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Director's Greeting....

We continue our series entitled *Inside Abernathy* in this issue with an overview of AFTC's Applied Research Program in Nutrition. Enjoy!

VOLUNTEERS GO E-FISHING!



Will Simpson, Richard Glenn (FWS), Sarah West Jon Anderson (volunteers), electrofishing in Abernathy Creek. *USFWS: C. Taylor*

Staff:

Administration/Facilities:

Judy Gordon, Center Director
Patty Crandell, Deputy Center Director
Vince Bocci, Administrative Officer
Toni Scholder, Administrative Assistant
Mark Hack, IT Specialist
Jim Lowell, Maintenance Worker
John Holmes, Fish Biologist
Jeff McLaren, Biological Technician
Scott Gronbach, Facilities Op Specialist
Jeff Poole, Water Treatment Plant Operator

Nutrition:

Ann Gannam, Regional Nutritionist
Ron Twibell, Fish Nutritionist
Nathan Hyde, Biological Technician
Heidi Hill, Fish Nutritionist
James Barron, Biologist

Conservation Genetics:

Denise Hawkins, Regional Geneticist
Christian Smith, Conservation Geneticist
Pat DeHaan, Conservation Geneticist
Brice Adams, Biological Technician
Matt Smith, Fish Geneticist
Jennifer Von Bargaen, Lab Geneticist
Dan Bingham, Fish Geneticist

Ecological Physiology:

Chris Taylor, Regional Eco-Physiologist
Kyle Hanson, Fish Physiologist
Ben Kennedy, Fish Ecologist
Richard Glenn, Microbiologist
Will Simpson, Fish Ecologist
Kurt Steinke, Electronics Engineer

Modeling and Management Decision Support:

Doug Peterson, Senior Scientist

The Ecological Physiology Program has completed their late summer electrofishing work and placed Passive Integrated Transponder (PIT) tags in 3000 juvenile steelhead trout. This work was accomplished with help from the Conservation Genetics, Nutrition, Facilities, and Modeling and Management Decision Support Programs and six volunteers from regional colleges and universities. Volunteers from Whitman College, Washington State University Vancouver (WSUV), and Portland State University (PSU) were extremely helpful and gained valuable field experience that should serve them well in their future endeavors. Sarah West, a senior at Whitman College, spent 6 weeks with us and will use her work as the basis for her senior thesis. Others who assisted were Jon Anderson, Sarah Whitley, Matthew Schult and Tyler Hicks, all graduate students at WSUV, and Avery Hansen, an undergraduate student from PSU. Kudos to all for the great help!

Program Highlights....

Nutrition

The Nutrition Program analyzed 30 feed samples for fish feed quality control in July and August as well as four lamprey feeds for the Columbia River FPO. As part of the routine analyses, all feeds from the hatcheries were checked for rancidity. Ann Gannam wrote the feed memos and then contacted the feed mills when necessary.

A lamprey feeding trial was started. Ammocoetes were obtained from the US Geological Survey (USGS) Columbia River Research Laboratory (Matt Mesa's Laboratory), held for 20 days at AFTC then stocked into the study tanks. The study will be conducted for four months and seven diets will be tested.



Tank setup for lamprey study.
USFWS: J. Barron



Ammocoetes for the study.
USFWS: J. Barron

Nutrition cont....

The low phosphorus feed study final report titled "Development of low phosphorus and low leaching feeds for effluent management" was completed and submitted to Grant County PUD as required for the completion of the project.

The Nutrition Program reviewed eight manuscripts :

- Aquaculture Research (2),
- Journal of Aquaculture Research and Development (1),
- Aquaculture (1),
- Journal of Applied Aquaculture (2),
- Journal of the World Aquaculture Society (1)
- Journal of Aquaculture Nutrition (1).

Conservation Genetics

Evan DeHaan was born on July 1, 2012 to proud parents, Patrick and Jennifer DeHaan. He weighed 8 pounds and was 22 inches long.



Evan Patrick DeHaan
P. DeHaan

Matt Smith attended the Introduction to ARC GIS10 and Environmental Applications training course offered through the Northwest Environmental Training Center in Olympia, WA.

Program Highlights cont....

Conservation Genetics....cont

Jennifer Von Bargaen completed rapid response analysis of potential broodstock for the Livingston Stone NFH winter-run Chinook program with four events in July and one the first of August totaling 78 samples. Jennifer also completed analysis of the non-rapid response samples for a grand total of 936 samples for this year.

Jennifer Von Bargaen identified the sex of juvenile steelhead captured in Abernathy Creek using a sex identification SNP (single nucleotide polymorphism) marker that she developed. These steelhead are part of a gene expression study designed to predict whether or not individual steelhead will migrate.

Dan Bingham joined the Conservation Genetics Program in August. Dan earned his Master's degree from the University of Montana, conducting applied population genetics research to address conservation issues facing native sauger in MT and WY. Most recently he was working at the US Forest Service (USFS) Rocky Mountain Research Station in Missoula, MT optimizing a SNP-based approach for describing the range-wide genetic population structure of westslope cutthroat trout.

Brice Adams and Student Conservation Association Intern (SCA) Brittany Balbag began processing approximately 1800 genetic samples for a project designed to assess the relative reproductive success of stray hatchery and wild steelhead spawning in two Deschutes River tributaries.

Conservation Genetics....cont

Jennifer Von Bargaen completed data generation for steelhead from Quinault and Makah NFH. These data will be incorporated into genetic profiles for these hatchery stocks.

Patty Crandell (Administration) and several AFTC geneticists worked at Carson NFH during spring Chinook salmon spawning to collect genetic samples for use in Parentage-Based Tagging (PBT). PBT involves comparing the genotype of offspring to a database of potential parent genotypes. PBT requires the annual collection and genotyping of hatchery broodstock to create a parent database. The genotypes of offspring collected as either juveniles or returning adults are then compared to this database of potential parents to determine the hatchery and brood year of origin. In order to achieve the full benefits of this technique (e.g. the ability to correlate reproductive success of specific parents, assess disease resistance of specific crosses, or monitor specific releases of fish or hatchery practices) it is necessary to collect data on specific crosses made, sex of parents, and other biological measurements on each spawned fish.



PBT sampling of spring Chinook Salmon at Carson NFH.
USFWS: P. DeHaan

Program Highlights cont....

Conservation Genetics cont....

Christian Smith spent a week at the University of Victoria to collaborate with researchers to analyze hatchery steelhead from Abernathy Creek, WA. The microarrays developed at the University were used to compare gene expression at 44K genes in fish which left Abernathy Creek (caught in a smolt trap) to those that did not (termed "residuals"). The goal of the work is to develop markers that will allow us to predict whether or not fish will migrate.



The 44K cGRASP Array allows hybridization of RNA from a sample to 44,000 oligos (genes) in a single run. This allows geneticists to observe which genes are "turned on" and "turned off" in a given sample, and thus to understand which genes are important at a given stage in a fish's life.

Jennifer Von Bargen and Brittany Balbag completed extraction of DNA from approximately 1,000 juvenile Chinook salmon sampled in the Entiat River. This was done as part of a collaborative effort between AFTC and the Mid-Columbia River FRO to improve our understanding of overlap in run timing between juvenile spring and summer Chinook salmon in the Entiat River.

Conservation Genetics cont....

Several members of the Conservation Genetics Program assisted the Ecological-Physiology Program with the collection of samples from juvenile steelhead in Abernathy Creek as part of a comparison of the relative reproduction success of hatchery and natural-origin steelhead a project funded by Bonneville Power Administration (BPA).

Pat DeHaan and Matt Smith attended the *Salvelinus confluentus* Curiosity Society meeting at Lake Crescent, Olympic National Park, WA. Pat gave a presentation titled "Genetic population structure of Olympic Peninsula bull trout and implications for Elwha Dam removal". While there, the group spent a day collecting Dolly Varden from the Sol Duc River to investigate potential hybridization between Dolly Varden and brook trout in that system.



Possible Dolly Varden collected in the Sol Duc River, WA. DNA will be collected for determination.

USFWS: P. DeHaan

Ecological Physiology

Electrofishing began in July, with a lofty goal of tagging 3000 juvenile steelhead in 2012. Program staff and volunteers will continue with this work through September.



Ecological Physiology staff and volunteers electrofishing on Abernathy Creek.
USFWS: C. Taylor

Five volunteers from WSUV, PSU, and Whitman College have been working hard with the Ecological Physiology Program in the field electroshocking and tagging steelhead.

Kyle Hanson was accepted into the Stepping Up to Leadership (SUTL) program – a very competitive program that included 2 folks from the Pacific Region this year.

Ecological Physiology cont....

Kurt Steinke went to Spring Creek NFH to help them with their fish ladder antennae and PIT tag reader.

Kurt Steinke went to Rush Creek, a tributary to the North Fork of the Lewis River in Skamania, Co., WA, to help Jim Byrne, Washington Department of Fish and Wildlife (WDFW), with data logger issues for bull trout.

Modeling and Management Decision Support

Doug Peterson provided scientific and technical review for three draft conservation plans developed under a Candidate Conservation Agreement with Assurances (CCAA) for Arctic grayling in the Big Hole River, MT. This was the final set of draft conservation plans reviewed by AFTC through an intra-agency collaboration with the Mountain-Prairie Region, Montana ES and Montana Partners for Fish and Wildlife. In all, Doug reviewed 10 draft conservation plans (or site-specific plans) that collectively totaled over 52,000 acres of land enrolled and included many of the senior water rights holders in the Big Hole River basin.

Doug Peterson (Modeling) and Kyle Hanson (Ecological Physiology) gave a webinar presentation titled “Climate Change Vulnerability Assessments for Region 1 NFHs: an example with Chinook salmon at Winthrop NFH” to the FWS National Climate Team during the group’s monthly meeting.

Modeling and Management Decision Support cont....

Doug Peterson and Victoria O'Byrne (Geographic Information System, GIS, SCA Intern in Modeling) assisted the Ecological Physiology Program with the electrofishing and fish tagging on Abernathy Creek, in support of the steelhead reproductive success study.

Victoria O'Byrne mapped stream flow predictions under future climate change scenarios for watersheds containing NFHs in the Pacific Region. She focused on the Methow River (Winthrop NFH) and Quilcene River (Quilcene NFH). This project supported AFTC's model on how climate change may affect the Pacific Region NFH's salmon programs.

Administration/Facilities

Judy Gordon hosted Amelia Whitcomb, Oregon State University, who presented an on-site brown bag seminar entitled "Mate choice of wild spawning coho (*Oncorhynchus kisutch*) in the Umpqua River, Oregon".

Judy Gordon, Denise Hawkins, and Patty Crandell participated in an internal briefing on PBTs for RO Fishery Resources staff.

Facilities staff completed the Main Office accessibility project. The project consisted of fabricating and installing custom wooden hand and guardrails along both sides of the ramp as well as installing galvanized steel handrails on opposite sides of the stairs leading into the parking lot. This project took over 60 man-hours to complete but was well worth the wait.

Administration/Facilities cont....

July was the month that our backup well & pump required water sampling and equipment testing. During our sampling evolution, a heightened level of nitrogen gas was discovered in the hatchery. We invited Jack Christiansen from Dworshak NFH to assist us in testing our aeration tower's effectiveness and to see if additional non-mechanical changes could be made in order to remove this risk in the future. Jack determined that the aeration tower is working correctly. We have begun planning a modification to the tower so that we can decrease the nitrogen gas even further. Expect to see more info on water quality monitoring and the aeration tower enhancements in the months ahead.

Facilities staff was busy upgrading the spawning area with long-overdue enhancements. Modifications included installing a new roofing system (that no longer leaks!) 6" higher than previous roof, installing GFCI outlets and lighting via conduit vice extension cords, removing multiple trip hazards from abandoned bio filter components as well as an excessively tall stem wall, and streamlining the fresh water conduit in order to provide a more professional appearance. Although this project took more than 120 man-hours to complete, it was important to remove these safety hazards and provide the tenants with a fortified structure.

Administration/Facilities cont....

Jim Lowell conducted electrical upgrades in the Conservation Genetics and Nutrition Laboratories in order to provide power to new scientific equipment. Jim also assisted the Ecological Physiological Program by welding eight aluminum frames together along with solar panels of varying shapes for a future study with conservation partners.

Jeff Poole designed and built an elaborate water filtration system in the hatchery for the Nutrition Program's new lamprey study at AFTC. His design is dynamic so that the system will be available to further studies of a similar nature thereby saving the FWS from unnecessary expenses.



Reports and Publications....

Conservation Genetics:

Smith, Christian. 2012. Genetic profile for Carson NFH spring Chinook salmon. Abernathy Fish Technology Center Report.

New Faces....



Dan Bingham
Conservation Genetics
Fish Geneticist

Dan was born and raised in Toms River, NJ. He earned his B.S. and M.S. from the University of Montana, Missoula, MT.

Dan has held several fisheries field technician positions. His career in genetics began as a research assistant with Fred W. Allendorf at the University of Montana studying the population genetics of sauger. From there he took a position as a Research Specialist for the USFS in Missoula, MT where he managed a SNP-based population genetics study of westslope cutthroat trout. Dan is excited to begin his career with the FWS.

Inside Abernathy....

This issue's *Inside Abernathy* article focuses on the **Nutrition Program**. The oldest of AFTC's applied research programs, the Nutrition Program began operations in 1961 with the relocation of nutrition research responsibilities from Entiat NFH. The Program's activities are divided into two parts: 1) the Pacific Region Fishery Resources Program's *Fish Feed Quality Control Program*; and 2) fish nutrition research.

The activities of the *Fish Feed Quality Control Program* focus on maintaining the quality of the commercially produced fish feeds used at Pacific and Pacific Southwest Regions' NFHs. Once each quarter each of the 17 NFH facilities sends a sample of their fish feed to AFTC. Nutrition Program staff then rapidly analyze (~3 days) the sample for fat, protein, ash, and moisture (aka proximate analyze), rancidity, and minerals. The results are provided back to each facility so that minimum time is lost in feeding fish if there is a problem. This information is shared via quarterly reports to the entire Pacific Region Fishery Resources Program, with state and tribal hatchery partners and is used in the development of the following fiscal years' regional NFH fish feed contract.

In addition, to producing up to 600 lbs of an experimental diet for partners' use on the Program's fish feed extruder, the research activities of the Nutrition Program focus on:

Alternative feed ingredients – as marine fish populations decline, so does the marine catch which provides the fat and protein for the commercially produced fish feeds used in aquaculture.

This has contributed to the steady rise in prices for commercially produced fish feeds. The Program staff has and continues to examine potential replacements (soy protein, canola and linseed oils) for the marine fish oil and protein currently used in commercial feeds.

Specialized diet development - as more threatened and endangered species are brought into captivity understanding their nutritional needs is critical to their survival and successful reproduction. The Program staff is working to develop feeds which meet the nutritional needs of threatened and endangered species held in captivity.

Controlling facility effluent quality through diet – Phosphorus is an essential element needed for fish health is found in commercially produced fish feeds. However when used in excess, Phosphorus is found in fish waste products and thus facility effluent water. The Program staff continues to study and define the minimum amount which can be used in fish feed, still promoting good health, and assisting in improving effluent water quality.

Contaminants in NFH fish – contaminants found in facility water, adult fish, and in fish feed can end up in juvenile hatchery fish potentially compromising their health. The Program staff research the sources of contamination and possible impacts on the fish.

Inside Abernathy cont....



Back row from left: Ron Twibell, James Barron. Front row from left: Ann Gannam, Heidi Hill. Not pictured, Nathan Hyde.

Ann Gannam, Regional Nutritionist and Program Head

As Regional Nutritionist and Program Head, Ann is the point of contact for the Pacific and Pacific Southwest Regions on fish nutrition issues and policy. She manages the Fish Feed Quality Control Program and also served as a point of contact for state and Tribal entities. She serves as the Contracting Officer Technical Representative on the Pacific Region's annual fish feed contract and as the Fishery Resources Program representative to the Science Support Program's Coordinating Committee. Ann's particular research interest is in using natural immunostimulants to boost the immune system of fish and improve survival.

Ron Twibell, Fish Nutritionist and Program Lab Manager

As Lab Manager Ron is the point of contact for the Program on laboratory supplies, inventory and availability. In addition to conducting research, responding to technical requests in Ann's absence, assisting in experimental feed production, Ron acts as AFTC's Chemical Hygiene Officer managing the chemical inventory for the facility.

Heidi Hill, Fish Nutritionist

Heidi is the research assistant/post doc for the Program. In addition to assisting with general Program activities (Fish Feed Quality Control, experimental diet manufacture, feeding trials, etc.), she has conducted analysis on the more than ten years of data in the Fish Feed Quality Control Program's database to look for ongoing issues. Heidi also developed and submitted a well-received post-doctoral grant proposal to the US Department of Agriculture.

Inside Abernathy cont....

James Barron, Fish Nutritionist

James is the newest addition to the Program, after recently completing the requirements of the FWS' Student Career Experience Program's requirements. When he's not assisting with general activities, James currently works on what and how to feed juvenile Pacific lamprey. His particular research interest is burbot culture.

Nathan Hyde, Biological Technician

Nathan is responsible for assisting in all aspects of the Program's activities, especially those associated with the Fish Feed Quality Control Program.

Recent publications:

Barron, J. M., N. R. Jensen, P. J. Anders, J. P. Egan, S. C. Ireland and K. D. Cain (2012). "Effects of temperature on the intensive culture performance of larval and juvenile North American burbot (*Lota lota maculosa*)." *Aquaculture* 364-365: 67-73.

Beaulaurier, J., N. Bickford, J. L. Gregg, C. A. Grady, **A. L. Gannam**, J. R. Winton and P. K. Hershberger (2012). "Susceptibility of pacific herring to viral hemorrhagic septicemia is influenced by diet." *Journal of Aquatic Animal Health* 24(1): 43-48.

Colburn, H. R., A. B. Walker, T. S. Breton, J. M. Stilwell, I. F. Sidor, **A. Gannam** and D. L. Berlinsky (2012). "Partial replacement of fishmeal with soybean meal and soy protein concentrate in diets of Atlantic cod." *North American Journal of Aquaculture* 74(3): 330-337.

Hanson, K. C., K. G. Ostrand, A. L. Gannam and **S. L. Ostrand** (2010). "Comparison and validation of nonlethal techniques for estimating condition in juvenile salmonids." *Transactions of the American Fisheries Society* 139(6): 1733-1741.

Metts, L. S., S. D. Rawles, Y. J. Brady, K. R. Thompson, **A. L. Gannam, R. G. Twibell** and C. D. Webster (2011). "Amino acid availability from selected animal- and plant-derived feedstuffs for market-size sunshine bass (*Morone chrysops* x *Morone saxatilis*)." *Aquaculture Nutrition* 17(2): E123-E131.

Ostrand, S., R. A. Glenn, A. Gannam and **K. C. Hanson** (2012). "Inhibitory effects of rosemary oil on the in vitro growth of six common finfish pathogens." *North American Journal of Aquaculture* 74(2): 230-234.

Rawles, S. D., K. R. Thompson, Y. J. Brady, L. S. Metts, M. Y. Aksoy, **A. L. Gannam, R. G. Twibell, S. Ostrand** and C. D. Webster (2011). "Effects of replacing fish meal with poultry by-product meal and soybean meal and reduced protein level on the performance and immune status of pond-grown sunshine bass (*Morone chrysops* x *M. saxatilis*)." *Aquaculture Nutrition* 17(3): 708-721.

Rawles, S. D., K. R. Thompson, Y. J. Brady, L. S. Metts, **A. L. Gannam, R. G. Twibell** and C. D. Webster (2010). "A comparison of two faecal collection methods for protein and amino acid digestibility coefficients of menhaden fish meal and two grades of poultry by-product meals for market-size sunshine bass (*Morone chrysops* x *M. saxatilis*)." *Aquaculture Nutrition* 16(1): 81-90.

Inside Abernathy cont....

Thompson, K. R., A. Velasquez, J. T. Patterson, L. S. Metts, C. D. Webster, Y. J. Brady, **A. L. Gannam**, **R. G. Twibell** and **S. L. Ostrand** (2012). "Evaluation of Plant and Animal Protein Sources as Partial or Total Replacement of Fish Meal in Diets for Nile Tilapia Fry and Juvenile Stages." *North American Journal of Aquaculture* 74(3): 365-375.

Twibell, R. G., A. L. Gannam, N. M. Hyde, J. S. A. Holmes and **J. B. Poole** (2012). "Effects of fish meal- and fish oil-free diets on growth responses and fatty acid composition of juvenile coho salmon (*Oncorhynchus kisutch*)." *Aquaculture* 360-361: 69-77.

Twibell, R. G., A. L. Gannam, S. L. Ostrand, J. S. A. Holmes and **J. B. Poole** (2011). "Altered growth rates, carcass fatty acid concentrations, and tissue histology in first-feeding steelhead fed a fish-meal- and fish-oil-free diet." *North American Journal of Aquaculture* 73(2): 230-238.

Look for the write-up on the *Applied Research Program in Conservation Genetics* in the next issue of our newsletter!



Ann Gannam working on the nitrogen analyzer.
USFWS



Feed ingredients running through the bypass of the extruder in preparation for a feed run.
USFWS

Workshops, Conferences, and Meetings....

Nutrition:

- Ann Gannam and Kyle Hanson (Ecological Physiology) visited Warm Springs NFH with Lower Columbia FHC staff to evaluate the NFH's spring Chinook juveniles.
- Ann Gannam, Heidi Hill and James Barron attended the 10th International Congress on the Biology of Fish in Madison, WI. The papers presented were: "Evaluation of alternative rearing strategies for Chinook salmon". Gannam, A. L., Twibell, R. G., "Influence of hatchery practices and genetic lineage on Gila trout reproductive success and egg fatty acid composition". Hill, H., Twibell, R., Conway, J., Gannam, A., Seals, J., "Effects of stocking density on survival and yield of North American burbot reared under semi-intensive conditions". Barron, J. M., Jensen, N.R., Anders, P. J., Egan, J. P., Ireland, S. C., Cain, K. D.
- Ann Gannam participated in a conference call to plan the Northwest Fish Culture Conference (NWFCC) to be held December 11-13, 2012 in Portland, OR.
- Ann Gannam visited with Jack Christiansen (Dworshak NFHC) to discuss low phosphorus feeds and recirculating systems while he was at AFTC evaluating the water system.
- Ron Twibell and Ann Gannam attended a meeting at Leavenworth NFH to discuss future experiments examining the use of low phosphorus feeds and the effect of those feeds on the fish and the effluent. Representatives from the Leavenworth NFH, Grant PUD and the Mid-Columbia River FRO were in attendance.

Conservation Genetics:

- Christian Smith and Denise Hawkins attended the biennial Coastwide Salmonid Genetics Meeting hosted this year by the University of CA, Davis Genomic Variation Laboratory. Christian gave a presentation titled "Effects of inaccurate estimation of proportion of parents sampled in a relative reproductive success study", using data from the BPA funded AFTC study of relative reproductive success of hatchery and natural origin steelhead spawning in Abernathy Creek.
- Christian Smith attended the 2012 Deschutes Basin Hatchery Annual Coordination Meeting in Madras, OR. Christian presented results of a genetic analysis of Chinook salmon population structure based on historical scale samples collected by the State of Oregon. The goal of the study is to evaluate how Chinook salmon population structure changed following construction of Warm Springs NFH.
- Denise Hawkins participated in the Makah Internal Hatchery Evaluation Team (HET) meeting held at the Washington FWO in Lacey, WA.
- Patty Crandell (Administration), Denise Hawkins and Christian Smith participated in the HET meeting for the Columbia River Gorge NFHC held at Carson NFH.
- Judy Gordon (Administration), Denise Hawkins and Christian Smith attended a presentation in the Pacific Regional Office by Shawn Narum and Maureen Hess, geneticists from the Columbia River Inter-Tribal Fish Commission (CRITFC) on the progress that CRITFC has made with PBT in the Snake River and potential expansion into the Columbia River Basin.

Workshops, Conferences, and Meetings cont....

Ecological Physiology:

- Chris Taylor attended Supervisory Skills training class in Portland, OR.
- Will Simpson met with Nicole Tancreto of the Pacific States Marine Fisheries Commission (PSMFC) to provide an evaluation of a new web-based interface for their Columbia Basin PIT tag database (PTAGIS). The PTAGIS database provides scientists with region-wide location and movement data for PIT tagged salmonids.
- Kyle Hanson, Doug Peterson (Modeling), Patty Crandell (Administration), Don Campton (RO), Bill Gale (Mid-Columbia River FRO), and Chris Pasley (Winthrop NFH) presented the final results of the modeled effects of climate change on Winthrop NFH operations to the Winthrop NFH HET held at the Nisqually NWR. They presented preliminary results on the anticipated effects of climate change on salmon culture programs at Winthrop NFH. The HET provided input on mitigation strategies and future directions for the climate change vulnerability assessment of the facility.
- Kyle Hanson attended the Makah NFH HET meeting and presented information regarding the ongoing climate change vulnerability assessment process to members of the Makah Nation Fisheries Management.

Modeling and Management Decision Support:

- Doug Peterson and Victoria O'Byrne attended a webinar titled "Sea-Level Rise for the Coasts of California, Oregon and Washington: Past, Present, and Future" by Dr. Phil Mote with the Oregon Climate Change Research Institute.
- Doug Peterson attended a FWS biometrics webinar titled "Population dynamics of the Pacific Walrus in a changing Arctic" by Rebecca Taylor with the USGS Alaska Science Center.
- Doug Peterson attended a webinar titled "Development of Landscape-scale, genetically based aquatic biodiversity assessments: an example with stream-dwelling vertebrates in the northern Rockies" by Dr. Michael K. Young from the USFS Rocky Mountain Research Station.
- Doug Peterson attended a National Climate Change and Wildlife Service Center (NCCWSC) webinar titled "Geo Data Portal: Translating Climate Data for Geographic Analysis" by Nathaniel Booth with USGS and Adam Terando with North Carolina State University.
- Doug Peterson coordinated a conference call with Montana Fish, Wildlife and Parks, Northern Rockies FWCO, Red Rock Lakes NWR, and The Nature Conservancy to discuss a genetic monitoring project for Arctic grayling in the Centennial Valley of southwestern MT.
- Doug Peterson attended the Bureau of Land Management/Fish and Wildlife Service/National Park Service Supervisory Skills Workshop held at the Pacific Region RO.

Administration/Facilities:

- Judy Gordon participated in the first meeting of the Pacific Region's Science Coordination Team's Peer-review Publication Processes Sub-committee with Rowan Baker and Paul Heimowitz.
- Judy Gordon and Patty Crandell participated on Fishery Resource Program conference calls.

Workshops, Conferences, and Meetings....

Administration/Facilities cont:

- Judy Gordon attended a meeting of the Traditional Ecological Knowledge (TEK) Science Subcommittee of the North Pacific LCC.
- Judy Gordon chaired a meeting of AFTC's Institutional Animal Care and Use Committee (IACUC). In attendance were IACUC members Kyle Hanson, Sonia Mumford (Olympia FHC), and attorney Heidi Heywood representing the local community.
- Judy Gordon participated in a conference call on fish passage above Quilcene NFH.

NATURE'S EXPLORER CAMP



Brice Adams talking to students about the salmon's ability to find their way home. *USFWS*



Brice Adams helping "a young salmon" find his way home. *USFWS*



Nathan Hyde explaining to students how the salmon "smell their way home". *USFWS*

Nathan Hyde and James Barron (both from Nutrition) with Brice Adams and Matt Smith (both from Conservation Genetics) conducted two separate outreach events for the Natures Explorer Camp put on by the Longview Parks and Recreation. They explained the Pacific salmon lifecycle and the importance of clean streams in the adult migration of salmon. To emphasize the importance of smell and clean streams to healthy salmon populations, the attendees participated in the "Smell Your Way Home" activity. Eight children participated in the first event and 6 children and 3 adults attended the second camp.