory fish.

Fish Passage Approval

(1) No person shall construct or maintain any artificial obstruction across any waters of this state that are inhabited, or were historically inhabited, by native migratory fish without providing passage for native migratory fish.

(2) Prior to construction, fundamental change in permit status or abandonment of an artificial obstruction in any waters of this state, a person owning or operating an artificial obstruction shall obtain a determination from the Department as to whether native migratory fish are or were historically present in the waters, unless the owner or operator assumes the presence of native migratory fish.

(3) If the Department determines, or the owner or operator assumes, that native migratory fish are or were historically present in the waters, prior to construction, fundamental change in permit status, or abandonment of the artificial obstruction the person owning or operating the artificial obstruction shall either:
(a) Obtain from the Department an approval determination of a fish passage plan that meets the requirements of OAR 635-412-0035 for the specific artificial obstruction.
(b) obtain from the Department a programmatic approval of a fish passage plan for multiple artificial obstructions of the same type. The Department may also grant programmatic approval to an agent for multiple owners or operators of artificial obstructions of the same type. Programmatic approvals are only valid so long as the owner or operator complies with the conditions of the programmatic approval. The Department shall only provide programmatic approval if:
(A) fish passage structures placed under the programmatic approval meet criteria determined by the Department,
(B) the owner, operator, or agent demonstrates to the Department prior experience providing or approving acceptable fish passage structures,
(C) the owner, operator, or agent reports installation information annually to the Department, including but not limited to the location and installation date of all fish passage structures placed under the programmatic approval,
(D) the owner or operator allows, or the agent requires owners or operators to allow, the Department to inspect fish passage structures placed under the programmatic approval at reasonable times, and
(E) the owner, operator, or agent agrees to expeditiously remedy all fish passage structures placed under the programmatic approval which the Department finds do not meet the criteria or conditions of the programmatic approval,
(c) pursuant to ORS 527.710(6), install and maintain road-stream crossing structures on non-federal forestlands in compliance with State Board of Forestry, through the Oregon Department of Forestry, rules and guidelines. These rules and guidelines require concurrence by the Oregon Department of Fish and Wildlife that they meet the purposes of the Department's fish passage program,
(d) obtain a waiver from fish passage requirements for the artificial obstruction as provided in OAR 635-412-0025, or
(e) obtain an exemption from fish passage requirements for the artificial obstruction as provided in OAR 635-412-0025.
(4) Fish passage plans shall provide for and be implemented such that fish passage is installed at the artificial obstruction prior to completion of or by the end of the same in-water work period as the action which triggered fish passage requirements under subsection (2), unless:
(a) an owner or operator demonstrates to the Department an imminent or immediate threat to human safety which requires construction at a failed artificial obstruction prior to being able to complete the requirements of subsection (3), and the Department approves a fish passage plan in which the requirements of subsection (3) shall be met by the end of the next in-water work period or as soon as practicable. Providing passage at the time of construction is preferred,
(b) the Commission finds that additional time is necessary and appropriate given the size and scope of the project,
(c) installation begins within this period and the Department finds that additional time to complete installation is necessary and appropriate given the size and scope of the project, or
(d) the Department finds that additional time is necessary and appropriate as part of the terms and conditions of a negotiated settlement for a federal proceeding, or in coordination with other federal requirements.

Stat. Auth.: ORS 496.138
Stats. Implemented: ORS 509.585 and ORS 509.645
Hist.: Adopted 1-6-06, f. & certified ef. 1-9-06

635-412-0025
Fish Passage Waivers and Exemptions
(1) Waivers from fish passage requirements shall be granted for an artificial obstruction if the Commission (or Department, as applicable) determines that mitigation rather than fish passage proposed by the person owning or operating the artificial obstruction provides a net benefit to native migratory fish.
(2) Net benefit to native migratory fish is determined by comparing the benefit to native migratory fish that would occur if the artificial obstruction had fish passage to the benefit to native migratory fish that would occur using the proposed mitigation. To qualify for a waiver of the requirement to install fish passage, mitigation shall result in a benefit to fish greater than that provided by the artificial obstruction with fish passage. The net benefit to fish determination shall be based upon conditions that exist at the time of comparison.
(3) Waivers shall be valid so long as the owner or operator continues to provide the agreed-upon mitigation measures and until the waived artificial obstruction undergoes further construction, a fundamental change in permit status, or abandonment.

(4) The Commission (or Department as applicable) may grant exemptions from fish passage requirements at an artificial obstruction if it is determined that:
(a) a lack of fish passage has been effectively mitigated;
(b) the owner or operator has received a legal waiver for the artificial obstruction from the Commission or the Department; or
(c) there is no appreciable benefit to providing fish passage.

(5) For exemptions granted under subsection (4)(a) and (4)(b), the exemption continues only so long as the original benefit of the mitigation is maintained.

(6) The Commission shall review, at least once every seven years, exempt artificial obstructions that do not have exemption expiration date to determine whether the exemption should continue. The Commission may revoke or amend an exemption if it finds that circumstances have changed such that the basis for the exemption no longer applies. An exemption granted as a result of an action which triggered fish passage requirements under OAR 635-412-0020(2) tolls the trigger event until the exemption is revoked.

(7) To obtain a waiver or an exemption from fish passage requirements, an owner or operator of an artificial obstruction shall obtain from and submit to the Department an application for the waiver or exemption.

(8) Based on application review, verification and site-specific knowledge, Department staff shall provide a written benefit analysis of whether the waiver request meets the requirements of subsection (1) or the exemption request meets the requirements of subsections (4) and (5). If there is some level of fish passage at the artificial obstruction, but it does not meet the requirements of OAR 635-412-0035, that passage shall be factored into the Department's net benefit analysis, allowing a reduction in required mitigation.

(9) To receive a waiver, or an exemption under subsection (4)(a), an owner or operator of an artificial obstruction shall enter an agreement with the Commission (or Department as applicable) that clearly describes timelines, duties, responsibilities, and options regarding the mitigation. The agreement shall state that the mitigation shall be completed prior to completion of or by the end of the same in-water work period as the action which triggered fish passage requirements under OAR 635-412-0020(2), unless the Commission finds that additional time is necessary and appropriate:
(a) given the size and scope of the project or
(b) to coordinate with requirements of federal proceedings.

(10) Once the application, analysis, and a draft agreement are completed, a decision on whether the waiver or exemption shall be granted shall be made by:
(a) the Department:
(A) if it determines that the total stream distance, including tributaries, affected by the artificial obstruction for which the waiver or exemption is being sought is less than or equal to 1 mile to a natural barrier;
(B) if the request is for an exemption under subsection (4)(a) or (4)(b); or,
(C) for re-authorization of an existing hydroelectric project subject to ORS 543A.030 to ORS 543A.055 and not subject to federal hydroelectric relicensing; and
(b) the Commission:
(A) in all other instances; or
(B) if the Department refers a decision to the Commission; or
(C) if the owner or operator files a protest of the Department's determination to the Commission.

(11) The decision to grant a waiver or exemption shall include the determination described in subsection (1) or (4) as well as approval of the agreement required in subsection (9).

(12) In addition to the Fish Passage Task Force as prescribed in OAR 635-412-0010(4)(e) and (g), the Department shall notify local watershed council(s), local soil and water conservation district(s), identified stakeholders, and others who have expressed an interest in fish passage issues or the specific waiver or exemption request and provide an opportunity to comment on the request at least three weeks prior to a decision on whether the waiver or exemption should be granted.

(13) The Commission (or Department, as applicable) may require further public comment prior to a decision on whether a waiver or exemption should be granted.

(14) The Department shall maintain a database of the locations of waived and exempted artificial obstructions and mitigation.

Stat. Auth.: ORS 496.138
Stats. Implemented: ORS 509.585 and ORS 509.645
Hist.: Adopted 1-6-06, f. & certified ef. 1-9-06
635-412-0030
Fish Passage Protests
(1) A person owning or operating an artificial obstruction may request alternative dispute resolution at any point in the process of determining fish passage requirements.
(2) The owner or operator of the artificial obstruction who objects to a determination made by the Department under these rules may file a protest with the Commission. Protests must be submitted in writing within 30 days of receipt of a written determination from the Department and must include the grounds for protesting the Department's determination.
(3) The Commission may approve, deny, or modify the Department's determination after sufficient opportunity for public review and comment.
(4) If a protest is not filed within 30 days of receipt of a written determination from the Department, the Department's determination shall become a final order.

Stat. Auth.: ORS 496.138
Stats. Implemented: ORS 509.585 and 509.645
Hist.: Adopted 11-12-04, filed and ef. 11-17-04

635-412-0035
Fish Passage Criteria
(1) General requirements for fish passage are:
(a) unless the owner or operator of an artificial obstruction chooses to provide year-round fish passage for all native migratory fish and life history stages, the Department shall determine:
(A) native migratory fish currently or historically present at the site which require fish passage,
(B) life history stages which require fish passage, and
(C) dates of the year and/or conditions when passage shall be provided for the life history stages and native migratory fish;
(b) the person submitting the fish passage plan to the Department for approval shall submit all information necessary to efficiently evaluate whether the design will meet fish passage criteria;
(c) if site-specific circumstances indicate that the fish passage criteria are not adequate to provide fish passage, the Department may require in writing that additional fish passage criteria be met;
(d) if native migratory fish- or site-specific circumstances warrant it, the Department may provide an exception to any specific fish passage criterion if the Department determines in writing that fish passage shall still be provided;
(e) all fish passage structures shall be designed to take into consideration their upstream and downstream connection and prevent undesirable impacts to fish passage, including but not limited to scour and headcuts;
(f) if joint state and federal approval is required, the Department shall take into account federal requirements during approval;
(g) primarily at sites with little existing site information or questionable design solutions, the Department may require monitoring and reporting to determine if a fish passage structure meets applicable criteria and/or is providing fish passage; and
(h) the person owning or operating an artificial obstruction shall maintain the fish passage structure in such repair and operation as to provide fish passage of native migratory fish at all times required by the Department.
(2) Requirements for fish passage at dams and other artificial obstructions which create a discontinuity between upstream and downstream water surface or streambed elevations are:
(a) fishways shall provide fish passage at all flows within the design streamflow range;
(b) the fishway entrance shall be located and adequate attraction flow shall be provided at one or more points where fish can easily locate and enter the fishway;
(c) fishway water velocities shall:
(A) range between 1 and 2 feet per second in transport channels,
(B) average no greater than 5 feet per second in baffled-chute fishways, including but not limited to Alaska steeppasses and denils, and
(C) not exceed 8 feet per second in discrete fishway transitions between the fishway entrance, pools, and exit through which fish must swim to move upstream, including but not limited to slots, orifices, or weir crests;
(d) at any point entering, within, or exiting the fishway where fish are required to jump to move upstream, the maximum difference between the upstream and downstream water surface elevations shall be 6 inches, except it shall be 12 inches if only salmon or steelhead adults require fish passage;
(e) in fishway locations through which fish must swim, water depths shall be a minimum of 6 inches where only juveniles require passage and 12 inches where adults require passage, except:
(A) baffled-chute fishways, including but not limited to Alaska steeppasses and denils, shall have a minimum flow depth of 2 feet throughout the length of the fishway, and
(B) water depths shall be a minimum of 2 feet within jump pools which shall be located downstream of any point entering, within, or exiting the fishway where fish are required to jump to move upstream;
(f) all fishway locations through which fish must swim shall be at least 12 inches wide;
(g) fishway pools shall:
(A) be sized according to the native migratory fish and life history stages requiring passage and to avoid over-crowding,
(B) have $V \geq wQH/4$ at all flows within the design streamflow range, where:
   (i) "$V$" is the water volume in cubic feet,
   (ii) "$w$" is 62.4, the unit weight of water, in pounds per cubic foot,
   (iii) "$Q$" is the fish ladder flow in cubic feet per second,
   (iv) "$H$" is the energy head of pool-to-pool flow in feet, and
   (v) 4 has a unit of foot-pounds per second per cubic foot,
(C) where the fishway bends 90 degrees or more, have turning pools with a flowpath centerline double the length of non-turning pools, and
(D) be placed at least every 25 feet of horizontal distance in baffled-chute fishways, including but not limited to Alaska steeppasses and denils;
(h) the fishway exit should be located to minimize the risk of fish unintentionally falling downstream of the artificial obstruction;
(i) fishway trash racks shall:
(A) allow for easy maintenance and debris removal,
(B) have a minimum clear space between vertical members of 9 inches, except:
   (i) 10 inches shall be provided if adult chinook are present, and
   (ii) at least 4 inches shall be provided if only juveniles are present, and
(C) have a minimum clear space between horizontal members of 12 inches;
(j) the fishway shall:
(A) have water temperatures which are within 1 degree Fahrenheit of the water entering the fishway,
(B) be designed to assure that fish do not leap out of the fishway,
(C) have all edges and fasteners which fish may contact ground smooth or chamfered,
(D) not have protrusions extend into the flow path of the fishway,
(E) have as much ambient lighting as possible,
(F) have fishway components which are not detailed in OAR 635-412-0035(2), including but not limited to auxiliary water systems, designed considering the most recent National Marine Fisheries Service or U.S. Fish and Wildlife Service fish passage criteria and guidelines, and
(G) meet the species-specific requirements in OAR 635-412-0035(7) if any of those native migratory fish require fish passage;
(k) requirements for specific types of fishways include:
(A) baffled-chute fishways, including but not limited to Alaska steeppasses and denils, shall not be used in areas where downstream passage will occur through the baffled-chute fishway,
(B) all fishways of a specific type with accepted configurations shall comply with those configurations, and
(C) fish passage plans for stream channel-spanning weirs, roughened channels (including but not limited to nature-like, rock, or engineered-stream fishways), and hybrid fishways (including but not limited to pool-and-chute ladders) which may combine criteria elements of natural streams and/or established fishway types (including but not limited to pool-and-weir, vertical slot, and baffled-chute fishways) shall clearly demonstrate how water depths, water velocities, water drops, jump pools, structure sizing, and fish injury precautions shall provide fish passage;
(l) for downstream fish passage: [Note: fish screening and bypass requirements for diverted water are separate from these requirements.]
(A) fish passage structures shall have an open water surface, except a submerged or enclosed conduit or orifice may be utilized if:
   (i) acceptable guidance or collection mechanisms are used and kept free from debris,
   (ii) water depth is greater than 4 inches during all flows,
   (iii) water velocity is greater than 2 feet per second during all flows,
   (iv) water is not pumped,
(v) conduits have smooth surfaces and avoid rapid changes in direction to preclude fish impact and injury, and
(vi) conduits are at least 10 inches wide;
(B) plunging flow moving past an artificial obstruction via spillways, outlet pipes, or some other means which may contain fish shall:
(i) at all flows, fall into a receiving pool of sufficient depth, depending on impact velocity and quantity of flow, to ensure that fish and flow shall not impact the stream bottom or other solid features, and
(ii) have a maximum impact velocity into a receiving pool, including vertical and horizontal velocity components, less than 25 feet per second; and
(C) water depth over spillways shall be greater than 4 inches during all flows.
(3) Requirements for fish passage at road-stream crossing structures such as bridges and culverts are:
(a) Stream Simulation Option:
(A) open-bottomed and closed-bottom road-stream crossing structures shall have beds under or within the structure that:
(i) are equal to or greater than the active channel width, as measured at sufficient locations outside the influence of any artificial or unique channel constrictions or tributaries both upstream and downstream of the site,
(ii) are equal to the slope of, and at elevations continuous with, the surrounding long-channel streambed profile, unless the Department approves maintaining a pre-existing road-impounded wetland,
(iii) have, for open-bottomed road-stream crossing structures, a minimum of 3 feet vertical clearance from the active channel width elevation to the inside top of the structure,
(iv) maintain average water depth and velocities that simulate those in the surrounding stream channel, and
(v) are composed of material that:
(I) assures the bed under or within the road-stream crossing structure is maintained through time,
(II) is either natural (similar size and composition as the surrounding stream) or supplemented to address site-specific needs including, but not limited to, bed retention and hydraulic shadow,
(III) contains partially-buried, over-sized rock if the road-stream crossing structure is greater than 40 feet in length,
(IV) is mechanically placed during structure installation rather than allowed to naturally accumulate, unless the surrounding streambed is primarily bedrock, and
(V) excluding partially-buried over-sized rock, is, for closed-bottom road-stream crossing structures, at a minimum depth of 20 percent of the structure height and a maximum depth of 50 percent of the structure height; and
(B) trash racks shall not extend below the active channel width elevation and shall have a minimum of 9 inches clear spacing between vertical members; or
(b) Alternative Option: the Department may approve road-stream crossing structures for which clear justification is provided, based on fish performance and/or fish behavior data and hydraulic conditions, that the alternative design shall provide fish passage.
(4) Requirements for fish passage at artificial obstructions in estuaries, and above which a stream is present, are:
(a) fish passage shall be provided at all current and historic channels;
(b) fish passage structures shall meet the criteria of OAR 635-412-0035(2) or (3), except fish passage structures shall be sized according to the cumulative flows or active channel widths, respectively, of all streams entering the estuary above the artificial obstruction; and
(c) tide gates and associated fish passage structures shall be a minimum of 4 feet wide and shall meet the requirements of OAR 635-412-0035(2) within the design streamflow range and for an average of at least 51% of tidal cycles, excluding periods when the channel is not passable under natural conditions.
(5) Requirements for fish passage at artificial obstructions in estuaries, floodplains, and wetlands, and above which no stream is present, are:
(a) Downstream Fish Passage
(A) downstream fish passage shall be provided after inflow which may contain native migratory fish;
(B) downstream fish passage shall be provided until water has drained from the estuary, floodplain, or wetland, or through the period determined by the Department which shall be based on one, or a combination of, the following:
(i) a specific date,
(ii) water temperature, as measured at a location or locations determined by the Department,
(iii) ground surface elevation,
(iv) water surface elevation, and/or
(v) some other reasonable measure;
(C) egress delays may be approved by the Department based on expected inflow frequency if there is suitable habitat and as long as passage is provided by the time the conditions in OAR 635-412-0035(5)(a)(B) occur;
(D) a minimum egress flow of 0.25 cubic feet per second (cfs) at one point of egress shall be provided;
(E) egress flow of 0.5 cfs per 10 surface acres, for at least the first 100 surface acres of impounded water, shall be provided;
(F) all plunging egress flows shall meet the requirements of OAR 635-412-0035(2)(I)(B);
(G) if egress flow is provided by a pump, it shall be appropriately screened;
(H) the minimum water depth and width through or across the point of egress shall be 4 inches;
(I) the ground surface above the artificial obstruction shall be sloped toward the point(s) of egress to eliminate isolated pools; and
(J) an uninterrupted, open connection with a minimum water depth of 4 inches shall be present from the point of egress to the downstream waters of this state, unless another connection is provided as per OAR 635-412-0035(2)(I)(A).

(b) Upstream Fish Passage: a fishway or road-stream crossing structure with or without a tide gate shall be provided during the period determined by the Department if there is current or historic native migratory fish spawning or rearing habitat within the estuary, floodplain, or wetland area impounded by the artificial obstruction.

(6) Requirements for fish passage at traps are:
(a) a collection permit issued by the Department is required to operate all traps;
(b) traps shall be constructed to prevent physical or physiological injury to native migratory fish;
(c) traps shall meet all requirements of OAR 635-412-0035(2)(g);
(d) traps located within a fishway (i.e., "in-ladder" traps) shall not inhibit native migratory fish from entering the fishway or trap and shall be removed if the Department determines that fish are not entering the trap;
(e) native migratory fish shall be processed through traps with minimal possible delay and as frequently as necessary to avoid over-crowding;
(f) all native migratory fish, excluding those which have approved take authorization from the Department and which do not require fish passage as per OAR 635-412-0035(1)(a), shall be returned to the stream by one of the following methods:
(A) movement from the trap to immediately-adjacent water which has fish passage, or
(B) transport within a watered container, including but not limited to lifts, hoppers, locks, and trucks, from the trap to a location approved by the Commission.

(7) Additional requirements for specific native migratory fish are:
(a) *Acipenser* species (sturgeon)
(A) the fish passage structure shall not require fish to jump when entering, within, or exiting the structure;
(B) the fish passage structure, including trash racks, shall be sized to accommodate the largest individual expected to require fish passage; and
(C) non-volitional transport within a watered container shall be allowed with Department approval.
(b) *Catostomus* and *Chasmistes* species (suckers)
(A) the fish passage structure shall not require fish to jump when entering, within, or exiting the structure;
(B) fishways shall have a maximum water velocity of 4 feet per second;
(C) fishways shall have a minimum water depth of 12 inches;
(D) fishways shall maximize downstream flow between pools to avoid back eddies;
(E) fishways shall have curved walls within turning pools; and
(F) fishways shall have a slope less than 4 percent.
(c) *Lampetra* species (lamprey)
(A) fishways shall not have overhanging surfaces;
(B) fishways shall have rounded or chamfered edge surfaces over which *Lampetra* species may pass;
(C) fishways shall, in locations with water velocities greater than 2 feet per second, have a passage route that:
(i) has a smooth, impermeable, uninterrupted surface or a simulated streambed,
(ii) has water velocities over the structure's surface less than 8 feet per second, and
(iii) is wetted.
(d) *Oncorhynchus* species (trout and salmon): fish passage structures for *Oncorhynchus keta* (chum) shall not require fish to jump when entering, within, or exiting the structure.
(e) *Ptychocheilus* species (pikeminnow): fish passage structures shall meet the requirements of OAR 635-412-0035(7)(a).
(f) if more than one native migratory fish species requires passage at a site and the requirements for the different species are mutually exclusive, the Department shall determine passage criteria.
(8) Requirements for artificial obstruction removal are:
(a) artificial obstruction removals shall follow the requirements of OAR 635-412-0035(10);
(b) if not completely removed, no parts of the remaining artificial obstruction shall:
   (A) constrict the stream channel, or
   (B) cause low flow depths less than the surrounding stream channel;
   (c) after an artificial obstruction is removed the stream channel shall be restored; and
   (d) the stream channel restoration shall address impacts to stream habitat caused by the artificial obstruction while in place and by its removal, including but not limited to upstream and downstream channel degradation, and provisions shall be made to address unexpected fish passage issues resulting from removal.

(9) Requirements for exclusion barriers are:
(a) exclusion barriers shall only be placed in the following situations, when fish passage is not required or is provided by other means:
   (A) to guide fish to an approved fish passage structure or trap,
   (B) to prevent fish from leaving waters of this state and entering human-made water supply conduits,
   (C) to prevent fish from entering waters of this state associated with operations of another artificial obstruction that could lead to fish injury, or
   (D) to achieve other fish management objectives approved in writing by the Department; and
(b) exclusion barriers shall comply with National Marine Fisheries Service or U.S. Fish and Wildlife Service criteria.

(10) Requirements for fish passage during construction of fish passage structures and periods when temporary artificial obstructions are in place are:
(a) all fish passage structures shall be constructed and temporary artificial obstructions shall be in place only during the site-specific in-water work period defined or approved by the Department;
(b) at times indicated by the Department as per OAR 635-412-0035(1)(a), downstream fish passage shall be provided and:
   (A) the outfall of a stream flow bypass system shall be placed to provide safe reentry of fish into the stream channel, and
   (B) if downstream fish passage during construction is not required and stream flow is pumped around the site, the site shall meet Department screening and/or bypass requirements;
(c) at times indicated by the Department as per OAR 635-412-0035(1)(a), upstream fish passage shall be provided and shall be based on the wetted-width or flows of the stream during the period of construction or temporary obstruction;
(d) in-stream construction sites shall be isolated from stream flow and fish;
(e) prior to in-stream construction activities, all fish shall be safely collected, removed from the construction site or de-watered reach, and placed in the flowing stream by an authorized person with a collection permit issued by the Department; and
(f) after construction, the construction site shall be re-watered in a manner to prevent loss of downstream surface water as the construction site's streambed absorbs water.

(11) Requirements for experimental fish passage structures are:
(a) experimental fish passage structures shall only be allowed in waters of the state after:
   (A) laboratory testing with native migratory fish or similar species indicates that the structure is feasible to provide fish passage,
   (B) field testing with a prototype structure, at a location where existing fish passage will not be compromised and where fish passage does not need to be addressed under OAR 635-412-0020(2) and (3), indicates that the structure is likely to provide fish passage, and
   (C) in addition to information needed to evaluate the structure's design for the specific location, the following are submitted to the Department and approved:
      (i) a written summary of the laboratory and field testing and how the results indicate that fish passage shall be provided,
      (ii) a monitoring and reporting plan to determine if the installed experimental fish passage structure meets applicable design objectives and is providing fish passage, and
      (iii) a modification plan for the experimental fish passage structure if monitoring indicates that fish passage is not being provided, including standard thresholds that will initiate these modifications;
(b) if at any time an experimental fish passage structure is deemed by the Department in writing to not provide fish passage, the owner or operator, in consultation with the Department, shall make such modifications to the structure or operation as are necessary to provide fish passage, and, after a reasonable period, if modifications are deemed by the Department in writing to not provide fish passage, a fish passage structure that meets the
standard criteria of OAR 635-412-0035 shall be installed as soon as practicable but no later than the end of the next complete in-water work period after notification by the Department;
(c) the owner or operator of an experimental fish passage structure shall allow the Department to inspect experimental fish passage structures at reasonable times;
(d) five years after the experimental fish passage structure is installed and fish are present to attempt passage a final monitoring report shall be submitted to the Department and the Department shall determine if the experimental fish passage structure provides fish passage;
(e) if the Department determines that the experimental fish passage structure does not provide fish passage, a fish passage structure that meets the standard criteria of OAR 635-412-0035 shall be installed as soon as practicable but no later than the end of the next complete in-water work period after notification by the Department; and
(f) after three experimental fish passage structures of the same design concept are placed in waters of the state and deemed to provide fish passage by the Department, the experimental fish passage structure shall no longer be considered experimental.

Stat. Auth.: ORS 496.138
Stats. Implemented: ORS 509.585 and 509.610
Hist.: Adopted 1-6-06, f. & certified ef. 1-9-06

635-412-0040
Mitigation Criteria
(1) Mitigation shall not be allowed for artificial obstructions located in, or which would prevent access to, "Habitat Category 1" habitat for native migratory fish as described in OAR 635-415-0025(1).
(2) Mitigation options include:
(a) providing fish passage at another pre-existing artificial obstruction which is not required to address fish passage under OAR 635-412-0015 or 635-412-0020;
(b) restoration or enhancement of native migratory fish habitat;
(c) fish management measures to directly increase naturally-producing, wild, native migratory fish populations; and
(d) other actions specifically approved by the Commission.
(3) Mitigation shall not include any activity that is a requirement or condition of any other agreement, law, permit, or authorization except if it is also for fish passage mitigation of the same action at the artificial obstruction for a different level of government.
(4) Unless a fish passage waiver for a site has already been obtained and mitigation has been provided, mitigation activities shall not be completed prior to a decision regarding a fish passage waiver.
(5) The Department shall approve final mitigation designs in writing prior to implementation (Note: mitigation actions or concepts, absent specific designs, can be approved at the time a waiver decision is made).
(6) Mitigation actions that provide fish passage shall meet the fish passage criteria contained in OAR 635-412-0035.
(7) The Commission may require the posting of a bond or other financial instrument acceptable to the Commission to cover the cost of mitigation actions or providing fish passage at the artificial obstruction if the mitigation action does not achieve its goals.
(8) A person owning or operating an artificial obstruction is responsible for maintaining, monitoring, evaluating the effectiveness of, and reporting on mitigation.
(9) Mitigation:
(a) shall be conducted in-proximity to the artificial obstruction, with respect to geographic scope;
(b) shall have habitat type and quality which is more beneficial than that affected by the artificial obstruction, if mitigation is passage into, restoration of, or enhancement of habitat;
(c) shall at least benefit the same native migratory fish species affected at the artificial obstruction;
(d) shall have a clear benefit for those native migratory fish species affected at the artificial obstruction if their status is listed as "threatened" or "endangered" under the state or federal Endangered Species Act;
(e) shall have standards for monitoring, evaluating, and adaptive management which are approved by the Department, which assure that the goal of the mitigation is achieved and maintained, and which are detailed in the waiver agreement required in OAR 635-412-0025(9);
(f) shall be considered if the owner or operator of the artificial obstruction believes the feasibility of fish passage at the artificial obstruction is less than that for mitigation;
(g) may require quantification of baseline conditions before a decision regarding a fish passage waiver is made in situations with no existing information, which require recent information, or which have no clear benefit;
(h) shall attempt to restore or enhance historic conditions;
(i) to the extent possible, shall be consistent with existing native migratory fish or watershed management plans;
(j) may qualify for financial incentives or grants issued by the Department and the owner's or operator's cost for mitigation or passage at the artificial obstruction shall not be a factor in the Department's net benefit determination;
(k) may require data collection and evaluation before a decision regarding a fish passage waiver is made in situations with no existing information, which require recent information, or which have no clear benefit; and
(l) shall be consistent with the purpose and goals of the Oregon Plan.

Stat. Auth.: ORS 496.138
Stats. Implemented: ORS 509.580, 509.585, and 509.610
Hist.: Adopted 1-6-06, f. & certified ef. 1-9-06