

DRAFT - GUIDELINES FOR OPERATING FISH WEIRS IN WATERS CONTAINING SALMONIDS LISTED UNDER THE ENDANGERED SPECIES ACT

**NATIONAL MARINE FISHERIES SERVICE
WEST COAST REGION
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PURPOSE

This document provides guidelines for the safe use of fish weirs in waters containing salmonids listed by the National Marine Fisheries Service (NMFS) under the Endangered Species Act (ESA). These guidelines are intended to help improve fish weir designs and operation in ways that will enhance fish safety, minimize fish passage delays, and increase weir efficiency. The guidelines and sampling protocol were developed from NMFS research experience and input from fishery researchers. NMFS deems the procedures and guidelines in this document to be necessary when working in freshwater systems where threatened or endangered salmon and steelhead may be found. As such, the guidelines provide a basis for reviewing proposed fish weir projects submitted to NMFS in the context of ESA Section 10(a)(1)(A) scientific research and enhancement of propagation permit applications as well as scientific research and monitoring, hatchery and genetic management plans, and activities proposed for coverage under the ESA Section 4(d) rules for salmon and steelhead.

BACKGROUND

Migration barriers—complete blockages and poorly functioning passage facilities—are a factor affecting most salmon populations. In status reviews, recovery plans, and hydropower biological opinions, experts have identified migration barriers and poorly functioning passage facilities as one of the factors limiting the recovery of salmon and steelhead (NMFS 2013, NMFS 2014). Barriers to fish passage block historic habitat and limit various populations' production capacity. And although the majority of barriers are culverts and dams, recovery planners include fish weirs in the list of potential barriers (ODFW 2010, LCFRB 2010).

Permanent and temporary fish weirs may adversely affect fish passage and offset the perceived biological benefit of the weir. Murauskas et al. (2014) found that operating a fish trap 7 days a week “can cause severe passage delays and preclude a large proportion of anadromous fish from reaching spawning tributaries.” Weirs may affect both upstream and downstream migration of adult salmonids. Upriver migration is characterized by a certain amount of exploratory movement into non-natal streams. Keefer and Caudill (2012) suggest that “exploration of non-natal habitats appears to be an innate part of adult salmon and steelhead breeding behavior.” Quinn (2005) calls it “testing the waters” and found that a “certain amount of testing the waters is part of the homing process.” However, if a weir stands in the way of passage (upstream or downstream), it can affect the homing rates of adult salmon and steelhead. If a fish makes an

exploratory run up a stream, is caught in a trap, and released to spawn above a weir, this constitutes straying from a functional point of view (Quinn-NOAA Tech Memo 30). Weirs may also affect the downstream migration of steelhead kelts.

Murauskas et al. (2014) recommend that “research and management proposals that require intensive trapping should not compromise safe, timely, and effective fish passage.” In order to determine the effects of a weir, we must consider the cumulative passage delay before and after the trap site. This is a complicated task, and we believe a reasonable standard would be no more delay than the typical 24 hour delay observed at the mainstem dams of the Columbia River.¹ When evaluating the effects on fish passage, any applicant desiring to employ a weir must assess time of passage with the weir in place compared to the passage time in the absence of the weir.

INSTALLING NEW WEIRS

Before a new weir is installed, operators must contact NMFS and consult on the design and installation. Proponents of new weirs should submit a description of the weir and the location where it would be installed. Design criteria for weirs can be found in NMFS’ Anadromous Salmonid Passage Facility Design Criteria (NMFS 2011). In their weir project proposals, proponents should specifically address the criteria in the following chapters/sections of the Anadromous Salmonid Passage Facility Design Criteria: 3.1-3.4; 4.6; 5.3; and 6.1-6.3. Along with the consultation on the weir installation, applicants for weirs for research or enhancement of propagation should also apply for an ESA Section 10(a)(1)(A) permit or ESA Section 4(d) authorization.

An application for an ESA Section 10(a)(1)(A) permit or 4(d) authorization should include:

- The objective of the weir (i.e., monitoring abundance, collecting genetic samples, etc.).
- The target species and any non-target ESA listed species that may be affected.
- The weir’s location, a diagram and/or pictures of the weir, and the duration (both seasonally and total number of years) of operation.
- A weir operating plan (see below) that clearly states the maximum passage delays and amounts of time fish would be held in a trap.
- An adaptive management plan explaining alternatives if these criteria are not met once the weir is operational.
- A description of the maximum number of fish the trap can safely hold.
- A description of the trapping schedule (see below).
- A plan for monitoring effects on fish passage.
- A statement regarding the potential for the facility to be vandalized or fish to be poached along with any planned security measures

¹ Depending on species, temperature, and flow, the average fish passage delay for mainstem Columbia River dams is about 24-48 hours.

WEIR OPERATING PLANS

Weir projects where fish are counted or handled for research and propagation purposes must include a plan for monitoring fish safety and passage effects as well as an annual monitoring report for each year that the weir is in place. Monitoring reports are separate from and in addition to any permit or take authorization reporting requirements. If there are PIT tagging operations in the watershed where a weir is planned, a PIT tag antenna may be useful for monitoring fish passage at the weir. Another option for monitoring fish passage is to install and monitor underwater video recording equipment. NMFS will consider other monitoring methods such as snorkel surveys, visual observation from the stream bank, or hook and line surveys provided those methods supply sufficient information about delay.

Continued approval of weir operation is contingent on monitoring data (in the form of a report) demonstrating that the weir is not having a significant effect on fish safety, migration delay, or spawning. Weirs without such a monitoring plan will not be approved.

A weir operating plan should also describe the environmental conditions during trap operation (e.g. water and air temperature, flow conditions (minimum and maximum), debris load, etc.). The plan should include a range of flows under which the trap can safely be operated. Stream flow should be determined based on a comparison of site specific hydraulic and hydrologic conditions to criteria values, with emphasis on weir velocity criteria. Here is an example:

- Flow range _ to _ cfs that provides the best fishing conditions and it is safe for staff working in the water in those flows. The trap would be fished at these flows and staff would be able to safely inspect and clean the weir.
- Flow range _ to _ cfs that is fishable depending on debris load. However staff cannot wade safely past the trap (middle of river) into deeper water. The trap would be fished at these flows, but it is not safe for staff to inspect and/or clean the weir.
- Flows greater than _ cfs severely limit activities at the weir and trap. Staff are not allowed to wade in the river to clean the weir or trap. If flows are forecasted to exceed X cfs staff will remove vulnerable equipment and open the weir/trap to allow for volitional passage. The trap would not be fished under these conditions.
- Flows forecasted to exceed Y cfs will trigger discussions of removing the trap and potentially the weir. The trap would not be fished under these conditions.

WEIR AND TRAPPING SCHEDULE

Weir operating plans must include a description of the schedule for checking the trap and inspecting the weir. The following criteria apply to all weirs.

- Traps should be checked and emptied daily (including weekends).
- If traps cannot be checked daily, the trap should be left open to allow for volitional passage on days when no one will be there to check the trap.
- All weirs, including video and sonar weirs should be inspected daily and cleaned of any debris.

ANNUAL REPORTS

On or before January 31st of every year, the responsible party must submit to NMFS a post-season report. The format and content of reports are specified by the permit or authorization, but typically include the dates of operation for the weir, the number of listed fish taken, the types of take (observed/harassed, handled, tagged, etc.) the results of monitoring activities, and a discussion of the effects on migration. The report should discuss any observed fish passage delays for both upstream and downstream passage.

SUMMARY

All weirs will therefore need to have:

- NMFS-approved design.
- An operating plan with the components listed above (Schedule, etc.)
- A monitoring plan.
- Annual monitoring reports.

REFERENCES

Matthew L. Keefer and Christopher C. Caudill. 2012. A review of adult salmon and steelhead straying with an emphasis on Columbia River populations. Technical Report 2012-6. Prepared for U.S. Army Corps of Engineers Walla Walla District.

Lower Columbia Fish Recovery Board (LCFRB). 2010. Washington Lower Columbia Salmon Recovery And Fish & Wildlife Subbasin Plan. May 28, 2010.

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Quinn, T.P. 2005. The Behavior and Ecology of Pacific Salmon and Trout. American Fisheries Society and University of Washington Press.

Quinn, T. Homing, Straying, and Colonization. Genetic effects of straying of non-native fish hatchery fish into natural populations: proceedings of the workshop. W. Stewart Grant (editor). 1997. U.S. Dep. Commer., NOAA Tech Memo. NMFS-NWFSC-30, 130p.

NOAA West Coast Region Fish Weirs Checklist

- ☐ Did they describe the objective of trapping?
- ☐ Did they describe the target species and any non-target ESA listed species that may be affected?
- ☐ Did they describe the location of the weir?
- ☐ Did they include a picture or diagram of the weir?
- ☐ Did they describe the duration of operation?
- ☐ Did they describe the maximum number of fish the trap can hold?
- ☐ Will the trap be checked daily?
- ☐ If the trap is not checked daily, will it be left open on days when no one will be there to check the trap?
- ☐ Will the trap be inspected and cleaned daily?
- ☐ Do they have a plan to monitor and record fish passage delays (upstream and downstream) on a daily basis?
- ☐ Did they describe how they will remedy fish passage delays?
- ☐ Will they submit a monitoring report?
- ☐ Did they describe the range of flows under which they will operate the weir and trap?
- ☐ Did they describe the temperature range for which fish will be handled or trapped?
- ☐ Did they describe weir picket spacing?
- ☐ Does the trap design readily attract fish towards passage via the trap?
- ☐ Did they describe the recovery technique for reviving fish prior to release?