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WFRC Highlights

Editor: Gary A. Wedemeyer *Issue No. 1, Fall 2002*

Director's Corner

Welcome to the first issue of WFRC Highlights, a quarterly Newsletter that will highlight current research news and events of interest to the WFRC family and hopefully foster a feeling of team spirit. Because our labs and field stations are so spread out geographically, most of us have not had the opportunity of getting to know each other very well.

Emeritus scientist extraordinaire, Gary Wedemeyer, has volunteered as editor. He pestered a few folks, including me, to provide copy for this issue. All are invited to make submissions for future issues (digital images welcome), so what we get from you is what you will see published. One of the first things we need is a better name, so please e-mail the editor your suggestions. Just remember, he is an elderly volunteer and shocks easily. Winner gets a valuable prize!

We'll distribute this (mainly by email) to all WFRC staff, other western BRD centers, and to select regional and headquarters folks. Likely, we'll also post some of the articles on the WFRC web page, currently being redesigned.

In this issue, the spotlight is on our Klamath Falls Field Station (KFFS). Take a minute to get better acquainted with our KFFS research team and their interesting work.

I'd be interested to hear your ideas for future issues of our newsletter and we'll see what evolves.

---Frank Shipley

Spotlight on the Klamath Falls (Oregon) Field Station

WFRC biologists have been conducting biological studies since 1994 on adult shortnose sucker populations in the Lost River and in Upper Klamath Lake and surrounding tributaries in the Klamath Basin. In 2001, we officially established a permanent Field Station to provide unbiased information on fisheries issues to resource managers in the Bureau of Reclamation and other Department of the Interior agencies in the Klamath Basin.

The Klamath station has monitored various aspects of adult sucker spawning populations since 1995. This includes monitoring adult suckers in the lower Williamson River, shoreline-spawning areas in Upper Klamath Lake, the fish ladder at Chiloquin Dam, and within selected areas of Upper Klamath Lake. Sampling at most locations usually begins in February and continues through late May – early June. Fish are identified to species, measured, examined for physical afflictions, and scanned for the presence of tags. If no tags are detected, fish are marked with a passive integrated transponder (PIT) tag.

The current adult sucker monitoring program is designed to provide consistent, systematic data on these populations, monitor population trends, provide information on the timing and duration of spawning at various locations, provide information on health and condition, and help direct future research.

As of 2001, Klamath Falls Field Station personnel have been the largest group of biologists conducting work in the Upper Klamath Basin. As part of the program we maintain a historical database for adult suckers in the Upper Klamath Basin that contains information on age, size structure, sex and species composition, and relative abundance.

Sampling on the lower Williamson River has been ongoing since 1995. Crews sample fish using trammel nets set approximately 1 km upriver of the confluence with Upper Klamath Lake. Beginning in 1997, trammel nets have been set at four fixed locations starting on the shoreline and extending out to the mid-channel of the river. In 1999, the sampling protocol was adapted to take advantage of increased fish movement during early morning hours. Nets are usually set an hour before sunrise and fished for about five hours, 4 – 5 days per week.

The Sprague River Dam (or Chiloquin Dam) fish ladder has been sampled periodically by the Klamath Tribes and USGS since the mid 1980's. In 2000, the USGS initiated a systematic monitoring program at the fish ladder, sampling three days per

week throughout the spawning season. The fish ladder is sampled by diverting the inflow and screening the ladder exit. When the ladder is sufficiently de-watered, crews use dipnets and small trammel nets to capture suckers present in the ladder cells.

There is strong evidence that unique stocks of Lost River and shortnose suckers live in Upper Klamath Lake, those that spawn in the Williamson and Sprague rivers and those that spawn in the shoreline areas of Upper Klamath Lake. Sampling at some of these shoreline spawning areas has occurred periodically since the mid – 1980's, however, systematic monitoring of these sites did not occur until 1999. Currently we sample at five shoreline-spawning locations; each site is sampled two days per week . Trammel nets are set one hour before sunset and fished for four hours or until 20 or more fish are captured. Great care is taken to minimize the impacts of our sampling program on the fish as they are actively spawning at these sites.

As well as sampling the sites mentioned above, our crews have also periodically sampled in Upper Klamath Lake during the spawning season. Starting in 2001, we began sampling during the spring to assess the changes from year to year in relative abundance, condition, sex, and size composition. We selected four general locations in Upper Klamath Lake that are sampled once per week. Trammel nets are set approximately one hour before sunset and fished until four hours after sunset.

Additional Activities in 2001.

In addition to studies on adult suckers, we have begun research on habitat use by young suckers in Upper Klamath Lake. Because resource managers are especially concerned about lake-level effects on young suckers, the study will determine how these fish use different kinds of habitat along shoreline areas. It will also examine the interactions of young suckers with native and exotic fishes. We will also collect basic water quality information in conjunction with research on young suckers. Poor water quality, often associated with summer algae blooms, can lead to kills of adult fish. Monitoring water quality at sites where young suckers are sampled will provide information on how lake conditions, including those caused by algae blooms, affect abundance and survival of young suckers.

The staff at Klamath Falls Field Station includes **Rip Shively** (Chief**), Scott Vanderkool, Gretta Blackwood, Brian Hayes, Eric Janney**, and **Barbara Adams**. See the WFRC directory for a complete list.

For more information contact: Rip Shively at the Klamath Falls Field Station (541) 273-8689 or Rip_Shively@usgs.gov

Shipley Returns from Siberia

September 13-27, I conducted field research with Russian scientists working on the Zhypanova River, in the southeast portion of the Kamchatkan Peninsula in the Russian Far East. The purpose of the research is to improve our understanding of several groups of fishes with broad and circumpolar distributions, which are important resources in the U.S. and Russia. Kamchatka steelhead *(Oncorhynchus mykiss)* are listed in the Russian Red Book of Rare and Disappearing Species. In the US Pacific Northwest, anadromous salmonids *(Oncorhynchus spp.)* and bull trout *(Salvelinus confluentus)* are of high management concern—or are listed under the Endangered Species Act—due to severe population declines.

The goal of this project is to develop genetic techniques to evaluate faunal diversity and develop an improved understanding of population and life history characteristics and geographic distribution will enhance the scientific foundation for management of these species throughout their range. We are emphasizing genetics and life histories of Kamchatka Peninsula rainbow trout and steelhead *(O. mykiss),* and char *(S. malma, S. leucomaensis)*. Both anadromous and resident forms of these genera occur in Kamchatka rivers such as the Zhypanova, that are free from hatchery and watershed development influences, providing research opportunities pertaining to natural patterns in genetic diversity that do not exist in the US

This research is part of an ongoing USGS collaboration with the Russian Academy of Sciences and Moscow State University, in which the WFRC has been active for more than a decade The research is also part of the Western Region's

"Genetic Tools" project G*enetic Analysis of Pacific Salmonids in the Russian Far East and the U.S. Pacific Northwest*

For the first week of work, I was the only American scientist in camp, and worked primarily with Serge Pavlov, Moscow State University. During the second week Jack Stanford, University of Montana, Dimitri Pavlov, Russian Academy of Sciences, and Ksenia Savvaitova, Moscow State University, Moscow joined us. Dr. Savvaitova is one of the world's leading authorities on char biology.

The Zhypanova River basin is uninhabited wilderness with a diverse and abundant salmonid fauna, which supports numerous grizzly bears. The basin is being considered for creation of a nature reserve, and Russia is seeking enhanced scientific understanding of fisheries resources to underpin natural resources management—particularly salmonids.

The trip exceeded expectations in terms of gathering data from specific species and discrete juvenile rearing habitats. An unexpected bonus was a meeting with Russian officials that helped communicate the significance of the science program to both countries. This meeting included the acting Governor of Kamchatka, a representative of President Putin, several import regional officials, and some American benefactors for possible nature preservation activities, including Gordon Moore, cofounder of Intel.

The next step in this research effort will occur when Serge Pavlov travels to the Seattle Laboratory of WFRC, in Spring, 2003. At that time Serge will work with Rusty Rodriguez, Carl Ostberg, Lyman Thorsteinson, and me to conduct genetic analyses of the samples we collected.

---Frank Shipley

Rodriguez/Redman Receive NSF funding for Antarctic Research Project

WFRC staff scientists Dr. Rusty Rodriguez and Dr. Regina Redman have been funded by the National Science Foundation to be part of an international team of scientists doing microbial ecology research at the McMurdo Antarctic research station operated by the NSF. Among the most complicated aspects of aquatic and terrestrial ecosystems are the biological and chemical processes that occur underground. Microbial ecology is of paramount importance to the health and dynamics of fish and wildlife communities yet little is known about the roles of most microbial organisms in soil food webs. This trip will allow the USGS to obtain critical expertise in microbial ecology (which has been identified as a need in several programs) and soil chemistry. In addition, it will allow the USGS to begin research in connecting soil activities with habitat restoration efforts and the spread of invasive plant species. This work will also advance several aquatic research projects at WFRC that focus on plant adaptation, habitat restoration, food web integrity, and species interactions. Rusty and Regina will analyze soil samples for species abundance and diversity. In addition, Rusty will be involved in assessing physical and chemical composition of soils. There is a complete analytical chemistry laboratory at the McMurdo Station where Rusty will receive training in soil chemical analyses (to the extent that he is trainable, of course).

The information obtained from these relatively simple food webs (less than 20 species) will be used to develop research strategies for more complex food webs in temperate ecosystems.

Departure for the south pole will be November 22, and they will be there for Christmas, New Years, and Groundhog Day. Back at WFRC around Valentines Day. Watch this space for a trip report.

Meet some of our WFRC Visiting Scientists

Hello, I am **Ines Romero Brey** from Santiago de Compostela, a small city in the Northwest of Spain, in an area called Galicia. Santiago de Compostela is famous as the end of a pilgrim's way, because in its cathedral are the remains of the Apostle Santiago and also because of its University, which is 500 years old. I studied biology there and am now doing my Ph.D. about viruses from wild fishes. Part of this work is to compare viruses from the wild to viruses from aquaculture. This is the reason why I came here -- doing a part of my thesis and to meet other researchers of this area, as well as trying to improve my English, so important in Science.

My supervisor here is **Jim Winton**. I have chosen this research center because of his excellent curriculum. My project here is sequencing some fragments of the virus genome of my isolates, trying to find differences between them. Bill Batts, the sequencer-man, is my helper in that sense. Although we didn't find differences, now we know all my isolates are identical, maybe because they are from the same fishery, Flemish Cap, close to the Grand Banks, in the Atlantic coast of Canada. In addition, I am also analyzing the proteins of these viruses (birnaviruses), in order to find the reason why they are always associated with tubular structures, composed by one of their proteins and which function is still unknown. I would like to thank everybody, especially Julia and Katie (my house-mates), Kyle (my desk-mate), Gael, Evi, Judy, Bill-Bill and Jim, because my stay here would not be so nice without their help and friendship.

Hello, my name is **Julia Franke** and I'm a veterinarian from Munich, Germany, working on my doctoral thesis. I have been interested in *Paramyxoviruses,* probably known to you as the agents causing measles and mumps. Now I have the chance to continue my work with the fish disease research group at the Western Fisheries Research Center for half a year. Here I try to find out more about the virus proteins and their antigenic properties. Besides my work, I enjoy learning about the different way of life in another country.

Greetings, my name is **Curt Endresen** and I am professor in Fish Health in Norway. I have had various positions at the University of Bergen since 1970. The first 22 years at the Medical School, and since 1992 at the Science Faculty, Department of Fisheries and Marine Biology. My main interests are in fish virology and immunology. I am leader of a group which is responsible for giving students courses related to fish diseases and supervision for their Master's and PhD degrees. Most of my work involves studies of viruses infecting Atlantic salmon such as infectious pancreatic necrosis virus (IPNV) and infectious salmon anemia virus (ISAV). I have also been involved in the development of vaccines for salmon which are used in Norway today. All salmon which are put into the sea in Norway are now vaccinated. This has reduced the use of antibiotics to some few hundred kilos compared to many tons used per year 10-15 years ago. From Aug. 2002, I have a 12 month sabbatical period. The reasons for being here at the Western Fisheries Research Center are many. The Center is well-known, the scientific research performed here has high standards and a lot of the activities are in fish virology, bacteriology and immunology which is within my main interests. While I am here, I will try to infect various salmonid species with different ISAV isolates and study the replication of the viruses in these species in two periods, in November and in April/May. We know that Atlantic Salmon are more resistant to ISAV infection in this period of the year (Oct-Dec) compared to Spring time but we do not know why.

Hello, I'm **Katie Springman**, a molecular toxicologist, new at WFRC. I came from the Superfund Basic Research Program and am originally from Texas. I lived in Mexico and Europe for some years, and so speak Spanish and French. I'm working with John Emlen on integrating aquatic contaminants' chemical characteristics (that modify transport, uptake, and toxicity) with the contaminants' physiological effects in fish, with particular interest in pharmaceuticals and personal care products, and endocrine disruptors. When not working, I'm on the road a lot—literally. I'm a marathon runner with quite a few marathons, 50K and 50M races, under my shoes. And.... my knees still work!

Hello—My name is **Yuzo Arima** and I am working in the immunology/bacteriology lab for Ron Pascho. Although I am a Japanese national, I have lived in the U.S. for most of my life. I received my bachelor's degree in biology from Columbia University in New York City (May 2001). During the fall of 2001, I had my first experience with fish disease research at Friday Harbor Labs (University of Washington), and I started working here at WFRC/USGS as a laboratory technician last February. I have been fortunate enough to be involved in numerous projects here at the Seattle lab. and my work has ranged from general salmon maintenance to conducting complement assays to

purifying plasmid DNA for vaccine studies. Currently I am extracting DNA from Chinook salmon eggs in order to study the heritability of disease resistance and immune function. I recently had a short hiatus from the lab due to visa issues and had to return to Japan for 3 months, but I am very excited to be back at work again!

Say Goodbye to Alison (Snif).

Dr**. Alison Colwell** has been working at WFRC Seattle since November 1997 conducting research with Jim Winton, Charlotte Rasmussen and Kendra Kinnan on the Whirling Disease project. This project, funded by a partnership between the U.S. Fish and Wildlife Service and the Whirling Disease Foundation, seeks to improve knowledge of the biology of the myxozooan parasite, *Myxobolus cerebralis*, the causative agent of Whirling Disease, and its aquatic oligochaete host, *Tubifex tubifex*. Alison has focused primarily on developing genetic markers for the parasite. The project at WFRC is in its fifth year, and will host the 8th Annual Whirling Disease Symposium at the Bell Harbor Conference Center in Seattle, February 6 & 7, 2003. Alison will leave WFRC in March 2003 and move to Fort Collins, Colorado. The fact that Alison's Mom is the head of the National Science Foundation has nothing at all to do with the fact that we will all miss our Alison.

Computer News you can Use

1. First, an item from WFRC's resident Guru Rockin' Robin Salling.

For those of you that use the many Instant Messaging applications available, there is good news. Up till now if you had numerous friends using various applications (i.e. AOL, ICQ, MSN etc.) you had to download every IM application. Now with the use of Trillian 0.74, a free bit of Software from Cerulean Studios (http://www.trillian.cc/trillian/index.html) you can simultaneously connect with the five most popular chat clients on the WEB. By importing your passwords buddy lists, various client preferences, and other chat specifics into the Trillian interface, it creates a single hub for all your chat traffic.

Installation and setup are simple. Upon installation Trillian takes you step-by-step through each major chat system. Added your account information for the ones you'll want to use and ignore the rest. The software automatically imports your buddy lists for each account you enter. You can view detailed event logs for each client, check supported email accounts and chat to your hearts content. You can customize your buddy lists, reduce group chat session windows and create numerous customized settings to tailor make the look and feel of each of the specific services you have picked.

The best part of all this is that Trillian is truly free. It contains no adware of any kind and does not have functionality or time limitations. A more robust version (Trillian 1.0) is available for about $25, but the freeware works just great. Let me know what you think.

--Robin Salling

2. And Now, Some Reader-Favorite Web Sites.

http://students.washington.edu/manu19b/UWspawnings.html (Here's a web site with some great videos of spawning salmon, Jennifer Bayer, CRRL and Reg Reisenbichler, Seattle)

www.tidepool.org (I'm the computer "dude" at CRRL. I find this website to be of great interest to researchers here. I usually set this up as the default web site for Internet Explorer... good science news, Jim Guyton)

www.fishbase.org (Katherine J. Felton, CRRL).

And, three more from Jim Peterson, CRRL:

http://www.fisheries.org/links/jourlink.html (A general list of some science journals)

http://internal.usgs.gov/library/ejls_search.html#Begin (An extensive list of electronically available journals)

http://www.csa.com/ (Everyone is probably familiar with the Cambridge Scientific Abstracts for searching, etc.)

From the A.O.(Seattle).

1. Meet Our New Budget Analyst:

Greetings everyone, my name is **Tom Barr** and I am the new budget person. To give you a little bit about my work background (please, let's not get him started), in a nutshell, I served nearly 15 years in the U.S. Marine Corps (Infantry). Since discharging from the Marine Corps I worked in private industry in businesses abroad and served as an Administrative Officer in the Royal Australian Air Force. I resumed work in the U. S. government in 2001 and my recent transfer to the USGS is from the Department of Defense, where I worked in contract administration. My university experiences are in the fields of Business Administration and Management. I am confident the diversity of my experiences and responsibilities in administration, budget planning, management and analysis will assist me greatly in supporting the mission here at the WFRC. On a more personal note, I have a love for travel and have traveled to more than 15 different countries — and lived in six of them. In total, I have lived outside the U.S. thirteen of the past twenty-four years, due either to military service or pursuing my own adventures. For now, my main interests are homesteading my family for stability reasons and becoming an integral part of the WFRC team. I am happy to be here at the USGS WFRC and will endeavor to support the mission/you the best that I can. Please don't hesitate to say stop and say hello when passing by my office.

2. Some FY 2002 Awards.

The Individual Safety, Health and Environmental Achievement Award went to **John Beeman, James Seelye, and Rip Shively.** The ISHEAA is the highest-level employee achievement award granted. The recipient is chosen from among nominees submitted to the Bureau Safety and Environmental Management Branch. This award is presented annually by the Departmental Designated Agency Safety and Health Official to employees who have achieved outstanding safety and health work conditions or performance through improved practices and attitudes.

3. Length of Service Awards:

30 Years of Service: **Ron Pascho.** Need some sage advice? Stop by Ron's office. Just don't stay too long. The old gentleman tires easily.

20 Years of Service: **Debra Becker,** and **Diane Elliott.** They are almost as venerable as Pascho.

10 years of service: **Michele Beeman, Timothy Counihan, Timothy Darland, Eveline Emmenegger, Conrad Frost, Glen Holmberg, Jack Hotchkiss, Robert Jackson, Eric Kofoot, Gael Kurath, Barbara Martin, Alec Maule, Judith Ranson, Russell Rodriguez, Robin Salling, Kyle Sato, Sean Shea, Kenneth Tiffan, Lisa Wetzel,** and **Andrea Woodward**. The younger generation.

A Little Light Reading...

Much to everybody's surprise, Assistant Center Director Lyman Thorsteinson has co-authored two really outstanding books recently—*Fishes of Alaska* (available from the American Fisheries Society), and *The Rockfishes of the Northeast Pacific* (University of California Press). My personal favorite is the Rockfish book, but both are destined to become classics.

Another recent WFRC book that is almost as good:

Wedemeyer, Gary (editor). Fish Hatchery Management, 2nd edition. American Fisheries Society, Bethesda, MD, 2002.

Recent WFRC Journal Articles include:

Alcorn, S.W., A.L. Murray, and R.J. Pascho. 2002. Effects of rearing temperature on immune functions in sockeye salmon (*Oncorhynchus nerka*). Fish Shellfish Immunol. 12:303-334.

Alcorn, S.W. and R.J.Pascho. 2002. Antibody responses by chinook salmon (Oncorhynchus tshawytscha) and rainbow trout (*Oncorhynchus mykiss*) to various protein antigens. Fish Shellfish Immunol. 13:327-33.

Allen, B.M., E.P. Bergersen. 2002. Factors influencing the distribution of Myxobolus cerebralis, the causative agent of whirling disease, in the Cache la Poudre River, Colorado. Dis. Aquat. Org. 49: 51-60.

Barfoot, C.A., D.M. Gadomski, and J.H. Petersen. 2002. Resident fish assemblages in shallow shorelines of a Columbia River impoundment. Northwest Sci. 76:103-117.

Elliott, D.G., and R.J. Pascho. 2002. Evidence that Coded-Wire-Tagging Procedures Can Enhance Transmission of *Renibacterium salmoninarum* in Chinook Salmon. J. Aquat. Anim. Health 13:181-193.

Emmengger, E.J., and G. Kurath. 2002. Genetic characterization of infectious hematopoietic ncrosis virus of coastal salmonid stocks in Washington State. J. Aquat. Anim. Health 14:25-34.

Harrahy, L.N.M., C.B. Schreck, and A.G. Maule. 2002. Antibody-producting cells correlated with body weight in juvenile chinook salmon (*Oncorhynchus tshawytscha*) acclimated to optimal and elevated temperatures. Fish Shellfish Immunol. 11:653-659.

Hershberger, P.K., K. Stick, B. Bui, C. Carroll, B. Fall, C. Mork, J.A. Perry, E. Sweeney, J. Whittouck, J. Winton and R.K. Kocan. 2002. Incidence of *Ichthyophonus hoferi* in Puget Sound fishes and its increase with age of Pacific herring. J. Aquat. Anim. Health 14:50-56.

Jager, H. I., W. Van Winkle, J. A. Chandler, K. B. Lepla, P. Bates, and T. D. Counihan. 2002. A Simulation Study of Factors Controlling White Sturgeon Recruitment in the Snake River. Pages 127-150 in W. Van Winkle, P. J. Anders, D. H. Secor, and D. A. Dixon, editors. Biology, management, and protection of North American sturgeon. American Fisheries Society, Symposium 28, Bethesda, Maryland.

Jorgensen, E. H., M. N. Vijayan, N. Aluru, and A. G. Maule. 2002. Fasting modifies Aroclor 1254 impact on plasma cortisol, glucose and lactate responses to a handling disturbance in Arctic char. Comp. Biochem. Physiol. C Comp Pharmacol. 132:235-245.

Kurath G., S. Corbeil, E.D. Anderson, and S.E. LaPatra. 2002. Efficacy of a DNA vaccine against infectious hematopoietic necrosis virus. Bull. Natl. Res. Inst. Aquacult., Suppl. 5:27-33.

Martin, B.A., and M.K. Saiki. 2002. Gut contents of juvenile chinook salmon from the Upper Sacramento River, California during Spring 1998. California Fish and Game 87(1):38-43.

Mesa, M. G., L. K. Weiland, and P. Wagner. 2002. Effects of acute thermal stress on the survival, predator avoidance, and physiology of juvenile fall chinook salmon. Northwest Sci. 76:118-128.

Palmisano, A.N., and N.E. Elder. 2002. Standardized seawater rearing of Chinook salmon smolts to evaluate hatchery practices showed low statistical power. Trans. Am. Fish. Soc. 130:409-416.

Parsley, M. J., P. J. Anders, A. I. Miller, L. G. Beckman, and G. T. McCabe Jr. 2002. Recovery of White Sturgeon Populations through Natural Production: Understanding the Influence of Abiotic and Biotic Factors on Spawning and Subsequent Recruitment. Pages 55-66 in W. Van Winkle, P. J. Anders, D. H.

Secor, and D. A. Dixon, editors. Biology, management, and protection of North American sturgeon. American Fisheries Society, Symposium 28, Bethesda, Maryland.

Petersen, J.H., and J.F. Kitchell. 2002. Climate regimes and water temperature changes in the Columbia River: bioenergetic implications for predators of juvenile salmon. Can. J. Fish. Aquat. Sci. 58:1831-1841.

Quinn, T.P., L. Wetzel, S. Bishop, K. Overberg, and D.E. Rogers. 2002. Influence of breeding habitat on bear predation and age at maturity and sexual dimorphism of sockeye salmon populations. Can. J. Zool. 79:1782-1793.

Redman, R.S., D.D. Dunigan, and R.J. Rodriguez. 2002. Fungal symbiosis from mutualism to parasitism: who controls the outcome, host or invader? New Phytol. 151:705-716.

Redman, R.S., Rossinck, M.R., Maher, S., Andrews, Q.C., Schneider, W.L. and Rodriguez, R.J. 2002. Field performance of cucurbit and tomato plants infected with a nonpathogenic mutant of *Colletotrichum magna* (teleomorph: *Glomerella magna*; Jenkins and Winstead). Symbiosis, 32:55-70.

Redman, R.S.,Sheenahan, K.B., Stout, R.G., Rodriguez, R.J., and Henson, J.H. 2002. Thermotolerance Generated by Plant/Fungal Symbiosis. Science (in press).

Saiki, M.K., B.A. Martin, L.D. Thompson, and D. Welsh. 2002. Copper, cadmium, and zinc concentrations in juvenile chinook salmon and selected fish-forage organisms (aquatic insects) in the upper Sacramento River, California. Water, Air, and Soil Pollution 132:127-139.

Schreck, C.B. and A.G. Maule. 2002. Are the endocrine and immune systems really the same thing? pages 351-357 in H.J.Th. Goos, R.K. Rastogi, H. Vaudry, and P. Pierantoni (Eds.) Perspectives in Comparative Endocrinology, Unity and Diversity. Monduzzi Editore, Bolgona, Italy. CD book.

Schrock, R. M., R.E. Reagan, and T. R. Batt. 2002. BIGSAM: A Biologically Integrated Geospatial Salmonid data Access Management tool. (A prototype program on compact disk.)

Schrock, R. M., R. E. Reagan, R. Martinson (PSMFC). 2002. 23rd Smolt Workshop: The role of smoltification in an ecosystem-based life history.

Wedemeyer, Gary, and 5 co-authors. Another Perspective on the Role of Hatcheries in Pacific Salmon Management. World Aquaculture, December, 2002.

Wiens, G.D., R. Pascho, and J.R. Winton. 2002. A single Ala139-to-Glu substitution in the Renibacterium salmoninarum virulence-associated protein p57 results in antigenic variation and is associated with enhanced p57 binding to Chinook salmon leukocytes. Appl. Environ. Microbiol., Aug. 2002, P. 3969-3977.

Winton, J.R. and K. Einer-Jensen. 2002. Molecular diagnosis of infectious hematopoietic necrosis and viral hemorrhagic septicemia. In: Cunningham, C. (ed.) Molecular Diagnosis of Salmonid Diseases. Kluwer, Dordrecht.

In Memorium.

As many of you already know, WFRC staff scientist Dr. Aldo Palmisano passed away in September after a long battle with ALS. Aldo first joined the WFRC at our Alaska field laboratory in Anchorage -- back in the days when FWS fishery research in Alaska was under the WFRC. He later transferred to our Marrowstone Island Marine field Station where he was Biologist-in-Charge for many years. He moved to the Seattle lab in 1985 where he completed the requirements for his Ph.D. at the University of Washington. Aldo was well known to be a meticulous scientist and did some of the original work on heat shock proteins in salmonids. He will be missed.