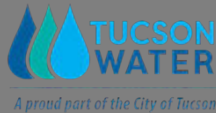


RESTORATION

Ecological Response to Restored Flows in the Urban Santa Cruz River

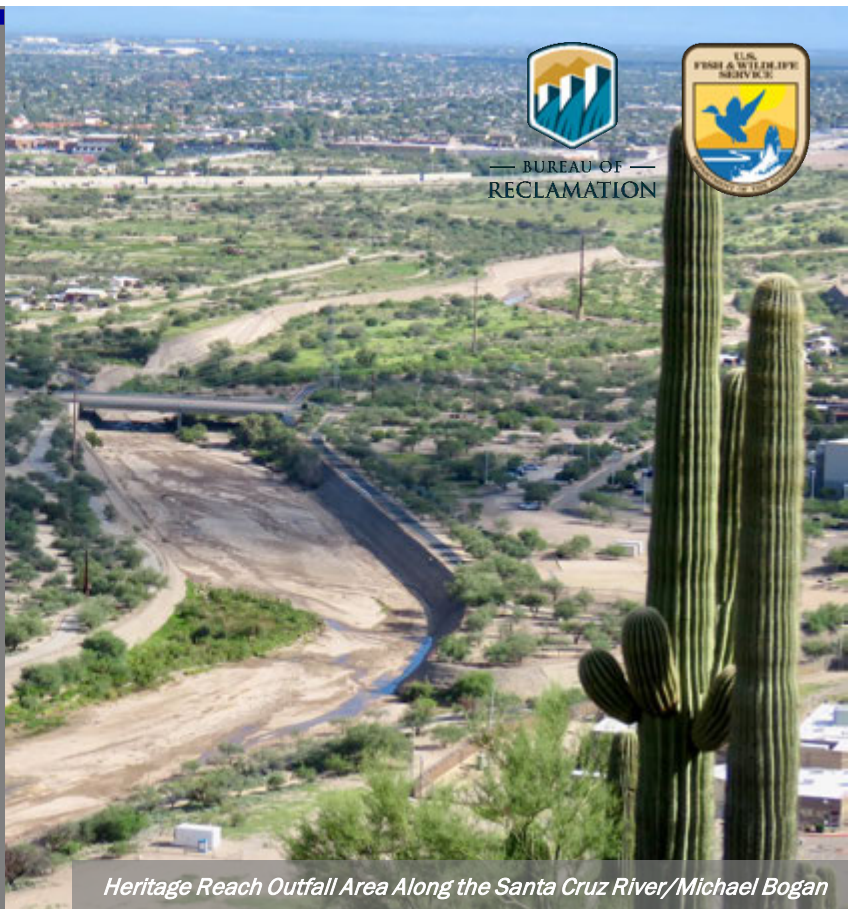


THE UNIVERSITY OF ARIZONA
COLLEGE OF AGRICULTURE & LIFE SCIENCES
**Natural Resources
& the Environment**

Most river systems in the American Southwest have suffered reduced, lost, or increasingly variable flows. Common drivers include dams/diversions, groundwater pumping, land use change, and reduced flows due to climate change. The Santa Cruz River originates in southeastern Arizona and flows through the city of Tucson. Loss of flows in the river led to decline or extirpation of most of its historically present native aquatic and riparian species. In 2019 Tucson Water, the city's water managers, began using reclaimed water to return flows to the Heritage Reach ('the reach') of the Santa Cruz River near downtown Tucson. Researchers studying the restored flows noted expedient ecological responses.



Project Location



Heritage Reach Outfall Area Along the Santa Cruz River/Michael Bogan

KEY ISSUES ADDRESSED

The Santa Cruz River was widely dewatered across most of its perennial reaches by 1940 due to development in the basin. Subsequent habitat loss led to the extinction of the Santa Cruz Pupfish (*Cyprinodon arcuatus*) and contributed to the decline of other species like the Gila Topminnow (*Poeciliopsis occidentalis*). The Southwest is expected to experience greater drought intensity and warmer temperatures due to climate change that may exacerbate habitat loss. Managed urban ecosystems are likely to play an increasingly important role in biodiversity conservation. However, the potential benefits of rewatering urban rivers, and best practices for their management, are not yet well understood. The Heritage Project is a managed urban ecosystem that provides drought-resistant habitat for native species and an example for future rewatering projects.

PROJECT GOALS

- Improve habitat availability for native species
- Provide novel habitat for species of conservation concern
- Monitor and adaptively manage the reach to inform ecological knowledge of, and produce best management recommendations for, urban rewatering efforts

DON'T DREAD DREDGING

In 2020, managers and researchers constructed and maintained an artificial wetland to help aquatic species return to the Heritage Reach after sediment dredging took place to reduce flood risks.



Gila Topminnow in the Heritage Reach/Michael Bogan

PROJECT HIGHLIGHTS

Ecological Response and Monitoring: Shortly after flows were returned, University of Arizona researchers began monitoring the response of vegetation, birds, invertebrates, and other wildlife in the reach through visual surveys, camera traps, and citizen science initiatives. Within three hours of the initial water release, seven species of dragonfly and damselfly were observed in the reach. Additionally, three toad species and one snake were observed shortly after rewatering, and species diversity continues to increase with time.

Topminnow Reintroductions: Managers at the Arizona Game and Fish Department and the U.S. Fish and Wildlife Service enrolled the Heritage Reach into a Safe Harbor Agreement under the Endangered Species Act, allowing the reintroduction of Gila Topminnow to the reach. The first reintroductions occurred in October 2020.

Drought-Resistant Habitat: Managers at Tucson Water made the Heritage Reach a priority for water allocation given the importance of the habitat it now provides. Because the reach is fed by effluent from the City of Tucson, it is unlikely to be adversely affected by drought in the future.

Collaborators

- City of Tucson, Tucson Water
- Michael T. Bogan, SNRE, University of Arizona
- Arizona Game and Fish Department

CCAST Author: Nicolas Katz, University of Arizona, November 2021.

For more information on CCAST, contact Genevieve Johnson (gjohnson@usbr.gov) or Matt Grabau (matthew_grabau@fws.gov).

Visit CCAST:



LESSONS LEARNED

Diverse native taxa quickly recolonized the Heritage Reach following rewatering. Managers suspect that the reach was particularly attractive to dispersing individuals because rewatering occurred in a drought year, and nearby riparian habitat is sparse. Nonnative vegetation and aquatic species pose an ongoing management challenge in the Heritage Reach.

Managers found inclusion of the public to be critical to the success of the Heritage Project. Efforts to increase public engagement in the Heritage Project increased after a large turnout at the rewatering ceremony. Public engagement was facilitated through social media, collaboration with local conservation organizations, and direct communication through in-person events like public hearings.

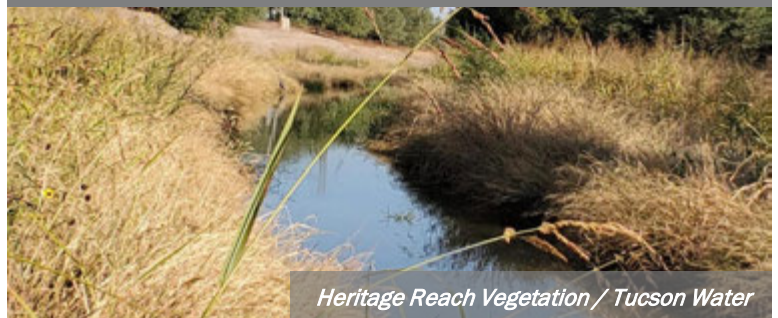
A diverse set of stakeholders are now involved in the Heritage Project. Managers suggest that establishing a list of potential collaborators early on, utilizing existing relationships to meet goals, developing short- and long-term goals, and vision planning across timescales were critical steps taken to ensure the success of the project.

NEXT STEPS

- Continue ecological monitoring of the Heritage Reach, including monthly plant, aquatic insect, bird, and wildlife surveys.
- Develop a full list of historical ecological communities of the Heritage Reach to inform future reintroductions
- Continue public engagement with and stewardship of the Heritage Reach

For more information on this project, contact Michael Bogan:

mbogan@email.arizona.edu



Heritage Reach Vegetation / Tucson Water