

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
AQUATIC ORGANISM PASSAGE

(Mi.)

CODE 396

DEFINITION

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

PURPOSE

Improve or provide passage for aquatic organisms.

CONDITIONS WHERE PRACTICE APPLIES

All aquatic habitats where barriers impede passage of aquatic organisms.

CRITERIA

Planning and Evaluation

Evaluate sites for variations in stage and discharge, tidal influence, hydraulics, geomorphic impacts, sediment transport and continuity, and organic debris movement. Design passage features to account for the known range of variation resulting from this evaluation.

Inventory of stream crossings will follow survey procedures developed for Maine (Abbott 2012).

Minimize any foreseeable channel plan or profile shifts resulting from the modification or removal of a passage barrier.

Plan and locate passage for compatibility with local site conditions and stream geomorphology, to the extent possible.

Avoid locating fishway entrances and exits in areas that will obstruct function, increase harassment or predation, or result in excessive operation and maintenance requirements.

Design Requirements

Design passage to accommodate present and reasonably anticipated changes in watershed conditions.

Design passage structures according to known swimming (ME DOT 2008) and leaping capabilities of target species or a similar species with comparable swimming abilities. Utilize hydraulic computations to document how designs satisfy the physiological requirements of target organisms.

Design and evaluate passage structures (including non-fishway structures) for hydraulic performance and structural integrity at the bankfull and 25-year peak flow events (at a minimum).

Design passage features to minimize or avoid energy deficits, physical stress, and harm to migratory organisms.

Design passage features to minimize or avoid excessive delays during migration periods.

Provide adequate attraction flow into a passage facility across the full range of discharge during which target species will move.

Use trashracks on culverts and fishways only if required or necessary. Ensure that trashracks are self-cleaning and/or easily maintained.

Select construction materials that are non-toxic, and resistant to degradation.

Plan construction logistics, methods, and sequencing to minimize adverse effects to aquatic organisms, riparian areas, and instream habitat.

Where a road-stream crossing is to be abandoned or a road is to be closed, mimic bank conditions and channel geometry of an undisturbed reach of stream. Stabilize exposed soil on banks and channels as needed.

Reporting Requirements

Miles of fish passage whether involving streams, lakes or ponds will be reported in accord with Subpart D, Part 640.00 in the National Biology Handbook.

CONSIDERATIONS

Develop or adopt a quantitative method to identify and evaluate passage barriers (see References). Information derived from this method can assist planning and budgeting activities.

Consider removing a passage barrier before installing or retrofitting a new facility or structure. Complete or partial barrier removal usually provides better passage conditions, and is more economical than designing, constructing, operating, and maintaining many passage structures.

Culverts or bottomless arches that incorporate natural streambed substrates throughout their length are preferred over other culvert configurations for passage purposes. Natural streambeds provide numerous passage and habitat benefits to many life stage requirements for fish and other aquatic organisms compared to man-made surfaces.

Design and locate features to improve or provide passage for as many different aquatic species and age classes as possible.

Retain as much riparian and streambank vegetation as possible during project access and construction activities to maintain shade, riparian continuity, and sources of nutrient and structural inputs for aquatic ecosystems. Where appropriate, consider removing access roads or trails and restoring native vegetation representative of the site.

Replacing or removing an existing instream structure may trigger channel adjustments (e.g., aggradation and/or degradation) upstream and/or downstream of the work site. Install grade controls or other slope modifications to mitigate adverse physical or ecological consequences (see Channel Bed Stabilization – Code 584 and Grade Stabilization Structure – Code 410).

Analyze any potentially negative interactions, including hybridization, disease, competition, or predation, between target and aquatic nuisance species when passage is provided above a barrier. If serious consequences are likely, take steps to avoid or minimize adverse effects.

Artificial barriers to fish passage can include dams and other structures greater than 50 years old that need to be evaluated as historic properties--structures eligible for the National Register of Historic Places. Also, barriers to fish passage along streams often are adjacent to land with high potential of containing prehistoric and historic archaeological sites, which need to be identified and evaluated for the National Register. Design and locate fish passages to minimize impacts on archaeological and structural historic properties.

Consider the habitat requirements of other aquatic or terrestrial species that may be affected by a passage project. Stream simulation culvert designs may improve survival for terrestrial vertebrates by providing safe migration routes under roadways. Floodplain relief culverts may also be used as a travelway.

Assess the amount of habitat upstream and downstream of a barrier to evaluate into project feasibility, cost effectiveness, and/or potential for connecting fragmented habitats. Using a watershed approach whenever possible provides a framework for project planning.

Fish passage facilities are often associated with water diversions or intakes that injure or kill aquatic species. Prevent fish entrainment, particularly juveniles, into diversions, penstocks, or pumps by installing screens according to USDA-NRCS (2006) specifications, or other approved criteria.

Passage projects can affect water management practices such as diversion, power generation, or storage. Strive to balance aquatic organism passage with other water management objectives.

Consider upstream, downstream and larger watershed issues that may affect passage. Common solutions may include maintaining or restoring adequate instream flow and/or other water quality parameters (e.g., temperature, dissolved oxygen).

At sites where fish passage is provided, consider vegetative plantings to protect streambanks and water quality at or near fish passage sites.

Barrier removal, especially dams and road crossings, can significantly affect wetlands, flooding potential, existing infrastructure, and social and cultural practices. Evaluate and address the full range of impacts when planning or designing barrier removal projects.

Floodplain and water development often alter historic river channel pattern and location. Consider bypassing a barrier by restoring streamflow to former, stable natural channels.

Passage facilities can assist population recovery and management. Where applicable, consider local, state, or federal brood stock collection and species management initiatives when planning passage features.

Consider using self-regulating tidegates in marine environments. These structures can be adjusted to automatically regulate saltwater intrusion into estuaries, and often improve estuarine functions and passage conditions.

In the case of low-water crossings, water quality impacts from vehicular pollutants and erosion caused by tire action can be severe. Where possible, reroute roadways or install hardened instream crossings (See .Stream Crossing, code 578).

PLANS AND SPECIFICATIONS

Provide site-specific plans for this practice. Plans will specify passage structure design, layout, and include (at a minimum):

- Location map and plan view of site, description of design flows, and a short summary of operating criteria.
- Project objectives
- Documentation of fish passage barriers
- Stream longitudinal profiles and cross-sections, as appropriate;
- Detailed construction drawings showing (as applicable) existing and planned site conditions including elevations(headwater and tailwater fluctuations), typical profiles, and cross-sections of planned structures description and analyses of design flows, and structural operating criteria;
- Construction specifications describing materials, logistics (including erosion control), and timing;
- Guidance for post-construction evaluation and monitoring to assess structural integrity and compliance with design criteria.

OPERATION AND MAINTENANCE

Develop an operation and maintenance plan for all applications of this standard. Within the plan, provide for periodic inspection and

corrective action should passage conditions become impaired because a structure is damaged, inoperable, or is not effective in passing target species. Typical operation and maintenance items include, but are not limited to:

- Specify what entity is responsible for the daily operation and maintenance of a passage structure.
- Operate fishways according to the approved operation schedule and water management plan.
- 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, baffles 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.
- Annually inspect vegetation used to stabilize banks at or near a fish passage site to ensure vegetation is functioning as desired; replant as necessary.
- Inspect gate and valve seals for damage.
- Replace worn or broken stop-logs, baffles, fins, or other structural components.
- Remove sediment accumulations from within passage structure where applicable.

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