
Appendix G Protocols for Adult Fish Facility Trapping Operations at Bonneville Dam

The following protocols will be implemented by agencies conducting research in the Bonneville Dam second powerhouse Adult Fish Facility (AFF). These protocols were coordinated with fish agencies and tribes through the Fish Passage Operation and Maintenance Coordination Team (FPOM). The purpose of these protocols is to provide measures to limit mortality resulting from stress when handling fish.

1. General Facility Protocols.

1.1. Users must have appropriate documentation for conducting research at the dam (See *Guide for Researchers at Bonneville Dam*). This includes valid state and federal permits that cover all listed species passing the project during the trapping period and users shall comply with all fish handling conditions in the permits. Note: If permit conditions are more restrictive than the following protocols, users must follow permit conditions.

1.2. The Corps reserves the right to terminate trapping operations at any time.

1.3. Users will be trained in the proper operation of the AFF to insure fish and personnel safety. Users may request training through the Project Biologists.

1.4. Bridge crane certification is required prior to operating the overhead crane. Training will not be provided by the Corps of Engineers.

1.5. Hard hats, long pants or raingear, steel-toed shoes or rubber boots are to be worn at all times. Shorts, tennis shoes, or sandals will not be permitted in the lab.

1.6. Water temperatures should be observed upon arrival and periodically during the day.

1.7. Personnel conducting research are required to be present in the AFF to divert desired fish into the anesthetic tank using the flume swing gates. While the AFF is in operation, flumes shall be open and a researcher must be on-site.

1.8. Undesired fish will be bypassed to the return pool.

1.9. Researchers shall perform no maintenance on Corps owned/installed equipment. Nets may be mended as necessary.

1.10. Qualified users may lower the main ladder picket leads and downstream exit bulkhead when they arrive, and must raise the picket leads when they are completed for the day. The downstream exit bulkhead may be left down when shad and lamprey are attempting to pass.

1.11. Users will be permitted to operate valves 9 and 10 to control flow down the flumes at their discretion and to operate the raw water booster pump. Users may operate valve 12 to provide flow in the holding pool and valve 15 to drain water at the return pool.

1.12. Users must use a cotton mesh net, large enough to safely handle the largest fish passing the project during the trapping period.

1.13. Fish greater than 100 cm in length may be diverted into the main anesthetic tank or returned to the ladder untouched. These fish will not be diverted into any auxiliary anesthetic tanks.

2. Notification and Documentation

2.1. Users will notify the control room when they set up and close down the lab.

2.2. Users will record the times picket leads are lowered and raised and which agency they are representing on the sheet provided by the project biologists.

2.3. Lamprey may be held up to 48 hours in the AFF. Researchers will notify Project Fisheries and the Control Room whenever lamprey are held.

2.4. Any and all mortalities must be immediately reported to a Project Biologist. The Project Biologist will examine the mortality and take any photos. The researcher shall give a detailed report including:

- a. Species
- b. Origin
- c. Length
- d. Weight
- e. Marks and injuries
- f. Cause and time of death
- g. Future preventative measures.

2.5. All mortalities are included in the Project Fisheries weekly report and the reports are submitted to FPOM.

3. Trapping protocols when fish ladder water temperatures are <70°F.

3.1. There will be no time restriction for trapping operations.

3.2. There will be no more than four Chinook, or four steelhead, or six sockeye, or any combination of four adult salmonids allowed in the anesthetic tank at any one time. This assumes that users can effectively track the length of time fish stay in the anesthetic tank.

3.3. There will be no more than one adult Chinook or steelhead or two sockeye allowed in the small recovery tank at any one time. The trail pool is the primary and preferred recovery area.

3.4. Water in the anesthetic tank will be replaced at least two times per day. Water temperatures in the anesthetic tank will be maintained within 2°F of the fish ladder water temperature. Note: If anesthetic tank water temperature exceeds 70°F, criteria in section 4 will go into effect.

3.5. Water in the small recovery tank will be running continuously to allow a constant exchange of water through the tank.

3.6. Personnel shall ensure fish are sampled as quickly as possible. It is recommended that it take no longer than 25 minutes to transition the fish from entry into the anesthetic tank to release back into the return ladder or transportation tank.

3.7. Personnel shall ensure that fish are fully recovered from anesthetization prior to release into the return ladder. Fish may volitionally leave the bail pool when they are ready.

3.8. When trapping is completed for the day, users will properly shut down the lab.

3.9. Four picket leads will be allowed during trap operations for up to 4 hours. After all picketed leads are raised, fish already in the AFF can be sampled for an additional one hour. The picketed lead operations are as follows. (**All counts are adult salmonids as enumerated at the Washington Shore count station for the previous day. Assumes that 4 shad = 1 salmonid*):

- A. zero – 6,000*** - All 4 picket leads can be lowered for 4 continuous hours.
- B. 6,000 -12,000*** - All 4 picket leads down for 3 hours. At the 3rd hour raise at least one picket lead for ½ hour, and then continue sampling for an additional 1 hour.
- C. 12,000 -18,000*** - All four picket leads down for 2 hours. At the 2nd hour raise at least 2 picket leads for ½ hour, and then continue sampling for an additional 2 hours.
- D. Greater than 18,000*** - All four picket leads down for 1 hour. At the end of the 1 hour raise at least 2 picket leads for ½ hour, and then continue sampling for 1 hour and raise 2 picket leads for ½ hour. Continue until 4 hours of operations with 4 picket leads down has been achieved.

3.10. Researchers will also be required to monitor the ladder every hour to ensure that crowding is not taking place. If evidence of crowding is occurring at least two picket leads will be raised for a minimum 1/2 hour before all four picket lead may be deployed again.

3.11. FPOM will be notified as soon as Weir 37 violates FPP criteria.

3.12. Project biologists retain the authority to raise additional picket leads depending on fish densities and ladder conditions.

4. Trapping protocols when fish ladder water temperatures are >70°F.

4.1. Trapping will not occur when fish ladder water temperatures meet or exceed 70°F as measured in the bail pool. The only exception is for *US v Oregon* requirements and for nighttime lamprey trapping.

4.1.1 Project Biologists will use the Corps temperature probe reading as the official temperature.

4.1.2 Temperatures are both instantaneous readings and 0000 to 2400 daily averages. Researchers can review temperatures from (insert web based temp address here) to determine if the trap is within temperature criteria prior to traveling to BON. Instantaneous temperatures will still be used to determine if trapping operations will continue for the day.

4.1.3 Project biologists will collect temperature data weekly from the data logger in the exit ladder. Daily checks may be requested when temperatures approach 70°F.

4.2. Between 70°F and 72°F, sampling will be permitted as defined below for up to four days per week from 0600-1030 hours to allow for *U.S. v Oregon* requirements and for nighttime lamprey trapping. This operation will remain in effect until daily average water temperatures drop to $\leq 69.9^{\circ}\text{F}$. All sampling will cease when temperatures reach 72°F. No sampling may resume until daily average water temperatures drop to $\leq 71.9^{\circ}\text{F}$.

4.2.1 Researchers may continue to work through fish in the holding pool for one hour after picket leads have been raised.

4.2.2 FPOM will be notified as soon as Weir 37 violates FPP criteria.

4.2.3 The density criteria for picket lead operations will be reduced by half and the operations will be as follows. The density criteria and monitoring of the adult ladder by the researchers as outlined in 3.9.1 also apply. (**All counts are adult salmonids as enumerated at the Washington Shore count station for the previous day. Assumes that 4 shad = 1 salmonid*):

A. zero – 3,000* - All four picket leads can be lowered for four continuous hours.

B. 3,000 -6,000* - All four picket leads down for 3 hours, at the 3rd hour raise at least one picket lead for ½ hour and then continue sampling for an additional one hour.

C. 6,000 -9,000* - All four picket leads down for 2 hours, at the 2nd hour raise at least one picket lead for ½ hour and then continue sampling for an additional 2 hours.

D. Greater than 9,000* - All four picket leads down for one hour, at the end of the hour raise at least 2 picket lead for ½ hour and then continue sampling for one hour and raise 2 picket lead for ½ hour. Continue until four hours of four picket lead operation has been achieved and all picket leads need to be raised by 10:30 am.

4.2.4 There will be no more than three adult Chinook or steelhead or four sockeye in the anesthetic tank at a time. A combination of salmonids is allowed, with the maximum of either two Chinook or steelhead and a sockeye or one Chinook or steelhead and two sockeye. This assumes users can effectively track the length of time fish stay in the anesthetic tank.

4.2.5 The brail pool is the primary and preferred recovery pool.

4.2.6 The small recovery tank will only be used in emergencies. If used, there will be no more than one adult Chinook or steelhead or two sockeye allowed in the small recovery tank at any one time.

4.2.7 If used, water in the small recovery tank will be running continuously allowing a constant exchange of water through the tank.

4.2.8 Assure oxygen levels are maintained at saturation in the anesthetic and recovery tanks. There will be no depression in oxygen levels in the anesthetic or recovery tanks. To assure this, water in the anesthetic tank will be replaced at least every three hours.

4.2.9 Maintain the anesthetic and recovery tank water temperatures 1-2°F lower than the ladder water temperature. If ice is used to cool the anesthetic or recovery tank water, the ice should be from river water or from an un-chlorinated water source. Do not exceed a 2°F difference between the anesthetic or recovery tank water and fish ladder water.

4.2.10 Personnel shall ensure fish are sampled as quickly as possible. It is recommended that it take no longer than 25 minutes to transition the fish from entry into the anesthetic tank to release back into the return ladder or transportation tank.

4.2.11 Personnel shall ensure fish are fully recovered from anesthetization prior to release. Fish may volitionally leave the brail pool when they are ready.

4.2.12 Project biologists retain the authority to raise additional picket leads depending on fish densities and ladder conditions.

5. Winter trapping protocols - December 01 through March 14.

The purpose of these protocols is to provide measures to limit passage delay, and stress from overcrowding in the brail pool. Personnel conducting research during this time are not required to be present in the AFF. Users are allowed to activate the flume swing gates to divert all fish into the brail pool.

5.1. Fish will not be permitted to remain in the brail pool longer than 24 hours. It is recommended that handling of fish occurs daily by 1800 hours. This assures that if fish are sampled at the end of the day, most of the fish captured are only held from the morning until afternoon since passage at night is minimal, thus reducing delay.

5.2. During sampling, the brail pool should be raised and one adult salmonid netted, via a sanctuary net, and placed into the anesthetic tank at a time. After removing fish from the brail pool into the anesthetic tank, the brail pool will be lowered back to its full depth.

5.3. There will be no more than three adult salmonids in the anesthetic tank at a time. This assumes users can effectively track the length of time fish are in the anesthetic tank.

5.4. There will be no more than two adult salmonids in the recovery tank at a time.

5.5. Water in the recovery tank will be running continuously, allowing a constant exchange of water through the tank.

5.6. Personnel shall ensure fish are sampled as quickly as possible. It is recommended that it take no longer than 25 minutes to transition the fish from entry into the anesthetic tank to release back into the return ladder or transportation tank.

5.7. Personnel shall ensure fish are fully recovered from anesthesia prior to release.

5.8. If daily sampling is not to occur within 24 hours, the main ladder picket leads and downstream exit gate will be raised. The lab will be properly returned to bypass mode.

Appendix G Protocols for Adult Fish Facility Trapping Operations at Ice Harbor Dam

1. General.

Personnel conducting research at the adult fish trapping facility at Ice Harbor Dam will implement the following protocols. These protocols were coordinated with fisheries agencies and tribes through the Fish Passage Operations and Maintenance Coordination Team (FPOM).

2. Administrative Requirements.

All researchers and managers working at the facility will adhere to the following requirements:

- A.** The facility will not be operated unless there is an approved Corps-funded research project that requires its use, or the user has a letter from the Corps that permits use of the facility. Users not funded by the Corps should request permission to use the trap by sending a letter to: Chief, Operations Division, U.S. Army Corps of Engineers, 201 North Third Avenue, Walla Walla, WA 99362. Appropriate authorizations from the relevant federal and state fishery agencies, as indicated in paragraph b below, should be included with the letter. Upon approval of the user's request, the Corps will provide copies of the user's letter and authorizations to the Corps' project biologist at Ice Harbor Dam.
- B.** Users must have the proper federal authorization (e.g. ESA Section 10 permit) from the U.S. Fish and Wildlife Service and/or NOAA Fisheries if their activity may or will affect listed species, as well as any required state authorization from the Washington Department of Fish and Wildlife for listed or unlisted species. Note: If federal or state fishery agency requirements are more restrictive than the following protocols, users must follow the fishery agency requirements.
- C.** Hard hats will be worn if so required by the Corps' Operations Manager at Ice Harbor (509-543-3256).
- D.** Long pants are to be worn at all times.
- E.** Steel-toed shoes or steel-toed rubber boots are to be worn at all times.
- F.** Notification Required For Work During Regular Business Hours (Monday through Thursday, 0630 to 1700 hours). Users will notify the project biologist when they arrive on site and when they depart (509-543-3208). If users supply the project biologist with a season schedule, it will not be necessary to notify project biologist upon arrival and departure.
- G.** Notification Required For Work During All Other Hours (Monday through Thursday, 1700 to 0630 hours, or anytime from Friday through Sunday). If users are on site during times other than regular business hours, specific notification procedures must be worked out with the Operations Manager at Ice Harbor in advance. Users may be required to contact the control room (509-543-3231) upon arrival and departure.

- H. Users must present a safety plan to the project biologist, who can provide guidance for developing the plan.

3. Trapping Protocols during Fish Passage Season (March 1 - December 15) when Fish Ladder Water Temperatures are < 70°F.

Since the trap is operated manually, personnel conducting research are required to be present at the facility to divert desired fish.

- A. The trap will be tested for proper operation before trapping begins. After each day's use the trap will be promptly removed from the water by suspending it in its guides, or by completely removing it from the fish ladder.
- B. Trapping operations can take place between 0600 and 1200 hours, for up to 4 hours per day or until the designated number of desired fish are obtained, whichever occurs first. During the summer months, the period from 0600 to 1000 hours is preferred. The trap shall not be in the water for more than 4 hours.
- C. Netting of fish is not recommended. If transfer of fish is necessary, fish should stay in water at all times through the use of a water-filled bag, sanctuary net, or other means. The device used should be large enough to safely handle the largest fish.
- D. Non-target fish will be released to the ladder.
- E. Oxygen levels in fish handling tanks will be maintained at saturation by replacing the water and providing aeration as necessary.
- F. Water temperatures in fish handling tanks will be maintained within 2°F of the fish ladder water temperature but less than 70°F.
- G. Personnel shall sample fish as quickly as possible. It should require no longer than 25 minutes to transition the fish from entry into the anesthetic tank to release back into the ladder or transportation tank.
- H. Fish must be adequately recovered from anesthetization prior to the next step in the handling process, whether placed in the ladder or transported.

4. Trapping Protocols during Fish Passage Season (March 1 - December 15) when Fish Ladder Water Temperatures are ≥70°F and ≤ 72°F.

The trap may be operated when water temperatures are within the range of 70°F to 72°F, provided that researchers closely adhere to the restrictions below. Trapping operations will not be allowed, and trapping must cease immediately, if fish ladder water temperatures exceed 72°F. Due to the narrow temperature range involved, researchers must use reliable digital thermometers.

- A. Researchers must notify the Corps project biologist in advance when trapping is to occur in this temperature range. The project biologist will occasionally monitor trapping operations.

- B.** The trap will be tested for proper operation before trapping begins. After each day's use the trap will be promptly removed from the water by suspending it in its guides, or by completely removing it from the fish ladder.
- C.** Trapping operations can take place between 0600 and 1200 hours, for up to 4 hours per day or until the designated number of desired fish are obtained, whichever occurs first. During the summer months, the period from 0600 to 1000 hours is preferred. The trap shall not be in the water for more than 4 hours.
- D.** Trapping operations may take place up to 4 days per week.
- E.** Netting of fish is not recommended. If transfer of fish is necessary, fish should stay in water at all times through the use of a water-filled bag, sanctuary net, or other means. The device used should be large enough to safely handle the largest fish.
- F.** Non-target fish will be released to ladder.
- G. Oxygen levels** in fish handling tanks will be maintained at saturation by replacing the water and providing aeration as necessary.
- H. Water temperature** in the anesthetic tank will be maintained 1-2°F lower than the ladder water temperature. If ice is used, the ice should be from river water or from an un-chlorinated water source. If practical, water temperature in the recovery tank should also be maintained 1-2°F lower than the ladder water temperature; otherwise flow-through water should be running continuously.
- I.** Personnel shall sample fish as quickly as possible. It should require no longer than 25 minutes to transition the fish from entry into the anesthetic tank to release back into the ladder or transportation tank.
- J.** Fish must be adequately recovered from anesthetization prior to the next step in the handling process, whether placed in the ladder or transported.

Appendix G Protocols for Adult Fish Facility Trapping Operations at Lower Granite Dam

1. General.

Personnel conducting research at the adult fish trapping facility at Lower Granite Dam will implement the following protocols. These protocols were coordinated with fisheries agencies and tribes through the Fish Passage Operations and Maintenance Coordination Team (FPOM).

2. Administrative Requirements.

NOAA Fisheries is the primary user of the facility and employs personnel that are permanently based there. These and all other researchers and managers working at the facility will adhere to the following requirements.

- A. The facility will not be operated unless there is an approved Corps-funded research project that requires its use, or the user has a letter from the Corps that permits use of the facility. Users not funded by the Corps should request permission to use the trap by sending a letter to: Chief, Operations Division, U.S. Army Corps of Engineers, 201 North Third Avenue, Walla Walla, WA 99362. Appropriate authorizations from the relevant federal and state fishery agencies, as indicated in paragraph b below, should be included with the letter. Upon approval of the user's request, the Corps will provide copies of the user's letter and authorizations to the Corps' project biologist at Lower Granite Dam.
- B. Users must have the proper federal authorization (e.g. ESA Section 10 permit) from the U.S. Fish and Wildlife Service and/or NOAA Fisheries if their activity may or will affect listed species, as well as any required state authorization from the Washington Department of Fish and Wildlife for listed or unlisted species. **Note: If federal or state fishery agency requirements are more restrictive than the following protocols, users must follow the fishery agency requirements.**
- C. Hard hats will be worn if so required by the Corps' Operations Manager at Lower Granite (509-843-1493 x258).
- D. Long pants are to be worn at all times.
- E. Steel-toed shoes or steel-toed rubber boots are to be worn at all times.
- F. Notification Required For Work During Regular Business Hours (Monday through Thursday, 0630 to 1700 hours). Users will notify the project biologist when they arrive on site and when they depart (509-843-1493 x263 or x264). If users supply the project biologist with a season schedule, it will not be necessary to notify project biologist upon arrival and departure.
- G. Notification Required For Work During All Other Hours (Monday through Thursday, 1700 to 0630 hours, or anytime from Friday through Sunday). If users are on site during times other than regular business hours, specific notification procedures must be worked

out with the Operations Manager at Lower Granite in advance. Users may be required to contact the control room (509-843-1493 x231) upon arrival and departure.

- H. Users must present a safety plan to the project biologist, who can provide guidance for developing the plan.

3. Trapping Protocols during Fish Passage Season (March 1 - December 15) when Fish Ladder Water Temperatures are < 70°F.

During the years just prior to 2003 the trap was operated automatically, 24 hours per day, during much of the fish passage season. Personnel conducting research during this time were therefore not always required to be present at the facility to divert desired fish. Automatic operation and the temporary absence of on-site personnel can continue as required. However, PIT tag detectors were installed in the upper end of the fish ladder in early 2003. As a result, the new detectors will collect PIT tag data normally collected at the trap. It is therefore anticipated that trap operation will be minimized in future years. Refer to section 2.3.2.2.n “Adult Trap Holding Tanks” in the 2009 Fish Passage Plan for further information on the operation of the adult fish trap.

- A. During lengthy periods of non-use (two days or more), the facility shall be dewatered or the water supply will be shut down. Since the facility obtains water from the fish ladder, this action will avoid out-of-criteria water flows in the ladder. If freezing weather may cause damage during such a non-use period, the facility will be dewatered.
- B. There will be no time-of-day restrictions for trapping operations.
- C. Adult fish generally do not need to be netted due to the layout of the facility. Netting of fish is not recommended. If transfer of fish is necessary, fish should stay in water at all times through the use of a water-filled bag, sanctuary net, or other means. The device used should be large enough to safely handle the largest fish.
- D. Non-target fish will be released to the return pool.
- E. There will be no more than 12 adult salmonids allowed in the anesthetic tank at any one time. This assumes that users can effectively track the length of time fish stay in the anesthetic tank.
- F. There will be no more than 12 adult salmonids allowed in the recovery tank at any one time.
- G. **Oxygen levels** in fish handling tanks will be maintained at saturation by replacing the water and providing aeration as necessary.
- H. **Water temperatures** in fish handling tanks will be maintained within 2°F of the fish ladder water temperature but less than 70°F.
- I. Personnel shall sample fish as quickly as possible. It should require no longer than 25 minutes to transition the fish from entry into the anesthetic tank to release back into the return ladder or transportation tank.

- J.** Fish must be adequately recovered from anesthetization prior to the next step in the handling process, whether placed in the return ladder or transported. In the case of the return ladder, full recovery is not desirable because fish may jump onto a grating.
- K.** Fish must be released or transported from the trap within four days.
- L.** Researchers and managers conducting studies or obtaining broodstock are responsible for ensuring the wellbeing of their fish at all times. Twenty-four hour monitoring by personnel on-site is advised but not required.

4. Trapping Protocols during Fish Passage Season (March 1 - December 15) when Fish Ladder Water Temperatures are $\geq 70^{\circ}\text{F}$ and $\leq 72^{\circ}\text{F}$.

The trap may be operated when water temperatures are within the range of 70°F to 72°F , provided that researchers closely adhere to the restrictions below. Trapping operations will not be allowed, and trapping must cease immediately, if fish ladder water temperatures exceed 72°F . Due to the narrow temperature range involved, researchers must use reliable digital thermometers.

- A.** Researchers must notify the Corps project biologist in advance when trapping is to occur in this temperature range. The project biologist will occasionally monitor trapping operations.
- B.** During lengthy periods of non-use (two days or more), the facility shall be dewatered or the water supply will be shut down. Since the facility obtains water from the fish ladder, this action will avoid out-of-criteria water flows in the ladder.
- C.** Trapping operations can take place between 0600 and 1200 hours, for up to 4 hours per day or until the designated number of desired fish are obtained, whichever occurs first. During the summer months, the period from 0600 to 1000 hours is preferred.
- D.** Trapping operations may take place up to 4 days per week.
- E.** Adult fish generally do not need to be netted due to the layout of the facility. Netting of fish is not recommended. If transfer of fish is necessary, fish should stay in water at all times through the use of a water-filled bag, sanctuary net, or other means. The device used should be large enough to safely handle the largest fish.
- F.** Non-target fish will be released to the return pool.
- G.** There will be no more than 3 adult salmonids allowed in the anesthetic tank at any one time. This assumes that users can effectively track the length of time fish stay in the anesthetic tank.
- H.** There will be no more than 3 adult salmonids allowed in the recovery tank at any one time.
- I.** **Oxygen levels** in fish handling tanks will be maintained at saturation by replacing the water and providing aeration as necessary.

- J. Water temperature** in the anesthetic tank will be maintained 1-2°F lower than the ladder water temperature. If ice is used, the ice should be from river water or from an un-chlorinated water source. If practical, water temperature in the recovery tank should also be maintained 1-2°F lower than the ladder water temperature; otherwise flow-through water should be running continuously.
- K.** Personnel shall sample fish as quickly as possible. It should require no longer than 25 minutes to transition the fish from entry into the anesthetic tank to release back into the return ladder or transportation tank.
- L.** Fish must be adequately recovered from anesthetization prior to the next step in the handling process, whether placed in the return ladder or transported. In the case of the return ladder, full recovery is not desirable because fish may jump onto a grating.
- M.** Fish must be released or transported from the holding tanks as soon as possible, preferably by 1000 hours the following day but no later than 1700 hours the following day. This provision applies to all situations but mostly involves fish held for hatchery broodstock.
- N.** Researchers and managers conducting studies or obtaining broodstock are responsible for ensuring the wellbeing of their fish at all times. Twenty-four hour monitoring by personnel on-site is advised but not required.