

– 2019 –  
WATER YEAR

PROGRESS TOWARDS  
BINATIONAL  
COLLABORATION

# a living river

CHARTING SANTA CRUZ RIVER CONDITIONS  
NOGALES WASH TO AMADO



SONORAN  
INSTITUTE



# THE SANTA CRUZ RIVER A LIVING ECOSYSTEM

There has been much to celebrate along the Santa Cruz River from Nogales Wash to Amado since this report series began in 2008. Water flowing in the river is cleaner and more easily recharges the aquifer. Aquatic wildlife is thriving and aquatic invertebrate diversity has more than doubled. An endangered native fish, the Gila topminnow, returned in 2015. In 2019, the U.S. federal government recognized the river's rich cultural and natural heritage with the designation of the Santa Cruz Valley National Heritage Area. Now, in 2020, a landmark decision to repair wastewater infrastructure will help further improve and safeguard river health for years to come.

The Santa Cruz River has been the lifeblood of the region for over 12,000 years, providing essential flowing water and habitat for humans and wildlife in this hot, arid region. Historically, many reaches of the river flowed year-round, providing water to communities from Mexico northward. Since the mid-20th century, however, groundwater pumping dried many stretches of the river. Two flowing stretches, including from Rio Rico to Amado, are supported almost entirely by treated wastewater.

The Nogales International Wastewater Treatment Plant (NIWTP) in Rio Rico treats wastewater from Nogales, Arizona, and Nogales, Sonora (collectively *Ambos Nogales*), and contributes a significant amount of water to the river—an average of 14 million gallons daily between 2008 and 2019. In 2009, a \$64 million upgrade to the NIWTP dramatically improved water quality and river health. However, water contamination from sewage pipeline breaches and stormwater runoff continues to threaten aquatic wildlife as well as human health and safety.

Fortunately, state and federal officials reached a groundbreaking decision this year to repair the aging pipeline that delivers wastewater to the treatment plant. In addition to helping prevent further sewage contamination, this crucial measure also includes important steps towards the binational collaboration that is key to achieving long-term protection of this important river.

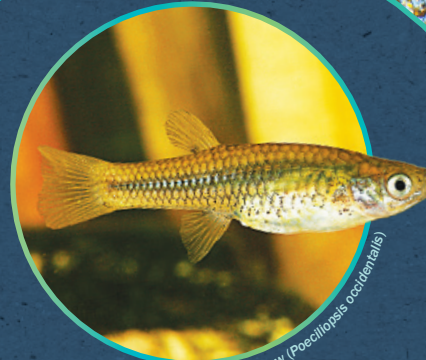
10 YEARS OF CHANGE

2009

Upgrades to Nogales International Wastewater Treatment Plant initiate trend of improved river conditions



*E. owl (Microcathartes whitneyi)*



*Gila topminnow (Poeciliopsis occidentalis)*

2013

Nogales, Sonora begins diverting some of its wastewater to the Los Alisos Treatment Plant

2015

Endangered Gila topminnow returns to the river after ten-year absence

2017

Millions of gallons of sewage spilled from rupture in wastewater infrastructure

2020

Landmark decision to repair wastewater infrastructure and help safeguard river health

2019

River's rich cultural and natural heritage recognized with designation of the Santa Cruz Valley National Heritage Area

## TRACKING RIVER CONDITIONS

Included here are Santa Cruz River conditions from Nogales Wash to Amado in the 2019 water year (October 1, 2018–September 30, 2019). Comparisons are made to conditions in 2008, before the upgrade of the NIWTP in 2009. In 2018, this report expanded to include conditions in Nogales Wash, an important corridor linking Ambos Nogales to the NIWTP and to the Santa Cruz. To explore all the data, download a supplementary report from the Sonoran Institute website at [www.tiny.cc/nlr19](http://www.tiny.cc/nlr19).

Sonoran Institute has tracked river conditions and published results through *Living River* reports since 2008. In 2012, the effort expanded in partnership with Pima County to assess conditions in the flowing reach in Tucson. All *Living River* reports can be found on the Sonoran Institute website: [www.sonoraninstitute.org](http://www.sonoraninstitute.org).

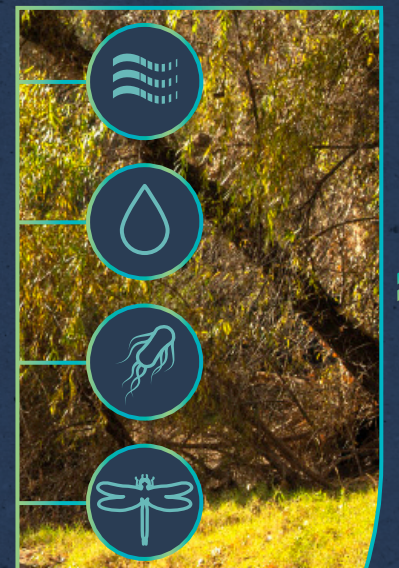
## 2019 NOTABLE FINDINGS

Length of river flow in June is shorter, but stable

Ammonia concentrations no longer toxic

*E. coli* and pollutant metals still a concern

Aquatic invertebrates continue to thrive



*American Wigeon (Mareca americana)*



# RIVER CONDITIONS IMPROVED IN 2019 WATER YEAR

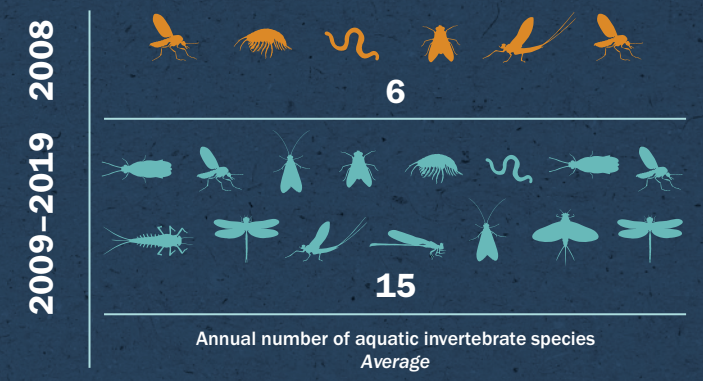


Spot-winged glider dragonfly (*Pantala hymenaea*)



## AQUATIC INVERTEBRATES THRIVE IN CLEANER WATER

Assessments of aquatic invertebrates occur annually at Tumacácori National Historical Park. In 2008, only 6 unique species were found. After the treatment plant upgrade, the number of unique species found more than doubled to an annual average of 15 species from 2009 to 2019. Cumulative number of unique species found has also increased, reaching 49 by 2019. As only 2 new species were found since 2016, the rate of increasing diversity may be slowing or reaching equilibrium.



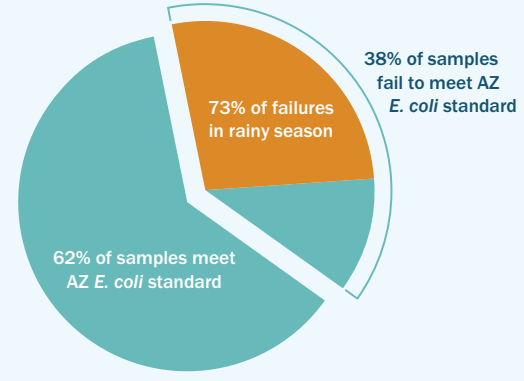
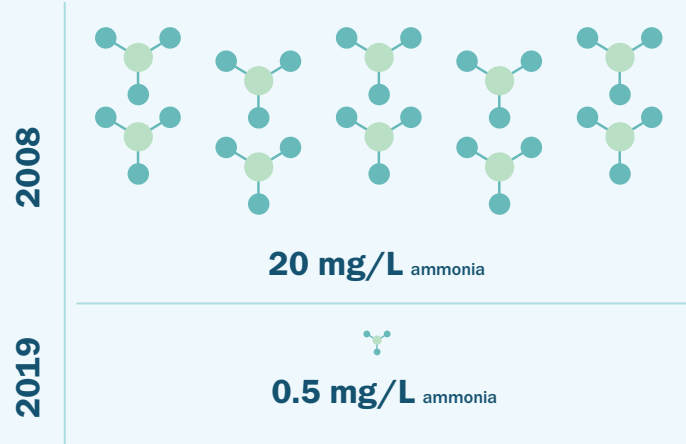
## WATER QUALITY IMPROVED

Many measures of water quality improved following the 2009 NIWTP upgrade—most significantly, ammonia. Measured at several locations, average ammonia concentrations declined from a toxic 20 mg/L in 2008 to 0.5 mg/L in 2019. Since 2009, only 5 quarterly sampling events detected elevated ammonia levels that averaged 2.25 mg/L just downstream of the NIWTP. Though Nogales Wash was not impacted by the upgrade, ammonia levels were already low and averaged 1.4 mg/L from 2008–2013.

Some water quality challenges remain. Presence of the bacteria *Escherichia coli* (*E. coli*) indicates fecal contamination in the river. High levels that do not meet Arizona's *E. coli* standard continue to be seen at all survey sites in Nogales Wash and the Santa Cruz River,

with 73% of exceedances occurring during the rainy seasons. This suggests that rain washes fecal material into the river from many points in the watershed.

Since 2008, concentrations of metals in the Santa Cruz and Nogales Wash were low, though levels of cadmium, copper, and nickel were occasionally detected at levels above the Arizona standard protecting aquatic wildlife. Pollutant metals can disrupt aquatic ecosystems by lowering reproductive success and interfering with growth and development. The NIWTP continues to detect metals in its wastewater. Metals not only interfere with the efficiency of treatment processes but also contaminate removed biosolids. When contaminated, removed biosolids must be landfilled instead of being used as fertilizer for agriculture.



For more detail and data, see the supplementary report at: [www.tiny.cc/nlr19](http://www.tiny.cc/nlr19)

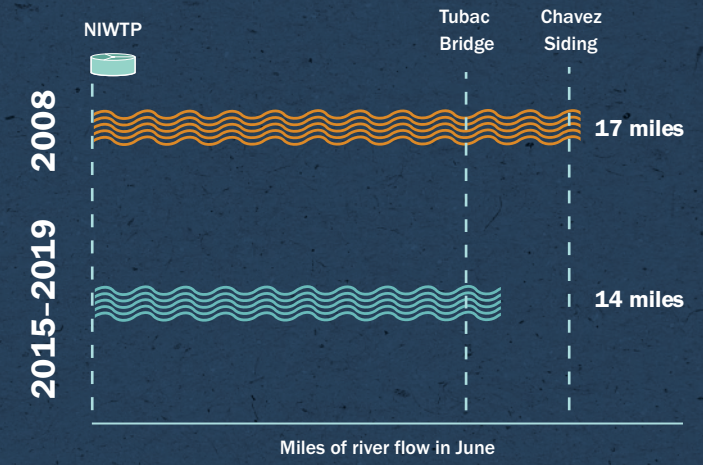


Santa Cruz River along the Juan Bautista de Anza Trail near Tumacácori



## MILES OF FLOW REDUCED, BUT APPEAR STABLE

In June 2008, the river flowed north over 17 miles from the NIWTP, past Chavez Siding Road. Since the 2009 upgrade, flow extent has been shorter and more variable, averaging 12 miles. It may be stabilizing, however. Since 2015, June flow extent has consistently been around 14 miles. Many factors impact flow extent, but this reduction since the upgrade is likely a positive sign of increased aquifer recharge. Cleaner water promotes infiltration through the riverbed by breaking down old clogging layers and preventing new layers from forming. Monitoring of flow extent in the U.S. reach of Nogales Wash began in July 2019. Flows reached all the way to the Santa Cruz River, over 9.5 miles from the U.S.–Mexico border.





## PARKS ARE HOTSPOTS FOR VISITING THE RIVER

We asked, “Where do you visit the river?” to better understand and map high-value areas along the Santa Cruz. Locations were identified throughout the region, from Nogales Wash to Green Valley, as well as along some of the tributaries like Sonoita Creek. Given that much of the land is private, it is not surprising that areas with public parks and access to the river—like Green Valley, Tubac, and Tumacácori National Historical Park—were hot spots for visitation. But smaller hot spots are reported at bridges, road crossings, and trailheads for the Juan Bautista de Anza Trail.

Is your favorite river location captured in this map? If you have not responded to our survey, we want to hear from you. As the river corridor continues to improve, visitation will certainly increase. By understanding how and where you experience the Santa Cruz, we can better identify the areas you value and capture your ideas for further improving this important river corridor. Share where you visit the river at: [www.tiny.cc/scrmap](http://www.tiny.cc/scrmap)

### LEGEND

- River reaches with seasonal flows
- River reaches dominated by effluent
- Direction of river flow
- Nogales International Wastewater Treatment Plant
- Locations visited
- Visitation popularity
- Less More



## BINATIONAL SOLUTIONS VITAL FOR PROTECTING THE SANTA CRUZ RIVER

The cool retreat of this lush green corridor, fish darting through the water, birds singing in the riparian forest, water replenishing the local groundwater supply—all this is supported by the steady release of effluent from the Nogales International Wastewater Treatment Plant.

The effluent released into the U.S. from the NIWTP comes from both sides of the border via the nearly 50-year-old International Outfall Interceptor (IOI) pipeline. The IOI is buried beneath Nogales Wash, which is also the principal waterway transporting stormwater runoff from Ambos Nogales to the river. Large, uncontrolled flows of stormwater have eroded the wash and exposed portions of the IOI, causing accidental sewage discharges.

Prompted by years of sewage spills and a 2012 State of Arizona lawsuit, state and federal officials gathered in 2018 to address protecting local communities and the river from further pipeline breaches. In July 2020, the Arizona Department of Environmental Quality and the U.S. International Boundary and Water Commission, who manages the NIWTP, reached a long-awaited settlement agreement. Nearly \$40 million in federal, state, and local funding was identified to upgrade the IOI and install protective measures where the IOI is vulnerable to damage from stormwater and other debris.

These are critical first steps toward protecting public safety and river health, but further action is required to ensure a lasting, permanently flowing river. Over 80% of the effluent from the NIWTP comes from Nogales, Sonora, and is thus legally controlled by Mexico. Since the effluent mostly benefits U.S. communities, any effort to permanently dedicate water to the river must benefit Mexico as well.

Sonoran Institute is optimistic that our communities can collaborate to find such a solution. Fortunately, July’s historic decisions launched calls for a new binational agreement that could ensure Mexico’s water will continue to flow to the NIWTP, and thus continue to support a flowing river. As we work toward these next milestones, join us in celebrating our living, and now much healthier, Santa Cruz River.

## GET INVOLVED

- Stay informed! Join the Sonoran Institute mailing list for the latest Santa Cruz news. Sign up at: [www.tiny.cc/scrsignup](http://www.tiny.cc/scrsignup)
- Help us map high-valued areas along the river by telling us where you visit the river. Survey at: [www.tiny.cc/scrmap](http://www.tiny.cc/scrmap)
- Engage with Friends of the Santa Cruz River to pick up trash, monitor water quality, and map flow extent: [www.friendsofsantacruzriver.org](http://www.friendsofsantacruzriver.org)
- Learn about bird sightings on the Santa Cruz by reading the Tubac Nature Center blog and bird list: [www.tubacnaturecenter.com](http://www.tubacnaturecenter.com)

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**SONORAN INSTITUTE** has worked since our founding in 1990 to realize our vision that 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 envision resilient communities living in harmony with the natural world, where flowing rivers and healthy landscapes enable all people and nature to thrive. Our work transcends borders, bringing together diverse communities to promote civil dialogue about complex conservation issues that know no boundaries. All aspects of our work are guided by inclusivity and collaboration to create positive environmental change in the western United States and northwestern Mexico.



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# IT WOULD BE GREAT TO HEAR FROM YOU!

Help us map high-valued areas along the river by telling us where you visit the river: [www.tiny.cc/scrmap](http://www.tiny.cc/scrmap)

## IMAGE CREDITS

**Front Cover:** Santa Cruz River near Tumacácori. **Back Cover:** Family farms and land along the fall-colored cottonwoods of the Santa Cruz River near Tumacácori. All photos ©Bill Hatcher/Sonoran Institute, 2020, with the exception of: **page 2:** Elf owl by Suchitra Pongkason; **page 3:** Gila topminnow by Bruce D. Taubert; **page 5:** Damselfly by Michael T. Bogan

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