NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

FISH PASSAGE

(No.)

CODE 396

DEFINITION

Modification or removal of barriers that restrict or prevent movement or migration of fish.

PURPOSES

Allow upstream and downstream movement of fish past barriers where feasible or desirable.

CONDITIONS WHERE PRACTICE APPLIES

All rivers, streams, and outlets of ponds or lakes where barriers impede desired fish passage.

CRITERIA

General Criteria Applicable to All Purposes

Fish passage measures shall be designed so that fish will not suffer excessive energy deficits or undue physical stress when swimming past a fish passage structure or site.

Fish passage shall be designed so that fish shall not be excessively delayed during passage at the structure or site unless modification or removal of a barrier, such as a tidegate, could result in undesirable effects to other resources.

Minimum and maximum flows through fish passage structures or sites must be adequate to attract target fish to the structure or site.

Location and overall design of fish passage structures, or fish passage features, shall accommodate watershed conditions such as variations in stream flow and bedload movement.

Location and overall design of fish passage structures or features shall accommodate different aquatic species and age classes to the extent possible.

Location and overall design of fish passage structures or features shall be compatible with local conditions and stream geomorphology.

Materials selected for constructing fish passage structures will be non-toxic to fish and other aquatic life.

At stream crossings, jump height below culverts and flow velocity through culverts should not exceed the abilities of those target species expected to move upstream and downstream of the site.

Modifications to dams to provide fish passage must be in accordance with existing laws and engineering specifications for dams.

All planned work shall comply with all federal, state and local laws and regulations.

Fish passage structures will be designed in accordance with Guidelines for Salmonid Passage at Stream Crossings (National Marine Fisheries Service, September 2001, http://swr.nmfs.noaa.gov/hcd/NMFSSCG.PDF)

CONSIDERATIONS

Native game and non-game fish species and amphibians as well as endangered, threatened, candidate, rare and other sensitive species shall be carefully considered when designing and implementing fish passage features.

Consider a stream simulation design for culverts at road crossings that incorporates natural streambed substrates.

Consider removal of the barrier or fish passage before installing a fish ladder.

If replacement of an in-channel structure will cause degradation or aggradation of the channel upstream, installation of bed controls appropriate for the geomorphic conditions of the site and fish passage needs should be considered (see Stream Channel Stabilization –Code 584 and Grade Stabilization Structure – Code 410).

Consider potential negative effects of providing passage for invasive or non-native species that may hybridize with, compete with, or spread disease to native fish or other aquatic species above a barrier.

Consider other aquatic and terrestrial species, including endangered and threatened species that have established habitat in areas where barriers currently exist or in upstream and downstream areas that would be directly affected by the action.

Consider the amount of habitat both upstream and downstream of a barrier and the potential for connectivity of important habitats for fish species of concern.

Consider seasonal variations in headwater and tailwater levels and how these may impact passage hydraulics for the life history stages of the fish for which the structure is being designed.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

Consider the need to prevent entrainment of fish, particularly juveniles, in irrigation diversions by installing screens.

Consider the need to design for strategic resting-places for target species facing long passages.

Consider historical structures when planning. This practice may affect cultural resources and should comply with GM 420, Part 401, during planning, prior to installation and during maintenance of fish passage structures.

Consider the need to balance fish passage with other water management objectives.

To the extent possible, fish passage structures should be designed to minimize excessive predation on fish entering or exiting the structure.

Removal of a fish passage barrier should take into consideration effects on wetlands, flooding potential, existing infrastructure and social impacts.

When an in-channel structure is impassable due to downstream channel incision and there is evidence of historical channels near the incised channel, consider bypassing the barrier by restoring historical channels.

Cultural Resources Considerations

NRCS' objective is to avoid any effect to cultural resources and protect them in their original location. Determine if installation of this practice will have any effect on any cultural resources.

Document any specific considerations for cultural resources in the design docket and the Practice Requirements worksheet.

GM 420, Part 401, the California Environmental Handbook and the California Environmental Assessment Worksheet provide guidance on how the NRCS must account for cultural resources. The Field Office Technical Guide, Section II contains general information, with Web sites for additional information.

Endangered Species Considerations

Actions taken to provide fish passage shall seek to avoid adverse effects to endangered, threatened, and candidate species and their habitats, as well as state species of concern, whenever possible. Refer to GM 190 ECS-Part 410.22 for actions affecting listed species.

Determine if installation of this practice with any others proposed will have any effect on any federal or state listed Rare, Threatened or Endangered species or their habitat. NRCS's objective is to benefit these species and others of concern or at least not have any adverse effect on a listed species. If the Environmental Evaluation indicates the action may adversely affect a listed species or result in adverse modification of habitat of listed species which has been determined to be critical habitat, NRCS will advise the land user of the requirements of the Endangered Species Act and recommend alternative conservation treatments that avoid the adverse effects. Further assistance will be provided only if the landowner selects one of the alternative conservation treatments for installation; or at the request of the landowners, NRCS may initiate consultation with the Fish and Wildlife Service, National Marine Fisheries Service and/or California Department of Fish and Game. If the Environmental Evaluation indicates the action will not affect a listed species or result in adverse modification of critical habitat, consultation generally will not apply and usually would not be initiated. Document any special considerations for endangered species in the Practice Requirements Worksheet.

Some species are year-round residents in some streams, such as, freshwater shrimp. Other species, such as steelhead and salmon, utilize streams during various seasons. Be aware that critical periods, such as spawning, eggs in gravels, and rearing of young may preclude activities in the stream that may directly affect the stream habitat during those periods. For example there should be no disturbance of stream gravel beds that may have eggs in them. That could include any equipment in the stream or even walking in the stream or work upstream that may result in sediment depositing in the gravel beds. Document any special considerations for endangered species in the Practice Requirements Worksheet.

Water Quality

This practice will have no effect on the quantity of surface or ground water.

Water Quality

This practice may improve the water quality of the fishery. Shading may decrease the water temperature during the warm season months. The dissolved oxygen content may be increased, improving the streams assimilative capacity. Pools and riffles are formed, reducing the flow velocity through the pool area. Coarse-grained sediments settle, changing the quantity and type of sediment delivered downstream.

1. Effects on channel erosion and the movement of sediment and soluble sediment-attached substances that would be carried by runoff.
2. Effects on wetlands or water-related wildlife habitats.
3. Short-term and construction-related effects on the quality of water resources.

4. Effects on stream temperatures to provide desired effects for aquatic and wildlife communities.
5. Effects on the visual quality of water resources.

PLANS AND SPECIFICATIONS

Specifications for this practice shall be prepared for each site. Plans and specifications shall be in keeping with this practice and shall describe the details adequately to apply the practice to achieve its intended purpose.

OPERATION AND MAINTENANCE

An operation and maintenance plan shall be developed for all applications. The plan shall provide for periodic inspection and prompt repair should fish passage become impaired or inoperable at the structure or site.

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Internet Resources:

California Department of Fish and Game
http://www.dfg.ca.gov

National Marine Fisheries Service Southwest Region
http://swr.nmfs.noaa.gov

Washington Department of Fish and Wildlife Fish Passage Technical Assistance
http://www.wa.gov/wdfw/hab/engineer/habeng.htm

Oregon Road/Stream Crossing Restoration Guide, Spring 1999 (with ODFW criteria)
http://www.nwr.noaa.gov/1salmon/salmesa/4ddocs/orfishps.htm
FishXing software and learning systems for the analysis of fish migration through culverts
http://www.stream.fs.fed.us/fishxing/

USDA Forest Service Water-Road Interaction Technology Series Documents
http://www.stream.fs.fed.us/water-road/index.html

British Columbia Forest Practices Code Stream Crossing Guidebook for Fish Streams
http://www.for.gov.bc.ca/tasb/legsregs/fpc/fpcguide/stream/str-toc.htm