Fish Passage Rapid Assessment Field Form (Version 4)

This form is intended to be used as an initial rapid barrier inventory and data collection. Collected records should be sent to add to the California Passage Assessment Database (PAD). This form is not to be confused with the Caltrans FirstPass form, nor used to replace detailed barrier passage assessment protocols. Please fill in Sections I, II, III (description) and IV even when no barriers are found! When a barrier or structure is found fill in the appropriate sections V-IX corresponding to the barrier/structure (e.g., fill in section V when a diversion is found skipping sections V-IX that correspond to other barrier/structure types unless more than one structure type is found at the same site – e.g., a diversion and a dam). Required fields are identified in each Section with an asterisk (*). Some Sections may not apply. Photos are highly desired including non-barrier locations. Instructions, data definitions, and supplemental information including contacts can be found on pages 4-11.

Required Equipment: GPS Unit or Smart Phone for recording latitude and longitude coordinates
Optional Equipment: stadia rod, auto level, velocity meter and wading rod

I. GENERAL

Surveyor*: _____ **Organization***: _____
Date*:_____ **Time**:_____

II. LOCATION

Stream Name*: _____ **Tributary To***: _____
PAD ID: _____ **Latitude***: _____ **Longitude***: _____
Barrier or Structure Found?*: □ Yes □ No **Length of Stream Segment Surveyed** (ft): _____
Bank Location (looking downstream)*: □ Left □ Right □ Both **Reach Gradient** (ratio or percent slope): __
Flow Conditions*: □ Continuous □ Isolated pools □ Dry
Known to be:□ perennial □ intermittent □ ephemeral
Road Name/Route*: _____ **Milepost***: _____
Landowner: _____ **Structure Owner**: _____
Photos Taken: □ Inlet □ Outlet □ Other_____
Photo Description/Numbers*:
_____
_____

III. STRUCTURE

Structure Type*: □ Diversion □ Dam □ Culvert □ Bridge □ Ford □ Grade Control □ Utility Crossing □ Tidegate □ Flood Control Channel □ Natural □ Other_____
Structure/Barrier Description*: Click or tap here to enter text.
_____
_____
_____
_____
_____
Apron?*: □ Yes □ No
Drop or Slope?*: □ Flush with bottom (no) □ Sloping (yes) □ Shelf (yes) **Drop Height** (in): _____
Structure/Barrier Dimensions - Width (ft):_____ **Height** (ft): _____ **Length** (ft): _____
Channel Width (ft): _____ **Status*** □ Active □ Abandoned □ Unknown
Passage Facility?* □ Yes □ No □ Unknown

Passage Facility Type* □ Denil □ Pool & Weir □ Vertical Slot □ Roughened Channel □ Baffles/Weirs Inside Culvert □ Climbing Pass □ Downstream bypass system □ Unknown □ None □ Other_____

Passage Status*: Salmonids □ Yes □ No □ Partial □ Temporal □ Unknown

Lamprey (climbing) □ Yes □ No □ Partial □ Temporal □ Unknown

Other Fish Species □ Yes □ No □ Partial □ Temporal □ Unknown

Total barrier □ Yes □ No

IV. AQUATIC ORGANISMS

Survey Downstream?* □ No □ Visual (walking) □ Snorkel □ Electrofish □ Lamprey □ Mussels □ Other

Survey Upstream?* □ No □ Visual (walking) □ Snorkel □ Electrofish □ Lamprey □ Mussels □ Other

Observed Downstream?

Species: □ Chinook □ Coho □ Steelhead/Rainbow □ Lamprey □ Mussels □ Other _____

Lifestages: □ Larvae □ Juvenile □ Adult

Observed Upstream?

Species: □ Chinook □ Coho □ Steelhead/Rainbow □ Lamprey □ Mussels □ Other_____

Lifestages: □ Larvae □ Juvenile □ Adult

Species notes:

_____

V. DIVERSION

Diversion Type* (see Dam for structure type):

Pump: □ Vertical □ Submersible □ Slant □ Centrifugal □ Other_____

Pump Running? □ Yes □ No

Other: □ Floodgate □ Siphon □ Canal □ Infiltration chamber □ Other_____

Pipe or Conveyance Size (in): _____ **Diversion Flow Rate (cfs)** _____ □ Unknown

Screened?* □ Yes □ No □ Unknown **Screen Aperture Size (in)** _____

Screen Type: □ conical □ cylindrical □ inclined flat plate □ rotary drum □ vertical flat plate □ single flat plate surface □ other_____

Screen Location: □ on channel □ off channel

VI. DAM

Dam Type*: □ Earth □ Rock/cement □ Board Weir □ Log Weir □ Inflatable □ Sheetpile □ Other _____

Usage: □ Seasonal □ Permanent

VII. CULVERT

Culvert Type*: □ Box □ Circular □ Open-bottom arch □ Pipe arch □ Other_____ □ Unmaintained

Culvert Material*: □ Concrete □ Metal □ Plastic □ Log/wood □ Other_____

Near-bottom velocity (ft/s):_____ **Number of Barrels/Pipes***: _____

Does Culvert Appear Undersized? □ Yes □ No □ Unknown Notes: _____

VIII. BRIDGE

Bridge Type*: □ Free span □ Instream structure

IX. NATURAL

Natural Barrier Type*: □ Waterfall □ Cascade □ Grade □ Landslide □ Log Debris Accumulations □ Other _____

Waterfall Drop*: □ ≤ 8 ft □ > 8 ft

X. ADDITIONAL NOTES

Detailed fish passage assessment needed? □ Yes □ No
Does this site need treatment? □ Yes □ No
What are specific treatment recommendations?
(Please use other side if needed for additional notes)

_____
_____
_____
_____
_____
_____
_____

Initial Lamprey Assessment:

Is one of the following true?

□ The structure is a natural structure (e.g. waterfall, cascade, log-jam).
□ The structure is a natural bottom thru culvert or bridge
□ The structure outlet is submerged during most flows.
□ The structure is a diversion without an instream structure blocking upstream passage.
____ If any boxes are checked, **further Lamprey Passage Assessment is likely not needed**.

If surveyor disagrees (see features below), ____ reasoning:

_____
_____
_____
_____

Lamprey habitat and distribution: Surveyors aiming to assess the likelihood of lamprey species in this system should review current distribution data for pacific lamprey [1] and habitat suitability information, such as *Comparison of Pacific Lamprey and Pacific Salmon Life Histories, Habitat and Ecology*[2] (PLCI LTWG, 2023). A desktop analysis is generally required to determine habitat suitability for restoration of target species. Suitable habitat may exist far upstream from a barrier, and conditions at the barrier should not be used to determine if a reach provides suitable spawning habitat.

[1]BIOS Layer: Pacific Lamprey Historical Range and Current Distribution – USFWS

https://services2.arcgis.com/Uq9r85Potqm3MfRV/arcgis/rest/services/biosds2673_fnu/FeatureServer/0

[2] Comparison of Pacific Lamprey and Pacific Salmon Life Histories, Habitat and Ecology, https://www.pacificlamprey.org/wp-content/uploads/2023/08/LTWG-Restoration_Lamprey-Salmon-Comparison_030823.pdf

Lamprey passage considerations: Structural features that challenge lamprey: perched culverts, acute edges, u-channels, baffles, weirs or other structures in the structure, overhangs, near-bottom velocities > 1 m/s, porous surface (grates), gaps or holes, lack of subaerial routes, confused turbulence, seams/cracks/gaps that break suction on otherwise smooth surfaces, heavy moss/algae, repeated structural challenges, seasonally dry conditions at site or upstream.

Field Definitions and Instructions for Filling Out This Form

I. GENERAL

Surveyor - Enter the names of people conducting the survey.
Organization - Enter the organization name.
Date/Time - Enter the day's date (mm/dd/yy) and the time of the survey (24hr).

II. LOCATION

Stream Name: Enter the stream name. Examples: Name from 7.5 minute quadrangle/topographic map, local stream name or 'unnamed' if there is no official or local name.
Tributary To: Enter the name of the receiving stream, river lake or ocean (downstream name).
Latitude/Longitude: Geographic Coordinate System North American Datum 1983 in decimal degrees.
Barrier(s) or Structure(s) Found: Mark 'No' if barrier(s) or structures (s) were not found and fill in stream segment surveyed. If a barrier or structure is observed, please fill in the rest of the form.
Length of Stream Segment Surveyed: Record the length of the surveyed stream segment or reach.
Bank Location: Where in the stream the structure is located, looking downstream.
Reach Gradient: Ratio or percent slope within barrier reach. Measure the bed elevation of two riffle crest thalwegs with an autolevel and stadia rod. Measure the distance between the two locations with a tape. Gradient = (upstream riffle crest thalweg bed elevation – downstream riffle crest bed elevation)/distance between two measurement locations. For slopes 5% or greater, a leveling or stadia rod and inclinometer can be used to measure slope/gradient with teams of two. Use a sticker or brightly colored tape to mark the rod at eye height of the person who will be holding the inclinometer (observer). The rod must be at the same level as the bottom of the observer's boots relative to the stream surface. The observer looks through the viewer of the inclinometer, places the hairline over the eye height marker (sticker or tape on rod) and reads the percent slope.
Flow Conditions:
- Continuous - Free flowing water.
- Isolated pools - Pools are present but they are not connected by free flowing water.
- Dry - No water at all.

Known to be:
- Perennial – Stream flow that is continuous throughout the year even during dry periods.
- Intermittent – Stream flow during certain times of the year and is not continuous.
- Ephemeral – Stream flow after precipitation events and for a short duration.

Road Name/Route: Enter road name and/or number.
Milepost: Generally, both State and County roads have markers located every half mile indicating the road/highway number, county it is located in, and the postmile or kilopost location of the marker. For north/south roads, the markers start at 0.00 from the southern end and increase as you travel north. For west/east roads, the markers start at 0.00 from the western end and increase as you travel east.
Land Owner: Owner of the land. May be private, public, tribal, or unknown. Write down the name if ownership is known. For ownership that is private, write "Private".
Structure Owner: Owner of the structure. May be private, public, tribal, or unknown, and may differ from land owner. Write down the name if ownership is known. For ownership that is private, write "Private".
Photos Taken: Mark when pictures of the inlet, outlet or other parts of a barrier were taken.
Photos Description/Numbers: Briefly describe each picture, orientation (e.g. looking upstream) and

number/filename.

Photos should include downstream entrance to structure, upstream exit, interior of culverts (esp. if any structural features) and any features of concern. Please provide photos with this form.

III. STRUCTURE

Structure Type:

Diversion - A man-made structure or installation for transferring water from a stream by a pipe, canal, well, or other conduit to another watercourse or to the land. Surface diversions fall into two general categories: pump and gravity.

Note: the diversion is distinct from the structure (dam) that impounds or directs the water.

Dam - A man-made barrier built across a stream or river to obstruct the flow of water. Includes debris, earth, rock, flashboard, drop structure, arch, weir, gravity, wing gabion, etc.

Culvert - A pipe that allows streams, rivers, or runoff to pass under a road.

Bridge - A structure conveying a road or pathway over a stream, river, or a depression.

Ford - A road crossing that allows the river to run over a road (Arizona crossing).

Grade Control - Stabilizing weirs constructed in the streambed to prevent lowering of the channel bottom. This includes man-installed bedrock chutes.

Utility Crossing - Some type of utility line, water, gas, sewer, etc. that crosses a creek or stream and impedes passage of fish.

Tidegate - A structure that controls tidal flow within an estuary or between tidewater and upland areas.

Flood Control Channel - Any partially or completely excavated channel intended to convey above-normal discharges.

Fish trap - A trap set up to catch fish usually for counting and monitoring purposes, and should always be a temporal barrier.

Natural - A natural barrier, such as waterfall, beaver dam, insufficient flow, landslide, velocity, etc.

Other - Anything that is not described in the above categories.

Structure/Barrier Description: Any additional significant details about the structure or barrier.

Apron?: A protective shield, usually made of concrete, to protect against erosion, may be around piers or abutments or span the entire creek.

Drop or Slope?: Is there a drop or slope from the apron to the downstream streambed? Options: Flush with bottom (no), Sloping (yes), and Shelf (yes).

Drop Height: Measure the height where the water drops over the structure (i.e., at the center of the culvert outlet/downstream end of the culvert) or natural barrier to the water surface below at estimated base flow. Include this for waterfalls, cascades (might be multiple drops), dams, grade control structures, and aprons at bridges and culverts, etc.

Structure/Barrier Dimensions: For round culverts/pipes, width and length is all that is needed. For box culvert, width, height and length measurements are all that is needed. For flood control channels and other linear barriers, only length is needed. For dams, grade control structures, fords, utility crossings and natural barriers height is important, but width and length can also be recorded.

Width – Measurement of the structure side to side and perpendicular to the streamflow.

For dams, flood control channels, grade control structures, fords, utility crossings and natural barriers (e.g. waterfall), measure the width of the structure/barrier from the points where the structure/barrier or fill (e.g., an earthen berm) meets either bank,

typically measured perpendicular to the flow.

For culverts, bridges and tidegates, measure the horizontal dimension inside the structure at a point that is perpendicular to the streamflow. If the widest point of the culvert is embedded below the surface of the streambed, measure width at the widest point possible above the streambed. If the span measurements are different at the outlet and inlet, record the smaller of the two measurements. If multiple culverts, use width measurement of largest span culvert.

Height – Measurement of the bottom to the top/crest of the structure/barrier.

For dams, grade control structures, fords, utility crossings and natural barriers (e.g. waterfall), measure the structure/barrier height from the lowest point at the base of the structure vertically to the top of the structure.

For culverts and bridges, measure the vertical dimension from the invert (floor) to the soffit (underside of top of the structure) just inside outlet and inlet. If streambed material is present, use a probe to reach the invert. For bottomless arch culverts, or if the invert is rusted-out/missing or inaccessible, measure from the soffit to the streambed and explain in the comments. If the height measurements are different at the outlet and inlet, record the smaller of the two measurements. For multiple culverts, record the height of the largest culvert.

Length - Include length of man-made and natural barriers (flood control channels, etc.).

Channel Width: The active channel width is identified by locating the height of annual scour along banks developed by annual fluctuations of stream flow.

Status:

Active – Select this if the structure appears to be active and/or maintained.

Abandoned – Select this this if the structure appears to be abandoned and/or not maintained. For example, is the bridge still utilized for vehicular or pedestrian traffic, or is it abandoned?

Unknown – Select this if it unknown whether the structure is active or abandoned.

Passage Facility?: Is there a fish ladder, bypass, or some other structure intended to improve fish passage? This is referred to as a FishWay in PAD

Passage Facility Type: Select one or more if Passage Facility? = Yes. There might be hybrid or multiple types (Combination of weir and pool, vertical slot or roughened channel fishways, pool and chute, etc.)

Denil - Denil fishway, Alaska steeppass, etc.

Pool & Weir - Pool and weir without orifice, Pool and weir with orifice, Pool and weir below culvert

Vertical Slot – Fishway which has vertical slots rather than weirs to dissipate energy and maintain a head drop of less than one foot from pool to pool.

Roughened Channel - Rock ramp, Artificial rapids, Roughened chute, Engineered steepened stream channel, Newberry riffles, Newberry weirs)

Baffles/Weirs Inside Culvert - These are generally structures that are added as a retrofit to a culvert to reduce velocity or improve fish passage in some way.

Climbing Pass - Elver pass, Lamprey pass

Downstream bypass system - Guidance net, Turbine intake screen, Louvers, Bar racks, Bypass pipe/channel, chute/sluiceway, Surface collector, Diversion return pipe/channel

None – No known fishway exists

Other – Anything that doesn't fit the above categories. Please describe the fish passage facility in the space to the right.

Passage Status: Based on field observations describe the impact on fish passage (estimate to your best judgment).

Jumping (e.g. salmonids, pikeminnows), Swimming (e.g. suckers, lampreys, dace), Climbing (Pacific Lamprey).

Yes – A barrier to these species at all flows and all lifestages

No – Not a barrier to these species at any flows and blocks no lifestages of these species

Partial – Blocks passage to certain species or lifestages

Temporal – Blocks passage at certain flows

Unknown – Unsure if it is a barrier to these species. May need further analysis.

Total barrier - yes = clearly blocks any passage (e.g. large dams without passage, high perched culverts).

IV. AQUATIC ORGANISMS

Survey - Was a biological survey done? upstream or downstream of the barrier? and of what kind? Lamprey surveys may target larvae, which require specialized slow-pulse electrofishing equipment or settings. Mussel surveys can be done with snorkel or view scope and focus on scanning substrate for individuals.

Observed - What aquatic species and lifestages were observed? This may inform the passage needs or status of the site.

Species Notes – Can include any additional information about species and lifestages observed including count.

Identifying Species and Other Information

Freshwater Mussels:

California has approximately 7 species of native freshwater mussels. Freshwater mussels are obligate parasites dependent on fish to carry their larvae (glochidia) by attaching to the gills of fish, including salmonids, and can be found in locations where there are salmonids and play an important role in maintaining water quality in their ecosystems.

More information: https://xerces.org/publications/guidelines/conserving-gems-of-our-waters

Salmon, Sturgeon, Trout and Pacific Lamprey: https://wildlife.ca.gov/Conservation/Fishes

V. DIVERSION

Diversion Type: Type of water diversion. Note: this refers to the extraction method, not the structure that impounds the water (see below under Dams).

Pumps:

Vertical - The pump is vertically oriented and pulls water straight up.

Submersible - Pump for diverting water is submerged under the water or bank and is not visible.

Slant - Both the pump and intake pipe are angled at a slant up the river bank.

Centrifugal - Old style pump with visual appearance of a snail shell (spiral or circular).

Pump other - Water diversion where type of pump used is unknown but use of a pump is certain.

Pump Running - Check Yes if the diversion was running at the time of the survey.

Other:

Floodgate - Water diversion where water is diverted by gravity flow and controlled via a screw gate.

Siphon - Common in the Delta, not usually seen anywhere else.

Canal - Water is diverted into a gravity fed channel

Infiltration chamber - Water is passed through the stream bed into pipe conveyance.
Other - Anything that is not described in the above categories.

Pipe or Conveyance Size: Inside diameter of the diversion intake, canal or drain in inches.

Diversion Flow Rate: The rate at which stream flow is diverted in cubic feet per second, in known.

Screened?: A yes, no, or unknown determination of whether the diversion has a fish screen. Fish screens are supposed to keep fish from being taken out of a stream or river by a water diversion.

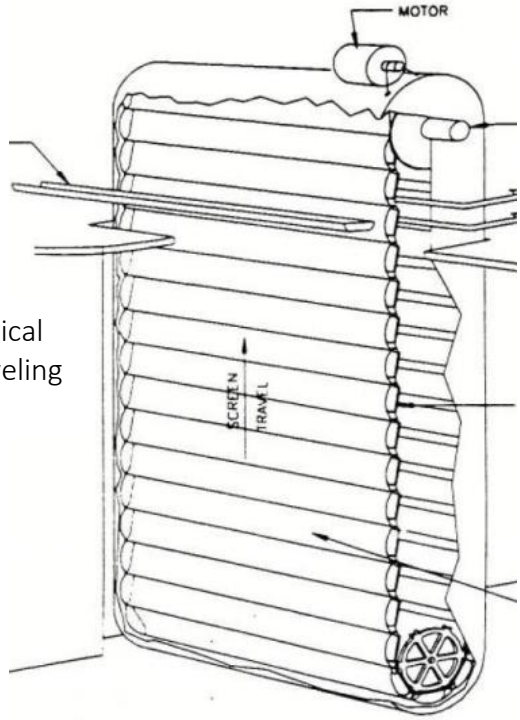
Screen Aperture Size: If screened, what is the size of gap/mesh in the screen in inches?

Screen Type: What type of screening is provided: conical, cylindrical, inclined flat plate, rotary drum, chevron vertical flat plate, single surface vertical flat plate, louver, vertical travelling belt?

Photos below courtesy of Mark Gard, CDFW:

Rotating Drum

Vertical Traveling Belt



Louvers

Cone

Inclined Flat Plate

Flat Plate

Screen Location: Is the screen located on or off channel (e.g. located in diversion canal)?

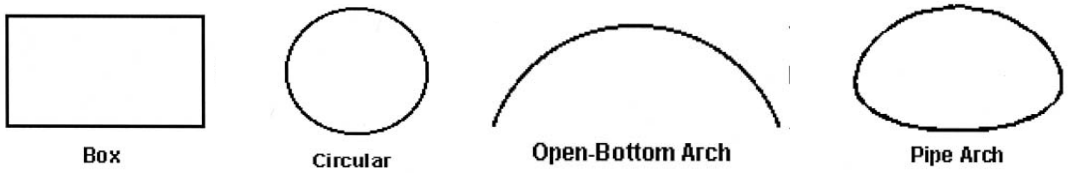
VI. DAM

Dam Type: Specify the material the dam is made from.

Seasonal/Permanent: Is the dam operational all year long or seasonally?

VII. CULVERT

Culvert Type:



Culvert Material: Check box that most accurately describes the culvert's construction material. Check multiple boxes if the culvert is composed of two or more materials.

Concrete - Generally no corrugations. Mostly box culverts, some circular and arch pipes are concrete.

Metal - Corrugated Metal (Steel) Pipe (CMP) = single sheet pipe of corrugated galvanized steel; Structural Steel Plate (SSP) = multiple plates of corrugated galvanized steel bolted together, and corrugated aluminum.

Plastic - Culvert of various types of high-impact plastics, usually with shallow corrugations.

Log/wood - Mostly old log stringer bridges and Humboldt crossings, also box and old circular pipe.

Other - Explain if none of the materials accurately describes the culvert.

Near-bottom velocity (ft/s): Measure the velocity at 0.5 feet off the bottom of the culvert exit, or mid-column if the water depth is less than 0.5 feet, with a velocity meter and wading rod.

Number of Barrels/Pipes - If a culvert consists of numerous barrels or pipe, list the total number.
Does Culvert Appear Undersized?: A yes, no, or unknown determination of whether the culvert is built to withstand a 100-year flood event. Compare size of culvert to 100 year flow for location from Streamstats (https://streamstats.usgs.gov/ss/)

VIII. BRIDGE

Bridge Type:

Free span - No part of the bridge is in the stream.
Instream structure - An abutment, pier, or some other part of the bridge is in the stream.

IX. NATURAL

Natural Barrier Type:

Waterfall - A sudden, nearly vertical drop in a stream, as it flows over rock.
Cascade - A waterfall or steep rocky feature without a specific vertical drop
Grade - Topography of streambed is too steep for fish to ascend. Specify details of species and lifestages the grade is too steep for in the description section, and/or estimate the slope.
Landslide - Movement of earth down a steep slope into a stream that blocks fish passage.

Waterfall Drop: Check the box with an estimate of the actual height of drop to the water surface at baseflow.

X. ADDITIONAL NOTES

Please provide any additional notes and comments that may help to describe the structure, to determine the need for a detailed fish passage assessment and needs for barrier remediation. Use other side of the form if needed.

Supplemental Information

Send comments and completed forms to:

Anne Elston, PSMFC, 1010 Riverside Pkwy, West Sacramento, CA 95605, Email: Anne.Elston@wildlife.ca.gov

Aquatic connectivity and anadromous fish passage questions:

Andrew Hampton, CDFW, 1010 Riverside Pkwy, West Sacramento, CA 95605, Email: Andrew.Hampton@wildlife.ca.gov

Lamprey information:

https://www.pacificlamprey.org/ltwg/

Lamprey questions:

Christina Parker, CDFW, 1010 Riverside Pkwy, West Sacramento, CA 95605
christina.parker@wildlife.ca.gov
Josh Boyce, USFWS, 2800 Cottage Way, Sacramento, CA 95825 josh_boyce@fws.gov
Stewart Reid, Western Fishes, 2045 East Main, Ashland OR 97520 WesternFishes@opendoor.com

Freshwater Mussels information:

Visual Survey Protocol Framework for Western North American Freshwater Mussels (Xerces Society)
https://xerces.org/publications/identification-monitoring-guides/visual-survey-protocol-framework-for-western-north
Best Management Practices for Protecting Native Western Freshwater Mussels During Aquatic and Riparian Restoration, Construction, and Land Management Projects and Activities (Xerces Society)
https://www.xerces.org/publications/guidelines/conserving-gems-of-our-waters

Mussel questions:

Emilie Blevins, Senior Conservation Biologist, Xerces Society, emilie.blevins@xerces.org
Alex Jones USFWS, 2800 Cottage Way, Sacramento, CA 95825 alexander_c_jones@fws.gov

Invasive mussel or other invasive species questions or potential sightings:

https://wildlife.ca.gov/Conservation/Invasives/Report, (866) 440-9530 , invasives@wildlife.ca.gov