MEMORANDUM

Oregon Department of Fish and Wildlife

Columbia River Management

Date: July 24, 2001

To: Adult Fish Facility Users

From: Bret Morgan

Subject: AFF Modifications

Over the years, the Adult Fish Facility (AFF) has seen an increase in use from various user groups who have experienced a rise in research needs. While demand for use has gone up, the AFF has, for the most part remained unchanged. In addition, as fisheries biologists we should all be doing our best to make sure that the research being conducted at the AFF is putting the least amount of stress on the salmonids/lamprey that are being studied. As researchers, observations and fish handling skills play a large role in making sure the fish that are being studied go through minimal stress and survive. However, there are certain mechanical and structural changes that I feel could and should be done to the AFF to enhance and promote a safer environment for the fish.

The limiting factor at the AFF as far as sampling needs are concerned is the recovery tank. The current recovery tank is inadequate in size and function. The recovery tank is easily over crowded. It has too steep of an exit gradient which makes it difficult for small fish to leave on their own power and causes larger fish to hit their heads on the rim of the tank when exiting. It has an inadequate attraction system (single hose for draw), and at times does not have enough water to fill the tank due to different user groups using the single raw water pump that is at the AFF. I believe the following should be done:

1) Add a second recovery tank or modify the brail pool in such a way so that it can be used both as a trapping device and a recovery tank. For several years now Oregon and Washington have discussed with the COE a desire to convert the brail pool into a recovery tank. The brail pool would have to be multi-functional because Washington uses it to trap winter steelhead. Steve had some good Ideas on how this could be done and these ideas are documented in Charlie's suggestions and probably by Steve.

2) Add a second raw water pump. The current demand exceeds the available water during several times of each day. When Idaho adds water to their tank, it decreases the intake of water to the recovery tank as well as the exit attraction flow. This can cause stress to the fish while they are in the recovery tank.

3) I believe the anesthetic tank is appropriate in size. I would not send more than six fish at any given time into the anesthetic because you would be putting the fish at risk. Often we

only send four-five fish at a time. The drain system on the current tank needs to be upgraded. The current drain is inadequate in size and takes to long to drain. I would like to see an improved aeration system or at least pure oxygen tanks that we could use during warmer water periods.

4) The drain that is on the east wall needs to be repaired. Currently we are not supposed to drain water from the recovery tank into the Columbia River. The drain has been plugged for some time now and a portion of the water from the anesthetic tank flows into the main flow of the Columbia anyway. This needs to be fixed and maintained.

5) The center and north flumes need some minor repair to the rubber coverings. Some rubber is coming off and is swinging in the water current.

6) For human safety, there should be more electrical outlets. Currently there are electrical cords hanging all over the trapping area. Also, electrical wiring should be checked and maintained each year to prevent potential shocking to either people or fish.

These suggestions I have listed are common concerns among the user groups at the AFF. Other agencies may have more concerns depending on their sampling protocol and goals. I would support any agencies suggestions that would add to the safety of not only humans, but to the safety of fish as well.

Thanks for your time.

Bret Morgan
ODFW

Date: 20 August 2001

To: Rock Peters and Gary Johnson, COE

From: Earl F. Prentice, NMFS

Subject: Proposed Modifications to the Adult Fish Facility (AFF) at Bonneville Dam

As you know, I have been actively soliciting comments regarding modifications the users of the Adult Fish Facility (AFF) located at Bonneville Dam desire in order to improve human safety, fish safety, and facility operations. Over a 5 month period I have received comments from representatives of CRITFC, WDFW, University of Idaho, ODFW, and NMFS. In this memo I have attempted to summarize the suggestions made by the entire group.

Rock, in July we talked about what procedure to follow to provide the COE with these suggestions. At that time you suggested a simple informal letter addressed to you and Gary would suffice: thus, this e-mail. I believe the list of ideas that the facility user group assembled provides a good platform for future discussions. We as a group are looking forward to discussions with the COE on these matters.

Group Suggestions
(Note: The list is not in order of priority.)

1) Electrical outlets: Presently electrical extension cords are required to be strung long distances in order to obtain 110 V AC power to electronic equipment (air pumps, computers, PIT-tag readers, lights, etc.) being used in the fish handling area of the AFF. This procedure is considered dangerous in addition to being inconvenient and could be corrected by installing ground faulted electrical outlets in several protected areas within the general work area.

2) Floor and Sanitary Drains: The drain system in the fish handling area of the AFF is inadequate to handle anesthetic, tank overflow, tank drain, and spill water. We suggest the following changes be considered:

A) Cut drain channels for "clean" water in the floor of the work area and place non-skid fiberglass grating over the drain channels to prevent accidental tripping. These drain channels could lead to the exit channel of the AFF or to the sanitary drain. This change would handle spill water that occurs from several activities in the work area making the work area a safer place in which to work.

B) The drain for the anesthetic tank needs to be increased in size and the aesthetic tank plumed directly to the sanitary drain. The sanitary drain presently cannot handle even a small portion of the water that is discharged in the work area. This is especially true during the time that tanks (i.e., aesthetic tank water, etc.) are being drained.

C) It was suggested that permission be obtained to redirect the drain water ("clean" water) from the recovery tank/s directly to the river. The volume of water originating at the AFF is presently directed to the COE sanitary water processing facility. This water is evidently

taxing the processing facilities capabilities. However, if the information in point 5 is valid, the water coming from the salmonid recovery tank and directed back to the ladder could also delay fish passage. Just another point for discussion!

3) Anesthetic tank: Several modifications to the existing anesthetic tank are offered for consideration.

A) Remove the drain that leads to the AFF exit channel. This would prevent anesthetic water from being discharged into the AFF exit channel.

B) The anesthetic tank drain could be repositioned and increased in size. The tank should discharged directly into the sanitary drain via a channel or solid pipe (the pipe must be located below the floor surface). If a channel were used it should be covered with non-skid grating. Regardless of the approach, a valve vault near the tank that is covered with a section of removable grating should be considered. The removable grating would protect the valve from being a trip hazard and also protect the valve from damage. In no case should the tank be elevated in height to achieve the suggested drain modification unless the floor is raised at the same time.

C) The fish measuring "stick" located on the top edge of the anesthetic tank needs to be protected. The measuring sticks overlay is broken and is a potential human and fish safety hazard. This cover also needs to be removable for cleaning the measuring device. At times algae growth, etc. makes it difficult to read the scale numbers.

D) Install a means to chill the water in the aesthetic tank. Presently ice is used to chill the water when water temperature exceeds 70 degrees. Ice at times is difficult and time consuming to obtain.

E) Redesign the bottom grate of the tank so that it can be easily removed. The grating needs to be removed on a regular bases for tank cleaning, removal of debris, and to service air stones.

F) Replace the air stones with ones that provide a more uniform air supply to the tank and are more efficient.

G) Provide a means of delivering oxygen directly to the existing and proposed anesthetic tanks to insure fish health especially when warm water is present. Provide a place to securely store oxygen cylinders for use with the anesthetic tank, provide a means to regulate oxygen flow, and add additional air stones to the tank for oxygen. Antidotal information suggests that O2 supplied directly to the anesthetic tank in the past has helped speed fish recovery and kept them quieter while anesthetized. Having this capability is a good backup measure regardless in case of power failure or some other emergency that may stop the flow of air to the anesthetic tank/s or for special fish recovery efforts. All that would be required is a place to locate and secure a large O2 tank, a regulator, and some airline and stones near the general work area. It is requested that project biologists set up an account to obtain O2 from the COE supply unit.

4) Location and use of a second aesthetic tank: Modifications suggested under item 3 should also apply to the design of any new tank placed in the facility. All facility users favored a second anesthetic tank. However, the users believe there is a greater need for a second recovery tank over a second anesthetic tank if a decision between the two must be made.

A) If the work area is enlarged as suggested in point 6 then the second tank could be placed in

that expanded work area. This was the site preferred by all facility users.

B) If 4A is not possible then consideration should be given to locating a second anesthetic tank (or preferably a recovery tank) above the pool. This also assumes that the brail pool itself is not modified to serve as a primary or secondary recovery area during the spring and summer field season. The brail pool presently is not used during the majority of the field season with the exception of the annual winter steelhead-sampling period. The pool area could be covered with removable grating, and equipped with removable air, oxygen, water, and drain lines. These items would need to be installed so they are not in the way of work activities or with the existing tanks etc. A means of directing fish to the second tank would need to be developed. In addition, a means (pathway) of transporting fish from the anesthetic tank to a recovery tank would need to be considered.

C) If a second anesthetic tank is installed at the facility; rules for its use should be established. We suggest that the tank not be used unless there is a second crew available to work any fish directed to the tank. It was felt, that without such a rule, there was a strong chance that a single crew might forget fish in a second tank and thus fish death could occur.

5) Lamprey work area modifications:

A) Some people believe that the recovery water that is released from the lamprey work area is causing a delay in salmonid passage. A possible solution is to redirect the lamprey recovery tank drain water into an area that would reduce its potential impact on salmonid passage or direct it to the sanitary drain. However, as stated in point 2C there is concern about overloading the sanitary water processing facility.

B) A separate raw water supply is required to the lamprey work area. When other facility users alter water pressure it affects the water pressure and flow at all work locations. This can lead to fish holding and handling problems.

6) Enlarge the work area: Considering the number of facility users, the work area is felt to be inadequate. Enlarging the area would increase productivity, provide a safer work environment for facility users, and enable fish to be handled in a safer and more efficient manner.

A) Non-skid grating could be installed over the brail pool. This modification would substantially increase the work area in front of the existing anesthetic and recovery tank area.

B) Located on the left side of the existing fish handling work area, as viewed downstream, is a large unused area. This area is presently accessible only by ladder from the facilities deck. By removing a section of wall on the left side of the work area, access to the unused area could be obtained. If the area were made available, we suggest a second fish recovery tank be installed in order to expedite fish handling and to ensure fish safety during recovery. Consideration should also be given to installing a second aesthetic tank in the new area. The area could also be used for other fish handling requirements. Electrical service, water drains, and water delivery plumbing would need to be installed in the new work area. We also recommend that the grating overhead of the proposed work area be replaced with solid non-skit plate to prevent foreign items from falling onto workers below.

C) Also see point 4B.

7) Recovery tank: All users indicated that the existing tank should be redesigned ASAP and that a second tank is a high priority. These comments come from a concern about fish safety and the time it takes to recover fish using the present system.

A) The present recovery tank drain is inadequate to handle the flow required for proper fish recovery and exit. In addition, the tanks drain is improperly located and sized.

B) A second recovery tank is required to accommodate the number of fish being processed by facility users. During certain activities where large numbers of fish are being handled, substantial time is wasted waiting for fish to recover before reintroducing them back to the river. A second recovery tank would reduce this wasted time. Finally, overcrowding of the present recovery tank does take place. It should be noted that this is not always a factor of fish numbers but of fish size (i.e., 95 cm chinook take up a lot of room). This over crowding potentially causing increased fish stress and injury. Finally, both large and small fish are presently placed in the same recovery tank. This creates a situation where small fish can become injured by the thrashing of larger fish upon recovery and exiting the tank.

C) Direct the fish discharge flume of the existing recovery tank farther up into the facility=s exit channel. This would provide a greater opportunity for fish to orient themselves to flow, reduce the potential of impingement against the exit channel=s discharge grating, and expedite their exit from the facility. It should be noted that not all users were totally supportive of this ideas but they did agree that the manner in which fish presently exit the tank and enter to exit ladder is not satisfactory. The main concern about redirecting the fish upstream was that fish would enter fast "shallow" (~3 ft depth) water and thus be washed back into the exit channel dewatering area. This concern could be overcome by directing the fish at a flat angle close to the water surface unlike what presently occurs. One individual suggested that the exit channel be increased in depth thus overcoming the concern of water depth and high velocity.

D) Modify the exit of the fish recovery tank so that fish do not fight to exit the tank. The objective should be to make the tank exit more fish friendlier (safer). It should be noted that if the tank is to easy for fish to exit, fish that are partially sedated could leave and then become impinged on ladder grates.

E) The tank needs to be enlarged in all dimensions to allow room for large fish to maneuver (some users suggest twice the present tank size). It should be noted that the tank must be designed and sized for the manual dumping of fish.

F) Fish presently contact the tank cover during the recovery and exit process thus increasing the chances for descaling and other injury to occur. The sides of the tank need to be increased in height and the lid modified (i.e., perhaps rounded).

G) The recovery tank should have its own water supply. Presently when adjustments are made to the tank or other users made flow adjustments at their work areas all water pressure is affected. This situation can lead to conditions where fish are not receiving an adequate supply of water.

H) Improve the attraction water flow at the exit of the recovery tank. Fish at times are not keying in on the small amount of water that is presently being used as an attraction flow. This results in some recovered fish not exiting the tank on their own volition in a timely manner.

I) Improve the means by which fish are placed into the recovery tank. On occasion fish are dropped in the process of trying to place fish into the recovery tank. In addition, fish recovering can and do jump out of the tank while trying to place fish in the tank.

J) Some users felt that the water in the recovery tank should be cooled during warm water periods. It was stated that since the water in the anesthetic tank was presently chilled that the water in the recovery tanks should also be chilled. This would be difficult to do, since many gallons of water flow in and out of the recovery tank. Obtaining ice was thought to be a time consuming task and an alternative water chilling method should be considered.

8) Flume modifications:

A) The two active flumes in the facility should be modified to prevent fish from hitting themselves on the flume=s edge while exiting. A transition to ~14-in dia pipe after the diversion gate of each flume would enable fish to safely pass into the facility=s exit channel without fear of them making contact with the edge of an open flume and jumping out of the flume.

B) The discharge pipes of both active flumes should be directed further up stream in the exit channel. This would provide greater opportunity for fish to orient themselves, reduce the potential of impingement against the exit channel=s discharge grating, and expedite their exit from the facility. Not all users agreed, see 7C for additional comments that would apply to this suggestion.

C) All open flumes need to have adequate covering to prevent fish from jumping out of the flume, yet be of a nature to provide adequate viewing of the fish. Presently the flume covering is haphazard.

D) The discharge sections of the two active flumes need to be banked to prevent fish from hitting the flume=s edge.

E) The depth of the flumes needs to be increased. Adding height to the flume walls should make the current flume covering adequate.

F) The cross bracing on the flumes need to be removed or increased in height so fish do not make contact as is presently the situation.

G) Remove the south fish flume in the AFF. It was suggested that the north flume be moved to the where the south flume is presently located. This would allow much better access to the facilities inside test ladder. The additional room provided by this change would increase the facilities potential for further studies and enable the test ladder to be used to its full potential by accessing all viewing areas. This suggested change could be made without jeopardizing present fish observation, collection and handling capability nor the safety of the fish. In fact, by relocating the flume, it places fish in a more convenient location to direct them into the new proposed work area. The big question was whether or not the third flume would be used in the future.

H) The center and north flumes need some minor repair to the rubber coverings. Some rubber is coming off and is swinging in the water current.

9) Fish Diversion Gates: At times operators inadvertently impinge fish with the diversion gate upon closure. We offer the following two ideas as potential solutions to the problem.

A) Install a pressure switch on the gate so that if a resistance of over a set amount was encountered during closure the gate would automatically open. This action would reduce the likelihood of injury to fish.

B) Make the side of the flume expandable so that if the diverter door impinges a fish the side

of the flume expands and reduces the pressure on the fish. This would allow time for the operator reopen the door and allow the uninjured fish to escape.

10) Facility "entry holding" tank: Fish can presently jump out of the facility=s entry tank and become stranded. In addition, jumping fish can contact sharp edges of various structures surrounding the tank.

A) The size of the protective barrier around the entry tank needs to be increased and all potential exits covered with protective webbing.

B) All sharp edges of structures should be padded, modified, or removed to reduce the chance of fish injury upon contact.

11) Facility Grounds Service and User Responsibility: To improve public image of the facility and worker safety we suggest the following.

A) Create, in harmony with the users, a list of facility user and COE responsibilities as related to the facility operation and maintenance.

B) Establish a faculty grounds maintenance program and policy. Brambles are growing up to door level in areas, user equipment is left unused next to the building over extended periods of time, trash is not picked up, etc. This all makes for an unsightly and unsafe work area.

12) Provide facilities orientation/operation training for all new users.

13) The facility-training manual should be reviewed, clarified, and updated. Several copies of the manual should be located at the facility. All new facility users should be required to review the manual as part of their facilities orientation/operations training.

14) Water and air venting occurs on the north wall near the stairs leading down to the fish handling work area during certain facility operations. The water can contact electrical equipment, damage equipment, and cause electrical shorting. The vent could be redirected to the floor, thus overcoming the problem.

15) Restrict the public from driving into the AFF parking area by installing warning signs, etc. Presently the public can enter the parking area without seeing any signs or warnings restricting their access. This situation is felt to be a hazard to workers.

16) Provide an additional raw water pump and separate raw water lines in order to provide adequate water flow to multiple facility user work areas. Presently if one user adjusts water pressure it affects all other users. This situation can lead to the loss of fish, compromised
studies if not monitored very closely, and reduce the functionality of the facility.

17) Better lighting is required in workstation areas from both a safety and work standpoint.

18) Mount portable PIT-tag readers over anesthetic tanks. Fish handling protocol calls for all fish captured and handled to be scanned for PIT-tags and tags found reported to the PIT-tag data base PTAGIS. To accomplish this task it is suggested that a PIT-tag reader be mounted near each anesthetic tank in a position so that the antenna may be pulled down from a position above the tank. It would be preferable if the antenna was retractable in order to keep it out of the way when not in use. RS232 links to a computer storage area/s should also be considered.

19) Install a dual antenna PIT-tag interrogation system at the exit of each recovery tank. Previously PIT-tagged fish are intentionally or accidentally diverted to the anesthetic tank area during the field season. The established fish handling protocol for all fish handled or delayed calls for the fish to be interrogated for PIT-tags and findings reported. Furthermore, we believe that their will continue to be a need to PIT-tag adult fish collected at the facility and to release those back to the river after handling. By installing a PIT-tag interrogation system at the exit of recovery tank/s, information as to the code of the fish and the time and date of the fish reentered the ladder would be established. The equipment could be connected to the existing facility adult PIT-tag infrastructure. PSMFC has been contacted in regards to this suggestion and are supportive.

20) Provide a general purpose telephone that is available to all users that has dial-in and local calling capabilities. This would allow agencies and others to have a telephone number in which to contact facility user personnel. There is no need for long distance availability on this phone since users can use their own calling cards to make long distance calls.

21) Modify the brail pool. The present brail pool design could be improved upon to make it more fish friendly and the area more effectively used. At present the brail pool is only used as a fish holding and trap area for steelhead during the winter sampling season. It was suggested that the area be considered for year around use for fish recovery and trapping after some modifications are made or as an additional work/staging area during periods other than the winter steelhead season (see previous comments).

Trapping and recovery

A) Modify the brail pool in such a way so that it can be used both as a trapping device and a recovery tank. It was stated that for several years Oregon and Washington users have discussed with the COE a desire to convert the brail pool into a recovery tank. The brail pool would have to be multi-functional because Washington uses it to trap winter steelhead. The users need the brail pool to remain available for use during winter steelhead sampling. Presently during the winter steelhead collection period, fish are diverted directly into the pool and remove and sampled once or twice per day depending on numbers. Users support modifications that would enable the pools use as a recovery area during the summer.

B) Install a finger weir exit to the pool. This would be a simple and effective modification that would ensure full recovery prior to release and eliminate disruptions to sampling during peak periods. Washington supports this modification and state they would only require that a "knife gate" be constructed that would block the pool exit during the winter.

C) Install an attraction flow to enhance fish exit. It was suggest that the attraction flow

system consist of a spray bar that spans the width of the finger weir rather than a single hose jet like the one used in the current recovery tank. It was stated that on occasion problems are encountered with fish not willing to volitionally exit over the finger weir. With the present design, the only solution is to raise the brail and net out the reluctant individuals.

D) Addressing a fish handling problem at the site. The State of Washington representatives state, " We encounter a currently unavoidable problem with winter sampling due to the peak passage period for wild winter steelhead (or primary target group) overlapping with the early part of the spring chinook run. At present, the only way to remove these chinook is by netting and releasing them down the recovery tank chute. This is a difficult task and a less than desirable situation since we are forced to handle a non-target species. We are eventually forced to stop sampling when chinook numbers reach a level where it is unacceptable to handle all of them. A possible solution is to modify the bottom of the brail so that the trenched portion was routed to a knife gate. Once the steelhead were removed, we could remove the gate, raise the brail and crowd the chinook out without having to handle them. This design would be pretty complicated because it would make it difficult to net steelhead from a position close to the opening of the anesthetic tank. Because of this complication, maintaining the current design, which would force us to continue netting out chinook, seems to be the more feasible option. I suggest that additional thought be given to this fish handling problem.

E) The PVC/netting barrier around the brail pool needs replacing with a more substantial material. The present material and design does not prevent people from falling into the pool and provides possible routes for fish to escape and die on the floor.

F) The swinging gate (between the current anesthetic and recovery tank) is broken and should be redesigned. The present gate is low enabling steelhead to jump over. The gate also has gaps at its corners where fish can jump out. The entire barrier and gate should be reconstructed with sturdier material.

G) Increase the facilities overall work area by covering the brail pool area during periods of non-use. The area could be used for a second recovery tank or anesthetic tank. See 4B. Again please note that users believe there is a greater need for a second recovery tank over a second anesthetic tank if a decision between the two must be made.

22) Facility high water alarm: The high water alarm was removed after it caused an electrical problem in 2000. The users believe that a new alarm should be installed and maintained.

Asked electricians