Fish Passage Plan

Appendix G

Adult Fish Facility Operating Protocols at Bonneville, Ice Harbor, and Lower Granite Dams

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1. BONNEVILLE DAM ADULT FISH FACILITY

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 FPOM. The purpose of these protocols is to provide measures to limit mortality resulting from stress when handling fish.

1.1. General Facility Protocols.

1.1.1. 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 ESA-listed species passing the project during the trapping period. Users shall comply with all fish handling conditions in the permits. *If permit conditions are more restrictive than the following protocols, users must follow permit conditions*.

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

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

1.1.4. Bridge crane certification is required prior to operating the overhead crane. The Corps will not provide this training.

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

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

1.1.7. 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.

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

1.1.9. Researchers shall not perform any maintenance on Corps owned/installed equipment. Nets may be mended as necessary.

1.1.10. 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.

1.1.11. 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.

1.1.12. Users must use a sanctuary net large enough to safely handle the largest fish passing the project during the trapping period.

1.1.13. Fish larger than 100 cm forklength may be diverted into the main anesthetic tank or returned to the ladder untouched. These fish will not be diverted into auxiliary anesthetic tanks.

1.2. Notification & Documentation.

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

1.2.2. 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.

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

1.2.4. All mortalities must be immediately reported to a Project Biologist. The Project Biologist will examine the mortality and take 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.

1.2.5. All mortalities will be reported in a *Memo for the Record* (MFRs) sent to the Portland District Columbia River Coordinator for distribution to FPOM.

1.2.6. Project Fisheries will notify FPOM as soon as Weir 37 consistently violates FPP criteria.

1.3. Trapping Protocols – Ladder Water Temperatures < 70°F.

1.3.1. There will be no start time restriction for trapping operations.

1.3.2. There will be no more than 4 Chinook, or 4 steelhead, or 6 sockeye, or any combination of 4 adult salmonids allowed in the anesthetic tank at one time. This assumes that users can effectively track the duration of time that fish stay in the anesthetic tank.

1.3.3. Anesthetic tank water 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. *If anesthetic tank water temperature exceeds 70°F, protocols in* ***section 4*** *go into effect.*

1.3.4. Observation Tanks.

(a) There will be no more than 2 adult fish in one observation tank at one time. The brail pool is the primary and preferred recovery area.

(b) Observation tanks will primarily be used for fish in "*distress*", defined as fish that have sustained injury during the trapping and sampling process; fish that have a previous injury (e.g., fish in "*fair*" or "*poor*" condition upon trapping due to marine

mammal injuries or similar), or fish that are showing symptoms of heavy sedation (e.g., diminishing gill movement, reduced gasp response when out of water).

(c) Fish will be released from the observation tanks when they are in the state of "*Partial Equilibrium*", defined as: gilling normally, making weak tailing movements, unable to swim upright and swims off course without avoiding obstacles; not strongly trying to break free of handlers.

(d) All fish in an observation tank must be continuously observed by a dedicated observer to ensure adult fish do not recover beyond partial equilibrium prior to return to the brail pool. No lid or restraining device shall be installed on top of the observation tanks.

(e) Observation tanks may be used for study objectives such as monitoring recovery time from anesthetic, if approved by FPOM and USACE.

(f) Water in the observation tanks will be running continuously to allow a constant exchange of water through the tank.

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

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

1.3.7. When trapping is done for the day, users will properly shut down the lab.

1.3.8. Four picket leads will be allowed during trap operations for up to four hours. After all picketed leads are raised, fish already in the AFF can be sampled for one additional hour. The picketed lead operations are as follows[1]:

0–6,000: All 4 picket leads can be lowered for 4 continuous hours.

6,000–12,000: All 4 picket leads down for 3 hours. At the 3rd hour, raise at least 1 picket lead for ½ hour, and then continue sampling for additional 1 hour.

12,000–25,000: All 4 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.

25,000–35,000: Two picket leads down for four hours.

> 35,000: No picket leads down.

1.3.9. Researchers will also be required to monitor the ladder every hour to ensure there is no crowding. If evidence of crowding is observed, at least two picket leads will be raised.

[1] All counts are of adult salmonids (including jacks) for the previous day at the Washington Shore count station. Assumes 4 shad = 1 salmonid (e.g., 6,000 salmonids + 4,000 shad = 7,000 total).

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

1.4. Trapping Protocols – Ladder Water Temperatures >= 70°F.

1.4.1. Trapping will not occur when fish ladder water temperatures meet or exceed 70°F as measured in the brail pool. The only exception is for *US v Oregon* requirements and for nighttime lamprey trapping. Nighttime is defined as official sunset to sunrise.

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

1.4.3. Temperatures are both instantaneous readings and 24-hour (0000–2400) averages. Researchers can review daily average, minimum, and maximum temperatures[2] to determine if the trap is within temperature criteria prior to traveling to BON. Instantaneous temperatures will be used to determine if trapping operations will continue for the day.

1.4.4. 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.

1.4.5. At water temperatures of 70–72°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. This operation will remain in effect until daily average water temperature drops to ≤ 69.9°F. All sampling will cease when temperature reaches 72°F. No sampling may resume until daily average water temperature drops to ≤ 71.9°F. An exception is that nighttime lamprey trapping will be permitted up to 73.9°F for tagging and transport purposes. All nighttime trapping for lamprey will cease when temperatures reach 74°F.

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

1.4.7. The density criteria for picket lead operations will be altered and the operations will be as follows (density criteria and adult ladder monitoring outlined above in **1.3.9** also apply[1]):

0–3,000: All 4 picket leads can be lowered for 4 continuous hours.

3,000–6,000: All 4 picket leads down for 3 hours. At the 3rd hour, raise at least 1 picket lead for ½ hour and then continue sampling for an additional 1 hour.

6,000–9,000: All 4 picket leads down for 2 hours. At the 2nd hour, raise at least 1 picket lead for ½ hour and then continue sampling for an additional 2 hours.

9,000–18,000: 2 leads down for 4 hours. All picket leads raised by 10:30 am.

> 18,000: No picket leads down.

1.4.8. There will be no more than 3 adult Chinook or steelhead, or 4 sockeye in the anesthetic tank at a time. A combination of salmonids is allowed, with the maximum of either 2 Chinook or

[2] Temperature data for Lower Columbia River projects: pweb.crohms.org/tmt/documents/ops/temp/

steelhead and 1 sockeye, or 1 Chinook or steelhead and 2 sockeye. This assumes users can effectively track the duration of time that fish stay in the anesthetic tank.

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

1.4.10. The observation tanks will be used for fish in distress under guidelines established in 3.3.1 through 3.3.4.

1.4.11. If used, water in the observation tanks will be running continuously allowing a constant exchange of water through the tank.

1.4.12. Ensure 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 ensure this, water in the anesthetic tank will be replaced at least every three hours.

1.4.13. 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 and should be added in individual sealed containers. Do not exceed a 2°F difference between the anesthetic or recovery tank water and fish ladder water.

1.4.14. 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.

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

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

1.5. Winter Trapping Protocols (December 1 – 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.

1.5.1. 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 ensures 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.

1.5.2. 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.

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

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

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

1.5.6. 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.

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

1.5.8. 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.

2. ICE HARBOR DAM ADULT FISH FACILITY

2.1. General.

2.1.1. 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 (FPOM).

2.2. Administrative Requirements. All researchers and managers working at the facility will adhere to the following requirements:

2.2.1. 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.

2.2.2. Users must have the proper federal authorization (e.g., ESA Section 10 permit) from the U.S. Fish & 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 & 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.*

2.2.3. Hard hats will be worn if so required by the Corps' Operations Manager at Ice Harbor (509-543-3256).

2.2.4. Long pants worn at all times.

2.2.5. Steel-toed shoes or steel-toed rubber boots worn at all times.

2.2.6. Notification Required For Work during Regular Business Hours (Monday–Thursday, 0630–1700 hours). Users will notify the project biologist when they arrive on site and when they depart (509-543-3208). The Project Biologist will determine daily availability of the transport tank trailer. Project Biologist needs for fish rescue or emergencies will be priority over the trap user needs for the project transport trailer. If users supply the project biologist with a season schedule, it may not be necessary to notify project biologist upon arrival and departure.

2.2.7. Notification Required For Work during All Other Hours (Monday–Thursday, 1700–0630 hours, or anytime Friday–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.

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

2.3. Trapping Protocols (Mar 1-Dec 15) – Ladder Water Temperatures <70°F.

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

2.3.2. 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 either dogging it off above the water or completely removing it from the fish ladder for subsequent days of trap use. On days when users will not be trapping, the trap will be completely removed and stored on the ladder deck.

2.3.3. Trapping operations can take place between 0600 and 1400 hours, operating in the water not to exceed 4 hours per day or until the designated number of desired fish are obtained, whichever occurs first. Trapping operations shall limit the number of fish lifted from the trap to the powerhouse deck to two per lifting cycle.

2.3.4. 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.

2.3.5. Non-target fish will be released to the ladder.

2.3.6. Oxygen levels in fish handling tanks will be maintained at saturation by replacing the water and providing aeration as necessary.

2.3.7. Water temperatures in all fish handling tanks will be maintained within 2°F of the fish ladder water temperature but less than 70°F. Frozen river water or chillers may be used to regulate water temperature in the anesthetic, recovery, and transportation tanks as long as the temperatures do not deviate more than 2°F from the ladder temperature and the tank temperature remains less than 70°F. Note: If anesthetic tank water temperature exceeds 70°F, criteria in **section 4** will go into effect.

2.3.8. 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. If practical, river water shall be cycled through anesthetic, recovery and/or transportation tanks while holding fish at the dam until transported to the river for release or returned to the ladder. If flow-through water cannot be provided in the transportation tank, water will be recirculated within the tank and oxygen added to maintain the tank at oxygen saturation level.

2.4. Trapping Protocols (Mar 1-Dec 15) – Ladder Water Temperatures 70°F–72°F.

2.4.1. The trap may be operated when water temperatures are within the range of 70–72°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. Water temperature in each tank and the ladder will be logged when each fish is handled or tagged. Due to the narrow temperature range involved, researchers must use reliable digital thermometers.

2.4.2. 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.

2.4.3. 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 either dogging it off above the water or completely removing it from the fish ladder. On days when users will not be trapping, the trap will be completely removed and stored on the ladder deck.

2.4.4. Trapping operations can take place between 0600 and 1200 hours, operating in the water not to exceed 4 hours per day or until the designated number of desired fish are obtained, whichever occurs first. The period from 0600 to 1000 hours is preferred. Trapping operations shall limit the number of fish lifted from the trap to the powerhouse deck to two per lifting cycle.

2.4.5. Between 70°F and 72°F, sampling will be permitted as defined here in **section 4** for up to four days per week until the 1200 hour when the trap will be removed from the water. This 70-72°F operation will remain in effect until daily average water temperatures drop to ≤ 69.9°F when the <70°F criteria in **section 3** apply. All sampling will cease when ladder water temperatures reach 72°F. No sampling may resume until daily average ladder water temperatures drop to ≤ 71.9°F.

2.4.6. 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.

2.4.7. Non-target fish will be released to ladder.

2.4.8. Oxygen levels in fish handling tanks will be maintained at saturation by replacing the water and providing aeration as necessary.

2.4.9. Water temperature in the anesthetic tank will be maintained within 1-2°F of the ladder water temperature (not to exceed 72°F). Frozen river water or chillers may be used to regulate water temperature in the anesthetic, recovery, and transportation tanks as long as the temperatures do not deviate more than 1-2°F from the ladder temperature. If practical, flow-through water should be running continuously through these tanks. If flow-through water cannot be provided in the transportation tank, water will be recirculated within the tank and oxygen added to maintain the tank at oxygen saturation level. Water in all tanks shall not exceed 72°F at any time. Water temperature in each tank and the ladder will be logged when each fish is handled or tagged.

2.4.10. 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.

2.4.11. Fish must be adequately recovered from anesthetization prior to the next step in the handling process, whether placed in the ladder or transported.

3. LOWER GRANITE DAM ADULT FISH FACILITY

3.1. General.

3.1.1. 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 (FPOM).

3.2. Administrative Requirements.

3.2.1. 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.

3.2.2. 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.

3.2.3. Users must have the proper federal authorization (e.g., ESA Section 10 permit) from the U.S. Fish & 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 & 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.*

3.2.4. Hard hats will be worn if so required by the Corps' Operations Manager at Lower Granite (509-843-1493 x258).

3.2.5. Long pants are to be worn at all times.

3.2.6. Steel-toed shoes or steel-toed rubber boots are to be worn at all times.

3.2.7. Notification Required For Work during Regular Business Hours (Monday–Thursday, 0630–1700 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.

3.2.8. Notification Required For Work during All Other Hours (Monday–Thursday, 1700–0630 hours, or anytime Friday–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.

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

3.3. Trapping Protocols (Mar 1–Dec 15) – Ladder Water Temperatures < 70°F

3.3.1. During years prior to 2003, the trap was operated automatically 24 hours/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. For further information on the adult fish trap operation, refer to the current **FPP Chapter 9 - Lower Granite Dam**.

3.3.2. During lengthy periods of non-use (three days or more), the facility shall be dewatered or the water supply will be shut down no later than 72 hours after the last sample. Prior to dewatering, the turnpool gate position will be changed to ladder passage operation and the trap return channel weir will remain in the full open position for up to 24 hours to allow fish to volitionally return to the adult fish ladder. The attraction pool, recovery pool, and return channel will be dewatered and a fish rescue will be performed within 48 hours following the time allotted for fish to return to the fish ladder. The trap should be operated with water supply from the juvenile bypass system to the extent possible, rather than diffuser-14, to avoid out-of-criteria flows in the ladder. In the event trap temperatures deviate significantly (>2°C) from fishway temperatures when using water from the juvenile bypass system, the facility should switch to using water from diffuser-14, provided flow criteria in the ladder is maintained.

3.3.3. There will be no time-of-day restrictions for trapping operations.

3.3.4. 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.

3.3.5. Non-target fish will be released to the return pool.

3.3.6. There will be no more than 12 adult salmonids allowed in the anesthetic tank at one time. This assumes that users can effectively track the duration of time fish stay in the anesthetic tank.

3.3.7. There will be no more than 12 adult salmonids allowed in the recovery tank at one time.

3.3.8. Oxygen levels in fish handling tanks will be maintained at saturation by replacing the water and providing aeration as necessary.

3.3.9. Water temperatures in fish handling tanks will be maintained within 2°F of the fish ladder water temperature but less than 70°F.

3.3.10. 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.

3.3.11. 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.

3.3.12. Fish must be released or transported from the trap within four days.

3.3.13. 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.

3.4. Trapping Protocols (Mar 1-Dec 15) – Ladder Water Temperatures 70°F–72°F.

3.4.1. During normal conditions, the adult trap will cease operations when water temperatures in the flow-through recovery tank reach 70°F, except as noted below in **section 3.4.2**. The NOAA-NWFSC Lead Trap Manager will monitor water temperatures in the flow-through recovery tank (located next to and fed by the trap) using a thermometer with a precision accuracy of ±0.1°F or better, and will make the final decision on when to cease trap operations. Temperatures recorded by NOAA may not exactly match Corps data for fish trap temperatures reported online.[3] The Corps' temperature gauge is located in the attraction pool where fish enter just prior to moving through the false weirs and into the trap when the trap door is open.

3.4.2. If researchers want to operate the trap when recovery tank temperatures are between 70°F and 72°F, the NOAA-NWFSC Lead Trap Manager must first request and obtain approval from the NOAA West Coast Region ESA Take Coordinator for the CRS Biological Opinion (Josie.Thompson@noaa.gov; 503-231-2313) and must also notify FPOM. *The trap will not be operated at temperatures above 70°F without written approval from NOAA's ESA Take Coordinator for the CRS Biological Opinion.* If the request is approved, NOAA's ESA Take Coordinator will provide advance notification to the Corps project biologist. The project biologist will occasionally monitor trapping operations.

3.4.3. During lengthy periods of non-use (two days or more), the facility shall be dewatered or the water supply will be shut down. The trap should be operated with water supply from the juvenile bypass system to the extent possible, rather than diffuser-14, to avoid out-of-criteria flows in the ladder. In the event trap temperatures deviate significantly (>2°C) from fishway temperatures when using water from the juvenile bypass system, the facility should switch to using water from diffuser-14, provided flow criteria in the ladder is maintained.

3.4.4. 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.

[3] Lower Granite adult fish trap temperature data: pweb.crohms.org/dd/nww/fl_temps/www/index.html

3.4.5. Trapping operations may take place up to 4 days per week.

3.4.6. 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.

3.4.7. Non-target fish will be released to the return pool.

3.4.8. There will be no more than 3 adult salmonids allowed in the anesthetic tank at one time. This assumes that users can effectively track the duration of time fish stay in the anesthetic tank.

3.4.9. There will be no more than 3 adult salmonids allowed in the recovery tank at one time.

3.4.10. Oxygen levels in fish handling tanks will be maintained at saturation by replacing the water and providing aeration as necessary.

3.4.11. 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.

3.4.12. 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.

3.4.13. 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.

3.4.14. 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.

3.4.15. 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.