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WFRC Research News

(Lab News You Can Use — To Survive and Thrive)

Gary Wedemeyer & Dena Gadomski, Editors *Winter Issue Jan. 2008*

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Some Recent WFRC Publications

Lab News You Can Use

by Lyman Thorsteinson

The USGS implemented a new organizational structure on October 1, 2007 to better align its science and leadership with DOI priorities. As part of the realignment, the WFRC—in its entirety—is now part of the Northwest Area (Washington, Idaho, Oregon). The Northwest, Southwest (includes Hawaii), and Alaska areas comprise the USGS Western Region. The Northwest Area held its initial leadership meeting in early December with participants from the USGS Science Centers, and Regional Executive and Regional Director's Offices. We discussed rules of engagement and learned about the strategic planning framework for the Area and roles and responsibilities of the realigned offices and their interaction with Centers. The planning is a work in progress and involves a unifying consensus process. A second meeting is scheduled for early January.

Last year was a busy year for this Center with multiple reviews and all that goes into preparing for them. One result was that we fell a little behind on publishing this newsletter. A 5–year Program Review in May 2007 required much work and, as part of that effort, our editor Gary Wedemeyer, wrote a very nice paper entitled "A Brief History of the Western Fisheries Research Center 1934 – 2006." While this paper concentrated on broad science accomplishments under various Directors of the Center, Gary is currently preparing a comprehensive accounting of our scientific legacy emphasizing individual scientists and their contributions to fisheries. In addition, Gary recently submitted his 100th professional paper (with Richard Wydoski) to the North American Journal of

Fisheries Management. This paper addresses the issue of whether fish feel pain and, when published, should invigorate a healthy debate.

This past year brought some fresh faces to the WFRC and some departures. Our greatest loss occurred in March with the sudden death of our colleague Dr. James Petersen, the Director of the Columbia River Research Laboratory. In this newsletter, we celebrate Jim's time with the WFRC by highlighting some of his career accomplishments. Jim was well-regarded by his peers and employees, is greatly missed, and fondly remembered by all. I and other WFRC leaders continue to pursue Jim's vision for a new CRRL facility in the Columbia River Gorge. Most recently, in meetings with the WR leadership, it was determined that a new CRRL would be the Regional Director's highest facility priority.

On the research front we have been fortunate to have two distinguished scientists visiting from South Korea to collaborate with us on our studies of the Infectious Hematopoietic Necrosis Virus. This virus continues to be a major pathogen of salmonids. In this issue, Dr. Jeong Woo Park describes his research, in Dr. Gael Kurath's Laboratory, on host specificity of INHV genotypes. Dr. Park will complete his sabbatical this January but his work will be continued by Dr. Chang Hong Moon who arrived in November. In related news, we were fortunate to receive some extra funding from BRD Headquarters in September and will be able to continue to work with Dr. Svetlana Rudakova on IHNV in sockeye salmon from the Russian Far East.

As we move into the New Year, many of our senior staff will be working on strategic plans for Biology in areas of ecosystems, climate change, invasive species, wildlife disease and human health applications, as well as information management and communication. Within the Northwest Area we are participating in interdisciplinary science programs in the Klamath Basin, the lower Columbia River, and nearshore Puget Sound. Emerging diseases (e.g., VHS in the Great Lakes), effects of multiple pathogens on marine forage fish populations (e.g., VHS and VEN in Pacific herring), and invasive species effects (e.g., quagga/zebra mussels, American shad) also represent areas of continued research emphasis and planning.

Finally, I'm very pleased to be able to announce some recent recipients of awards. In September, Kyle Garver, William Batts, and Gael Kurath won a "Best Paper" Award from the American Fisheries Society for their research on IHNV in sockeye salmon and rainbow trout. Earlier in 2007, our Facility Manager, Kyle Sato, received a national award from the Department of Energy for energy conservation at the Seattle Laboratory. Congratulations to all for their efforts in support of Center missions.

Happy New Year's greeting to our readers!

Jim Petersen: A Celebration

by Tomas Poe, Alec Maule, and Dena Gadomski

Dr. James H. Petersen, Director of WFRC's Columbia River Research Laboratory (CRRL) passed away suddenly at work on March 22, 2007, at the age of 53. His death was seizure-related.

Jim, pictured here in 2006 talking with Secretary of the Interior Dirk Kempthorne, was born in Emmett, Idaho, on June 19, 1953. Jim grew up in McCall, Idaho where he attended high school and graduated as the Salutatorian. Shortly after graduation from Boise State University, he received a Rotary scholarship to study marine ecology on the Great Barrier Reef off the coast of Australia.

Upon returning to the states in the late '70s, he entered the University of Oregon where he continued his studies in marine ecology, earning a Ph.D. in 1984. From 1984 to 1987 he worked for the Los Angeles County Natural History Museum as a marine ecologist conducting research on the effects of nuclear –power plant cooling –water effluent on kelp bed ecology.

In 1988, Jim accepted a position as a research fishery biologist at the CRRL, then operated by the U.S. Fish and Wildlife Service. For over a decade, Jim examined numerous aspects of predation as a factor limiting the survival of juvenile salmonids in the Columbia River Basin. That research included examining the behavior of predators and their prey, developing bioenergetics and individual-based models of predation, and projecting changes in predation in a "normalized" Columbia River. In 1994, Jim was a key driver in developing the stream ecology program, which has become a mainstay of CRRL.

More recently Jim had been working on a wide range of topics, including the impacts of altered water temperature on native fishes in the Columbia and Colorado rivers, the influence of invasive species on survival of Pacific salmon, and the effects of altered water quantity and quality on the thermal endemic aquatic community in the Muddy River near Las Vegas, Nevada.

Jim's contributions to the aquatic sciences are chronicled in over 25 peer-reviewed publications, numerous technical reports to the fisheries agencies that supported his research, and his appointment to Adjunct Faculty at the University of Washington and the University of Idaho. He had several books outlined that he planned on writing, including one on invasive species of the Columbia River.

During his all too short tenure at the CRRL, Jim received numerous performance awards culminating in a prestigious Fulbright Fellowship to Jamaica where he taught bioenergetics modeling at the Discovery Bay Marine Laboratory. Jim was a scientist of international renown who collaborated with other researchers throughout the United States and abroad. He was an effective leader with quiet grace and respect for all, a mentor to many young fishery biologists working in the region, and a close and dear friend to many. As Director of CRRL, Jim oversaw the work of as many as 150 employees and helped to position the lab as one of the preeminent fisheries research facilities in the Pacific Northwest. His staff looked up to Jim as someone who led through example, kind words, and a genuine concern for the research and the people conducting it.

In 1989, Jim married Dena Gadomski in Long Beach, California and she moved to Cook, Washington to join her new husband — sharing love, life, and fisheries research. One of Jim and Dena's passions was travel, and they shared many exciting trips together to various far away locales including: Australia, Mexico, Central America, the Cook Islands, Scotland, Italy, Belgium, France, and the Amazon River. Jim and Dena recently joined Dena's sister and brother-in-law for a cruise through the Panama Canal. Along the way, they stopped at various countries such as Costa Rica, Aruba, and Puerto Rico, and Jim added to his collection of native masks that he hung in his CRRL office. On the cruise, Jim also enjoyed the casino where he wore a vintage tuxedo to emulate the "rat pack."

His hobbies were gardening, birding, photography, and sailing his 30 foot Catalina sailboat on the Columbia River. He particularly excelled at wood working, making beautiful furniture, usually in the "arts and crafts" style, and intricate jewelry boxes.

Jim also enjoyed joining friends on Friday evenings at the Full Sail Brewery (often wearing a Hawaiian shirt), where he proudly displayed "the best investment of his life," a personalized Full Sail beer mug he bought 19 years ago and for which he still paid the 1988 price for a fill up. Full Sail beer also played a role in Jim's memorial gathering since in his will he left $200 for good beer for a party.

Jim is survived by his wife Dena; sister Joyce and husband Lewis McFadden, McCall, Idaho; nephews Rob (Kim), Jeff (Mary Jean), and Scott (Kim); great nephew Shane; great nieces Andrea and Sylvia; and cats, Johnny (who misses his Sunday afternoon naps with Jim), and Winona (who misses his expertise with a can opener). His parents, Malcolm and Edith Petersen, and his sister Carol preceded him in death. Also preceding him in death is his beloved cat P.C. His family, friends, and co-workers at the Columbia River Research Laboratory will miss Jim very much.

Contributions in Dr. Petersen's name may be made to the Audubon Society or The Nature Conservancy.

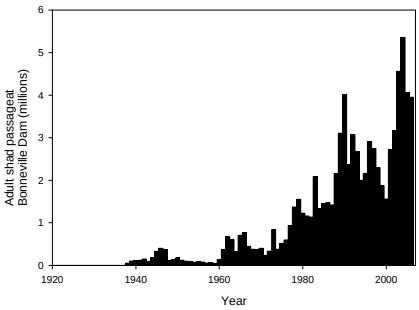
Columbia River Shad

by Jim Petersen

American shad are non-native, anadromous clupeids that have become extremely abundant in the Columbia River during the last 70 years. Shad are native to eastern North America, spawning and rearing in rivers from Florida, USA, to Newfoundland, Canada. Although largely unstudied, the huge number of shad that enter the Columbia River, perhaps over 20 million a year, may be felt throughout the food web and through other mechanisms. Adult counts at Bonneville Dam have been as high as 5 million fish during recent years.

American shad were transported to the West Coast in 1871 when Seth Green, an enterprising fish culturist, was asked by the California Fish Commission to release juveniles into the Sacramento River. During June 1871, Mr. Green used the recently-completed transcontinental railway to move 12,000 fry across the country in seven days. Fry were transported in four 8-gallon milk cans, and Green made three stops for fresh water or cooling ice. Although air temperatures were occasionally over 38 °C during the trip, Seth arrived with about 10,000 surviving fry that he released 443 km upriver from Sacramento. The transplanted fry survived and the population grew and expanded its range. Adult shad migrated north and south along the Pacific Coast, and soon became established in rivers from southern California to Alaska.

American shad are iteroparous; adults are believed to spawn several times in the Columbia River over about 6 years, although this has not been well documented. Adult shad migrate into the Columbia River during May through July and spawn soon after migration. Incubation of eggs is 3 –8 days. Larval and juvenile shad rear in the mainstem Columbia River during July through late fall with high densities in some locations such as the John Day Reservoir. After this phase, juveniles migrate downriver and adults spend 3 –6 years in the ocean before returning to spawn in their natal stream.



Food Web Impacts

Shad as Competitors. Juveniles of most stocks of Pacific salmon and steelhead migrate to the sea prior to the peak abundance of juvenile American shad (August – October), so there has been little concern about direct competition. Juvenile fall Chinook salmon, however, migrate during mid- to late-summer and may have significant temporal and spatial overlap with juvenile shad. When juvenile fall Chinook salmon begin seaward migration, they leave near-shore rearing habitats and use off-shore habitats, which commonly overlap with those of juvenile shad. During the off-shore migratory phase, fall Chinook salmon consume zooplankters and shad may act as competitors for these food resources.

Shad as Prey. Shad may be supplementing the diet of a variety of fish species. Subyearling fall Chinook salmon have been observed to consume larval and small juvenile shad (K. Tiffan, USGS, unpublished data), and in this way shad may enhance survival of salmon in the system. Conversely, juvenile shad may be preyed upon by predators of juvenile salmonids, thus having an indirect negative effect on salmonid survival. Studies indicate that up to 80% of the diet of northern pikeminnow in late summer and fall may be juvenile shad. These larger predators would likely have a higher overwinter survival rate and be in a better condition the following spring.

Adult American shad are preyed upon by predators such as white sturgeon and some marine fishes. White sturgeon have been observed capturing shad in adult salmon ladders at several dams on the Columbia River (M. Parsley, personal observation). The potential energetic benefit to white sturgeon is unknown, but it could be significant if shad are replacing low-energy diet items like crayfish or other benthic organisms.

Impacts on Fish Health

Disease Vectors. *Ichthyophonus hoferi* is a cosmopolitan, intercellular parasite primarily of marine and estuarine fishes. Preliminary screenings indicate that American shad have become natural reservoirs of *Ichthyophonus* infections, with 60% of subadult shad infected in Puget Sound, Washington, and 73% of adult shad infected in the Columbia River (P. Hershberger, unpublished data). Interestingly, the emergence of *Ichthyophonus* in marine fishes from the Pacific Northwest coincides with the population expansion of shad over the past several decades, and the role of introduced shad as a disease vector to native fishes in the Pacific Northwest is a primary research need.

Thiaminase Deficiency. Predators that consume large quantities of shad in the Great Lakes develop a deficiency in thiaminase, and this deficiency may be responsible for poor recruitment. Nonnative alewives (*Clupeidae*) are consumed by salmonines in the Great Lakes and may be causing early mortality syndrome (EMS). EMS results from severely depressed levels of thiamine and laboratory experiments have provided conclusive proof of the ability of dietary thiaminase to induce low thiamine. Since American shad and alewives are congeners, shad may also induce low thiamine in Columbia River predators.

Ichthyophonus in Yukon River King salmon

by Paul Hershberger, Marrowstone Marine Field Station

I was recently asked to travel to Nome, Alaska and present a seminar "Ichthyophoniasis*:* an Emerging Disease in Fishes from the West Coast of North America" to Kawerak, Inc., a non-profit organization of the Bering Straits Native Corporation. In addition to the Kawerak staff, the seminar was attended by native Eskimos from the Yupik villages in the Arctic Yukon – Kuskokwim (AYK) region of Alaska.

Concern about fish health issues is currently increasing among resource managers and native subsistence users in the AYK region, in large part because of the recent emergence of *Ichthyophonus* in Yukon River king salmon. The resulting disease epizootic has resulted in resource management concerns regarding pre-spawn mortality among infected individuals and has resulted in increased harvest to make up for the clinically diseased fish that must be recognized and discarded by subsistence fishers.

Elwha Fish Surveys

by Jeff Duda, WFRC Seattle

Historically one of the most productive salmon producing rivers in the Puget Sound, the Elwha River once supported 10 runs—representing all five species of Pacific Salmon—that spawned throughout the basin. However, two dams constructed on the Elwha River over 90 years ago dramatically changed the ecology of the river. Built without fish passage, the lower Elwha dam limited salmon to the lower five miles of the river.

The ecological effects of the dams on the Elwha ecosystem were large and cumulative. The reservoirs created by the dams (Lakes Mills and Aldwell) have acted as sediment traps, storing 13.8 and 4.0 million cubic yards of fine grained sediments. This has starved the lower river, the delta at the river mouth, and the nearshore and

beach areas of material that would have naturally accumulated and receded. Instead, there has been considerable erosion in the nearshore areas of the Strait of Juan de Fuca and an armoring of the river bed that has contributed to a reduction in spawnable areas remaining for salmon. The anadromous fish community structure has changed from one dominated by pink salmon to one that is dominated by hatchery produced Chinook and coho salmon. Between the dams and above the upper dams, the loss of marine-derived nutrients may have affected aquatic communities as well as cross-boundary effects in riparian and upland areas. It is believed that many species of birds and mammals who feasted upon salmon carcasses may have suffered population declines.

Following passage in 1992 of the Elwha River Ecosystem and Fisheries Restoration Act, it was determined that the removal of dams on the Elwha River would best accomplish the goal of "full restoration of the native anadromous fisheries." The impending removal of the two Elwha River dams in Washington State has accelerated research and monitoring activities by various federal and state agencies, the Elwha Klallam Tribe, and universities. Researchers are seizing the opportunity to study the ecological effects of dam removal and track the restoration salmon populations. The baseline information will represent the existing conditions of a river ecosystem that dramatically changed over 90 years ago when the dams were constructed.

The Elwha River opportunity is unique because the dams will be among the largest ever removed, a restored river could support large runs of salmon that are currently suffering population declines, and most of the watershed occurs within Olympic National Park.

One recent example of baseline data collection was a large scale snorkel survey — from headwaters to the sea — for adult fish in the mainstem Elwha River during late August 2007. The 42 mile survey began at 2,250 feet, just above Chicago Camp in the upper Elwha Valley and ended at the sea where the river enters the Strait of Juan de Fuca. Twenty-one biologists from the NPS, US FWS, USGS, NOAA Fisheries, Peninsula College, and the Wild Salmon Center participated in the survey. Unlike similar whole-river efforts that may occur over an entire summer, this survey of the Elwha was conducted in a single week.

Because such a large wilderness river was surveyed over such a short period of time, this survey represents a one-of-a-kind effort. "We had three commitments during this survey: 1) the safety of all personnel; 2) to establish a baseline of adult fish distribution and patterns of abundance for each species throughout the entire river, prior to dam removal; and 3) to increase collaborative and cooperative efforts among researchers working in the basin" said Sam Brenkman, fisheries biologist at Olympic National Park. In order to cover such a long distance and large area, the expedition required 21 divers, aerial reconnaissance surveys to scout remote canyons, and a string of 6 pack mules that hauled 1000 pounds of fisheries sampling and camping equipment into remote locations in the upper Elwha river basin. The survey followed in the footsteps of an earlier whole river effort conducted by WFRC personnel over the summer of 1995. That effort was led by WFRC's Dr. Reg Reisenbichler. Currently, biologists are analyzing the data collected and planning for a similar effort next summer.

The presence of salmon below the dams contributed to a higher species richness being found there than in sections between or above the dams. In the five river miles below the dams, divers observed Chinook, pink, and coho salmon, along with sculpin, bull trout, threespine stickleback, and starry flounder. Above the dams, only rainbow trout and bull trout were observed, while these species and the non-native brook trout were observed between the dams. In total, the divers observed 7,300 rainbow trout, 215 bull trout, 539 Chinook salmon, and 26 pink salmon. The data will begin to inform research questions related to the interaction of resident populations above the dam with re-

colonizing salmon populations, as well as the overall recovery of salmon following dam removal.

Dam removal is expected to commence following the building of infrastructure to maintain the domestic water supply of Port Angeles, which has just begun. USGS researchers will continue to work collaboratively with their research partners to document the existing ecological conditions that are expected to respond to dam removal and the restoration of salmon populations.

WFRC's Garver/Batts/Kurath Receive "Best Paper" Award

by Gary Wedemeyer, and Beth Beard AFS

For the 4th time in the 16 years since the Journal of Aquatic Animal Health was established, WFRC scientists in the Fish Health Research Program have received the Best Paper Award! Other winning papers appeared in 1990, 1997 and 2001. In 1998, a paper from the fish health research team was a finalist for this award.

This year's winning paper was:

Garver, Kyle A., William N. Batts and Gael Kurath. 2007. Virulence Comparisons of Infectious Hematopoietic Necrosis Virus U and M Genogroups in Sockeye Salmon and Rainbow Trout. Journal of Aquatic Animal Health 18:232 – 243.

Infectious hematopoietic necrosis virus (IHNV) may not be as well known as other wildlife diseases like rabies and bird flu, but it has afflicted already struggling wild salmon and trout populations in the Pacific Northwest. One puzzling aspect of the disease, however, is how the various strains of the virus seem to affect each fish species differently.

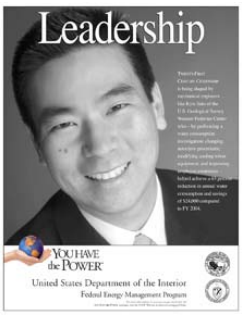
In their award winning paper in the Journal of Aquatic Animal Health, scientists from the U.S. Geological Survey's Western Fisheries Research Center genetically classified isolates of IHNV into three major groups—U, M, and L strains. Rainbow trout, sockeye salmon, and kokanee (landlocked sockeye) were exposed to seven strains of IHNV from the U and M groups to compare their pathogenicity.

While the sockeye and kokanee were much more susceptible to the U than the M virus groups, the opposite was true of rainbow trout. The researchers theorize that the M group virus may have evolved as a relatively recent "jump" from sockeye to rainbow trout, and in doing so, lost its virulence to its original host species. A comparison of the virus surface proteins reveals that three changes in the "G" gene sequence may be at least partially responsible for the differing virulence between the U and M IHNV virus groups. Future studies may uncover the mechanism involved in how the virus controls virulence.

For further information, contact Dr. Kurath at gael_kurath@usgs.gov.

Sato Wins DOE Award

by Gary Wedemeyer



Mr. Kyle Sato, WFRC Facilities Manager and mechanical engineer, has recently been recognized for his work in leading the Center's facilities organization to achieve their goal of improved building infrastructure, operational processes, and management practices. Mr. Sato worked with the Federal Energy Management Program to conduct a SAVEnergy audit which identified significant energy and water saving opportunities.

Based on these results, Mr. Sato conducted an analysis of water consumption at the laboratory. His work led to the implementation of several water conservation improvements including changing autoclave procedures, modifying cooling tower

equipment, and installing water-saving equipment in restrooms.

Additionally, Mr. Sato worked to improve employee awareness through meetings, e-mail, and notifications about equipment operation and procedures. His efforts resulted in a 63 percent reduction in water consumption compared to FY 2004, totaling more than 2 million gallons and a cost savings of almost $24,000 in FY 2005 alone.

Mr. Sato received the award at the National Press Club in Washington D.C. from the DOE's Assistant Secretary for Energy Efficiency and Renewable Energy. He also received a letter of congratulations from Dirk Kempthorne, Secretary of the Department of the Interior. Sato is currently working with City government to re-create wetlands at Magnuson Park using the chlorinated effluent from our experiment fish tanks as the water source.

Visiting Scientist Dr. Jeong Woo Park

by Gary Wedemeyer

After a year doing research in Gael Kurath's lab here at WFRC, visiting scientist Dr. Jeong Woo Park, his wife Young Joo Son, and sons Young Jin and Sang Jin will be returning to the University of Ulsan, Korea where Dr Park is a professor in the Department of Biological Sciences.

Dr. Park's work on the role of virus-inducible stress proteins in IHNV infections was very successful and his student Dr. Chang Hoon Moon has already arrived at WFRC to carry it further.

Dr. Park summed up his research results as follows:

"The purpose of my study here was to identify viral proteins and/or cellular factors responsible for the host-specificity of IHNV using in vitro cell culture system. My data revealed that, even *in vitro*, IHNV genogroups showed partial host-specificity; while the M genotype grows well in rainbow trout-derived RTG-2 cells, the U genotype does not. The reduced growth rate of the U genotype does not seem to be caused by any defects in genes of the U genotype IHNV since the U genotype grew equally well as the M genotype did in carp-derived EPC cells. This suggests that some host factors in RTG-2 cells have different effects on the IHNV genogroups, which result in different growth of the M and U genotypes in RTG-2 cells. Thus, I tried to identify host cell factor of RTG-2 cells responsible for host-specificity of IHNV genotypes. My data suggest that the interferon system, the well-known anti-viral system, is one of the major factors responsible for the host-specificity of IHNV in RTG-2 cells. The conclusion is based on the following evidences: 1) there was no difference in the growth between the M and the U genogroup IHNVs in EPC cells which does not produce any detectable level of IFN after virus infection; 2) in RTG-2 cells which produce IFN after virus infection, the M genogroup IHNV grew much faster than the U genogroup IHNV; 3) while the pretreatment of poly I:C which enhances the IFN production just attenuated the growth of the M genotype IHNV in RTG-2 cells, it completely blocked the growth of the U genogroup IHNV in until 3 days post infection. Usually the IFN system induced by virus infection suppresses the growth of virus. Thus, many viruses have developed strategies to block IFN system for their growth in the host cells. One of them is to suppress the IFN induction. Thus, I tested the possibility whether the host-specificity of two genogroups is caused by the difference in their abilities to suppress the IFN system. However, I found that both genogroups induced IFN and the IFN level of M-infected cells is a little higher than that of U-infected cells. This suggest that host-specificity of the two genogroups is not caused by the difference in their ability of suppression of IFN induction but by the difference in their ability of evasion from the attack of induced IFN. Until now, it has not been certain how the IFN system acts differently on the M and U genotype IHNVs.

Next, I tried to determine the viral proteins responsible for the host-specificity. The analysis of the multiplication cycle of two genogroups revealed a big difference in genomic replication rate, which means that their growth differs from the early step of their life cycle. The IHNV glycoprotein (G) is responsible for the initiation step of virus infection, the interaction between virions and host cell surface molecules, and the genogroups are based on the G nucleotide sequences. Thus, it is possible that differences in G protein can cause the host-specificity observed in the cell culture system.

To determine whether this is true, two recombinant IHNVs (rIHNVs) which have same genomic background except G gene (rIHNV/GM with G of M genotype and rIHNV/GU with G of U genotype) were tested for their growth in RTG-2 cells. There was no difference in the growth in RTG-2 cells between them, which means that G protein and the initial interaction between virions and cell surface molecules are not key factor responsible for the host-specificity. The initial interaction between virion and host cell surface molecules is followed by viral gene transcription and viral genomic replication. Among IHNV viral proteins, phosphoprotein (P) and nucleocapsid (N) proteins are reported to play roles in transcription and replication steps, respectively. In addition, several studies on mammalian rhabdoviruses suggest that protein kinases modulate the activities of P and N through phosphorylation.

Recently, I have found several amino acid differences between M and U genotypes within the phosphorylation sites of N and P protein and, as a result, a few phosphorylation sites in P and N proteins of M genotypes are missing in those of U genotype. If virus-induced IFN system can activate certain protein kinases and, in turn, they add phosphate group to N and/or P protein of only M genotype, these can cause different growth rate between the M and the U genotypes. Now I am trying to link the IFN system to phosphorylation of N and/or P protein and to determine whether difference in the phosphorylation of N and/or P is associated with the host-specificity by using specific protein kinase inhibitors."

Who's Who in Administration

by Liz Turpin, A.O. WFRC, Seattle

In the last issue, I introduced you to Gael Sauer, Robin Salling, Mary Dunning, Barry Egenes, Craig Zaugg, Jennifer Jones, Cheryll Trammell, Judy Maule, Linda Kay Hazen, Jim Guyton, Barbara Gee, Roderick Polintan, Christina Hicks, and Michele Beeman. In this issue, we are featuring Betty Gordon and Seok Wilson, CRRL; and Roz Lehner and Loretta Slusher, Seattle.

Betty Gordon.

"Hi Everybody, I'm Elizabeth (Betty) Gordon (CRRL). I was born and raised in Tillamook, Oregon, where my grandparents homesteaded in the 1890s. Since high school, I have held such varied jobs as long distance telephone operator and proof machine and computer operator during the 1960s and 70s. From there, I served 20 years as a welfare assistance worker for the State of Oregon, and managed to complete a bachelor's degree in Business Administration in 1991 from Portland State University. I moved to Skamania that same year, and worked, variously, as a law office manager/clerk/ bookkeeper, assistant administrator for an assisted living facility, and office manager for a local rock quarry before coming to CRRL three years ago. I have always loved animals, and have raised livestock ranging from a dairy and beef cattle to pigs, chickens, ducks & geese. I enjoy pastry & bread baking, as well as canning and preserving. I have sewn for many years, and am especially fond of costume design, and making wedding dresses and tailored clothing. I'm handy with a screwdriver or wrench, and am not afraid to use power tools! For recreation, I golf, play piano, am an avid reader, do crossword and jigsaw puzzles, and love to play card games with family and friends."

Seok Wilson

"I'm Seok Wilson (Sue), personnel specialist at CRRL. I am married with two children and graduated from University of New South Wales, Sydney, Australia with a Masters in Accounting, Systems and Financial Management. I was an

Australian Chartered Accountant (equivalent to an American CPA) but resigned when it did not appear that we would be returning to Australia any time soon. Besides Australia, I have worked in the United Kingdom and Bermuda, as an accountant and auditor. While my children were growing up, I took a part time position with The Dalles School District as a bookkeeper and had been with them for the last 13 years before I took my present position at Cook."

Loretta Slusher

"Hello Everyone, I'm Loretta Slusher, Office Automation Assistant, WFRC−Seattle. I have been a Federal employee since 1989. As "Admin Assistant" for DOD/Defense Contract Management Agency, DOD/Defense Contractors Audit Agency, DOI/Minerals Management Service and USGS WFRC-Seattle I have done many jobs under various position titles. Travel, Payroll, Human Resources, and Records Management have been my main focus.

In the past I rode my own Honda Goldwing Aspencade motorcycle for over 20 years. I was a member of the national group for women; Motor Maids, and won several trophies at various events, usually for long distance for a women driver (Sturgis, SD for example). I have quilted for many years and have made many quilts and wall hangings for my eight grandchildren. My husband and I love to go camping in our motor home and all our animals go with us: three Pomeranians, one cat and one cockatiel; they all love to camp and get along just fine in the motor home. I enjoy my job here at WFRC but look forward to retiring next spring, when I can do more traveling in the motor home.

As companion to USGS Dog, "Bear," I enjoy showing him off in his green USGS vest, and I believe he also enjoys coming to work occasionally, especially when treats are handed out. This picture shows Bear on my desk with his new vest."

Roz Lehner

"Hi Everybody! I'm Roz Lehner (Seattle), your newest Human Resources Administrative Operations Assistant. I am a Seattle native, born and raised in the Ballard area. I met my husband, over twenty years ago, right here in the Sand Point neighborhood. We have been married just over three great years. We both love to spend time in the great outdoors. We live for our next opportunity to travel, and spend a lot of time swimming, fishing, hiking and camping. I love to read, write and play video games. I've even been known to jump out of an airplane or two to add a little excitement to life. My Dad used to drive for FEAR (Figure Eight Auto Racing) out at Evergreen Speedway. It has always been my life-long goal to drive in at least one demolition derby. To my mother's chagrin, I favored auto shop over home economics in high school. I rather fancy myself as a lady with tomboy tendencies.

I really enjoy working with such a nice group of people here at WFRC. Stop by and visit anytime. Smiles and candy are always freely given!"

A Little Lite Reading

Washington's "Copper River Kings"

by Gary Wedemeyer

Copper River Kings... who needs them! You may be surprised to learn that we have a similar tasting wild King salmon right in our own backyard. Although no one is going to discount Alaska's fabulous fish, you can buy local, high-quality Kings that are just as tasty. This fish is the "marbled salmon" and, surprisingly, it is virtually unknown.

What many people don't realize is that King salmon come in three colors: Red, white, and marbled! Red colored salmon are well known, white salmon are less well known, but are occasionally featured in restaurants. The marbled Chinook is two-toned in color and unique. It has varying amounts of both red and white flesh mixed throughout the body. The

marbled effect, a genetic anomaly, makes the salmon less pink than other varieties. That's unusual, and to an untrained observer could be interpreted as a sign of inferiority. So marbled salmon are often considered discolored and are therefore rarely sold in fish markets. That, of course, is an oceanic mistake. "They are discolored and dissed, but not to be missed!"

Red, white, and marbled King salmon are all the same species, but each has subtle taste and textural differences of its own. Washington's wild marbled King salmon is high in Omega-3's and equally high in taste. They are genetically distinct and occur only in the fisheries of Washington and lower British Columbia. Biologists believe they originate from the tributaries of the lower Frasier River, Harrison, Vedder, and Chilliwack rivers of B.C.

Marbled King salmon have been called anemic and discolored admits Steve Wilson, a fisherman since the late 1980s and a man who sells the marbled salmon directly to consumers at farmers markets throughout Washington. Fortunately, as more people learn about and sample this regional salmon, its popularity has been increasing. Seattle's posh Canlis restaurant now features marbled King salmon − both because of their excellent taste and because they are troll caught.

Most marbled salmon sold locally in Washington are caught off the coast near Neah Bay. The season begins in May and can run as late as August. Due to the many biological variables, the marbled salmon may or may not be available. Fishermen don't know what type of King – red, white or marbled − they will catch during a particular season. You are lucky when you can find these fish. To increase your luck, and for more marbled salmon information, visit www.marbledsalmon.com, or www.wilsonfish.com.

Some Recent WFRC Research

(Ed. note, see Best paper Award Article on page 7)

Garver, Kyle A., William N. Batts, and Gael Kurath. 2006. Virulence comparisons of infectious hematopoietic necrosis virus (IHNV) U and M genogroups in sockeye salmon (Oncorhynchus nerka) and rainbow trout (O. mykiss). Journal of Aquatic Animal Health 18:232-243.

Abstract: Infectious hematopoietic necrosis virus (IHNV) is an aquatic rhabdovirus that infects salmon and trout in the Pacific Northwest of North America, Europe and Asia. Isolates of IHNV have been phylogenetically defined into three major viral genogroups designated U, M and L. To characterize virulence of IHNV in the context of these three viral genogroups, seven strains of IHNV including 3U, 3M and 1L genogroup viruses were compared for their pathogenicity in sockeye salmon (Oncorhynchus nerka) and rainbow trout (O. mykiss) fry. Fish were waterborne exposed to the different viral strains and virulence was assessed by comparing mortality curves and final cumulative percent mortality in both species of fish at 10 and 15oC. In two different stocks of O. nerka the U genogroup virus types were extremely virulent, typically causing 69-100% average cumulative mortality, while the M genogroup virus types caused very little or no mortality, ranging from 0-4%. The endangered Redfish Lake sockeye stock was found to have extreme differences in susceptibility to the U and M genogroups. Conversely, in two stocks of rainbow trout the M genogroup virus types were more virulent, inducing 25-85% average cumulative mortality, while the U genogroup viruses caused lower mortality ranging from 5-41%. In both fish species a single L viral genogroup strain caused low to intermediate mortality of 13-

53%. Viral glycoprotein sequence comparisons of the 7 challenge strains revealed three amino acid sites (247, 256 and 270) that consistently differed between the U and M genogroups, possibly contributing to pathogenicity differences.

(Ed. note: In today's world, dependency on hatcheries cannot be ignored or denied, but their role is being both confirmed and re-thought by scientists and policymakers—as this noteworthy paper by Rubin et al. shows)

Rubin, S., R. Reisenbichler, J. Hensleigh, L. Wetzel, and B. Baker. In Preparation. Genetic differences between sea-ranched and wild steelhead for growth and survival in the hatchery and seaward migration after release. Performance/Stock Productivity Impacts of Hatchery Supplementation. Bonneville Power Administration Research Report.

Abstract: Various studies suggest that sea ranching of anadromous salmonids can result in domestication (increased fitness in the hatchery program) and a loss of fitness for natural production; however, the mechanism has not yet been characterized adequately. We tested for genetic differences in survival, growth, downstream migration, and adult returns between hatchery and wild steelhead from the Clearwater River, Idaho, reared together in hatcheries. We found little or no difference in survival in the hatchery but substantially higher rates of growth and subsequent downstream migration for the progeny of hatchery fish. Faster growth for progeny of hatchery fish contributed to their higher migration rate, but other as yet uncharacterized traits also affected migration since the migration difference between stocks was apparent even within size classes. The migration difference seemed primarily due to a difference in residualization rather than to differential mortality. Adult return rate was consistent with the differences in migration for one of two year-classes; only three adults (all WxW) returned from the other. Intermediate performance by hybrids (hatchery females x wild males) on growth, downstream migration, and adult returns corroborated the genetic basis of the stock differences. Natural selection after release from the hatchery favored fish that performed well in the hatchery and genetically changed (domesticated) the wild population to resemble the hatchery population.

We also tested whether the difference in performance between hatchery and wild fish would be less in a hatchery program designed to favor the wild fish. The standard program produces smolts in one year by providing high rations and elevated winter temperatures. We reared fish in the standard program and also for two years with lower rations and winter temperatures to more closely mimic the natural life history. Survival and growth of progeny from wild fish relative to progeny from hatchery fish may have been better with two-year rearing than in the standard program (differences were consistent but small and non-significant); however, performance remained substantially worse for progeny of wild fish. Our results suggest a need to test whether alternative hatchery procedures meet expectations for reducing domestication.

We also tested for competitive interference by rearing hatchery and wild fish in separate raceways as well as together, and for incidence of precocious maturation. Wild fish grew slower under sympatry than under allopatry indicating competitive inferiority of wild fish in the hatchery environment. Social dominance of hatchery fish rather than direct competition for limited food was implicated because slower growth of wild fish under sympatry occurred even when food was provided in excess. Incidence of precocious males was higher for wild fish than for hatchery fish under allopatry but not under sympatry. The presence of hatchery fish suppressed maturation of wild males beyond the indirect effect of growth suppression. Under two-year allopatric rearing, mature males composed 10-30% of the wild fish and 4-12% of the hatchery fish. Precocious males did not migrate downstream after release; however, excluding them had little effect on migration results (migration rate was still much higher for hatchery than for wild fish). As with slow growth, precocious maturation reduced success after release, contributing to domestication of the wild population.

Finally, we evaluated the growth and subsequent emigration of fish that residualized after release rather than migrating downstream. We were able to compare performance between these residuals and their siblings that we had released into the stream two years earlier as unfed fry to rear naturally. Condition factor of residuals decreased markedly over the summer and in August was much lower than that of their naturally reared siblings, and the residuals produced significantly fewer smolts the following spring. Better performance by naturally reared fish indicated that the poor performance of residuals was not due to carrying capacity limitations. Our results suggest that performance of residuals in streams after extended periods of hatchery rearing may be poor even if their parents were wild fish.

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(Eds. note: Citations to network-accessible information in journal articles are rising as the internet is increasingly used as a research tool. However, a surprising number of published links to data, software, and literature sources change, breaking static links within published papers. In this study of four ESA journals, up to 30% of internet-based links were inactive. Authors, publishers, and users who post content on the internet need to recognize the problem of attrition and strive for ways to minimize the problem.)

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