

**CORPS OF ENGINEERS FUNDED RESEARCH  
ANADROMOUS FISH EVALUATION PROGRAM  
WALLA WALLA DISTRICT  
FY 01**

**ADS-0-1-5 Evaluation of Adult Salmon and Steelhead Migration Past Dams:**

University of Idaho, Idaho Cooperative Fisheries Research Unit will continue use radio telemetry to monitor the migration behavior (passage rates, loss and survival) of adult salmonids through the hydrosystem.

- a. One of the objectives of this study is to evaluate the use of cool water corridors and refugia during the upstream migration of steelhead and fall chinook. A component of this evaluation is to determine the potential benefits of cool water releases on adult salmon migration and spawning success so experimental releases of cool water from Dworshak may be requested.
- b. Three major activities are proposed at Lower Granite:
  - Modification of the submerged weirs in the adult ladder to increase flows through the orifices has been completed in FY00. Evaluation of the success of this modification on reducing the rate of adult turn-around in the transition pool will be conducted for an additional year.
  - Radio tags and depth/temperature monitoring tags will be recovered at the adult fish trap and reused in “known source” adult fish to monitor passage to hatcheries and spawning areas.
  - Evaluation of the differences in the homing of returning adult fish with known passage histories and sites of origin. PIT-tagged adults are proposed to be collected at the trap on the adult fish ladder. These fish will be radio tagged and released to complete their spawning migration.
- c. Second year of the evaluation on the effects of the closure of all floating orifice gate entrances to the adult fishway on adult fish passage migration behavior and fishway passage rates at Little Goose and Lower Monumental Dams.
- d. Three activities occur at Ice Harbor:
  - Passage success (frequency, rate and percent fallback) under normal spill conditions with new deflectors and the flow retaining wall, compared to high spill levels proposed because of the reduce gas benefits created by the installation of the flow deflectors. **(Sub-element dropped due to drought)**
  - Monitoring of holding and passage time of adult fallbacks within the juvenile bypass facility.

**BTS-01-1 Seasonal Distribution, Abundance and Migration of Bulltrout in the Dworshak Reservoir:** Normandaue, University of Idaho, and Idaho Fish and Game. Bull trout will be tracked with radio telemetry through the Dworshak reservoir and tributaries to determine seasonal abundance and distribution range into the various tributaries.

**TPE-W-00-1a Evaluate Survival and Adult Return Rates of Juvenile Salmon Transported Compared to In-river Migrating Fish:** National Marine Fisheries Service. This study originally compared the adult returns rates of wild chinook and steelhead transported from Little Goose to those released from Lower Granite to complete their outmigration in-river. This year an index group was tagged to obtain an SAR for transport only. The hatchery marked fall chinook from Lyons Ferry hatchery will be released up stream and transported from Lower Granite. There is no plan for an inriver group of marked fish.

This year a transport study was started out of McNary Dam as a late addition to the study. The study fish were the hatchery spring Chinook used in an upstream survival study being conducted by the PUDs. (There was a chance that not enough fish would be detected at McNary for this study to succeed, as was the case). Run-of-river fall chinook will be marked at McNary for a comparative transport / in-river evaluation.

**TPE-W-00-1b Evaluate Survival and Adult Return Rates of Juvenile Salmon Transported Compared to In-river Migrating Fish, Fish Condition:** University of Idaho. The physiological condition of fish used in the comparative evaluation of the transport to in-river survival group will be monitored at the Lower Granite juvenile fish sampling facility and on the barge for the fall chinook component of the study.

**BPS-W-00-9 Evaluate Comparative Survival of In-River Passage to Multiple Bypassed Salmon:** University of Idaho. This is an evaluation assessing the differences in physiological responses (including accumulative stress) of transportation or multiple dam passage on hatchery chinook. Fish of known origin and passage histories will be sampled for the PIT tag Diversion systems at Lower Granite, John Day and Bonneville Dams.

**BPS-W-01-5 Post-Construction Evaluation of the Modified PIT Tag Detection and Diversion System:** National Marine Fisheries Service. This study will assess the descaling, injury and delay to fish as they pass through the modified portions of the PIT tag diversion system at Lower Granite Juvenile Fish Facility, as well as documenting the detection efficiency of the system.

**ADS-0-1-6a Identification, Enumeration and Survival of Steelhead Kelts:** Kelts abundance, migration timing and survival will be evaluated by CRITFC at Lower Granite, Little Goose and Lower Monumental.

**BPS-01-14 Evaluation of the Installation of a Trash Boom on the Distribution and Abundance of Picivorous Fish in the Little Goose Forebay:** This study evaluates the changes that occur in the predator population in response to the installation of the Little Goose trash boom. The University of Idaho plans to monitor predator abundance in the forebay throughout the season using electoshocking methods.

**SPE-W-00-5 Evaluation of Ice Harbor Project Survival:** National Marine Fisheries Service. A combination of radio tags and PIT tags will be used to determine Ice Harbor Project survival and to partition relative survival between Ice Harbor and McNary for spring summer and fall chinook. Tagged fish (at Lower Monumental) will be released into the reservoir and tailrace at Ice Harbor and monitored via radio receivers through the McNary reservoir and the PIT tag detection system at McNary.

**BPS-W-00-8 Evaluation of Prototype Separator:** National Marine Fisheries Service. Evaluation of high velocity flume, separation concept will be finalized at Ice Harbor in the prototype separator.

**BPS-W-00-8 Existing Style Separator Development:** National Marine Fisheries Service. An evaluation of improved existing style separator is proposed for the operational separator. A separator insert (composed of the best combination of separator improvements developed from previous separator research) is being developed for insertion into the McNary separator.

**BPS-W-00-3 Prototype Testing of A Cylindrical Dewatering Screen:** National Marine Fisheries Service will be conducting the biological and debris handling performance of a prototype cylindrical dewatering system currently under construction on the tailrace deck.

**BPS-W-00-4 Determine the Effects of Extended Length Screens on the Behavior Pacific Lamprey:** Battelle. Video monitoring of lamprey behavior when they come in contact with the extended submerged bar screens (ESBS) and during the operation of cleaning brushes.

**BPS-W-00-9 Evaluate Comparative Survival of In-River Passage to Multiple Bypassed Salmon:** University of Idaho. This is an evaluation assessing the differences in physiological responses (including accumulative stress) of transportation or multiple dam passage on hatchery and wild chinook and steelhead.

**BPS-W-00-10 Compare Long-Term Survival of Yearling Hatchery Chinook Smolts Of Different Migration Histories:** National Marine Fisheries Service. This study will evaluate differential post-system mortality for fish with known migration rates. This is study focus on physiological changes between the different groups with an attempt to identify causes of mortality.

Temporary rearing facilities at Bonneville juvenile fish facility will be the site of the evaluation of differential mortality of fish that migrate downstream through bypass systems (on the Snake River and McNary Projects) compared to fish that out-migrate via spill (in-river). This is a multiple year evaluation that will require extensive support facilities. The first year of this work will focus on the development of methodologies and design, construction and operation of handling/rearing facilities.

**TPE-W-01-2 Evaluation of juvenile fall chinook passage through McNary Dam Juvenile Fish Facility.** National Marine Fisheries Service. Previous evaluations of fish passage through McNary have documented delay problems for Fall Chinook. This evaluation uses radio telemetry to locate specific problems within the juvenile fish bypass system.

**TPE-W-00-2 Evaluation of migration and survival of juvenile salmonids following transportation:** Oregon State University. This study will evaluate the differences between transported versus in-river migrants with respect to their smoltification and general health as it contributes to survival and behaviors that lead to greater chances of survival (travel time, predation rates and migration routes) through the estuary and near shore ocean environment. Steelhead and fall Chinook will be radio tagged and tracked through the upper estuary to the saltwater interface. The information from this work provides the foundation for modifying elements of the transportation program, identifies problem areas in the estuary and provides travel time, holding, and survival.

**BPS-00-10, Obj. 2ci Evaluation of delayed mortality of juvenile salmonids in the near ocean environment following passage through the Columbia River Hydrosystem.** Oregon State University. Evaluate delayed mortality in juvenile salmon transported and in river migrants that is manifested after entering the saltwater environment. Sonic telemetry and an acoustic buoyed receiver arrays will be used to track juvenile salmon from the salt-water interface and of-shore through the Columbia River Plume. Migration travel time, survival through three zones, (the upper estuary, lower estuary and near-shore ocean) and migration direction will be obtained for juvenile salmon that were transported or that remain in-river. This information also supports studies investigating future changes to the transportation strategies.

**BPS-W-00-10: Smolt Health Repletion and Sea Survival:** Washington State University. This is tissue analysis only. Additional analysis will be conducted on tissue from smolts collected during and after the transportation process to assess the

variation in the concentration of enzyme precursors that control osmoregulation functions across the cellular membranes. This work provides information in to causes of delayed mortality

**TPS-W-00-3 Evaluation of the efficacy of an ultraviolet light system for reduction of bacterial numbers in water of juvenile fish facility at Lower Granite Dam.** Biological Resources Division. Evaluation of the Ultraviolet Light sterilization process. Previous analysis suggests that the new sterilization procedures are not as successful as originally intended. Water samples will be collected during fish handling procedures for comparison of bacterial concentrations at different locations within the juvenile fish facility at Lower Granite Dam.

**BPS-W-11 (BPS-9,10; TPE-1,2; SBE-9): Evaluate the Migration Behavior of PIT-Tagged Juvenile Salmonids in the Columbia River Estuary.** National Marine Fisheries Service. Monitor the migration characteristics of PIT tagged juvenile salmon in the upper estuary. This includes the migration timing, travel rates, and survival of know source fish to determine estuary uses of stream type salmonids.

This work also includes the development of a saltwater PIT tag trawler to allow for migration and survival estimates further out into the marine environment. In addition, the development of a single vessel PIT tag detector to provide critical ocean entry timing of the sample fish to allow data sets to be standardized for better assessment of ocean condition effects on outmigration groups.

**BPS-W-00-11: Electronic Recovery of ISO-PIT Tags From Piscivorous Bird Colonies in the Columbia River Basin** National Marine Fisheries Service. Evaluate predation on juvenile salmonids using the PIT tag recovery from avian islands in the estuary (contributes to the relocation of the tern colonies). A sub-objective is to identify hot spots of avian predation throughout the migration corridor.

**BPS-W-01- New Water Temperature Effects on Juvenile fall chinook in Snake and Columbia Rivers; McNary Pilot Study.** Biological Resources Division. Effort to try and reduce some the impacts associated with the exposure of juvenile salmon to high temperatures in the McNary forebay. While temperature issues at McNary are not new, it is anticipated that with lower flows and no spill the temperature problems at McNary will likely be much worse under the drought conditions. One of the actions planned to reduce temperature related juvenile salmon loss is the use of forebay guidance mixers to reduce temperatures in localized areas in which fish hold in the McNary forebay. The foundation of this concept is based on the results of recent temperature monitoring conducted at McNary; which indicates that during periods of higher temperatures the occurrence of a low velocity wind across the forebay of McNary reduces the temperature of the surface water by several degrees. The resulting lower temperature is attributed to surface mixing and evaporative cooling. Deployment of two flow inducers at the south end of the powerhouse at a depth of

approximately 15 feet, on a slight angle towards the surface is proposed. The orientation of the guidance flow inducers will be determined following preliminary temperature measurements scheduled for early June. Localized effects on temperature will be monitored.

To help develop a model to predict potential high fish losses associated with high temperature exposure, two baseline data gathering activities are being initiated in association with this work. The first is to collect temperature profile data during the summer and early fall throughout the forebay of McNary and the second action is to monitor fish condition at McNary and to identify indicators of high temperature exposure in juvenile fish (such as heat shock proteins and *F. columnaris*).

**SBE-P-95-9: Development of Full-Flow and Surface Flow Bypass PIT-Tag Interrogation Systems for Snake and Columbia River Dams** Some of the lower survival in multiple bypassed fish may be due to the current PIT tag detection systems that are being used to bypass the test fish back to the river. National Marine Fisheries Service is working on taking the development of adult PIT tag technology and advances in the PIT tag trawler work to extend to high velocities and further detection ranges that have found in the primary bypass systems at the juvenile fish facilities.

**SBE-W-00-1 Migration characteristics of juvenile spring chinook salmon and steelhead in the Lower Granite Reservoir and evaluation of simulated Wells Insert of Fish Guidance Efficiency.** Biological Resources Division. Radio telemetry of spring/summer chinook and steelhead is being used to evaluate the travel time during the low flows from Sillcot Island to Lower Granite Dam. Travel time and survival will be correlated to the flow conditions they experience. Once these fish reach Lower Granite Dam the effect of simulated Wells inserts on the fish guidance efficiency of the extended bar screens will be evaluated.

**SBE-W-00-5 Analysis of Deployment methods for the three-dimensional fish tracking system at Lower Granite Dam.** Biological Resources Division and PNNL. Evaluation of 3-dimensional model and field acoustic data will be continued will special emphasis on integration of the databases.