

# a living river

CHARTING SANTA CRUZ RIVER CONDITIONS  
NORTHWEST TUCSON TO MARANA—2017 WATER YEAR



THE RETURN OF THE ENDANGERED GILA TOPMINNOW



SONORAN  
INSTITUTE



PIMA COUNTY



# THE SANTA CRUZ RIVER

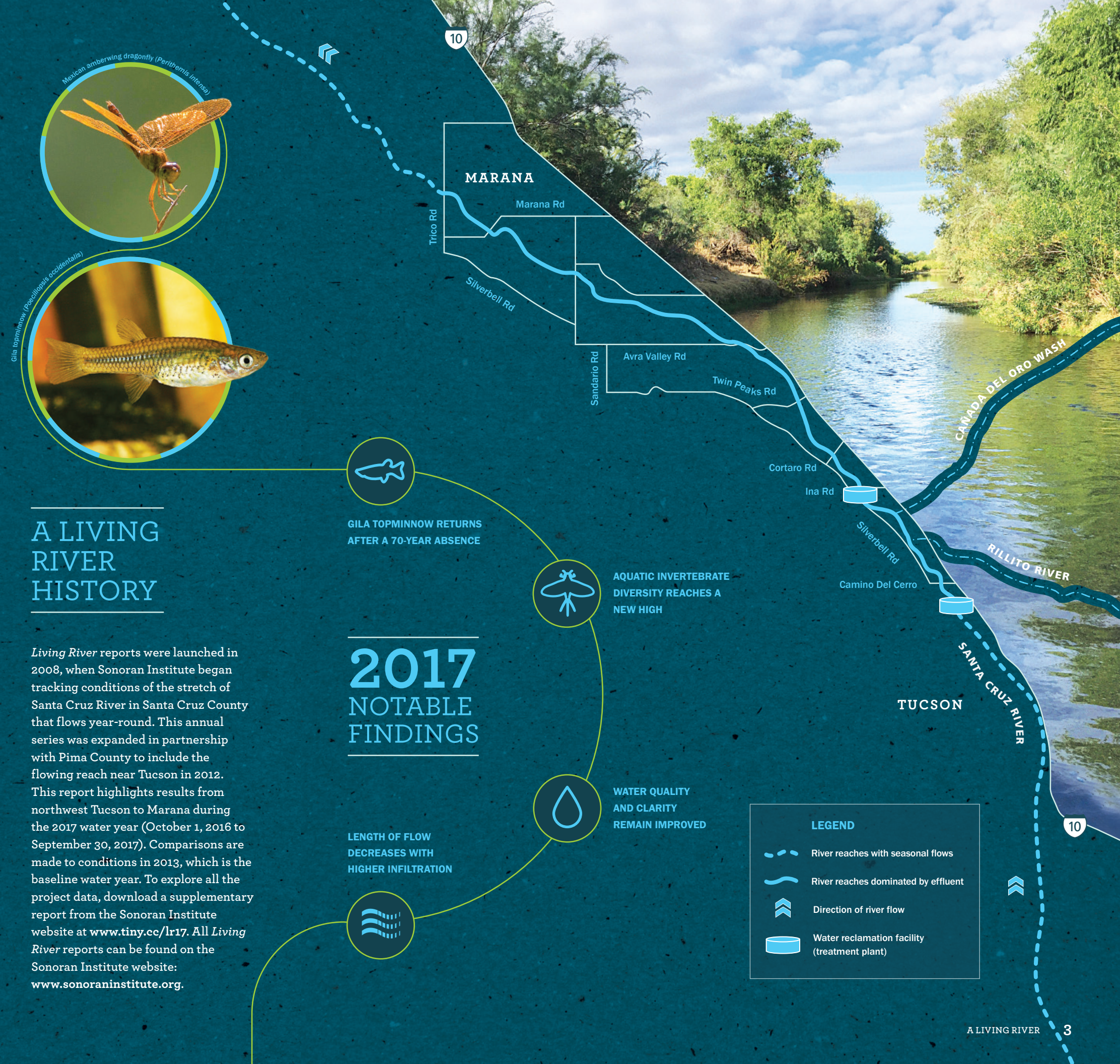
## A LIVING ECOSYSTEM

More than 70 years ago, the Gila topminnow disappeared from its native waters in the Santa Cruz River in Pima County. The river's lack of water flows and poor water quality over much of the last century had pushed this endangered species to the brink. Then, in November 2017, our research team made an exciting discovery: the Gila topminnow had returned to the stretch of the Santa Cruz River near Tucson! How is this possible, you might wonder? For many, the river that has sustained communities in this region for over 12,000 years had faded from view. Increasingly, however, Pima County residents are rediscovering the Santa Cruz. They are realizing that part of the river still flows year-round, and are enjoying the new vitality and recreational opportunities that come with the river's improving health.

The Santa Cruz River from northwest Tucson to Marana provides Pima County's primary wetland habitat, with river flows sustained year-round by the release of effluent—highly treated wastewater. Pima County has been releasing this recycled water into the river since the 1970s, so why is the Gila topminnow only reappearing now?

In December 2013, Pima County invested over \$600 million to upgrade the wastewater treatment process, dramatically improving water quality in the river. This improved water quality can now better support a rare aquatic environment along the river. It also enhances a river park that helps reconnect our community to our rich river heritage.

Will the river continue to improve? Will other native fish return to the river next year? River and water resource management is complex, and continued release of water into the river is not guaranteed. What is certain is that the Santa Cruz River is alive and significantly healthier. There is a lot to celebrate!



# WELCOME BACK GILA TOPMINNOW!



## RIVER HEALTH CONTINUES TO IMPROVE IN 2017 WATER YEAR



### FISH DIVERSITY INCREASES

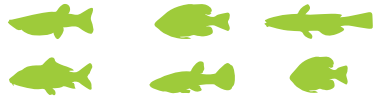
In 2013, only one fish species was found, the non-native western mosquitofish. In 2017, six species were found in the river, most notably the endangered Gila topminnow. This native fish hasn't been observed near Tucson in over 70 years. Historically, the Santa Cruz River supported several native fish species: Gila topminnow, Sonora sucker, longfin dace, and a pupfish species that went extinct when the river ceased to have year-round flow.

2013



1

2017



6

Number of fish species



### AQUATIC INVERTEBRATE DIVERSITY AT HIGHEST LEVEL

Most aquatic invertebrates are sensitive to pollution and are thus a key indicator of wetland health. That is, the more pollution-sensitive species present, the healthier the river. The number of species found has more than doubled since 2013. Further, the percentage of the community comprised of pollution-sensitive species has increased.

Aquatic invertebrates are measured at four locations along the river. Data from these sites are averaged to characterize the river as a whole.

2013



5%

2017

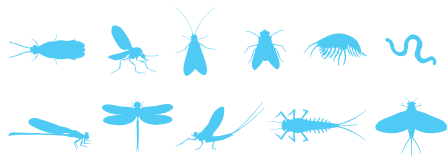


34%

Pollution-sensitive species  
average percent of  
invertebrate community



5



11

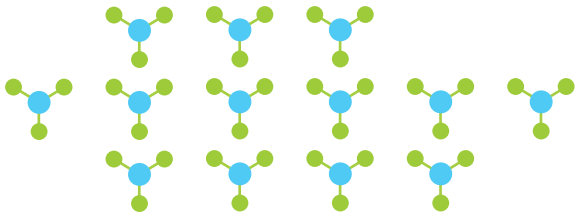
Number of species  
average



### WATER QUALITY AND CLARITY IMPROVE

The primary reason for increases in fish and aquatic invertebrate diversity is improved water quality, resulting from the water reclamation facility upgrades. There are many ways to evaluate water quality, but the changes in levels of ammonia (a form of nitrogen toxic to fish at high concentration) are perhaps most illustrative. Ammonia is more common in rivers dominated by effluent. In the Santa Cruz, concentrations declined more than tenfold, from 13 mg/L in 2013 to just 1 mg/L in 2017.

2013



13 mg/L ammonia

2017



1 mg/L ammonia



Common carp (*Cyprinus carpio*)



Mayfly (*Ephemeroptera*)



### MILES OF FLOWING RIVER DECREASE

In 2013 the river flowed daily past Trico Road, the end of the 23-mile study area. Now flow extent is more variable, as demonstrated by the 67 days in 2017 when the river didn't reach Trico Road. River flow now ranges between 21 and 23 miles. The minimum flow extent, measured in June when miles of flow are at their lowest, dropped by 7%. That is, at its shortest point, the flow only reached 21.4 (or 93%) of the maximum 23 miles. Reduced flow extent is actually a positive sign, since it is primarily due to the cleaner water infiltrating more easily into the riverbed and replenishing the aquifer.

2013



23 miles in June 2013

0 dry days

2017



21.4 miles in June 2017

67 dry days

Miles of river flow

Days river dry at  
Trico Road



# CELEBRATING LIFE ALONG OUR RIVER

## YOUTH SHOW THEIR LOVE OF THE RIVER

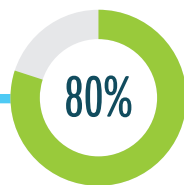
Do you love science, the river, and creative kids? You'll enjoy the Living River of Words Youth Poetry and Art exhibit. Some of the final selections are shown on this page and the back cover, and were included in an exhibit traveling throughout Pima County. Living River of Words offers local schools the opportunity to participate in a program that encourages young people to explore how water moves through the landscape and to learn about the connections that plants, animals, and people have with water. Sign up and learn more at: [www.pima.gov/nrpr](http://www.pima.gov/nrpr).

## RESIDENTS STRESS IMPORTANCE OF A HEALTHY RIVER HABITAT

What do we want to see along the Santa Cruz, and what are the top management priorities? These are some of the questions that Sonoran Institute recently asked residents across Pima County. The answers are timely, because Pima County Regional Flood Control District has begun developing a management plan for the Santa Cruz River, starting with the Grant Road to Trico Road section. While the Flood Control District's responsibility is to minimize flood risk, residents indicated their desire to combine flood control with environmentally beneficial actions such as maximizing wildlife habitat, something 80% of participants agreed was a high priority for the river.



Maximize aquifer recharge and restore upstream tributaries



Maximize wildlife habitat

## "GILA TOPMINNOW RETURNS" ARTWORK

Haven't had a chance to explore the river yet? Now you have one more reason. Get out there and see new artwork celebrating the return of the Gila topminnow. Through a collaboration between Pima County, Sonoran Institute, and Tucson artist Kimi Eisele, the Chuck Huckelberry Loop multi-use path now features stenciled artwork of the fish and the story of its return. Ride your bike on the east side of the river, north from Speedway, to find the fish. Use #GilaTopminnow on social media to tag art and experiences along the river that celebrate the Gila topminnow.

## BATS COLONIZE NEW INA ROAD BRIDGE

If you love watching the bats fly out of the bridge at Campbell Road along the Rillito River, you'll soon be able to enjoy this spectacular aerial display along the Santa Cruz River too. Since new bridge construction doesn't include the expansion joints that provide good bat habitat, the design team for the new bridge at Ina Road included bat boxes. So many Mexican free-tailed bats filled the initial boxes that more were installed, doubling bat boxes from 7 to 14.

## ACKNOWLEDGEMENTS

Sonoran Institute and Pima County prepared this report with funding from U.S. Environmental Protection Agency, Pima County Regional Wastewater Reclamation Department, Pima County Regional Flood Control District, and community individuals.

## IMAGE CREDITS

**cover** left: damselfly by Brian F. Powell; right: Gila topminnow by Bruce D. Taubert. **2:** Song sparrow by Trevor Jones; Mexican amberwing dragonfly by Doris Evans; Gila topminnow by Bruce D. Taubert. **3:** Santa Cruz River by Harris Environmental Group, Inc. **4:** Gila topminnow by Bruce D. Taubert. **5:** Common carp by Claire Zugmeyer/Sonoran Institute; Mayfly by Stana; Daniel Bunting by Randy Metcalf/Pima County. **6 top:** *The Moonlight* by Audree Jenshak, age 8, Agua Caliente Elementary — Ms. McKinney; Kimi Eisele by Brian F. Powell; bottom: artwork by Sydney Knoll-Grass, age 15, Tucson High School — Ms. Jenness. **7:** Santa Cruz River ©Bill Hatcher/Sonoran Institute, 2018.

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## WATER NOT GUARANTEED TO STAY IN THE RIVER

Flowing water, fish habitat, native willows for birds, a green corridor to recreate along—all this is only possible with the release of effluent into the river. In 2017, Pima County water reclamation facilities released approximately 40,200 acre-feet of water into the river (enough water to cover 30,400 football fields with water 1 foot deep). This water supply is not guaranteed, and this volume represents a 14% decrease from what was released in 2013. If proposals to use the water for other beneficial uses are approved, more water may be removed from the river in the future. Now is the time to understand how the community values the river so decision makers can balance potentially competing priorities.

## GET INVOLVED

- Attend the 10<sup>th</sup> annual Santa Cruz River Research Days to learn about research and conservation efforts along the Santa Cruz River: October 30–31. Learn more at [www.sonoraninstitute.org](http://www.sonoraninstitute.org).
- Follow the progress of the Santa Cruz River Management Plan being developed for the river between Grant Road and Trico Road at: [www.webcms.pima.gov/government/flood\\_control/reports/santa\\_cruz\\_river\\_management\\_plan/](http://www.webcms.pima.gov/government/flood_control/reports/santa_cruz_river_management_plan/).
- Scoop the Poop! Did you know the effluent in the river is cleaner than most stormwater? Help improve the quality of stormwater that flows to the Santa Cruz by reducing the amount of pet waste that gets washed into the river.



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**SONORAN INSTITUTE** has worked on the Santa Cruz River since our founding in 1990 to realize our vision: the Santa Cruz River, from Mexico to Marana, is a living, flowing river and the foundation of community health and prosperity.

The Sonoran Institute's mission is to connect people and communities with the natural resources that nourish and sustain them. We work at the nexus of commerce, community, and conservation to help people in the North American West build the communities they want to live in while preserving the values which brought them here. We envision a West where civil dialogue and collaboration are hallmarks of decision making, where people and wildlife live in harmony, and where clean water, air, and energy are assured.



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Sean Mergenthaler, age 7, Agua Caliente Elementary—Ms. Mansour



Andrea Sampson, age 15, Tucson High School—Ms. Jenness

## JOIN US IN CELEBRATING OUR SANTA CRUZ RIVER!

### PIMA COUNTY

Pima County Regional Flood Control District  
Pima County Regional Wastewater Reclamation Department  
Pima County Office of Sustainability and Conservation  
Pima County Natural Resources, Parks and Recreation

[www.pima.gov](http://www.pima.gov)

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