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Western Fisheries Research Center (WFRC)

Western Fisheries Science News

A mesocosm deployed in Upper Klamath Lake, complete with antenna arrays that are powered by solar panels. Inset: Underwater image of fish in a mesocosm. Photo by USGS.

Mesocosms Give Us the Fish-eye View into the Lives and Deaths of Endangered Suckers

New insights into the secret lives of juvenile Lost River suckers are being made possible through the use of mesocosms, underwater experimental net pens.

Lost River and shortnose suckers— long-lived members of the family Catostomidae and endemic to the Klamath River Basin— are listed as endangered under the Endangered Species Act and are a high priority for recovery. Recent research by the Western Fisheries Research Center (WFRC), Klamath Falls Field Station (KFFS) indicates that despite relatively high adult survival in most years, both species have experienced substantial decreases in abundance in Upper Klamath Lake because losses from mortality have not been balanced by recruitment of new individuals to spawning populations. The vast majority of Lost River and shortnose suckers presently making up spawning populations were hatched in the early 1990s. As the majority of shortnose suckers reach the maximum age reported for the species of about 30 years, their populations are expected to critically decline. Populations of Lost River suckers, that can live to be 50 years old, may have more time. Research indicates that recruitment of new spawners is limited by high first year mortality, rather than emigration from the lake or some other factor. Identifying the specific factors that (Continued on page 2)

Events

USGS Scientist Presents Tidal Wetland Research at Future of Our Salmon Technical Workshop: On August 16-18, 2016, fish biologist Collin Smith presented his research on using acoustic camera technologies to monitor fish behavior and movements in response to changing hydrodynamic conditions at the entrance to a tidally influenced wetland, at the workshop in Spokane, WA. The event focused on technical aspects of floodplain management within the Columbia River Basin, and was convened by the Columbia-River Inter-Tribal Fish Commission. For more information, contact Collin Smith, csmith@usgs.gov, 509-538-2919.

USGS Hosts Visit by Congressman Kilmer: On August 12, 2016, the WFRC Marrowstone Marine Field Station hosted a visit from Congressman Derek Kilmer (Washington's 6th District). Kilmer was particularly interested in learning about some of the disease issues that impact herring in the Puget Sound. For more information, contact Jill Rolland, jrolland@usgs.gov, 206-526-6291.

White House Recognition of Prize Competition Efforts: Prize competition efforts were given recognition in a White House blog release. One agency in particular, the U.S. Bureau of Reclamation (BOR), within the DOI established the Water Prize Competition Center, an interagency center that is working with other Federal agencies to collaboratively design, launch, and judge prize competitions for innovative solutions related to the several mission-critical areas including infrastructure sustainability, ecosystem restoration, and water availability was mentioned. Scientists (Continued on page 2)

contribute to or cause juvenile sucker mortality is critical for effective management and eventually the recovery of both sucker species.

Concerned about fish health and condition, KFFS researchers Summer Burdick and Danielle Hereford teamed up with WFRC fish health specialists Diane Elliott, Carla Conway, and Maureen Purcell to investigate the health and condition of juvenile suckers relative to water quality and fish communities in Upper Klamath. They also collaborated with microbiologist Sara Eldridge and hydrologist Liam Schenk from the USGS Oregon Water Science Center to come up with the use of experimental mesocosms that would allow them to examine the natural environment under controlled conditions, providing a link between field surveys and controlled laboratory experiments.

The mesocosms were designed and built by Todd Perry and his team at KFFS. They have been deployed in three areas of Upper Klamath Lake, complete with a large net pen, PVC frame, floating dock, Passive Integrated Transponder (PIT) tag antennas, bird-control netting and water quality monitors. Weekly microcystin and ammonia measurements are compared to juvenile sucker mortality rates to determine if there is a relationship. Hatchery reared juvenile Lost River suckers were PIT-tagged, placed in the mesocosms in July of this year, and their vertical movements are being continually monitored using PIT tag technology. The mesocosms are checked three times per week for mortalities and moribund (fish close to death), which are taken, preserved and sent for histological analyses.

The mesocosms have made it possible to track daily movement patterns, identify precise (within several hours) timing of mortality, and to capture some suckers near death. Teaming up with WFRC's headquarters has allowed scientists to learn more about the environmental stresses and potential causes of mortality for suckers in the mesocosms. Having this type of insight is valuable when considering fish in the wild that are harder to observe. As the project wraps up, researchers are beginning to evaluate the data. One preliminary observation is that there appears to be a difference in survival among sites, which may lead to clues about causes of mortality (more information will be available next spring).

This tool is also allowing the researchers to start thinking about some new questions associated with fish behavior. Researchers have deployed Go-Pro cameras to capture some unique footage of suckers within the mesocosm, which is allowing researchers to see, as a fish, the changes in behavior and condition. Gaining this type of insight will be instrumental in guiding fish recovery efforts.

For more information, contact Danielle Hereford, dhereford@usgs.gov or Summer Burdick, sburdick@usgs.gov.

Events (Continued)

from the WFRC have been working directly with the BOR on many aspects of these competitions. For more information, contact Patrick Connolly, pconnolly@usgs.gov, 509-538-2969.

In the News

Research scientist Theresa "Marty" Liedtke from the WFRC was featured in an article of the Encyclopedia of Puget Sound. The article titled "The secret lives of forage fish: Where do they go when we aren't looking?" describes research being done on important forage fish to help understand how many there are, where they go, and how we can preserve their populations for the future. For more information, contact Theresa Liedtke, tliedtke@usgs.gov, 509-538-2963.

On August 2, 2016, WFRC scientist Jim Hatten was featured on National Public Radio KJZZ (Phoenix, AZ), discussing recent research about how climate change may affect birds and reptiles in the Southwest. For more information, contact James Hatten, jhatten@usgs.gov, 509-538-2932.

On July 16, 2016, research by WFRC scientist Jim Hatten and co-authors was featured in the Summit County Citizens Voice about how climate change may affect birds and reptiles in the Southwest. For more information, contact James Hatten, jhatten@usgs.gov, 509-538-2932.

Publications

Kock, T.J., B.K. Ekstrom, T.L. Liedtke, J.D. Serl, and Mike Kohn. 2016. Behavior patterns and fates of adult steelhead, Chinook salmon, and coho salmon released into the upper Cowlitz River Basin, Washington, 2005-09 and 2012: U.S. Geological Survey Open-File Report 2016-1144, 36 p.

Furey, N.B., S.G. Hinch, M.G. Mesa, and D.A. Beauchamp. 2016. Piscivorous fish exhibit temperature-influenced binge feeding during an annual prey pulse. Journal of Animal Ecology 85(5): 1307-1317.

Duda, J.J., Wieferich, D.J., Bristol, R.S., Bellmore, J.R., Hutchison, V.B., Vittum, K.M., Craig, Laura, and Warrick, J.A., 2016, Dam Removal Information Portal (DRIP) — A map-based resource linking scientific studies and associated geospatial information about dam removals: U.S. Geological Survey Open-File Report 2016-1132, 14p.

USGS Western Fisheries Research Center
6505 N.E. 65th Street
Seattle, Washington 98115
http://wfrc.usgs.gov/ 206-526-6282