

The Water bLog

a newsletter of the
Utah Center for Water Resources Research
at Utah State University

Welcome!

The Water bLog is the semi-annual newsletter of the Utah Center for Water Resources Research (UCWRR), housed at the Utah Water Research Laboratory. The Center supports the development of applied research related to water resources problems in Utah and promotes instructional programs that will further the training of water resource scientists and engineers. Each issue of The Water bLog reports on a small selection of the current or recently completed research projects conducted at the center. More information is available online at:

<http://uwrl.usu.edu/partnerships/ucwrr>

Message from the Director



Mac McKee, Director

For more than 50 years, the UCWRR has been conducting water-related research and finding practical solutions to water resources problems in Utah and beyond.

As we wrap up the 2015 'Year of Water' celebrations with Utah State University and the Utah Water Research Laboratory, we are delighted with the positive feedback we have received for this focus on water in all its forms and functions.

This issue of the Water bLog highlights projects in Utah that address the challenges of both surface water and groundwater. One project engineered a solution that will extend the usefulness of a fish barrier in Utah's Virgin River that was found to be ineffective at very high river flows. The other project addressed the more urban challenge of optimizing aquifer recharge and aquifer storage and recovery to better manage variable water supplies along the Wasatch Front.

These projects represent only a tiny fraction of the active research underway at the UCWRR aimed at solving water-related natural resources problems throughout Utah, the nation, and the world. ■

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RESEARCH HIGHLIGHT

Virgin River Fish Barrier Modification Model

UCWRR researchers designed and implemented physical and numerical models to develop a modification to the Virgin River fish barrier that would prevent non-native red shiner from migrating upstream during flood conditions

Red shiner is a non-native fish species in Utah's Virgin River that often out-competes desirable native fish species for food and habitat. Incremental chemical treatments starting in 1984 have proven to be successful in eradicating red shiner in specific reaches of the river. Structures such as the Virgin River Gorge fish barrier constructed in 2009 about 20 miles southwest of Saint George, Utah, protect native species by preventing red shiner from migrating further upstream. This barrier was effective



The current Virgin River Gorge fish barrier

until September 2014 when a major storm event elevated the river flow rates beyond the fish barrier's ability to function as it was originally designed. After the flood event, red shiner were again found in significant numbers upstream of the barrier.

Research

UCWRR researchers at the Utah Water Research Laboratory were commissioned to implement physical and numerical model studies of the Virgin River Gorge fish barrier to:

- Determine the hydraulic conditions that allow fish to migrate upstream past the barrier.
- Evaluate viable structural modifications to the barrier that would increase its effectiveness at the higher flow rates.

The 10:1 scale physical model study showed that, for existing conditions at the barrier, the right-side bank (looking downstream) experiences low velocities along the embankment edge over a certain range of river flow rates in the downstream shadow of the construction access road, thereby providing fish passage during flood events. Sedimentation deposits left at the toe of the construction access road after flood events provide hard evidence of this finding.

A wall was designed to increase flow velocities at this critical location during high flows. Several wall modification options were tested in the physical model, fine-tuned in the numerical



The Virgin River Gorge fish barrier during a flood event and sedimentation near the fish barrier following a flood event

model, and verified again in the physical model. The final wall design will help accelerate and concentrate flood flows so that fish are effectively blocked from migrating upstream during flood conditions. Design team members have chosen to incorporate the proposed wall in addition to contouring the embankment slopes of the river where the barrier exists so that all resting areas for fish in the reach are eliminated.

Benefits to the State

Endangered native species populations such as the Virgin River chub and woundfin are beginning to recover due to the fish barrier and other efforts. These modifications to the Virgin River Gorge fish barrier will:

- Provide a cost-effective way to ensure continued functioning of the existing fish barrier.
- Significantly reduce the possibility of red shiners migrating upstream beyond the barrier during flood events to protect endangered native fish species from predation by non-native red shiner.

Looking to the Future

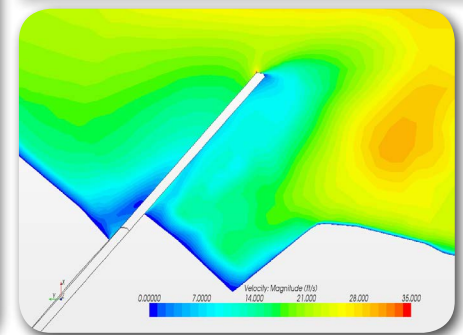
Protecting native fish species from invasive red shiners is a long-term goal of the Washington County Water Conservancy District. This research helps facilitate that goal. ■

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Physical and numerical models at the Utah Water Research Laboratory test the effectiveness of structural modifications to the Virgin River Gorge fish barrier





USU Year of Water 2015 Celebrations

Utah State University (USU) and the Utah Water Research Laboratory (UWRL) have been celebrating 2015 as the Year of Water. This year is also the 50th anniversary of the dedication of the UWRL, home of the Utah Center for Water Resources Research (UCWRR). Student and faculty have been busy this fall presenting research and welcoming visitors to the facility. Here are just a few highlights from our celebrations.

Public Open House

On Thursday evening, September 10th, more than 200 visitors toured the UWRL building, where students and faculty presented demonstrations and discussed their ongoing research. In all, the event featured 34 displays at 21 stations in two buildings and on all three floors of the laboratory, where visitors could learn about the important cutting-edge water-related research going on here.



Other Events

Throughout this Year of Water 2015, UCWRR Director, Mac McKee, has welcomed numerous dignitaries and other visitors and given dozens of tours and presentations. A visiting group of Environmental Engineering alumni and emeriti included NASA astronaut Mary Cleave, who received her Ph.D. here at USU in 1980.



Alumni Get Together

On Saturday, October 3rd, alumni and current students gathered for a casual get-together to renew old ties and introduce new research. Some of our alumni were part of our history from the very beginning! The get-together was a great way to celebrate our past and our future at the same event.



We have also been pleased to partner with other colleges and departments across campus, such as Agriculture and Applied Sciences and the Caine College of the Arts to celebrate and reemphasize



Future Issues

Research Highlights:

"Pharmaceuticals and personal care products in East Canyon Creek, Utah"

(UCWRR researchers are investigating the extent and seasonal variation of these pollutants in the sediments, organisms and aquatic plants downstream of the Snyderville wastewater treatment plant)

"Mitigating methane emission from septic systems"

(UCWRR researchers have developed a compost biofilter system to convert methane to carbon dioxide, which can then be used by plants growing on the compost)

the vital importance of water to all facets of nature and society.



Although this 50th anniversary has allowed us focus on the past in many ways, our view remains solidly on the future of water research. Our faculty have traveled far and wide conducting and presenting their research and sharing their extensive water resources expertise. ■



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