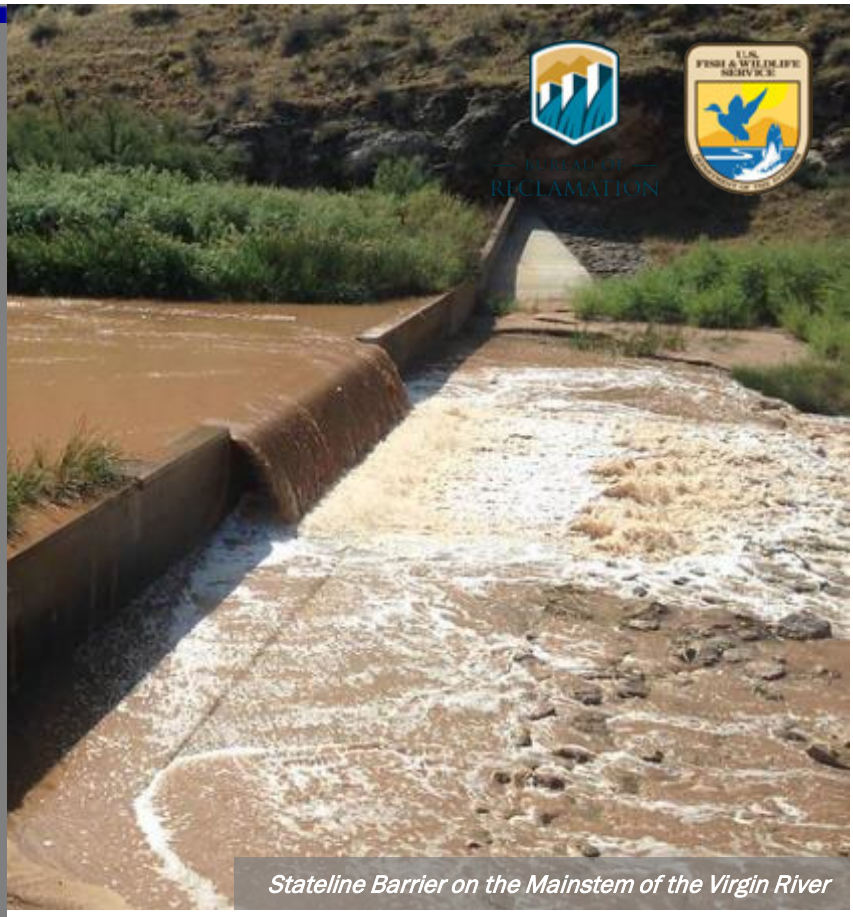
RESTORATION

Invasive Red Shiner Eradication in the Virgin River of Southwestern Utah



Stateline Barrier on the Mainstem of the Virgin River

The Virgin River flows through Utah, Arizona, and empties into Lake Mead, Nevada. Native fishes have been displaced from stretches of the Virgin River that contain non-native Red Shiner (*Cyprinella lutrensis*). The Virgin River Resource Management and Recovery Program (VRP), initiated in 2002, focused on eradicating Red Shiner to ensure persistence of native species in the Virgin River in Utah. To facilitate eradication efforts, partners constructed multiple fish barriers to prevent Red Shiner movement upstream. Over the last two decades, partners implemented intensive eradication efforts using rotenone (a broad-spectrum piscicide) and mechanical removal.


Project Location

KEY ISSUES ADDRESSED

Competition for food, predation on native fishes, and high reproductive rates of Red Shiner can overwhelm native species. Between 1997 and 2014, Utah Division of Wildlife Resources (UDWR) and VRP eradicated Red Shiner from over 40 miles of stream in the Virgin River Basin in Utah. The next phase targeted downstream habitat in Utah and Arizona. In 2014, partners conducted a rotenone treatment that eradicated Red Shiner between the Stateline Barrier and the Virgin Gorge Barrier (VGB); however, modifications made to the VGB for regulatory compliance allowed for recolonization following high flow events. In 2015, Utah State University recommended modifications to the VGB following hydraulic modeling. Partners completed these modifications and treated the reach again in 2018. This treatment successfully eradicated Red Shiner adults; however, eggs fertilized prior to the treatment persisted, and newly hatched Red Shiner recolonized the reach after treatment.

PROJECT GOALS

- Implement rotenone treatments from the Virgin River in Utah and ~15 miles of the Virgin River Gorge in Arizona that target all Red Shiner life stages
- Monitor treated reaches to determine eradication success

NATIVE SALVAGE

Before conducting rotenone treatments, biologists moved native fishes upstream or downstream of the treatment reach so the fish would not be affected by the chemical treatment.

Red Shiner from the Virgin River

PROJECT HIGHLIGHTS

Planning for Efficiency: Partners mapped all Red Shiner habitat and potential Red Shiner refuge areas prior to treatment. To achieve target toxicity, partners also determined flow volume of the Virgin River and all freshwater inflows in the treatment reach. This was necessary to calculate precise rotenone concentrations for chemical treatment.

Eradication Techniques: Partners used fish barriers to segment the Virgin River into manageable reaches to eradicate Red Shiner. In 2021, partners conducted two rotenone treatments, two weeks apart, to ensure Red Shiner larvae that hatched after the first treatment were killed. As a result of these treatments, partners successfully eradicated Red Shiner from the Virgin River in Utah and approximately 15 miles of the Virgin River in Arizona.

Post-Treatment Monitoring: Post-treatment monitoring was essential to evaluate the success of the 2021 rotenone treatment. Results from full pass distribution seining determined that the treatment was 100% successful at eradicating Red Shiner. This monitoring also revealed that native fish species including Woundfin and Virgin River Chub rapidly recolonized the treatment reach.

Collaborators

- Virgin River Resource Management and Recovery Program
- Utah Division of Wildlife Resources
- Arizona Game and Fish Department

LESSONS LEARNED

Collaboration is the biggest strength of this project and the primary reason for its success. Each collaborator brought manpower, funding, and other resources to the project. Previously established relationships among federal, state, and local partners were critical for the success of rotenone treatments. Under the VRP, partners conducting rotenone treatments utilized an already built collaborative space that streamlined the process to receive support for rotenone treatments. Successful achievement of the 2021 treatment highlights the importance of collaboration, flexibility, persistence, and perseverance during the implementation of invasive species eradication efforts.

Man-made barriers were critical for segmenting the river into manageable reaches and preventing upstream recolonization of treated sections. The VGB design is critical for preventing Red Shiner recolonization because it prevents upstream colonization during flooding. Despite the success of these eradication efforts, the threat of upstream recolonization is constant, and active management will be necessary to ensure successfully treated reaches are not recolonized.

NEXT STEPS

- Continue downstream Red Shiner eradication into Arizona and Nevada
- Recover populations of Woundfin and Virgin River Chub in the Virgin River
- Maintain an early detection monitoring program to respond rapidly to Red Shiner recolonization or other invasive species threats

For more information on this project, contact Martin Schijf: martinschijf@utah.gov

Virgin Gorge Barrier on the Mainstem of the Virgin River

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Photos courtesy of UDWR
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