

# Aquatic Organism Passage

**Oregon Conservation Practice Job Sheet**  
**November 2011**

**396**

Client Name: \_\_\_\_\_



Culvert with no upstream fish passage



Dam with no upstream fish passage

## Definition

Modification or removal of barriers that restrict or impede movement or migration of fish or other aquatic organisms.

## Purposes

Improve or provide upstream and downstream passage for fish and other aquatic organisms.

## Where Used

This practice applies to all watercourses and outlets of ponds, lakes and wetlands where barriers impede passage for fish and other aquatic organisms.

Passage barriers can be *natural* (e.g., waterfalls, beaver dams) or *artificial* (e.g., road culverts, surface water diversions). If native fish have evolved around the presence of natural barriers – they should be left in place. Beaver dams are an example of a natural barrier that should be left in place. Beaver dams may block weak-swimming fish at all flows or strong swimmers during only extreme flows, yet they create very diverse habitat for fish and numerous other species of aquatic and terrestrial wildlife.

Artificial barriers, on the other hand, should be completely removed or the stream should be rerouted around them to avoid installing expensive,

high-maintenance fishways (fish ladders). However, for some surface-water diversion dams or weirs, a fishway may be the only alternative. A concurrent “passage” problem at these diversion structures is the loss of fish that become entrained in the diverted flow. This problem is best addressed by installing screens, using Practice Standard 587, *Structure for Water Control*.

## Conservation Plan

This practice is commonly applied concurrently with Practice 395 - Stream Habitat Improvement and Management as part of a conservation plan.

Often, artificial barriers (especially culverts) are associated with unstable stream conditions. When this occurs, the Fish Passage practice should be part of a long-range goal to restore geomorphic stability and habitat features to the stream by combining it with Stream Habitat Improvement and Management, (395), Channel Stabilization (584), and Streambank and Shoreline Protection (580).

Structures installed under this practice must be designed not only for upstream passage of fish, but also for downstream passage of high flows and bedload. The Oregon Department of Fish and Wildlife (ODFW) requires that road crossings maintain their structural integrity during a 100-year flow event.

## Fish Passage Criteria

There are many native species of anadromous and resident fish that use Oregon State streams. Their ability to negotiate instream obstructions varies by species and by size of individual fish within a species. This practice will follow the passage criteria established by ODFW for native fish species. Also, additional criteria may be required by federal agencies for fish that are protected under the Endangered Species Act. This practice will also provide passage for other aquatic species which spend a majority of their time in freshwater stream systems.

ODFW has prioritized fish passage barriers where passage would provide the greatest benefit to native migratory fish. This table can be found at: [http://www.dfw.state.or.us/agency/commission/minutes/07/jan/D\\_4\\_statewide%20fish%20passage%20priority%20list.pdf](http://www.dfw.state.or.us/agency/commission/minutes/07/jan/D_4_statewide%20fish%20passage%20priority%20list.pdf).

Since August 2001, the owner or operator of an artificial obstruction located in waters in which native migratory fish are currently or were historically present **must** address fish passage requirements *prior to* installation, major replacement, a fundamental change in permit status (e.g., new water right, renewed hydroelectric license), or abandonment of the artificial obstruction. Native migratory fish include native salmon, trout, lamprey, sturgeon, suckers, and a few other species. Addressing fish passage requirements entails the owner/operator obtaining from the ODFW: 1) approval for a passage plan when passage will be provided, 2) a waiver from providing passage, or 3) an exemption from providing passage. Laws regarding fish passage may be found in ORS 509.580 through 910 and in OAR 635, Division 412 <http://www.dfw.state.or.us/OARs/412.pdf>.

Fish passage criteria and design are normally based on the migration timing and swimming ability of the weakest individual of the weakest species and life history stage of native migratory fish which are present that require upstream access. Maximum velocities for upstream passage through culverts are based on the *prolonged swimming speed* (medium energy, sustainability in minutes) of the target fish. Passage should be designed for the weakest fish in the system - commonly, salmon fry (<60 mm or 2.2 inches). For these small fish, velocities over 1.1 ft/sec are considered impassable. For adult trout (>150 mm or 6 inches), chum, and pink salmon, velocities must not exceed 4 ft/sec for culverts up to 100 feet long; 3 ft/sec for 100-200 feet and 2 ft/sec, if over 200 feet. For adult chinook, coho, sockeye and steelhead, velocities

must not exceed 5, 4, and 3 ft/sec, respectively, for the same culvert sizes. Thus, it is important to identify this information for the location in question by contacting your local ODFW fisheries biologist.

Fish screens may be required by Oregon law and are often included as a condition of a water right or permit issued by a state agency, such as Oregon Department of State Lands (DSL) or Oregon Water Resources Department (OWRD).

DAMS AND OTHER AREAS WHERE UPSTREAM AND DOWNSTREAM STREAMBED ELEVATIONS ARE DIFFERENT: [See ORS 635-412-0035 (2)]. If NRCS is working with a landowner with a dam, then a fishway or ladder must be built according to specific criteria with regards to flow velocities through the fishway and attraction flow, baffles, fishway pools, entryways and trash racks.

CULVERTS: Shall be designed using the Stream Simulation Option [See ORS 635-412-0035 (3)(a)] or to an Alternative Option (as approved by ODFW with justification) [See 635-412-0035 (3)(b)].

TIDEGATES AND OTHER OBSTRUCTIONS IN ESTUARIES, FLOODPLAINS OR WETLANDS: [See 635-412-0035 (4) and (5)]. Obstructions in estuaries, floodplains and wetlands must provide upstream and downstream passage and/or passage during tidal cycles determined by the ODFW fisheries biologist.

Additional requirements for passage at fish traps [635-412-0035 (6)], obstruction removal [635-412-0035 (8)], exclusion barriers [635-412-0035 (9)], and during construction 635-412-0035 (10)] can also be found at the link above. There are also requirements for experimental fish passage structures [See 635-412-0035 (11)] as well.

ODFW has specific requirements for certain native fish species, such as sturgeon, suckers, lamprey, trout and salmon and pikeminnow. These specific native fish requirements will be applied to all fish passage designs. Links to the specific native fish requirements can be found at: <http://www.dfw.state.or.us/OARs/412.pdf> [635-412-0035 (7)].

## Operation and Maintenance

This practice will be inspected periodically and restored as needed to maintain the stated purpose for passage. Additional operation and maintenance requirements will be listed in individual Supporting Practices.

Site-specific requirements are listed on the Job Sheet with instructions for filling out the Job Sheet on the Specification. Additional specifications will

be used for Aquatic Organism Passage from individual Supporting Practices and construction designs.

|  |     |   |          |                         |   |                        |                             |                        |     |      |    |    |
|--|-----|---|----------|-------------------------|---|------------------------|-----------------------------|------------------------|-----|------|----|----|
|  <b>NRCS</b><br>Natural Resources Conservation Service  |     | <b>AQUATIC ORGANISM PASSAGE</b><br><i>Conservation Practice Specification 396</i>                 |          |                         |   |                        |                             |                        |     |      |    |    |
| Customer:  |     |   | Company: |                         |   | Application Date:      |                             |                        |     |      |    |    |
| Program:   | CRP | CREP  | CSP      | EQIP                    | FLEP  | FRPP                   | GRP                         | WHIP                   | WRP | NONE |    |    |
| Contract #:  |     |   |          | Planned Finishing Date: |   |                        |                             |                        |     |      |    |    |
| Legal Description: Township  |     |   | Range    |                         | Section   |                        | ¼ Section:                  |                        | NW  | NE   | SW | SE |
| Stream Name:   |     |   |          | HUC:                    |   | Receiving Water:       |                             |                        |     |      |    |    |
| Listed Fish:   |     | Chinook   | Coho     | Chum                    | Steelhead   | Bull Trout             | Suckers                     | Other: _____           |     |      |    |    |
| Site Concerns:<br>Active Bank Erosion<br>Loss of Diversion Flow<br>Active Bed Scour<br>Road Failure  |     | Push-up" Berm<br>Channel Avulsion<br>Structure Failure<br>Inadequate Fish Habitat<br>Other: _____ |          |                         |   | Streambed Composition: |                             |                        |     |      |    |    |
|  |     |   |          |                         |   | Sand                   |                             | Cobble                 |     |      |    |    |
|  |     | Silt  |          | Boulder                 |   |                        |                             |                        |     |      |    |    |
|  |     | Muck  |          | Concrete                |   |                        |                             |                        |     |      |    |    |
|  |     | Gravel  |          |                         |   |                        |                             |                        |     |      |    |    |
| Target Fish:   |     |   |          |                         | Fish Screens:   |                        |                             |                        |     |      |    |    |
| Fry Salmonid (< 60mm)  |     | Adult Pink or Chum  |          |                         | Present – Not ODFW/<br>NMFS Criteria  |                        | Present - Needs             |                        |     |      |    |    |
| Fingerling Salmonid (60-150mm)   |     | Adult Other Salmonid  |          |                         | Present – Meets ODFW/<br>NMFS Criteria  |                        | Repair                      |                        |     |      |    |    |
| Adult Trout (> 6" or 150mm)  |     | Other: _____  |          |                         |   |                        | None - Must be<br>Installed |                        |     |      |    |    |
| ESA<br>Consultation<br>Completed?  | Yes | Permits Obtained<br>(Check Appropriate<br>Boxes)  |          |                         |   | DSL                    | ACOE                        | Other (Specify): _____ |     |      |    |    |
| No   |     |   |          |                         |   |                        |                             |                        |     |      |    |    |
| <b>Purpose(s) of Practice:</b>   |     |   |          |                         |   |                        |                             |                        |     |      |    |    |
| <b>Improve upstream and downstream passage for fish and other aquatic species</b>  |     |   |          |                         | <b>Provide upstream and downstream passage for fish and other aquatic species</b> |                        |                             |                        |     |      |    |    |
| <b>Other (explain):</b>  |     |   |          |                         |   |                        |                             |                        |     |      |    |    |
| <b>Passage Barrier Evaluation Procedure:</b> List tools or methods used to assess habitat conditions (e.g., Stream Visual Assessment Protocol 2, ODFW culvert assessment, or Other habitat inventory, etc.). |     |   |          |                         |   |                        |                             |                        |     |      |    |    |
|  |     |   |          |                         |   |                        |                             |                        |     |      |    |    |

**BARRIER DESCRIPTION**

Measurements made in \_\_\_\_\_ meters \_\_\_\_\_ feet \_\_\_\_\_ inches.

Listed as barrier? \_\_\_\_\_ Unknown \_\_\_\_\_ No \_\_\_\_\_ Yes by \_\_\_\_\_ ODFW \_\_\_\_\_ Tribe \_\_\_\_\_ Other \_\_\_\_\_

Miles to next barrier \_\_\_\_\_

**1A. EXISTING CULVERT** (Fill out information for the first culvert, print out page, clear data and fill information out for second culvert. Repeat if necessary.)

|                               |     |  |           |  |                |
|-------------------------------|-----|--|-----------|--|----------------|
| Number:                       |     | Shape:   | Material: |  | Span: _____    |
| 1.1                           | 2.3 | ARCH   | CAL       | SPA  | Rise: _____    |
| 1.2                           | 2.4 | BOX  | CPC       | SPS  | Outfall: _____ |
| 1.3                           | 3.3 | ELL  | CST       | SST  | Length: _____  |
| 1.4                           | 3.4 | RND  | MRY       | TMB  | % Slope: _____ |
| 2.2                           | 4.4 | SQSH   | PCC       | OTHER  |                |
|                               |     | OTHER  | PVC       |  |                |
| Bed Material:                 |     | Apron:   |           | Fill Depth: _____                                    |                |
| Bed Rock                      |     | At Outlet  |           | Damaged:   |                |
| Boulders                      |     | None   |           | Collapsed  |                |
| Cobble                        |     | At Inlet   |           | Obstruction  |                |
| Gravel                        |     | Both   |           | Drop at Inlet  |                |
| Sand                          |     | Ends   |           | Rebar Showing  |                |
| Silt                          |     |  |           | Gradient Change                                      |                |
| Clay                          |     |  |           | Rusted Through                                       |                |
|                               |     |  |           | Multiple Materials                                   |                |
|                               |     |  |           | Unknown  |                |
|                               |     |  |           | Not Damaged  |                |
| Downstream Gradient _____ (%) |     | Downstream Gradient _____ (%)                    |           | Invert Elevations: Inlet _____ Outlet _____          |                |
| Average Bankful Width: _____  |     | _____ Angle of stream to inlet culvert (degrees) |           | _____ Angle of stream to outlet of culvert (degrees) |                |

**1B. CULVERT SOLUTION**

|   |            |                            |               |  |  |
|---|------------|----------------------------|---------------|--|--|
| Complete removal, no replacement with another structure |            |                            |               |  |  |
| Replaced with:  |            | Replaced with:             |               | Shape:                                   |  |
| Bridge  |            | No Slope Culvert           |               | ARCH                                     |  |
| Complete Removal  |            | Hydraulic Design Culvert   |               | BOX                                      |  |
|   |            | Stream Stimulation Culvert |               | ELL                                      |  |
|   |            |                            |               | RND                                      |  |
|   |            |                            |               | SQSH                                     |  |
|   |            |                            |               | OTHER                                    |  |
|   |            |                            |               | Material:                                |  |
|   |            |                            |               | CAL SPA                                  |  |
|   |            |                            |               | CPC SPS                                  |  |
|   |            |                            |               | CST SST                                  |  |
|   |            |                            |               | MRY TMB                                  |  |
|   |            |                            |               | PCC OTHER                                |  |
|   |            |                            |               | PVC                                      |  |
| _____ Span  | _____ Rise | _____ Length               | _____ % Slope | Embedded Depth: _____ Inlet _____ Outlet |  |
| Downstream Bed Controls:                                |            | Upstream Bed Controls:     |               | Baffles Installed – Type:                |  |
| Log # _____   |            | Log # _____                |               | Angled # _____                           |  |
| Rock # _____  |            | Rock # _____               |               | Corner # _____                           |  |
|   |            | Retrofitted in Place       |               | Notched # _____                          |  |
|   |            |                            |               | Weirs Installed:                         |  |
|   |            |                            |               | Concrete # _____                         |  |
|   |            |                            |               | Metal # _____                            |  |
|   |            |                            |               | Wood # _____                             |  |
| Notes:  |            |                            |               |  |  |

**2A. EXISTING DAM (WEIR)**

|   |                                  |  |  |
|---|----------------------------------|--|--|
| Height: _____   | Face: Vertical<br>Ogee<br>Sloped | Base: Concrete Apron<br>Natural Bed<br>Riprap Apron<br>Other | Plunge Pool Depth: _____                                       |
| Construction/Form:<br>Temporary "Push-Up" Berm<br>Concrete (w/Stoplogs)<br>Concrete (Solid)<br>Metal (w/Stoplogs) |                                  |  | Reservoir Depth: _____<br>Wood (or Log)<br>Large Rock<br>Other |

**2B. DAM SOLUTION**

|  |  |                                |
|--|--|--------------------------------|
| Roughened Channel w/Rocks<br>Roughened Channel w/Logs<br>Complete Removal<br>Pool and Weir Fishway | Other: _____<br>Bypass Channel<br>Denil Fishway<br>Alaska Steepass | # of Weirs/Bed Controls: _____ |
|--|--|--------------------------------|

**3A. EXISTING BRIDGE**

|  |  |  |
|--|--|--|
| Material:<br>Log Stringer<br>Steel<br>Wood<br>Other: _____ | Footings:<br>Concrete<br>Wood<br>Earthen<br>Other: _____ | Distance from bridge bottom to OHW: _____<br>Length: _____<br>Width: _____ |
|--|--|--|

**3B. BRIDGE SOLUTION**

|  |   |   |   |
|--|---|---|---|
| Complete removal, no replacement with another structure                                      |   | Replaced with: Bridge<br>Culvert<br>Ford                                  |   |
| Replaced with:<br>No-slope Culvert<br>Stream Stimulation Culvert<br>Hydraulic Design Culvert | Shape:<br>Arch<br>Box<br>ELL<br>RND<br>SQSH<br>Other  | Material:<br>CAL SPA<br>CPC SPS<br>CST SST<br>MRY TMB<br>PCC Other<br>PVC | Span: _____<br>Rise: _____<br>Length: _____ |
| Downstream Bed Controls:<br>Log # _____<br>Rock # _____                                      | Upstream Bed Controls:<br>Log # _____<br>Rock # _____ | Retrofitted in Place  |   |
| Notes:   |   |   |   |

**ADDITIONAL HELP:**

- Assessment of fish barriers: [ODFW Fish Passage - Barrier Inventories](#)
- WDFW “Design of Road Culverts for Fish Passage”: <http://wdfw.wa.gov/publications/pub.php?id=00049>
- FishXing software (free, but must have approval for this to be loaded onto USDA machines): <http://stream.fs.fed.us/fishxing>
- ODFW fish passage criteria: <http://www.dfw.state.or.us/OARs/412.pdf>
- NMFS fish passage and screening criteria: [http://www.habitat.noaa.gov/pdf/salmon\\_passage\\_facility\\_design.pdf](http://www.habitat.noaa.gov/pdf/salmon_passage_facility_design.pdf)
- Oregon Restoration Guide: <http://www.oregon.gov/OWEB/docs/pubs/habguide99-complete.pdf>
- ODFW Guidelines and Criteria for Stream-Road Crossings: <http://oregon.gov/ODF/privateforests/docs/RdStrmCrossRestorGuideA-E.pdf>
- ODFW Fish Passage Criteria: [http://www.fws.gov/midwest/Fisheries/StreamCrossings/images/PDF/ODFW Fish Passage Criteria - 2004.pdf](http://www.fws.gov/midwest/Fisheries/StreamCrossings/images/PDF/ODFW_Fish_Passage_Criteria_-_2004.pdf)

| Additional Specifications   |
|---|
| <ul style="list-style-type: none"> <li>• Attach Conservation Plan Map: Identify Planned/Installed Aquatic Organism Passage site(s).</li> <li>• Include any associated conservation practices planned for area(s) around the site(s).</li> <li>• Also include before and after photos of the project.</li> </ul> |

**Supporting Practices** (*Specifications that will be used to implement these activities are provided under the appropriate NRCS conservation practice standards indicated below and provided separately*).

|  |  |
|--|--|
| Dam<br>348                                       | Access Road<br>560                         |
| Ponds<br>378                                     | Stream Crossing<br>578                     |
| Stream Habitat Improvement and Management<br>395 | Streambank and Shoreline Protection<br>580 |
| Critical Area Planting<br>342                    | Open Channel<br>582                        |
| Grade Stabilization Structure<br>410             | Channel Stabilization<br>584               |

| Notes: |
|--------|
|        |

**Implementation Procedure/Guidelines:** List methods or guidelines used to design habitat elements (e.g., ODFW Fish Passage Criteria or Guidelines, NMFS or USFWS passage guidelines.)

**Operation and Maintenance:** Client agrees to annual monitoring of this practice to determine: 1) if passage objectives for targeted aquatic species are being met, 2) if facilitating practices are functioning or need repair, and 3) if modifications are needed for maintaining unobstructed flows through the structure. Also refer to O&M requirements listed in individual Supporting Practices and construction designs.

## Refer to Design Engineering Drawings and Specifications in Casefile

Engineer or Technician Preparing Designs: \_\_\_\_\_

Approved: \_\_\_\_\_ Date: \_\_\_\_\_

### PRACTICE APPROVALS:

#### 1. Planning Approval:

| Practice Code No.  | PRACTICE     | LEAD DISCIPLINE   | CONTROLLING FACTOR                | UNITS | JOB CLASS                |                          |                          |                          |                          |
|--|--------------|-------------------|-----------------------------------|-------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|  |              |                   |                                   |       | I                        | II                       | III                      | IV                       | V                        |
| 396  | Fish Passage | <i>BCSD-AqBio</i> | Barrier Type:                     | N/A   | All                      | 0                        | 0                        | 0                        | 0                        |
|  |              |                   | <input type="checkbox"/> Culvert  |       |                          |                          |                          |                          |                          |
|  |              |                   | <input type="checkbox"/> Dam/Weir |       |                          |                          |                          |                          |                          |
|  |              |                   | <input type="checkbox"/> Bridge   |       |                          |                          |                          |                          |                          |
| This practice is classified as Job Class (check one) for Controlling Factor (check box): |              |                   |                                   |       | <input type="checkbox"/> |

Approved by: \_\_\_\_\_

Job Title / I & E JAA: \_\_\_\_\_ Date: \_\_\_\_\_

**2. Supporting Practice Design Approval:** Attach Supporting Practice Job Sheets with appropriate Job Approval Authority to this Job Sheet.

## Refer to Design Engineering Drawings and Specifications in Casefile

Design Approved by: \_\_\_\_\_

Job Title / Design JAA: \_\_\_\_\_ Date: \_\_\_\_\_



**PRACTICE DESIGN CERTIFICATION** (TO BE COMPLETED AFTER JOB SHEET IS COMPLETE AND BEFORE PRACTICE INSTALLATION.)

By signing below, I certify that:

- 💧 The conservation practice planning and design outlined in this Job Sheet Specification meet the purposes, associated criteria, appropriate site conditions and client objectives; and
- 💧 I have the required Job Approval Authority or TSP certification required for this conservation practice design.

Certification by: \_\_\_\_\_ Date: \_\_\_\_\_

Job Title: \_\_\_\_\_

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**CLIENT'S ACKNOWLEDGEMENT STATEMENT:**

The Client acknowledges that:

- a. They have received a copy of the specification and understand the contents and requirements.
- b. It shall be the responsibility of the client to obtain all necessary permits and/or rights, and to comply with all ordinances and laws pertaining to the application of this practice.

Accepted by: \_\_\_\_\_ Date: \_\_\_\_\_

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**CERTIFICATION:**

**I have completed a review of the information provided by the client or have conducted a site visit and certify this practice has been applied according NRCS standards and specifications.**

Certification by: \_\_\_\_\_ Date: \_\_\_\_\_

Job Title: \_\_\_\_\_ Construction JAA: \_\_\_\_\_

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