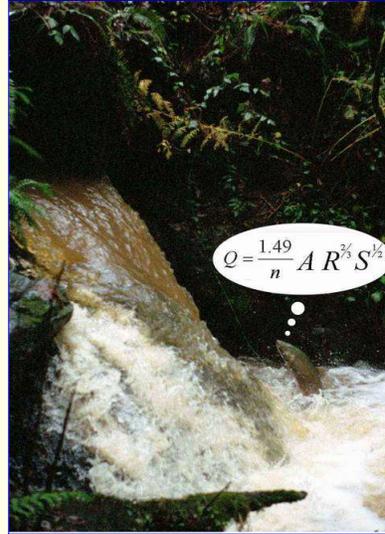


Fish Passage Assessment and Prioritization

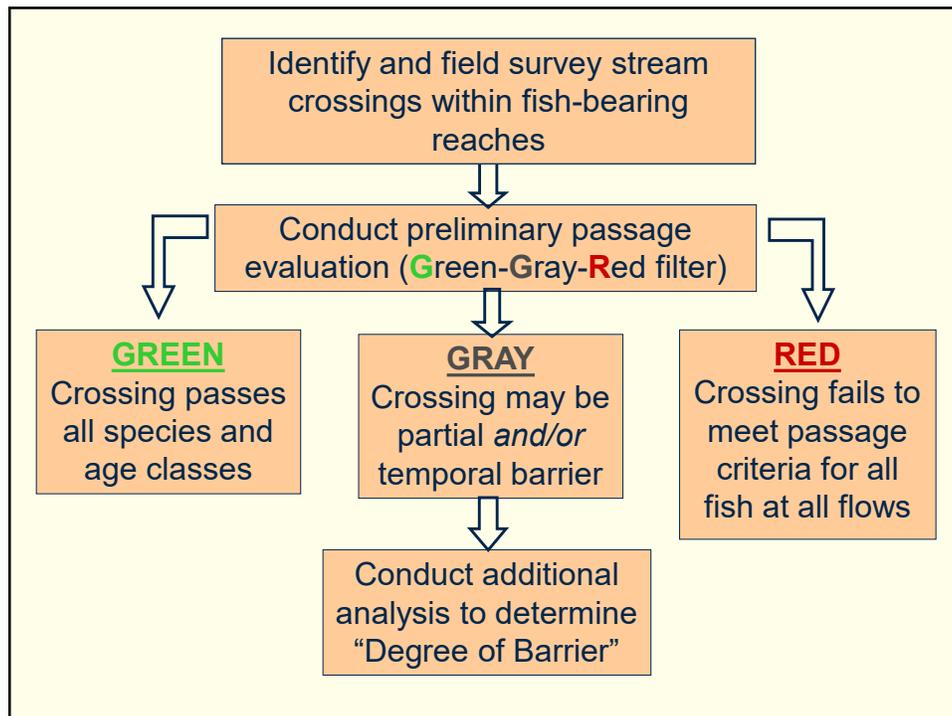


Steps Prior to Site Assessments

- Identify sites – road/landowner databases, Passage Assessment Database (PAD), Calfish.org, watershed groups, first-pass assessments.
- Pre-survey considerations – site access, adjacent landowners, permit requirements, .
- Field Crew Safety – proper PPE, cones and signs, assess site conditions, agency specific training requirements.

Site Assessment – Data Collection

- Survey Equipment – total station or auto-level required.
- Structure specifications – sizes, lengths, configurations, slopes, material types.
- Channel measurements – slopes, widths, depths, substrate types.
- Other Information – site sketch, photographs, flow conditions, water quality, fish presence.



Passage Evaluation Steps

- Determine focal species and age classes.
- Select swimming and leaping capabilities, and minimum depth criteria.
- Determine and calculate range of migration flows for focal species and age classes.
- Run hydraulic analyses.
- Determine percent of migration flows that meet (or fail to meet) selected velocity, depth and leap criteria.

The “Assessment” Fish

Factors to Consider:

- Selection of an appropriate species or age-classes.
- CDFW – Section IX – adult anadromous, adult resident trout, and juveniles.
- In Central and Southern areas, resident Coastal Rainbow Trout are an important focal age class to consider.

Swimming Abilities and Requirements

Types of Swimming Modes:

- Sustained – maintained indefinitely.
- Prolonged – maintained for 20 seconds to 200 minutes.
- Burst – highest velocity mode, maintained for < 20 seconds.

Salmonid Performance Criteria

CDFW : Assessment Criteria

Species or Lifestage	Minimum Water Depth	Prolonged Swimming Mode		Burst Swimming Mode		
		Maximum Swim Speed	Time to Exhaustion	Maximum Swim Speed	Time to Exhaustion	Maximum Leap Speed
Adult anadromous salmonids	0.8 feet	6.0 ft/sec	30 minutes	10.0 ft/sec	5.0 sec	15.0 ft/sec
Resident trout and juvenile steelhead trout >6"	0.5 feet	4.0 ft/sec	30 minutes	5.0 ft/sec	5.0 sec	6.0 ft/sec
Juvenile salmonids <6"	0.3 feet	1.5 ft/sec	30 minutes	3.0 ft/sec	5.0 sec	4.0 ft/sec

Adult maximum leap height = 1.0 feet.

Juvenile maximum leap height = 0.5 feet in most situations, with exceptions for weirs/fish ladders = 1.0 feet.

Minimum Depths for Fish Migration



Flows for Passage Assessments

- Range of salmonid migration flows.
- Seasonality of migration periods.
- Low Flows – exceedance flows or minimum alternatives.
- High Flows – exceedance flows or a percentage of the two-year recurrence interval flow.

Hydraulic Passage Analyses

- Select model – HEC-RAS, FHWA HY-8, FishPAC, or FishXing.
- Determine range or percent of migration flows through evaluated structure that meet performance criteria for each age class of the focal species.
- Develop a total passability score for each evaluated structure for ranking or prioritization purposes.

CDFW Stream Crossing Ranking

Ranking Objectives:

- A first-cut, sorting of evaluated sites using “scored” criteria.
- Division of sites into groups of: high, medium, and low priority.
- Consideration of other factors prior to selection of sites for remediation.
- Identification of restoration sites vs. maintenance sites.

CDFW Stream Crossing Ranking

Ranking Criteria

- Species diversity and listing status.
- Extent of barrier for three groups of salmonid age classes.
- Quantity and quality of potential upstream habitat.
- Sizing and condition of current crossing.

CDFW Stream Crossing Ranking

Other Factors to Consider

- Additional stream crossings or migration barriers.
- Current diversity of species versus historic diversity.
- Presence of fish at stream crossing during migration periods.
- Costs of treatment options.
- Opportunity.
- Scheduling of other road maintenance projects.
- Amount of road fill at undersized and/or poor condition stream crossings.

California Fish Passage Forum



FISHPass is a web-based decision-support tool designed to help users identify fish passage barriers for remediation. FISHPass is an optimization model that uses barrier information from the California Passage Assessment Database (PAD), accounts for spatial layout of the barriers in the network, cumulative barrier passability, potential upstream habitat, and optionally, estimated costs.

Why is Fish Passage Important?

- Improve transportation network.
- Safety.
- Comply with ESA regulations.
- Restore fish populations.

Why is Fish Passage Important?



Why is Fish Passage Important?



Why is Fish Passage Important?



FIGURE 11. Fishing for salmon with drift gill nets at the mouth of the Klamath River. Photograph by Hazeltine, 1913.

Why is Fish Passage Important?



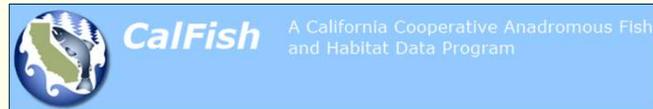
Photo: Thomas Dunklin

Fish Passage Resources

Passage Assessment Database: (PAD)

The Passage Assessment Database (PAD) is an ongoing map-based inventory of known and potential barriers to anadromous fish in California, compiled and maintained through a cooperative interagency agreement. The PAD compiles currently available fish passage information from many different sources, allows past and future barrier assessments to be standardized and stored in one place, and enables the analysis of cumulative effects of passage barriers in the context of overall watershed health.

<http://www.calfish.org/tabid/420/Default.aspx>



Fish Passage Resources

CA Fish Passage Forum:



The mission of the Fish Passage Forum is to protect and restore listed anadromous salmonid species, and other aquatic organisms, in California by promoting collaboration among public and private sectors for fish passage improvement projects and programs.

<http://www.cafishpassageforum.org/>

Fish Passage Resources

CDFW – Restoration Manual

Part IX – Fish Passage Evaluation at Stream Crossings.

Part XII – Fish Passage Design and Implementation.

<http://www.dfg.ca.gov/fish/>



Fish Passage Resources

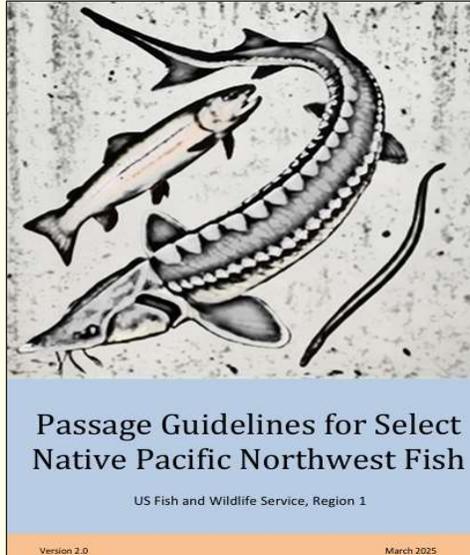


NOAA FISHERIES | West Coast Region
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Construction and development activities affect aquatic habitats. They impact the hydraulic conditions of a natural waterway and can block fish from migrating to and from the ocean. We work to minimize these impacts by implementing innovative engineering designs that facilitate safe, timely, and effective fish passage in estuaries and inland watersheds.

http://www.westcoast.fisheries.noaa.gov/fish_passage/solutions/

Fish Passage Resources



Fish Passage Resources

FishXing Download:
www.fs.fed.us/biology/nsaec/products-tools.html

