

## Fish Passage - Preliminary Site Inventory Form and Instructions

**Part I. Preliminary Site Inventory.** (Use back of form or additional pages as necessary)

**Purpose:** This site inventory should be completed as early as possible for projects with water-crossing structures that may act as instream barriers, and used to help evaluate alternatives for final scope of work at a site (rehabilitation or replacement). *A barrier is defined as a natural or constructed obstruction or device that inhibits or blocks the historical/natural upstream or downstream movement of fish or other aquatic species.* Examples of natural barriers are waterfalls, beaver dams, log jams, and rock slides. Constructed barriers may include dams, diversion structures, pipes and boxes of any type or size, commonly referred to as bridges, struts, culverts, pipes or pipe arches (with or without footings). Other non-physical barriers can include chemical and temperature limitations. The completed form will provide a portion of the information needed to determine appropriate action.

**Please complete sections I.-VI. For help, see Selected Instructions by section below.**

**I. General**    Date: \_\_\_\_\_ Reviewer: \_\_\_\_\_ Agency/Phone: \_\_\_\_\_  
 Town/Route/Road Name: \_\_\_\_\_  
 Barrier Name \_\_\_\_\_ Barrier ID \_\_\_\_\_  
 Waterbody Name: \_\_\_\_\_ Watershed: \_\_\_\_\_  
 State \_\_\_\_\_ County \_\_\_\_\_ Town \_\_\_\_\_  
 HUC11 \_\_\_\_\_ Map Location: \_\_\_\_\_  
 Latitude\Longitude: \_\_\_\_\_ GPS    U.S.G.S. map  
 Primary Owner: \_\_\_\_\_  
 Owner Type:    Federal            Public            Utility            State            Private  
 (circle)        Local Govt.    Tribal  
 Is there public access at the site? \_\_\_\_\_ Is there public parking? \_\_\_\_\_

**II. Stream\Fisheries Observations**

Cover type:    forested    shrub    grassy    Describe: \_\_\_\_\_  
 \_\_\_\_\_  
 % Gradient Upstream:        0-1    1-4    >4                    % Shading Upstream: \_\_\_\_\_  
 % Gradient Downstream:      0-1    1-4    >4                    % Shading Downstream: \_\_\_\_\_  
 Existing structures or barriers:    Upstream                    Downstream  
 Describe: \_\_\_\_\_  
 \_\_\_\_\_  
 Estimated Stream Velocity: \_\_\_\_\_  
 Culvert width:    Matches stream            Narrower than stream            Wider than stream  
 Fish present:    Yes    No    Unsure  
 \_\_\_\_\_  
 Fish Observed:    Upstream                    Downstream  
 \_\_\_\_\_  
 Fish species/size/age class: : \_\_\_\_\_  
 \_\_\_\_\_

Existing structure passable?: Yes No Unsure If no, why?  
 Describe: \_\_\_\_\_  
 \_\_\_\_\_

**III. Type of Barrier (circle)**

<u>Natural Barriers</u>	<u>Constructed</u>	<u>Barriers</u>	<u>Dams</u>		
Waterfall	Culvert	Road Crossing	Levee	(Buttress)	(Stone)
Beaver Dam	Diversion	RR Crossing	Electrical	(Arch)	(Timber Crib)
Debris Dam	Navigational Lock	Screen	Dam (Earth)	(Multi-Arch)	Other
Other	Breeched Dam	Pump	(Rockfill)	(Concrete)	
	Dyke	Other	(Gravity)	(Masonry)	

**IV. Barrier Stats**

Year of Barrier construction (if natural, year of discovery) \_\_\_\_\_  
 Partners involved in barrier construction \_\_\_\_\_  
 Height of Barrier (ft) \_\_\_\_\_ Width of Barrier (ft) \_\_\_\_\_ Length of Barrier (ft) \_\_\_\_\_  
 Agency responsible for Barrier Operation \_\_\_\_\_  
 Agency responsible for Barrier Regulation \_\_\_\_\_  
 What purpose does the barrier serve? \_\_\_\_\_  
 Fish Species affected by barrier: \_\_\_\_\_

If fish passage structure is present, what kind of passage does it allow?  
 Upstream \_\_\_\_\_ Downstream \_\_\_\_\_  
 Type of passage structure: \_\_\_\_\_

**V. Culvert Observations/measurements**

Structure type/shape: \_\_\_\_\_ Corrugated: Yes No  
 Depth of corrugations: \_\_\_\_\_ Spacing of corrugations: \_\_\_\_\_  
 Structure Height/Diameter: \_\_\_\_\_ Width: \_\_\_\_\_ Length: \_\_\_\_\_  
 Orientation: \_\_\_\_\_  
 Embedded invert: Yes No Approx. depth below substrate at Inlet: \_\_\_\_\_  
 Approx. depth below substrate at Outlet: \_\_\_\_\_  
 Alignment with stream: Horizontal: Good Fair (Upstream or Downstream) Poor  
 Vertical: Flatter Same Steeper  
 Water depth in structure: At Inlet: \_\_\_\_\_ At Outlet: \_\_\_\_\_ High water marks: \_\_\_\_\_  
 Inlet: Measured drop from culvert invert to streambed: \_\_\_\_\_  
 Describe: \_\_\_\_\_ Apron: Yes No Type: \_\_\_\_\_  
 Outlet: Measured drop from culvert invert to streambed: \_\_\_\_\_  
 Describe (physical drop, cascade): \_\_\_\_\_  
 Apron: Yes No Apron Type: \_\_\_\_\_ Age of structure: \_\_\_\_\_ years

Average water depth in stream: \_\_\_\_\_ Size of area draining into pipe: \_\_\_\_\_

**VI. Fish Passage Stats**

Site Data:

- 1) Basin Map showing location of all barriers in the watershed near the project \_\_\_\_\_
- 2) Stream Flow Data \_\_\_\_\_
- 3) Headwater and tailwater rating curve \_\_\_\_\_
- 4) Photos of the site \_\_\_\_\_
- 5) Existing and/or proposed plans of the project \_\_\_\_\_

Existing Fish Passage Structure Data:

- 1) Tailwater elevation \_\_\_\_\_
- 2) Crest level (dam) elevation \_\_\_\_\_
- 3) Invert elevation of fishway entrance (downstream end) \_\_\_\_\_
- 4) Invert elevation of fishway exit (upstream end) \_\_\_\_\_
- 5) Total number of baffles in the fishway \_\_\_\_\_
- 6) Elevation difference between baffles \_\_\_\_\_
- 7) Distance of fishway entrance to the base of the barrier \_\_\_\_\_
- 8) Angle of fishway entrance to river flow \_\_\_\_\_
- 9) Water velocities in the fishway during the migration period(s) \_\_\_\_\_

Fisheries Data:

- 1) Fisheries Management Plan if available \_\_\_\_\_
- 2) Design population of target species and approximation of other migrants \_\_\_\_\_
- 3) Estimated timeframes of upstream and downstream migration of target species \_\_\_\_\_
- 4) Data on the swimming capabilities and other considerations for species of interest \_\_\_\_\_
- 5) Species management objectives \_\_\_\_\_

**VII. Other**      Photos:                  Digital (preferred)                  Other  
Sketch:                  On back                  On additional page  
Other observations:    On back                  Added page(s)  
Rare, Threatened, Endangered Species present?    Yes      No      Unknown  
Describe: \_\_\_\_\_  
Need further review?    Yes      No      Describe: \_\_\_\_\_

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## Part II. Instructions for completing Fish Passage - Preliminary Site Inventory Form

### Selected Instructions by Section:

#### I. General

**Barrier Name:** The name of the barrier. If the barrier does not have an official name, the popular name is used.

**Barrier ID:** The ID should be consistent with the National Inventory of Dams NID\_ID field if applicable.

**Waterbody:** The name of the waterbody on which the barrier is located. The name is consistent with the names used on USGS topographic quadrangles. If the stream is unnamed, it is identified as a tributary ("TRIB") to the next downstream named river. If the barrier is located off stream, the name of the waterbody is entered plus "OFFSTREAM". This field is similar to the one in the National Inventory of Dams.

**Watershed:** Name of watershed basin that contains the waterbody from DeLorme Atlas (DeLorme) or U.S.G.S. Map.

**State:** The two letter abbreviation for the state in which the barrier is located. If the barrier is located on a waterbody that is the border between two states, both abbreviations are entered separated by a forward slash ("/").

**County:** The county in which the barrier is located.

**Town:** The town in which the barrier is located.

**HUC11:** The hydrologic unit code (watershed) in which the barrier is located, as determined by the eleven digit U.S. Geological Survey Hydrologic Unit Code.

**Map Location:** 7.5 minute USGS topographic map name or coordinates from DeLorme. For DeLorme, use Map Number and alphanumeric locator (e.g.: Davis Brook, #34, B - 1).

**Latitude and Longitude in decimal degrees:** The latitude and longitude of the barrier, in decimal degrees. The format contains four leading characters (the first character is for negative values) and eight decimal places (i.e. 42.22223333). Indicate if GPS or U.S.G.S. map used.

**Collector Route Code, Route Mileage, Element ID:** These are identifiers for cross-referencing.

**Primary Owner:** The name of the primary owner of the barrier. This can include federal, state, local, private, utility, and tribal. The agency name is used for non-private owners, while the full name of the owner is used for private individuals.

**Owner Type:** The affiliation of the primary owner, from the following list:

Federal  
State  
Local Government  
Public Utility  
Private  
Tribal

## **II. Stream and Fisheries Observations**

**Cover type:** Circle one or more, as appropriate. Add brief description of cover/habitat in area of structure. Include human development in adjacent area, evident disturbances, special concerns.

**Gradient:** Circle as appropriate. Look at channel up and downstream of crossing to make determination. As a general rule: **0-1%** slope area characterized by no to slow moving current; **1 to 4%** gradient usually show a riffle\pool overall flow pattern, with moderately fast moving water spaced between pools and no to slight current; **> 4%** characterized by 'pool and drop' overall flow pattern, with steep drops (such as rapids and waterfalls) spaced between pools of significantly slower flow.

**Shading:** Approximate percent cover in areas near inlet and outlet. Observe canopy over water up- and downstream of crossing. (Vegetation cover is important in moderating stream temperatures and providing basis for food webs within waterbody.)

**Estimated Stream Velocity:** Use flow meter or estimate travel time over known distance. This data should be collected during the fish migration timeframe.

**Culvert width:** Note how width of crossing structure 'fits' stream channel width near inlet and circle appropriate response.

**Fish species/size/age class:** If possible, note. If not possible, record numbers, body shape or any other apparent characteristics of observed fish.

## **III. Type of Barrier**

The type of the barrier, chosen from an established list (below). If the barrier is a dam, BarrierType also includes the type of dam, according to the types established and defined by the National Inventory of Dams. A culvert is generally defined as a constructed enclosed space through which water is directed. "Other constructed barrier" is reserved for non-dam barriers. The most fitting category is used for this; any variance is recorded under the Notes field.

Waterfall  
Beaver Dam  
Debris Jam  
Other Natural Barrier  
Culvert  
Diversion

Navigational Lock  
Breeched Dam  
Dyke  
Road Crossing  
Railroad Crossing  
Screen  
Pump  
Other Constructed Barrier  
Levee  
Electrical  
Dam (Earth)  
Dam (Rockfill)  
Dam (Gravity)  
Dam (Buttress)  
Dam (Arch)  
Dam (Multi-Arch)  
Dam (Concrete)  
Dam (Masonry)  
Dam (Stone)  
Dam (Timber Crib)  
Dam (Other)

#### **IV. Barrier Stats**

**Year of barrier construction:** The year that the barrier was either constructed, or if the barrier is a natural barrier, then the year when it was first recorded.

**Partners involved in barrier construction:** This field identifies the federal, state, local, private, public utility, and tribal partners associated with this barrier. List of codes contains the Federal Agency list (page 5).

**Height:** The height of the barrier, in feet. It is defined as the vertical distance between the lowest point on the crest of the barrier (or culvert floor) to the top of the average water surface below the barrier.

**Width:** The width of the barrier, in feet, perpendicular to stream flow. If the barrier is a dam, this is recorded as the length along the top of the dam. Included in dam lengths are spillway, powerplant, navigational lock, fish passage, etc., if these form part of the length of the dam; if detached from the dam, these structures are not included.

**Length:** The length of the barrier, in feet, parallel to stream flow. This is specifically used for barriers in which this dimension would have significant impacts on fish passage, such as with a culvert or a consecutive series of waterfalls.

**Agency responsible for Barrier Operation:** Code (below) identifying which federal agency is involved in the operation of the barrier. If several agencies are involved, codes are separated by comma.

**Agency responsible for Barrier Regulation:** Code (below) identifying which federal agency is involved in the regulation of the barrier. If several agencies are involved, codes are separated by comma.

<u>Federal Agency</u>	<u>Names Codes</u>
Dept. of Agriculture	
Natural Resources Conservation Service	USDA NRCS
Forest Service	USDA FS
Rural Housing Service	USDA RHS
Dept. of Defense	
U.S. Army Corp of Engineers	CE
U.S. Army	DOD USA
U.S. Navy	DOD USN
U.S. Air Force	DOD USAF
Dept. of Interior	
Bureau of Reclamation	DOI BR
Bureau of Indian Affairs	DOI BIA
Bureau of Land Management	DOI BLM
Fish & Wildlife Service	DOI FWS
Geological Survey	DOI GS
National Park Service	DOI NPS
Dept. of Labor	
Mine Safety & Health Admin	DOL MSHA
Dept. of State	
Intl Boundary & Water Comm	IBWC
Dept. of Energy	DOE
Federal Energy Regulatory Comm	DOE FERC
Nuclear Regulatory Comm	US NRC
Tennessee Valley Auth	TVA

**Purpose:** The purpose of the constructed barrier or the reservoir above the barrier, chosen from the list below. If the dam has multi purposes, list the codes in decreasing importance separated by a comma. This is left blank for natural barriers. The most fitting category is used for this; any variance is recorded in the Notes section.

- Irrigation
- Hydroelectric
- Flood Control
- Navigation
- Water Supply
- Recreation
- Stream Crossing
- Fire Protection or Farm
- Fish and Wildlife
- Debris Control
- Tailings
- Mill
- ANS Control

Other

**Fish Species affected by barrier:** This field requests information on what kinds of fish seem to be affected by the barrier, list all species that appear to be affected.

**If fish passage structure is present, what kind of passage does it allow:** This section requires the fish passage professional to circle whether there is a fish passage structure that allows either upstream or downstream passage.

**Type of fish passage structure:** The list below represents the possible responses to this question.

Culvert

Ladders

Spillway

Bypass channels

Turbines

Barged

Screened intake

Lock

Gates

Elevator

Fishway

Truck

Lock

Gates

Notches

Screening

Electrical

Other

#### V. Culvert Observations/Measurements

**Structure type:** Fill in type of structure, including circular, elliptical, pipe, box, arch, etc. and material including plastic, steel, reinforced concrete.

**Orientation:** For example, N/S or E/W

**Embedded invert:** Is invert of structure below substrate surface? Circle appropriate response. If structure below streambed elevation, estimate depth of invert below substrate at inlet and outlet.

**Alignment with stream:** Is existing structure aligned with channel? Look at local setting upstream and downstream before completing.

Horizontal:

Good: approximates general course of stream.

Fair: structure not well aligned with either inlet OR outlet of waterway.

Indicate upstream or downstream.

Poor: structure distinctly out of line with channel.

**Water depth in pipe:** Measure any high water mark above existing water level. This data should be collected during the fish migration timeframe.

**Inlet:** Measure the drop from the culvert invert to the streambed bottom. Include one or two words describing inlet. Include whether inlet is projecting, has a headwall, wings, is eroded, has physical drop, etc. Note existence/type of inlet apron or protection.

**Outlet:** Measure the drop from the culvert invert to streambed bottom. Include one or two words describing outlet. Include whether outlet has physical drop, falls over a barrier, has pool, etc. Note existence/type of any outlet apron or protection.

## **VI. Fish Passage Stats**

**Basin Map:** showing location of all barriers in the watershed near the project.

**Stream Flow Data:** USGS stream gage data from nearby location if available - monthly means and stats package. For ungaged rivers develop a range using watersheds with similar lat/long and watershed characteristics including drainage area size range and elevation. Calculate Av. Day (daily average for month of passage)/Drainage Area (sq.mi.) = # csm (flow per sq. mi. of upstream drainage area).

**Headwater and tailwater rating curve:** Do three cross-sections upstream of the barrier and three cross-sections downstream. Do one cross-section for every 1-foot drop in elevation, and evenly spaced apart. \*\*For coastal streams with less gradient (one-foot drop rule not applicable), the transects should be spaced 20-50 feet apart. Once a spacing distance is chosen, each transect must be the same distance apart. This data should be collected during the fish migration timeframe or the summer low flow period.

**Existing and/or proposed plans of the project site:** If a hydropower facility, turbine size and description of proposed operations. Also need spillway information - length of dam, gates and sizes - etc.

**Tailwater elevation:** Elevation at the surface of the water as it exits the downstream end of the structure. This data should be collected during the fish migration timeframe or the summer low flow period.

**Distance of fishway entrance to the base of the barrier:** Fishway entrance should not be located too far downstream from the base of the barrier.

**Angle of fishway entrance to flow:** Fishway entrance should be at a 45° angle to the river flow.

**Water velocities in fishway:** Use flow meter or estimate travel time over known distance. This data should be collected during the fish migration timeframe.

**Fisheries Management Plan:** Contact the State Fisheries Agency; Town fisheries harvest plan, rates and regulations.

**Design population of target species:** Found in the Fisheries Management Plan or from the State Fisheries Agency.

**Estimated timeframes of upstream and downstream migration of target species:** Contact the State Fisheries Agency and see "Table 2: Maine Fish Species: Time of Impact and Related Data" in Maine Department of Transportation 19 March 2002 Fish Passage Policy and Design Guide (<http://www.state.me.us/mdot/mainhtml/publication.htm>). Note: these timeframes will be earlier as you go further south of Maine.

**Data on the swimming capabilities and other considerations for species of interest:** See "Table 2: Maine Fish Species: Time of Impact and Related Data" in Maine Department of Transportation 19 March 2002 Fish Passage Policy and Design Guide and reference used to develop the table (<http://www.state.me.us/mdot/mainhtml/publication.htm>).

**Species Management Objectives:** Found in the Fisheries Management Plan or from the State Fisheries Agency.

#### **VII. Other**

**Photos:** Digital photographs or video recommended.

**Sketch:** Sketch 'plan view' and unusual conditions on back of form or additional sheet.

**Other observations:** Include other considerations not specifically requested on form. Include anything considered appropriate - wildlife observations, plant community composition, severe erosion, pollution, etc.

**Need further review:** Is there need to gather additional or more complete information about site? Use your judgment to decide if conditions/resources warrant.

This inventory form was developed using the Maine Department of Transportation 19 March 2002 Fish Passage Policy and Design Guide (<http://www.state.me.us/mdot/mainhtml/publication.htm>) and the Upper Susquehanna Coalition Data Collection Worksheets ([http://www.u-s-c.org/html/data\\_worksheets.htm](http://www.u-s-c.org/html/data_worksheets.htm)). Additional technical assistance was provided by the USFWS, Region 5, Hadley, MA.