



Natural Resources Conservation Service
WASHINGTON

Fish Passage - 396

Conservation Practice Job Sheet

July 2010



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.

Fish passage barriers can be *natural* (e.g., waterfalls, beaver dams) or *artificial* (e.g., road culverts, surface water diversions). Native fish have evolved around the presence of natural barriers – they should be left in place. Beaver dams, for example, 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 *Structure for Water Control* (587).

Resource Management System

This practice is commonly applied concurrently with Practice 395 - Stream Habitat Improvement and Management as part of a resource management system for a conservation management unit.

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 other supporting practices such as Stream Habitat Improvement and Management, (395), Channel

Stabilization (584), Streambank and Shoreline Protection (580) and others.

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

Fish Passage Criteria

There are **48** native species of anadromous and resident fish that use Washington 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 already established by WDFW for the **8** native species of salmon and trout and may be further refined when criteria is set for the state's **15** other migratory species. Also, additional criteria may be required by federal agencies for fish that are protected under the Endangered Species Act.

Operation and Maintenance

This practice will be inspected periodically and restored as needed to maintain the stated purpose for passage.

- Specify what entity is responsible for the daily operation and maintenance of a passage structure.
- Check a passage structure at regular intervals to ensure it is operating within design criteria.

- Clean trashracks and debris collectors or remove debris accumulations regularly.
- Adjust gates, orifices, valves, or other control devices as needed to regulate flow and maintain a passage structure within operating criteria.
- Periodically check staff gages or other flow metering devices for accuracy.
- Annually inspect passage structures for structural integrity and disrepair.
- Inspect gate and valve seals for damage.
- Replace worn or broken stoplogs, baffles, fins, or other structural components.
- Remove sediment accumulations from within passage structure where applicable.

Additional operation and maintenance requirements will be listed in individual Supporting Practices.

Specifications

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 Fish Passage from individual Supporting Practices.

 Washington Natural Resources Conservation Service		FISH PASSAGE <i>Conservation Practice Specification 396</i>								
September 2009 Double-click grey boxes to select an option or enter information in grey boxes.										
Customer	Joe Steelhead		Company	EcoRanch		Date	7/2/2010			
Program	WHIP		Contract #	123456		Scheduled installation date	8/15/2010			
Legal description	Township	34 N	Range	5 E		Section	33	¼ Section	NW	
Stream Name	Fish Creek		WRIA	03.0000		Receiving water	Big Fish Creek			
Listed fish	Ck <input type="checkbox"/>	Co <input checked="" type="checkbox"/>	Cm <input type="checkbox"/>	Sk <input type="checkbox"/>	St <input type="checkbox"/>	Site concerns	road failure		Streambed composition	gravel
Target fish	fry salmonid (< 60mm)		Fish screens	none - not needed						
ESA Consultation completed? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Not Needed <input type="checkbox"/>			Permits Needed (check appropriate boxes)? WDFW-HPA <input checked="" type="checkbox"/> ACOE <input checked="" type="checkbox"/> Other (specify) _____							

Purpose(s) of Practice:	
<input checked="" type="checkbox"/> Improve upstream and downstream passage for fish and other aquatic species	<input type="checkbox"/> Provide upstream and downstream passage for fish and other aquatic species
<input type="checkbox"/> Other (explain):	List target species: coho salmon

Passage Barrier Evaluation Procedure: List tools or methods used to assess habitat conditions (e.g., Stream Visual Assessment Protocol, WDFW culvert assessment, or Other habitat inventory, etc.).
SVAP, Family Forest Fish Passage Program: Barrier Evaluation Form

BARRIER DESCRIPTION Measurements made in feet Listed as barrier? yes by WDFW Miles to next barrier 0.06

1A. EXISTING CULVERT (For multiple culverts: copy, paste and enter data in the first two lines as many times as the number of culverts)

Number	Shape RND	Material CST	Span 1.22	Rise 1.22	Outfall 0.27	Length 7.40	% Slope 1.20
1.1							
Bed material	Apron none	Fill depth 0.10	Tidegate no	Water velocity 68 ft/sec	Damaged collapsed		
<input checked="" type="checkbox"/>							
7.2 Downstream gradient (%)	3.3 Upstream gradient (%)	Invert Elevations: inlet 97.8 outlet 96.6	2.90 Average bankfull width	180 Angle of stream to inlet of culvert (degrees)	105 Angle of stream to outlet of culvert (degrees)		

1B. CULVERT SOLUTION

Complete removal, no replacement with another structure <input type="checkbox"/>	Replaced with bridge	Replaced with Bridge	Shape N/A	Material N/A	Span 17	Rise	Length 20
Downstream Bed Controls Type rock # 1	Upstream Bed Controls Type rock # 1	Retrofitted in Place <input type="checkbox"/>	Baffles Installed Type N/A #	Weirs Installed N/A #	Notes		

2A. EXISTING DAM (WEIR)

2B. DAM SOLUTION

Height	Face vertical	Base concrete apron	Plunge Pool Depth	Construction/Form temporary "push-up" berm	Reservoir Depth
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roughened channel w/rocks
Weirs/Bed Controls

3A. EXISTING BRIDGE

Material Log Stringer	Footings Concrete	Distance from bridge bottom to OHW	Length	Width
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3B. BRIDGE SOLUTION

Complete removal, no replacement with another structure <input type="checkbox"/>	Replaced with bridge	Replaced with No-slope culvert	Shape ARCH	Material CAL	Span	Rise	Length
Downstream Bed Controls? Type log #	Upstream Bed Controls? Type log #	Retrofitted in Place <input type="checkbox"/>		Notes			

Fish Passage – Photo Points

Take a photo of the barrier before and after project implementation (either replacement or removal).

		
<p>Pre – Project</p>		
<p>Post – Project</p>		

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).

Access Road 560 <input checked="" type="checkbox"/>	Streambank and Shoreline Protection 580 <input type="checkbox"/>	Open Channel 582 <input type="checkbox"/>	Dam 348 <input type="checkbox"/>	Channel Stabilization 584 <input type="checkbox"/>
Grade Stabilization Structure 410 <input checked="" type="checkbox"/>	Stream Crossing 578 <input type="checkbox"/>	Stream Habitat Improvement and Management 395 <input type="checkbox"/>	Other <hr/> <input type="checkbox"/>	

Notes:
Access Road will be used to replace the culvert barrier for fish passage purposes. Grade
Stabilization will be used to ensure stability of stream bottom.

Implementation Procedure/Guidelines: List methods or guidelines used to designing habitat elements (e.g., WDFW Aquatic Habitat Guidelines, NMFS Screening and Passage Criteria, USFWS Partners for Fish and Wildlife Restoration guidelines, etc.)
NMFS Passage criteria

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.
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Refer to Design Engineering Drawings and Specifications in Casefile

Engineer or Technician Preparing Designs: Sheila Technician

Approved: Emily Engineer Date: 7/2/2010

CLIENT'S ACKNOWLEDGEMENT (TO BE SIGNED AFTER JOB SHEET IS COMPLETED AND BEFORE PRACTICE INSTALLATION.):

By signing below, I acknowledge that I:

- a. have reviewed and understand the site specific design, installation specifications and operation/maintenance requirements in this Job Sheet and have an understanding of purposes and criteria for use of this conservation practice;
- b. will install, operate, and maintain this conservation practice in accordance with the site specific Job Sheet specifications
- c. will make no changes to the planned design and installation without prior written approval of the Natural Resources Conservation Service.
- d. will obtain all necessary permits and/or rights, and comply with all ordinances and laws pertaining to the installation, operation, and maintenance of this conservation practice, prior to the start of installation; and
- e. will assume responsibility for notifying all Utilities affected by the installation, operation and maintenance of this conservation practice.

Accepted by: /s/ Joe Steelhead

Date: 7/15/2010

REQUIRED JOB APPROVAL AUTHORITY OR TSP CERTIFICATION CATEGORY

1. Planning Approval:

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

Approved by: /s/ Randy RedWing

Job Title / I & E JAA: Area Biologist / V Date: 7/10/2010

2. Supporting Practice Design Approval: Choose one of the following below or use the blank lines at the bottom for other supporting practice **design** Job Class information.

Practice Code No.	PRACTICE	LEAD DISCIPLINE	CONTROLLING FACTOR	UNITS	JOB CLASS					
					I	II	III	IV	V	VI
560	Access Road	CED-HE	1) Road Surface	type	soil	gravel	bitum	Conc.	all	
			2) Culvert Pipe, ID	ft	3	6	12	18	all	
			3) Bridge-span	ft	10	14	18	20	all	
			4) Ford	no	all	None	None	None	None	
This practice is classified as Job Class (check one) for Controlling Factor (check box):										
584	Channel Stabilization	CED-DE	1) Design Capacity	cfs	25	100	200	500	1,000	2,000
			2) Velocity	fps	3	4	6	8	10	12
This practice is classified as Job Class (check one) for Controlling Factor (check box):										
348	Dam Diversion	CED-DE	1) Hazard	class	a	a	a	a	a	a
			2) Streamflow (25 yr. freq.)	cfs	250	500	1,000	1,500	2,000	3,000
			3) Flow Diverted	cfs	25	50	100	150	200	300
			4) Height of Drop	ft	3	4	5	6	8	15
This practice is classified as Job Class (check one) for Controlling Factor (check box):										
410	Grade Stabilization Structure – Impoundment	CED-DE	1) Hazard Class	Class	a	a	a	a	a	a
			2) Effective Height	ft	6	10	15	20	35	50
			3) Drainage Area	sq. mi.	0.5	1	5	10	20	40
			4) Storage X Height	ac-ft ²	20	45	100	1,000	3,000	15,000
			5) Embankments Over Active Faults		None	None	None	None	None	none
410	Grade Stabilization Structure – Excavated Pond	CED-DE	1) Volume	ac-ft	5	10	all			N/A
410	Grade Stabilization Structure – Box Inlet Drop Spillways/Structures	CED-DE	1) Net Drop	ft	2	4	6	8	10	N/A
			2) Weir Capacity	cfs	50	100	200	500	1,000	N/A
410	Grade Stabilization Structure – Toe Wall Weir Structure	CED-DE	1) Net Drop	ft	2	4	6	8	10	N/A
			2) Capacity	cfs	50	100	200	500	1,000	N/A
410	Grade Stabilization Structure – Conduit Spillway (Single)	CED-DE	1) Inside Diameter	Inches	6	12	18	24	48	N/A
410	Grade Stabilization Structure – Straight Drop Spillways/Structures	CED-DE	1) Net Drop	ft	2	4	6	8	10	N/A
			2) Weir Depth	ft	2	3	4	All		N/A
			3) Weir Capacity	cfs	50	100	200	500	1,000	N/A
410	Grade Stabilization Structure – Reinforced Concrete Chute	CED-DE	1) Net Drop	ft	2	4	6	8	10	N/A
			2) Weir Depth	ft	2	3	4	All		N/A
			3) Weir Capacity	cfs	50	100	200	500	1,000	N/A
410	Grade Stabilization Structure – Slide Gates	CED-DE	1) Head, 10 ft or more	cfs	5	10	50	100	200	N/A

			2) Head, less than 10 ft	cfs	10	20	100	300	500	N/A
410	Grade Stabilization Structure – Irrigation and Drainage Structures	CED-DE	1) Capacity	cfs	2	5	10	50	500	N/A
			2) Net Drop	ft	2	3	4	5	6	N/A
410	Grade Stabilization Structure – Fish Screening Devices	CED-DE	1) Design Flow	cfs	2	5	10	25	All	N/A
410	Grade Stabilization Structure – Siphon	CED-DE	1) Head	ft	10	10	10	10	10	N/A
			2) Capacity	cfs	1	5	10	50	100	N/A
			3) Max. Head Loss/100 ft	ft	2	1	0.5	0.25	0.10	N/A
410	Grade Stabilization Structure – Pipe: Long Span Supported	CED-DE	1) Capacity	cfs	2	4	6	8	10	N/A
This practice is classified as Job Class (check one) for Controlling Factor (check box):										
582	Open Channel – Conveyance Channel	CED-DE	1) Design Capacity (Subcritical Flow)	cfs	50	125	250	500	1,000	2,000
			2) Design Velocity	fps	2	4	6	8	10	12
582	Open Channel – Stream Channel Reconstruction	CED-DE	1) Design Capacity	cfs	25	100	200	500	1,000	2,000
			2) Velocity	fps	3	4	6	8	10	12
582	Open Channel – Installing Large Wood	CED-DE	1) Design Capacity	cfs	25	100	200	500	1,000	2,000
			2) Velocity	fps	3	4	6	8	10	12
This practice is classified as Job Class (check one) for Controlling Factor (check box):										
578	Stream Crossing	CED-EG	1) Road Surface	Material	soil	gravel	bitum	Conc.	all	
			2) Culver Pipe, ID	ft	32	6	12	18	all	
			3) Bridge - span	ft	10	14	18	20	all	
			4) Ford	No	All	N/A				
This practice is classified as Job Class (check one) for Controlling Factor (check box):										
395	Stream Habitat Improvement and Management	BCSD-AqEco	1) Stream Length	ft	100	500	1,000	1,500	2,000	
			2) Flow	cfs	50	100	300	400	1,000	
			3) Bankfull Width	fps	5	10	20	40	all	
This practice is classified as Job Class (check one) for Controlling Factor (check box):										
580	Streambank and Shoreline Protection - Purpose	CED-HE	1) Agricultural Land	each	All	N/A				
			2) Bridges/Roads	each	All					
			Buildings/Homes	each	All					
580	Streambank and Shoreline Protection - Beaches and Shorelines	CED-HE	Water Height Above Shoreline	ft	1	1.5	2	2.5	3	
580	Streambank and Shoreline Protection - Streambanks	CED-HE	1) Geomorphic Bankfull	cfs	50	500	1,000	2,000	5,000	20,000
			2) Effective Bank Height	Ft	6	8	12	16	25	all
			3) Bankfull Velocity	fps	3	5	6	8	10	12

This practice is classified as Job Class (check one) for Controlling Factor (check box):											
This practice is classified as Job Class (check one) for Controlling Factor (check box):											

Design Approved by: /s/ Emily Engineer

Job Title / Design JAA: Area Engineer / V Date: 7/10/2010

[Required Certification Categories for Technical Service Providers](#)

"TECHREG CATEGORY" Listed for this Practice: **Fisheries Interdisciplinary Biological/Engineering**

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:/s/ _____ Date: _____

Print Name: _____ Job Title: _____

Construction JAA: _____

PRACTICE INSTALLATION CERTIFICATION (TO BE COMPLETED AFTER PRACTICE INSTALLATION AND CHECK OUT)

By signing below, I certify that:

-  The practice has been installed according to the site specific installation requirements and specifications;
-  the required operation and maintenance requirements are being met; and
-  I have the required Job Approval Authority or TSP Certification for this conservation practice installation.

Certification by:/s/ _____ Date: _____

Print Name: _____ Job Title: _____

Construction JAA: _____

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