



Western Fisheries Research Center (WFRC)

Western Fisheries Science News



Silver carp are an invasive species from Asia found in the great rivers of the central US. Silver carp have been observed to jump in response to rocks thrown in the water, passing trains, geese taking off from the water, or just when they unexpectedly find themselves in a tight place. However, a speeding boat seems to especially frighten them and often dozens of the fish will be airborne at once, sometimes reaching heights of ten feet in the air. Photo by USGS.

Seismic Water Guns Studied as a Deterrent against the Invasion of Asian Carp in the Great Lakes

The Bighead Carp and Silver Carp are two Asian carp species that may pose a threat to the Great Lakes ecosystem if they move from the Mississippi River basin into the Great Lakes. Introduced into the Mississippi River basin during the 1970s, they spread across the basin. If these carp get into the Great Lakes they may deplete resources that are normally consumed by native fish species and could adversely affect the sport and commercial fisheries industries in the Great Lakes.

The current problem is how to keep the Asian carp from entering the Great Lakes. The Chicago Sanitary and Ship Canal (CSSC) was completed in 1990 and is the shipping link between the Great Lakes Waterway and the Mississippi River system, by way of the Illinois and Des Plaines Rivers. To keep Asian carp from entering into the Great Lakes an electric dispersal barrier (EDB) was installed within the CSSC and went into operation in 2002. This barrier was quickly followed by two additional barriers which were completed in 2009. The EDB is formed of steel electrodes that are secured to the bottom of the CSSC. A direct current pulse is sent through the electrodes creating an electric field in the water to discourage fish from crossing. However, research has shown that fish may be getting through the barrier and that additional deterrents are necessary.

In a recent [2015 publication](#), U.S. Geological Survey researchers from the Western Fisheries Research Center, (Continued on page 2)

Honors

USGS Scientist Receives Distinguished Service Award in Fish Health: On July 15, WFRC scientist Diane Elliott was awarded the S.F. Snieszko Distinguished Service Award (DSA) at the American Fisheries Society (AFS) Fish Health Section annual meeting in Ithaca, New York. The S.F. Snieszko DSA, considered the highest award given by the Section to a fish health professional, is presented to individuals to honor their outstanding career accomplishments in the field of fish health. Elliott is the third woman to receive this award and the fifth recipient from the WFRC. There have been 38 total previous recipients since it was first awarded in 1979. For more information, or contact Diane Elliott at dgelliott@usgs.gov or 206-526-6591.

Events

USGS Scientist Presents Webinar on Prioritizing Fish Passage: On July 21, WFRC scientist Rachel Reagan presented a webinar sponsored by the North Pacific Landscape Conservation Cooperative titled "Prioritizing restoration and enhancement of passage at stream-road crossings for fish." This NPLCC-funded project, co-led with USGS aquatic ecologist Jason Dunham, evaluated how climate change might impact the risk of culvert failure and how to best prioritize culvert replacements. For more information, contact Rachel Reagan at rreagan@usgs.gov or 509-538-2299, ext. 354.

USGS Scientists Host a Stakeholders Meeting on IHN Virus Landscape Ecology: On July 22, scientists at the WFRC hosted a stakeholders meeting to communicate results of a research project investigating drivers of virus emergence and displacement events in steelhead trout of the Columbia River Basin and coastal Washington State. The project is (Continued on page 2)

Upper Midwest Environmental Science Center (UMESC), and the Illinois Water Science Center discuss the use of seismic water guns as a deterrent against the invasion of Asian carp. The researchers evaluated the efficiency of a water gun array by studying the behavior of acoustically-tagged Bighead Carp and Silver Carp in a closed shallow pond. The water gun, which was developed in the 1980s, produces an acoustic pulse in the surrounding water by the implosion of a cavity created behind a jet of high-pressure water that is expelled from the gun ([Hutchinson and Detrick, 1984](#)).

The water guns were tested in an earthen pond located at UMESC. Two water guns were centered 10 yards from the south end of the pond and 10 yards apart. Fish responses to the firing of the water guns were monitored using an acoustic telemetry system.

Three trials consisting of three one hour periods were conducted. Each trial consisted of a (1) pre-firing, (2) firing, and (3) post firing period ([2015 publication](#)). These trials produced some interesting results.

- During the firing period, carp moved away from the guns and the associated higher pressure occurring in the vicinity of the guns.
- During the pre-firing period, both carp species were distributed through the pond. During the firing period the utilization distribution (UD) for carp contracted. However UD became more constricted through the three time periods in all trials for both species. The average area of UD during the firing period was approximately half of the area observed during the pre-firing period, with neither species resuming the total use of the pond after the guns stopped firing.
- The water guns did influence carp behavior, but as deployed in the pond environment, they were not 100 percent effective at preventing carp from moving past the water guns.

The research showed that water guns could be used as a barrier, but because they were not 100 percent effective they would need to be used with other types of barriers. The water guns could also be beneficial for herding, as the fish tended to school together as they moved away from the firing guns. The guns could, therefore, be helpful for removing fish and moving them to another location. Researchers concluded that more testing and evaluation needs to be completed before fully understanding the use of the water gun as a means to control Asian Carp.

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Events (Continued)

funded by the USDA as part of the joint NSF-NIH-USDA Ecology and Evolution of Infectious Disease program. Project co-investigators from USGS, University of Washington, and the Cary Institute of Ecosystem Studies presented findings on virus, host, and environmental factors that contribute to development of a landscape model of infectious hematopoietic necrosis virus transmission. Meeting participants included fish health staff representing the Northwest Indian Fisheries Commission, Oregon Department of Fish and Wildlife, and U.S. Fish and Wildlife Service regional fish health programs in Oregon, Washington, and Idaho. For more information, contact Gael Kurath at gkurath@usgs.gov or 206-526-6654.

Events

USGS at White Salmon Riverfest: On July 15, WFRC scientist Brady Allen gave a presentation to about 120 local residents at the 10th Annual White Salmon Riverfest near Husum, WA. Allen described the history of the Condit Dam removal and the changes in fish populations since the dam was removed. The White Salmon River Fest and Symposium focuses on the White Salmon River and the environment, community, and history that surrounds it. The river is considered an invaluable social, recreational, and economic benefit to those who call it home. For more information, contact Brady Allen at ballen@usgs.gov or 509-538-2299, ext. 356.

USGS Participates in American Fisheries Society Fish Health Section (AFS-FHS)

Meeting: On July 13-15, USGS personnel from the WFRC participated in the annual meeting of the AFS-FHS in Ithaca, New York. Center Director Dr. Jill Rolland took part in the Section Executive Committee meeting and was awarded a Certificate of Appreciation for seven years of service as the outgoing AFS-FHS Secretary-Treasurer. Dr. Diane Elliott gave a presentation describing current research on the parasite *Ichthyophonus* in Yukon River Chinook salmon, and also gave an invited talk at the conference banquet. For more information, or contact Diane Elliott at dgelliott@usgs.gov or 206-526-6591.

Publications

- Adams, N.S.,** C.D. Smith, J.M. Plumb, G.S. Hansen, and J.W. Beeman. 2015. An evaluation of fish behavior upstream of the water temperature control tower at Cougar Dam, Oregon, using acoustic cameras, 2013: [U.S. Geological Survey Open-File Report 2015-1124](#), 62 p. DOI: 10.3133/ofr20151124.
- Foley, M.M.,** J.J. Duda, M.M. Beirne, R. Paradis, A. Ritchie, and J.A. Warrick. 2015. Rapid water quality change in the Elwha River estuary complex during dam removal. [Limnology and Oceanography \(Early View\)](#). DOI: 10.1002/lno.10129. <http://onlinelibrary.wiley.com/doi/10.1002/lno.10129/full>

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