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Fisheries and Aquatics Bulletin

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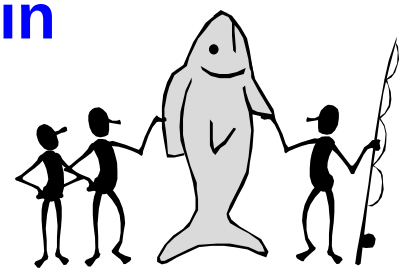

From the Program Coordinator's Desk

Thanks to Zack Bowen
After 30 days of a challenging and exciting detail as the Acting Assistant FAER Program Coordinator in BRD headquarters, Zack has headed back to the mountains of Colorado to his Fort Collins Science Center (FORT) base. Zack was a tremendous asset to the Science Staff here in Reston. He performed a variety of critical Program management and administrative functions related to the FAER Program. Zack was instrumental in developing a BRD-wide Advisory Committee to serve on the FAER Program five-year plan team. He also presented an enlightening Bureau-wide seminar entitled "Fish Habitat and Channel Modification in the Upper Yellowstone River," which highlighted increasing development pressures on the Upper Yellowstone and the science that FORT researchers are providing to assist our partner agencies in addressing these issues. Zack employed expert skills networking with the headquarters staff, Department staff, and partner Bureaus for advancing the FAER Program.

A special thanks to Doug Posson, FORT Director, for supporting Zack's detail to HQ.

Zack, *thanks again*!

Learn about Other FAER Research and Share Your Own Expertise

Research in the FAER Program covers an amazing amount of territory in terms of geography, diversity of topic areas, and expertise. Often, opportunities arise for scientific collaborations that take advantage of the collective pool of expertise in the Program. Keys to making these collaborations happen and succeed are (1) awareness of the expertise available and (2) communication. The same ideas apply to relations between scientists and HQ. Information, ideas, and opportunities can be communicated in both directions to help the Program be responsive and effective. To this end, there are a few ways the FAER Program is working towards better coordination and communication.

"FAB": *Fisheries and Aquatics Bulletin*
Thank you to all those who contributed material to this issue of the FAB. Remember, the FAB is a great opportunity to publish your fisheries and aquatic resource articles and other pieces of interest to gain national exposure; the current distribution is about 350 aquatic resource professionals. *Contact:* Jim Preacher, FAER Program Coordinator.

Fact Sheets: Help the Home Office and Gain Free National Exposure
Submit a fact sheet on current research and we will post it and disseminate information in briefings from the FAER Program. This helps keep a steady supply of current content in HQ and allows scientists to have their work admired by additional audiences—some of whom are responsible for supporting your

work. Submit your fact sheet to dmbarth@usgs.gov. For fact sheet examples and USGS visual identifier requirements, see http://www.usgs.gov/visual-id/specs/factsheets/fscolor.html.

FAER Internet Presence
We are still constructing the FAER Program Web site. Now is a great time to contribute ideas on what would be most useful to you. If you have ideas or suggestions, please send them on to Jim Preacher, FAER Program Coordinator.

Details, Details
For the ultimate in information exchange there is no substitute for being there. Temporary details to the home office in Reston are a superb way to help with important work, gain a new perspective on USGS science, and get to know the fine people who work in HQ. If you are interested in a possible detail, contact Jim Preacher, FAER Program Coordinator. If you would like to talk with a person with recent detail experience, you can contact Robin Schrock, CRRL; Carol Ann Woody, ASC; or Zack Bowen, FORT.

FAER Science on High Profile Issues

Fish Passage
There are an estimated 75,000 hydro barriers in the United States that restrict or preclude the free passage and migration of numerous fish species. Current environmental movements are advocating removal of river and stream barriers to allow free passage of fish and aquatic species along rivers. The push for barrier removal is in contrast with the Administration's plans for enhancing or maintaining hydro power structures for energy. These contrasting agendas set the stage for unique fish passage research at the USGS Conte lab. Steve Rideout and his staff are on the cutting edge of providing fish passage technologies that can address many of these fish passage challenges. For more information, contact Stephen_Rideout@usgs.gov.

Mycobacteriosis in Striped Bass in the Chesapeake Bay
Nearly 75% of the striped bass along the eastern seaboard originate from the Chesapeake Bay. Sampling data over the past four years reveal that a large percentage (up to 65% in some areas of the bay) of the striper population is infected with mycobacteria. The impacts to the sport fishing and commercial fishing industry, as well as the economy and ecology of the region, could be disastrous if this mycobacteriosis epizootic in striped bass persists, and worse if it spreads outside the bay. Frank Panek and his staff at Leetown's National Fish Health Research Laboratory are fully engaged in research on mycobacteriosis. *Contact:* Frank_Panek@USGS.gov.

Research Briefs

Asian Carp Invade the Mississippi Basin
by Marcia K. Nelson

The latest aquatic invaders, and certainly the largest in the great rivers of the United States, Asian carp are becoming all too common. These invasive species, specifically silver and bighead carp, continue to spread widely throughout the Mississippi River basin. USGS researchers at the Columbia Environmental Research Center are in the process of tracking their movements and habitat selection. Evidence indicates that these carp feed even during cold weather, and they have been observed making upstream migrations of many miles. Asian carp are well-adapted to the Nation's large river systems, posing a real problem in terms of competition with and predation on native fishes in our aquatic freshwater systems. One particularly annoying habit is that these carp jump into moving boats, threatening passengers with serious injury as these fish can reach upwards of 50 pounds. A potential control method of these unwanted species is for the USGS to develop a sex pheromone, a chemical substance produced by individuals that serves as a stimulus to other individuals of the same species. It is a ready-made attractant that could be used in a species-specific trapping program. At some point, long-term effects of Asian carp must be evaluated through the develop-

Silver carp. Image: llovshin@acesag.auburn.edu

ment of predictive models, such as those used in ocean fisheries science. They foretell impending variations in populations stemming from fishing pressures that result in aquatic biota fluctuations and changing habits.

Recent news articles can be viewed online, especially the *Columbia Missourian*, "Boatload of Trouble" (main story) for additional information and an action photo of the flying Asian carp http://www.digmo.com/news/story.php?ID=2393. A fact sheet on Asian carp produced by scientists at the Columbia Environmental Research Center includes preliminary findings and is available online at http://www.cerc.usgs.gov/pubs/center/pdfDocs/invasive_carp.pdf. *Contact:* Duane Chapman, Columbia Environmental Research Center.

Historical Changes in the Columbia River Estuary Based on Sediment Cores: Feasibility Studies
by Jim Petersen

The importance of the Columbia River estuary to salmon and other fishes, migratory birds, and other species is well established. Relatively little is known, however, about long-term, historic variations in biological processes and conditions within the estuary. For example, have conditions varied greatly with climatic regime shift? How has dam construction on the Columbia River influenced biological communities over time? We conducted a feasibility study to see if sediment cores from the estuary could be aged and whether biological or contaminant indicators could be identified. Such information may be useful in understanding long-term environmental variation and in restoration studies.

From a set of cores that were originally collected for a regional sediment study, we selected three for analysis. Strata were aged and sections from cores were examined for 30 heavy metals, diverse algal pigments, percent organic content, diatom species, stable isotopes of C and N, a few organic contaminants, and grain size distributions. Smaller samples of cores were also examined for invertebrate parts and fish scales, although none were observed.

We were able to successfully age the sediments within these cores. A variety of indicators suggested that major shifts in algal communities and contaminant levels have occurred either locally or regionally in the Columbia River estuary. These sorts of findings can be refined to assist with historical interpretations and hypothesis tests about mechanisms. Averages of indicators from deeper and older sediments often had small variances, suggesting they could be used in evaluating restoration actions, considering the impacts of dredging, or for detecting natural change. Overall measures of bioproductivity, such as total diatom concentration, might be used to compare the type of environment that juvenile salmon now encounter with the historical environment. Finally, a larger study may be useful in distinguishing the role of climate regime changes and human impacts on estuarine or freshwater conditions within the Columbia River Basin. *Contact:* Jim Petersen, Western Fisheries Research Center, Columbia River Research Laboratory.

Fisheries and Aquatic Science at the Fort Collins Science Center

Colorado is typically in the news for not having enough water. As a result, many folks may not immediately connect the Fort Collins Science Center (FORT) with fisheries and aquatic resources research. While Colorado is in the midst of a long-term drought and unquestionably coastally challenged, there is still much research relevant to the FAER Program. Below are some snapshots of current projects. If you want to know more about any of these projects, contact program directors Dave Hamilton (dave_hamilton@usgs.gov) or Zack Bowen (zachary_bowen@usgs.gov).

River and Stream Modeling and Decision Support Systems. This project focuses on developing one- and two-dimensional aquatic habitat models, refining hydrodynamic models for habitat issues, building computer tools for habitat research, providing science-based information for regulated river systems, and developing planning and assessment models to evaluate water management strategies. Changes in river flows cause temporal and spatial variability in habitat for aquatic organisms. Visual representations of this variability provide resource managers with more explicit information on what is required to maintain or improve river conditions for target species, for example, in the Upper Yellowstone River in Montana and the Klamath River Basin, Oregon and California. Decision support systems provide a central location for data, provide in-

stitutional memory for resource managers, and allow "gaming" with river systems to optimize or improve certain resource variables.

Three (possibly four) year classes of bonytail.

Western Freshwater and Anadromous Fish. Project scientists investigate and examine fish community relationships in lakes and rivers, using both traditional and new technologies. Spatial scales range from small streams to large reservoirs. Methods employed in this project range from standard gill netting and electrofishing to sophisticated hydroacoustic sonar, geographic information systems (GIS), tracking telemetry, and other remote-sensing techniques. Both recreational and special-status species research are a part of this work. For example, studies being conducted on the Colorado River and associated reservoirs will benefit restoration efforts for endangered fish species and assist the Bureau of Reclamation in developing water project operating plans. In other work, investigations of predator/prey interactions utilize laboratory testing, underwater videography, and stable isotope analysis.

Fish Disease and Sediment Transport Modeling. The goal of this project is to link sediment-channel interactions with changes in physical habitat important to fish populations. FORT scientists are determining sediment limiting factors for *Tubifex* species, an intermediate host for whirling disease, using statistical routines developed at FORT to predict spatial distribution of sediment size classes with one-, two-, and three-dimensional models. The studies of sediment and channel interaction develop predictions for channel maintenance flows, flows to remove (or not remove) sand and fines, and flows to predict spawning gravel movement. For example, FORT scientists are using sediment transport modeling to identify specific places in river channels modified by construction activities that could be redesigned to reduce the area and suitability of sediment deposits for *Tubifex* species to survive.

Lake and Wetland Ecosystems: Constructed Wetlands. In the arid West, loss of critical wetland and riparian habitat due to depletion of water resources has severe impacts on biodiversity. Often the only water available for restoring wetland or riparian habitat is of impaired quality. Using constructed wetlands as low-cost, low-maintenance, socially attractive treatment systems provides an opportunity to reuse impaired source water while enhancing wildlife habitat. FORT scientists are applying an ecosystem perspective to understanding water treatment functions, evaluating the habitat created, and developing cost-effective techniques for operation and maintenance of these wetlands. Research is designed to understand water treatment functions within constructed wetlands, evaluate wildlife habitat, improve the integration of habitat value and treatment function, develop cost-effective techniques for habitat management, and apply new techniques to the restoration of degraded natural riparian and wetland ecosystems. Technical assistance in design, operation, and maintenance of constructed wetlands is provided to client agencies in many western states.

Riparian Ecology. Riparian ecosystems in the arid West support large and diverse communities of plants and animals, improve water quality, attenuate floods, and provide recreational opportunities. However, the dependence of riparian systems on streamflow and their desirability for a number of human activities and uses make them vulnerable to human impacts. FORT scientists are studying the factors that generate change in riparian systems to improve the scientific basis for management decisions. For example, relations between river hydrology and the

distribution and abundance of riparian plant and animal species are being quantified at multiple sites in the Upper Colorado, Missouri, and Bill Williams River systems so that water resource managers can better understand the consequences of different flow scenarios. Other riparian research studies at FORT are addressing the role of vegetation in mediating flows of water and sediment, and the responses of riparian vegetation to dam removal and alluvial groundwater decline.

Good Reading

Mueller, G.A., and P.C. Marsh, 2002, **Lost, a Desert River and Its Native Fishes: A Historical Perspective of the Lower Colorado River**: Information and Technology Report USGS/BRD /ITR 2002-0010, 69 pp.

The Colorado River once had one of the most unique fish communities in the world, with 75 percent of its species found nowhere else. Settlement of the lower basin brought dramatic changes to both the river and its native fish. Those changes began more than 120 years ago as settlers began stocking non-native fishes. By 1930, non-native fish had spread throughout the lower basin and replaced native communities. All resemblance of historic river conditions faded with the construction of Hoover Dam in 1935 and other large water development projects. Today, few remember what the Colorado River was really like.

Seven of the nine mainstream fishes are now federally protected as endangered. Federal and state agencies are attempting to recover these fish; however, progress has been frustrated due to the severity of human impact. This report presents testimony, old descriptions, and photographs describing the changes that have taken place in hopes that it will provide managers, biologists, and the interested public a better appreciation of the environment that shaped these unique fish.

The entire publication is available online at http://www.fort.usgs.gov/products/publications/10026/10026.asp. A second printing of the book is due later this summer. For more information, contact Gordon_Mueller@usgs.gov.

Conferences and Meetings of Interest

Aug. 3-8, 2003: 88th Meeting of the **Ecological Society of America:** Uplands to Lowlands: Coastal Processes in a Time of Global Change, Savannah, GA. For information, visit http://www.esa.org/savannah/meeting.html

Aug. 10-14, 2003: **American Fisheries Society** 133rd Annual Meeting, Québec City, Québec, Canada. Contact Betsy Fritz, 301-897-8616, ext. 212; bfritz@fisheries.org.

Aug. 18-19, 2003: **Dam Removal 2003: Lessons Learned Workshop** presented by the Environmental & Water Resources Institute (EWRI) of the American Society of Civil Engineers, Baltimore, MD. For more information, visit their website at http://www.ewrinstitute.org/damremoval03/

Sept. 10-13, 2003: 93rd Annual Meeting of the **International Association of Fish and Wildlife Agencies**: Celebrating the Leopold Legacy, Madison, WI. For details, call 1-800-624-4960, or visit http://www.iafwa.org/2003%20Annual%20Meeting.htm

Nov. 4-8, 2003: **North American Lake Management Society** 2003: Protecting Our Lakes' Legacy, Mashantucket, CT. For details, call 608-233-2836, write nalms@nalms.org, or visit www.nalms.org.

Job Announcements

Supervisory Fishery Biologist, Cook, WA

The Supervisory Fishery Biologist directs all aspects of the large, complex research program at the Columbia River Research Lab in Cook, Washington. The incumbent supervises scientists and oversees the administrative staff and the maintenance of laboratory facilities and research systems.

Announcement Number: WR-2003-0233
Vacancy Description: Supervisory Fishery Biologist, GS-0482-14 (CS-DEU)
Open Period: 07/07/2003–09/15/2003
Series/Grade: GS-0482A-14/14
Salary: $79,344 to $103,150
Promotion Potential: GS-14
Hiring Agency: INTERIOR, Geological Survey
Duty Locations: 1 vacancy in Cook, WA

Remarks: This vacancy is being readvertised. If you previously applied to this announcement last May, you do not need to reapply. For more information, contact Cathy Shahan, 650-329-4109, or write cshahan@usgs.gov

Center Director for the Forest and Rangeland Ecosystem Science Center, Corvallis OR
The selectee will serve as the Center Director for the Forest and Rangeland Ecosystem Science Center (FRESC) and will be responsible for the management of a broad, multi-disciplinary program of biological research, inventory and mon-itoring, and information management.

Announcement Number: WR-2003-0269
Vacancy Description: Supervisory Biologist, GS-0401-15, (spb-DEU)
Open Period: 07/01/2003–08/01/2003
Series/Grade: GS-0401A-15/15
Salary: $93,330 to $121,330
Promotion Potential: GS-15
Hiring Agency: INTERIOR, Geological Survey
Duty Locations: 1 vacancy in Corvallis, OR
For more information, contact Sandy Borges, 650-329-4954; sborges@usgs.gov

USGS at Its BEST

Contaminant Effects on Fish: The Biomonitoring of Environmental Status and Trends (BEST) Program Evaluate Impacts of Contaminants in Large Rivers
by Jim Coyle

To better understand the impact of environmental contaminants on the Nation's biological resources, the Biomonitoring of Environmental Status and Trends (BEST) Program monitors the reproductive, physiological, and biochemical health of fish residing in large rivers. Beyond their economic, ecological, and intrinsic value, fish can provide indications of the health of surrounding ecosystems. Contaminants from discrete point sources (e.g., municipal or industrial facilities) and non-point sources (e.g., runoff from agricultural fields or urban settings) are absorbed by aquatic systems. Some classes of contaminants accumulate in the tissues of fish and are passed on to higher-order consumers (fish, wildlife, and humans); other contaminants do not. Both cumulative and non-cumulative contaminants, singly and in combination, can adversely affect the health, survival, growth, and reproductive success of exposed fish.

In the summer and fall of 2003, BEST research will document the levels of selected chemicals in fish tissue and evaluate the physiological and biochemical functions of resident fish species in the Colorado River Basin for indications of contaminant-related stress. Sources of contaminants in the Basin include agriculture and irrigation return flows, mining activities, and isolated point sources associated with municipal and industrial activities.

Catfish with eroded barbels.

Resident fish will be collected from 10 sites distributed throughout the Colorado River and its tributaries (Gila, Green, San Juan, Gunnison and Yampa Rivers). BEST methodology typically targets two guilds of fish species for collection. Predatory fish are targeted because they are frequently exposed to contaminants accumulated in the tissue of prey species. Bottom feeding fish are targeted because their dietary route of exposure includes contaminants sorbed to sediment, detritus, and plants. The target species for the Colorado study include the common carp and largemouth bass; other species, such as suckers, smallmouth bass or channel catfish may be substituted if target species are unavailable at a site.

When completed, study data and interpretative reports will be available on BEST's web page (www.best.usgs.gov). Fish contaminant and effects data will be assessed relative to contaminant sources in the Colorado River Basin. Findings from this basin and others evaluated by BEST will help government and private researchers prioritize research, improve resource managers' understanding of existing and emerging conditions in rivers, and provide regional and national benchmarks to help local investigators gauge the degree of contaminant impacts.

For more information on this project, contact Tim Bartish at (970) 226-9484 or tim_bartish@usgs.gov.

Final Fish Facts: One Big Minnow!

—From the *San Juan River Basin Recovery Implementation Program* Web site. For more, visit http://southwest.fws.gov/sjrip/default.htm.

The Colorado pikeminnow, formerly the Colorado Squawfish, is the largest American minnow (up to 6 feet long and 80 pounds in size). It is an elongated pike-like fish with a dusky-greenish, slender body with gold flecks on the dorsal (upper) surface. Its head is long and slender. The mouth is large and nearly horizontal, with slender teeth adapted for grasping and holding prey. It is the top native carnivore of the Colorado River system and a voracious predator. Its substantial size and migratory habits resulted in the use of common names such as "white salmon," and "Colorado salmon." It is listed as federally endangered by the U.S. Fish and Wildlife Service (32 FR 4001; March 11, 1967).

The fish occurs in the warm, swift waters of the big rivers of the Colorado Basin. Adults are migratory and inhabit pools and eddies just outside the main current. Young can be found in the backwater areas. Historically, the fish was found in the Colorado River and major tributaries in Arizona, New Mexico, Utah, Colorado, and Wyoming. Fossil evidence indicates that it may have used lakes as well as rivers. Populations also exist in the Colorado, Green, Yampa, Gunnison, and San Juan Rivers, tributaries of the Colorado River. Experimental, nonessential populations of Colorado pikeminnow have been introduced in the Verde and Salt River basins in Arizona (50 CFR Part 17.84b).

Colorado pikeminnow are adapted to rivers with seasonally variable flow, high silt loads, and turbulence. Young-of-the-year and juvenile Colorado pikeminnow live in shallow backwater areas, with little or no current over silt and sand bottoms. When they are about 8 inches in length, habitat preferences change with fish seeking deeper water with some velocity. Colorado pikeminnow can tolerate a broad range of temperatures from 35°C in the summer to lower than 10°C in winter. Food for young pikeminnow is mainly made up of zooplankton and insect larvae. The young become predatory at about 4 inches. Nearly 86 percent of the diet for juveniles is other fish.

Florence Barnes with pikeminnow caught in Lily Park in early 1930's. Photo courtesy of Katharine Rinker. Taken from Quartarone, F. 1993. Historical accounts of upper Colorado River Basin endangered fish. Colorado Division of Wildlife, Denver, CO.

Historically, the Colorado pikeminnow was an important food for humans. American Indians caught them. In 1871 the Powell Expedition reported capturing Colorado pikeminnow. In 1891 it was identified as the largest and best food fish on the Lower Colorado River. The species was widely sought by anglers prior to its decline.

Stream alteration and habitat fragmentation caused by dam construction, irrigation dewatering, channelization, and the introduction of competitive and predatory non-native fishes have led to a decline in the population. Other factors include changes in stream nutrients and lowered turbulence. Nutrients that once occurred in rivers are confined to reservoirs. Channelization below dams has reduced the number and size of backwaters and sloughs sought after by the Colorado pikeminnow and other native fishes for nursery and resting areas. The natural cycle of flood and drought has been replaced by stable discharges and water levels.