



U.S. Fish & Wildlife Service

Abernathy Fish Technology Center Newsletter

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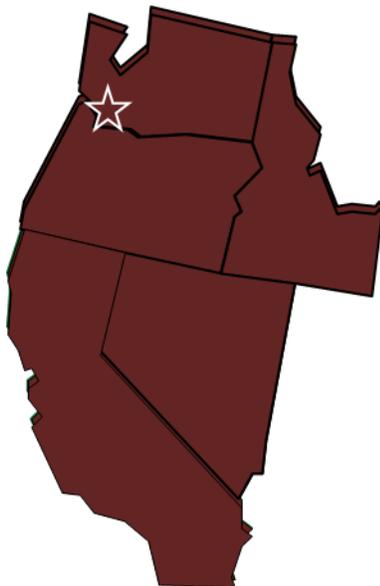
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International Technical Assistance Program



Ms. Vannida Boulaphan (L) and Mr. Phousone Vorasane (R) Photo: AFTC



Quantitative Ecology & Technology and AFTC hosted a one-week visit from Vannida Boulaphan and Phousone Vorasane, biological technicians from Laos PDR, who are currently in the United States receiving technical training under an internship program sponsored by US Department of Interior's International Technical Assistance Program (DOI-ITAP). During their visit to AFTC, they were trained how to implant PIT (Passive Integrated Technology) tags in small fish, received a primer on PIT tag technology and antenna design, helped collect and analyze samples to determine saltwater readiness of steelhead smolts, shadowed a biologist in the Conservation Genetics lab, learned about fish nutrition and culture, and were taught how to standardize catch-per-unit-effort (CPUE) using capture fishery data from Mekong River as an example.

AFTC Staff Member Attends Fisheries Academy

Richard Glenn attended Fisheries Academy from February 22 – March 4 at the National Conservation Training Center (NCTC). The course covered strategic planning including budgeting and work plans, working with partners, strengthening interpersonal and communication skills, developing leadership qualities, and obtaining an increased knowledge and understanding of the diversity of issues, challenges, and priorities of the FWS. As part of the course, attendees were assigned a two week group project covering a real conservation issue to apply the skills gained through the course, met and heard from FWS partners, and received instruction on leadership and communications. The class was scheduled during the Fish and Aquatic Conservation Program meeting so that Fisheries Academy students could interact with the ARDs from all nine regions of the country. The course included a trip into Washington D.C. to visit with two Congressional aides from the Natural Resource Committee, a visit to the Congressional Research Service, and a visit to the Department of Interior Building to meet with Jim Kurth, the Deputy Director for Operations.

Richard found the whole experience very rewarding working with other US FWS employees from around the country has given him a greater appreciation for the diverse issues within the FWS. Richard really appreciated the chance to visit with the ARD's and Deputy ARD's on a more personal level. He witnessed a Congressional committee meeting, hear from Congressional aides about their duties and interactions, and get a sliver of an inside view of the operations at the Capitol. Attending any course at NCTC is a good experience and enjoyable, but this experience broadened his perspective, honed skills, and increased his understanding of the role the FWS plays in fish and aquatic conservation.

Staff:

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Judy Gordon, Center Director

Patty Crandell, Deputy Director

Vince Bocci, Administrative Officer

Steve Dyer, Administrative Assistant

Mark Hack, IT Specialist

Scott Gronbach, Facilities Operations Specialist

Jeff Poole, Water Treatment Plant Operator

Jim Lowell, Maintenance Worker

Conservation Genetics

Christian Smith, Regional Geneticist & Program Head

Pat DeHaan, Conservation Geneticist

Matt Smith, Conservation Geneticist

Justin Bohling, Conservation Geneticist

Jennifer Von Bargaen, Lab Geneticist

Brice Adams, Conservation Geneticist

Mikki Brinkmeyer, Biological Science Technician

Physiology & Nutrition

Kyle Hanson, Regional Physiologist & Program Head

Richard Glenn, Microbiologist

John Holmes, Fish Biologist

Ann Gannam, Regional Nutritionist

Ron Twibell, Fish Nutritionist

James Barron, Fish Biologist

Kelli Hawke, Biological Science Technician

Kieslana Wing, Contractor

Quantitative Ecology & Technology

Doug Peterson, Senior Scientist & Program Head

Ben Kennedy, Fish Ecologist

Will Simpson, Fish Ecologist

Kurt Steinke, Electronics Engineer

AFTC Program Highlights



Richard Glenn at Nation's Capital. Photo: FWS



Fisheries Academy 2016 and the Fisheries Management Team March 3, 2016

Fisheries Academy 2016. Photo: NCTC



Left to Right: Matthew Patterson, Steve Guertin, Richard Glenn. Photo: NCTC

Conservation Genetics

Jennifer Von Bargaen and Brice Adams began our annual evaluation of endangered Winter Run Chinook Salmon broodstock for Livingston Stone NFH. Fin clips of potential brood fish are express-shipped to AFTC, where they are analyzed using 96 single nucleotide polymorphism (SNP) markers and are classified as Winter Run or Non-Winter Run based on the

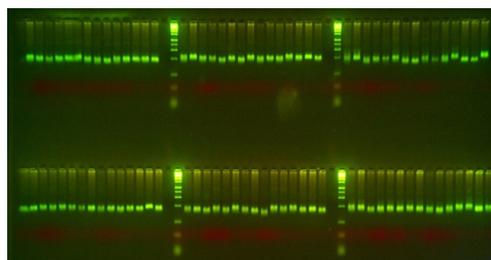
genetic data. Results are shared with the hatchery within 24 hours of the samples arriving at AFTC. This analysis is repeated weekly from February through July, and has been conducted every year since 2003.

Justin Bohling, Brice Adams, Matt Smith and Christian Smith provided assistance to Ecological Services in the Pacific and Pacific Southwest regions by reviewing genetic manuscripts, reports and proposals submitted by our partners.

Pat DeHaan delivered an online seminar titled "Evolutionary History and Conservation Genetics of Great Basin Redband Trout" as part of the Advanced Topics in Conservation Genetics lecture series presented by NCTC (<http://nctc.fws.gov/topic/online-training/webinars/advanced-conservation-genetics-schedule.html>).

Jennifer Von Bargaen tested amplification conditions for walleye microsatellites. These markers will be used for analysis of introduced walleye populations that we are conducting in collaboration with Avista Power.

Physiology & Nutrition



Agarose gel showing amplified walleye Microsatellite DNA. Photo: Jennifer Von Bargaen

Under the project "Natural Reproductive Success and Demographic Effects of Hatchery-Origin Steelhead in Abernathy Creek, Washington", trapping of returning adults continues. A total of 81 coho salmon were captured and released upstream this return year. At the end of February, a total of 55 steelhead had been captured (12 natural origin, 17 hatchery origin, and 26 out-of-basin hatchery origin). Richard Glenn has been taking blood, egg, and ovarian fluid samples from female steelhead that were included in the broodstock as part of the maternal effects project. A portion of the hatchery production of juvenile steelhead was implanted with PIT tags for monitoring migration after release next spring.

To date, fourteen samples have been received from hatcheries, the feed mill, and AFTC for Fish Feed Quality Control (FFQC) 2nd quarter sampling. As part of the routine analyses, feeds from the hatcheries were checked for rancidity. Ann Gannam wrote the feed memos which are sent to the hatchery and the feed mill. Six feed ingredients were received from the Rangen Feed Mill for analysis. The ingredients will be analyzed for proximate composition (protein, lipid, moisture and ash). With the composition of the ingredients characterized, the AFTC Diet will be formulated for the feed mill for production of feed for Spring Creek NFH.

Program Highlights— continued

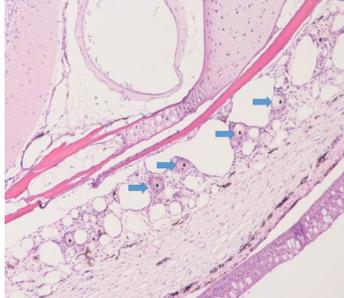
As a continuation of the Chelan PUD lamprey project, James Barron is maintaining the lamprey in the grow-out portion of the study. The final report for the lamprey survival bottleneck study is in preparation for the Chelan PUD.

Chinook salmon in the recirculating aquaculture system trial were sampled twice in February. Ann Gannam, Richard Glenn, and Ron Twibell conducted the physiological sampling of the fish in February that included taking gill biopsies, lengths, and weights. Weigh sampling was also conducted in by Ann Gannam, Ron Twibell, and James Barron.

Ron Twibell completed and submitted a study plan for a second year of work on the Hagerman NFH recirculating aquaculture system study to the Idaho FRO.

Ron Twibell collated his data in preparation for a report on his project, "Effects of Dietary Lipid Source and Ultraviolet Radiation on Sunburn and Steatitis in Steelhead, *Oncorhynchus mykiss*". Steatitis was significantly higher in fish fed fish oil and fish exposed to UV light. There was a significant interaction of dietary oil and light as well. This histology slide (100X

magnification) shows granulomas (areas of inflammation) in the fat (arrows) in the tissue surrounding the brain of the fish



This histology slide shows granulomas (areas of inflammation) in the fat (arrows) in the tissue surrounding the brain. Photo: Bethany Balmer

Quantitative Ecology & Technology

Kyle Hanson, Will Simpson, Kurt Steinke, Richard Glenn, Kelli Hawke, Doug Peterson, Phousone Vorasane, Vannida Boualaphan, and Ben Kennedy measured, weighed, collected genetic samples and PIT tagged 1,500 juvenile hatchery steelhead from Abernathy Fish Technology Center. The tagged fish also included experimental treatment groups that were reared on a low-fat diet.

These steelhead will be released in April and May and they will be monitored on their way to the Columbia River via PIT tag antenna arrays as well as a screw trap that is operated by the Washington Department of Fish and Wildlife.

Doug Peterson, Ben Kennedy, Will Simpson, Phousone



Juvenile steelhead PIT tagging crew. Left to right: Kelli Hawke, Ben Kennedy, Vannida Boualaphan, Doug Peterson, Phousone Vorasane and Will Simpson. Photo: AFTC

Vorasane, and Vannida Boualaphan visited PacifiCorp's adult fish lift and floating smolt collector facilities on the Lewis River. Their visit was hosted by PacifiCorp biologist James Samagaio,

Adams, B. and J. Doyle. 2016. Rapid Response Genetic Analysis and Genetic Estimation of Spawner Abundance of Bull Trout Collected in the Lewis River, WA. AFTC Final Report CY 2016 .

DeHaan, P., B. Adams, B. Bangs, and P. Scheerer. 2015. Connectivity and Gene Flow among Oregon Chub Populations in the Middle Fork Willamette River. AFTC Final Report FY2015 .

Koch, J. F., S. D. Rawles, C. D. Webster, V. Cummins, Y. Kobayashi, K. R. Thompson, A. L. Gannam, R. G. Twibell and N. M. Hyde. 2016. Optimizing fish meal-free commercial diets for Nile tilapia, *Oreochromis niloticus*. *Aquaculture* 452: 357-366 .

Program Highlights — continued

who was a former biological technician at AFTC.

Will Simpson, Kurt Steinke and Doug



Floating smolt collector at Swift Dam. Photo: AFTC



PacificCorp's fish sorting facilities at Merwin Dam. Photo: AFTC

Peterson visited the Three Mile Falls Dam on the Umatilla River as part of their project to install a PIT tag array to monitor movement of juvenile Pacific lamprey. On the visit, they tested whether PIT antenna performance would be influenced by magnetic interference with rebar present in the dam structure. Abernathy is collaborating with NOAA-Fisheries, US Bureau of Reclamation, Oregon Department of Fish & Wildlife and Confederated Tribes of the Umatilla Indian Reservation.



Will & Kurt test antenna Three Mile Falls Dam. Photo: AFTC



Kurt Steinke Abernathy began testing new noise-cancelling

Will tests performance of 3' x 3' antenna at Three mile Falls Dam. Photo: AFTC

designs for PIT tag antennas to be installed under the Abernathy Creek bridge.



Kurt Steinke with prototype. Photo :AFTC

Meetings and Conferences

Doug Peterson and Kurt Steinke had a teleconference with Chad Mellison (FWS-Reno) and Kevin Thomas (California Department of Fish and Wildlife) to provide technical assistance on their plans to install a PIT tag antenna system in a wilderness area.

Kyle Hanson presented an overview of the steelhead conservation hatchery work being conducted at AFTC to a group of volunteer anglers organized by Washington Department Fish and Wildlife (WDFW). The anglers will be catching adult steelhead in Mill, Abernathy, and Germany Creeks this winter to collect genetic samples.

James Barron, Ann Gannam, and Kyle Hanson participated in a conference call with Mary Moser, NOAA, and Ralph Lampman, Yakama Fisheries, to discuss study design and set-up for the coming year's Chelan PUD project.

Jennifer Von Bargen, Mikki Brinkmeyer, Justin Bohling and Brice Adams visited the WDFW Molecular Genetics Laboratory, where they received training in normalization of restriction-associated DNA sequencing data.

Justin Bohling attended the Urban Ecology and Conservation Symposium in Portland, OR. Justin was a coauthor on a presentation of the ecology and genetics of cutthroat trout in Tryon Creek.

Ongoing Projects

Water Velocity Effects on Salmon as Reared in Recirculating Systems. *Management Need:* Determine the effects of water velocity on composition, growth, condition, and performance of juvenile PNW salmon as applied to recirculating systems in support of hatcheries in the Pacific Region considering the use of recirculating systems. *Partners:* Pacific Region National Fish Hatcheries, Fishery Resources Program via Fisheries Operations and Need System (FONS).

Diet development for Lost River and short nose suckers in the Klamath River Basin. *Management Need:* Determine dietary needs of listed populations to assist in recovery. *Partners:* Klamath Tribes, Klamath Falls FWO, California/Nevada FHC.

Development of diets and rearing techniques for the culture of Pacific lamprey, *Entosphenus tridentatus*. *Management Need:* Assist Tribal partners in developing methods for the artificial propagation of Pacific lamprey, a species of concern. *Partners:* Yakama Nation; Fishery Resources Program via FONS.

Assessing the effects of multiple tagging methods on Pacific lamprey ammocoetes. *Management Need:* Assist Tribal partners in developing methods for the monitoring and evaluation of this species of concern. *Partners:* Yakama Nation; Fishery Resources Program via FONS.

The physiological response of white sturgeon to handling stress in captivity. *Management Need:* Determine if the stress from catch and release angling is detrimental to survival of white sturgeon, a species of concern. *Partners:* Dalhousie University; Carleton University.

Pacific Region's Fish Feed Quality Control (FFQC) Program. *Management Need:* The FFQC Program, the only one of its kind in the FWS, provides quarterly monitoring of the quality of the commercially produced fish feeds used at Pacific and Pacific

Southwest Regions' NFHs. Information is compiled on an annual basis and used in the development of the Pacific Region fish feed contract. *Partners:* Pacific and Pacific Southwest Region's NFHs, Oregon, Washington, Idaho, and Tribal fish hatcheries.

Effects of dietary lipid source and ultraviolet radiation on sunburn and steatitis in Steelhead, *Oncorhynchus mykiss*. *Management Need:* Provide information regarding the potential relationship between fish nutrition and sunburn in steelhead. *Partners:* Pacific Region National Fish Hatcheries

Evaluation of thermal exposure of adult Chinook salmon during the migration to Warm Springs National Fish Hatchery. *Management Need:* Determine if Chinook salmon migrating to Warm Springs National Fish Hatchery experience thermal stress. *Partners:* Warm Springs National Fish Hatchery, Lower Columbia Fish Health Center, Confederated Tribes of Warm Springs.

Natural reproductive success and demographic effects of hatchery-origin steelhead in Abernathy Creek, WA. *Management Need:* Provide information to help managers minimize differences between NOR and HOR fish. *Partners:* Bonneville Power Administration; Washington Department of Fish and Wildlife.

Climate change vulnerability assessments of Pacific Region National Fish Hatcheries. *Management Need:* An understanding of the anticipated habitat changes under different climate change scenarios provides managers with information to proactively respond to these conditions and their impact on NFHs. *Partners:* Pacific Region NFHs; Mid-Columbia River FRO; Fishery Resources Program via FONS.

Fish Suppression of common carp in Malheur Lake using electrofishing to target eggs and embryos. *Management Need:* Determine the feasibility

Ongoing Projects—continued

ity of using electrofishing to kill eggs and embryos for control of invasive common carp in Malheur Lake. Partner: Malheur NWR.

Antenna design for the Biomark IS1001 PIT tag reader. Management Need: Provide expert level engineering and technical assistance to partners monitoring species of interest using new technologies while reducing biologist time spent in design and troubleshooting. Partner: NOAA Fisheries, USFWS Green Bay.

Entrainment and bypass of ESA-listed salmon at irrigation diversions on the Umatilla River. Management need: Determine what environmental factors influence the magnitude of fish entrainment into irrigation canals and if captured fish are successfully screened and returned to the Umatilla River using PIT tag technology. Partner: Bureau of Reclamation

Aquatic organism passage (AOP) at remediated stream road crossings. Management Need: Assess the efficacy of genetic, direct capture, and remote sensing methods to verify fish passage through remediated culverts. Partners: US Forest Service, Trout Unlimited.

Mekong River fish ecology and sustainable development. Management Need: Assess the scientific capacity and data needs for resource managers in Laos and Cambodia to address hydroelectric development on the mainstem Mekong River. Partners: USGS, US DOI International Technical Assistance Program (ITAP)

Effectiveness of transitioning to a locally-sourced steelhead broodstock at Winthrop National Fish Hatchery. Management Need: Determine if hatchery improvement programs and actions are achieving the expected biological performance objectives. Partners: USFWS Mid-Columbia FRO and NOAA Fisheries.

Stress response of juvenile steelhead salmon to electrofishing and tagging under different thermal

regimes. Management need: To understand how fish respond to capture and handling under conditions experienced in late summer. Partners: USFWS Directorate Fellows Program.

Evaluation of the spatial and temporal distribution of juvenile Chinook Salmon in the Entiat River.

Management Need: Use genetic data to improve our understanding of the distribution of spring and summer run Chinook Salmon juveniles and thus improve our ability to prioritize restoration projects targeting spring Chinook Salmon recovery. Partners: USFWS Mid-Columbia FRO

Design and installation of a PIT tag array to monitor outmigration of juvenile Pacific lamprey in the Umatilla River. Management need: Determine entrainment rates of juvenile lamprey as they move downstream through the Umatilla River. Partners: NOAA-Fisheries, US Bureau of Reclamation

Rapid response genetic analysis of threatened bull trout collected below dams in the Clark Fork River, MT. Management Need: Provide data to inform upstream fish passage decisions for listed bull trout. Partners: Avista Corporation; Confederated Salish Kootenai Tribes; Idaho Fish and Game; Kalispel Tribe of Indians; Montana Fish Wildlife & Parks; Montana Ecological Services Field Office; Pend Oreille Public Utility District; Pennsylvania Power & Light, MT.

Genetic identification of endangered winter-run Chinook salmon in the Sacramento River, CA. Management Need: Rapid response broodstock identification for spawning of listed species. Partners: Livingston Stone NFH; Red Bluff FWO; NOAA Fisheries.

Population genetic structure of Spalding's catchfly: a terrestrial plant. Management Need: Develop genetic markers and monitor diversity of populations to identify management units and inform conservation planning. Partners: Idaho FWO; University of Montana.

