

a living river

ENSURING THE HEALTH OF THE BINATIONAL
SANTA CRUZ RIVER



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Ian Dowdy



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Shaping the Future of the West

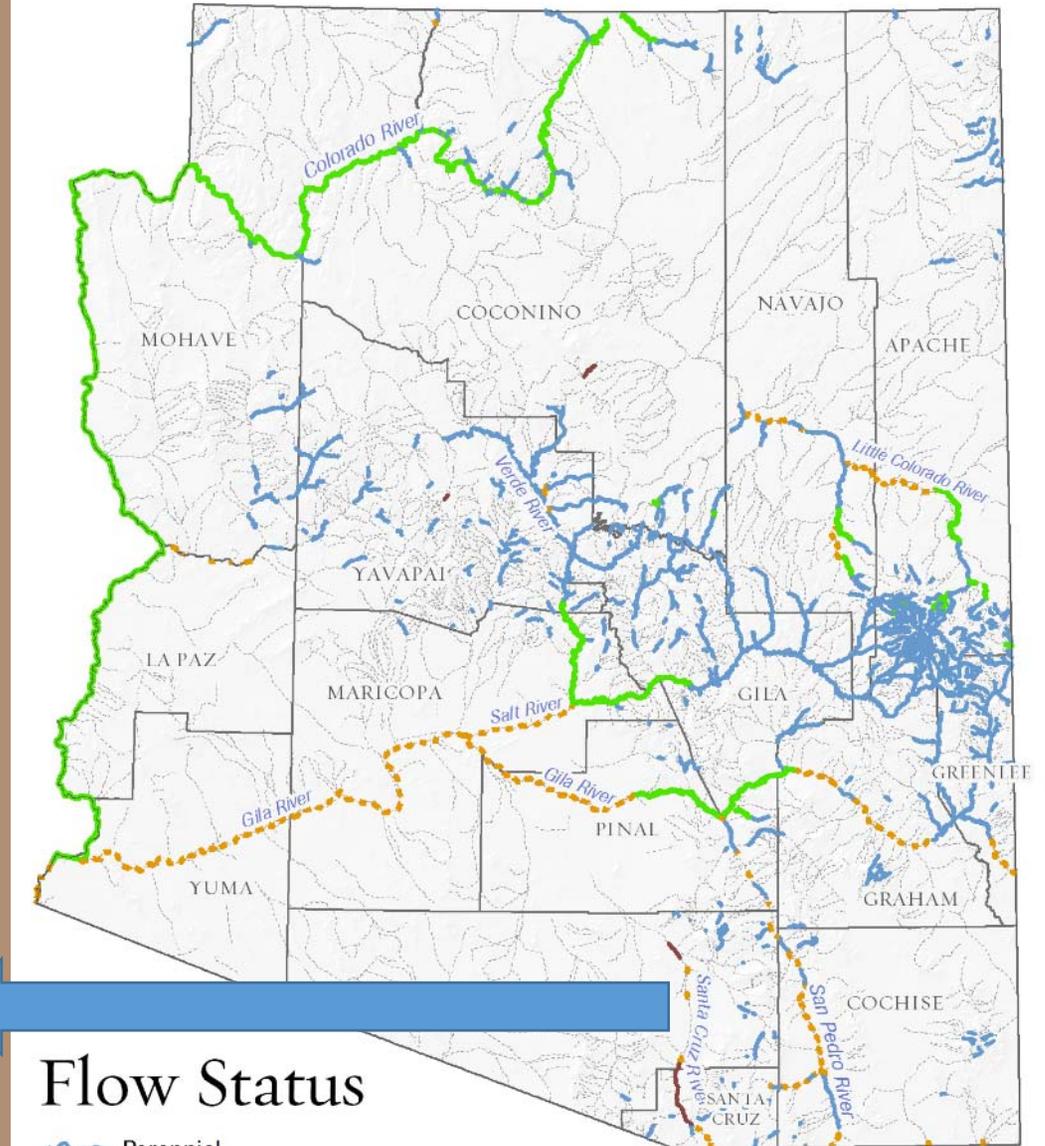
For over 25 years, the Sonoran Institute has worked to help people and communities achieve harmony between the built environment and the natural world.

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Retain. Restore. Revitalize. Reconnect.





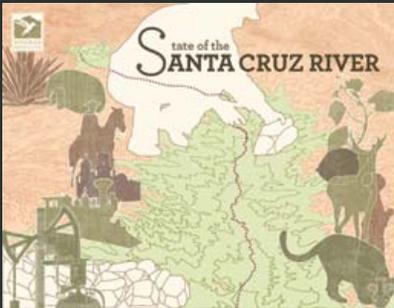
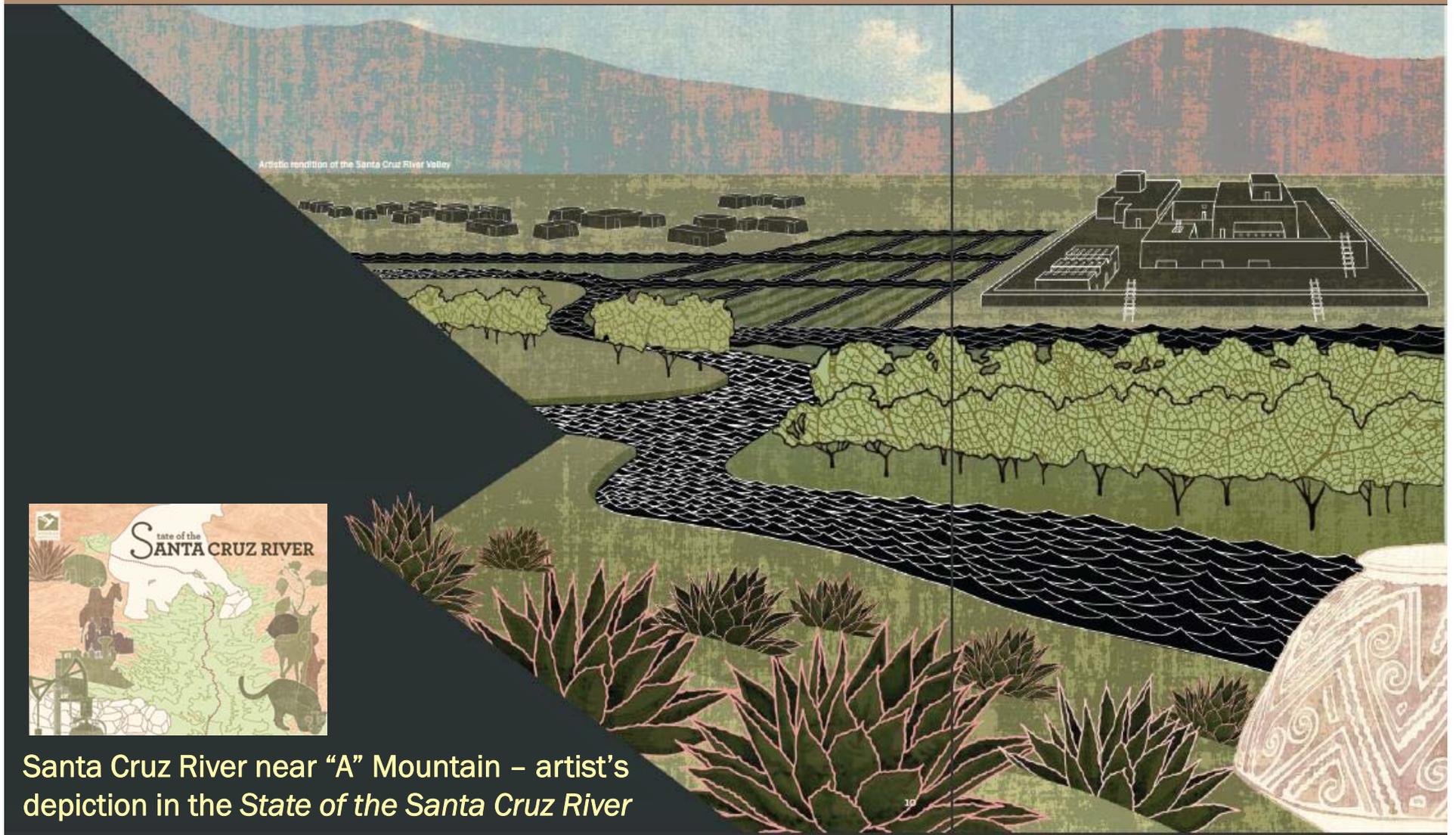
Flow Status

-  Perennial
-  Formerly Perennial
-  Regulated
-  Effluent Dominated (May Be Formerly Perennial)
-  Intermittent or Ephemeral



Flow status data created from TNC Freshwater Assessment, available from azconservation.org

12,000 years of rich history



Santa Cruz River near "A" Mountain – artist's depiction in the *State of the Santa Cruz River*



Santa Cruz River near "A" Mountain, 1904

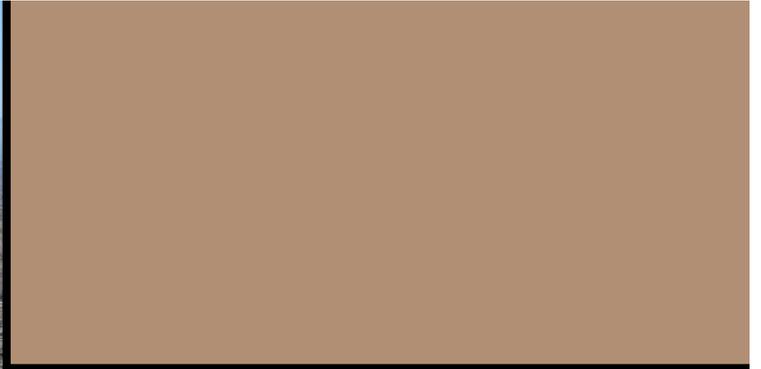


Santa Cruz River near
Tumacácori, 2015

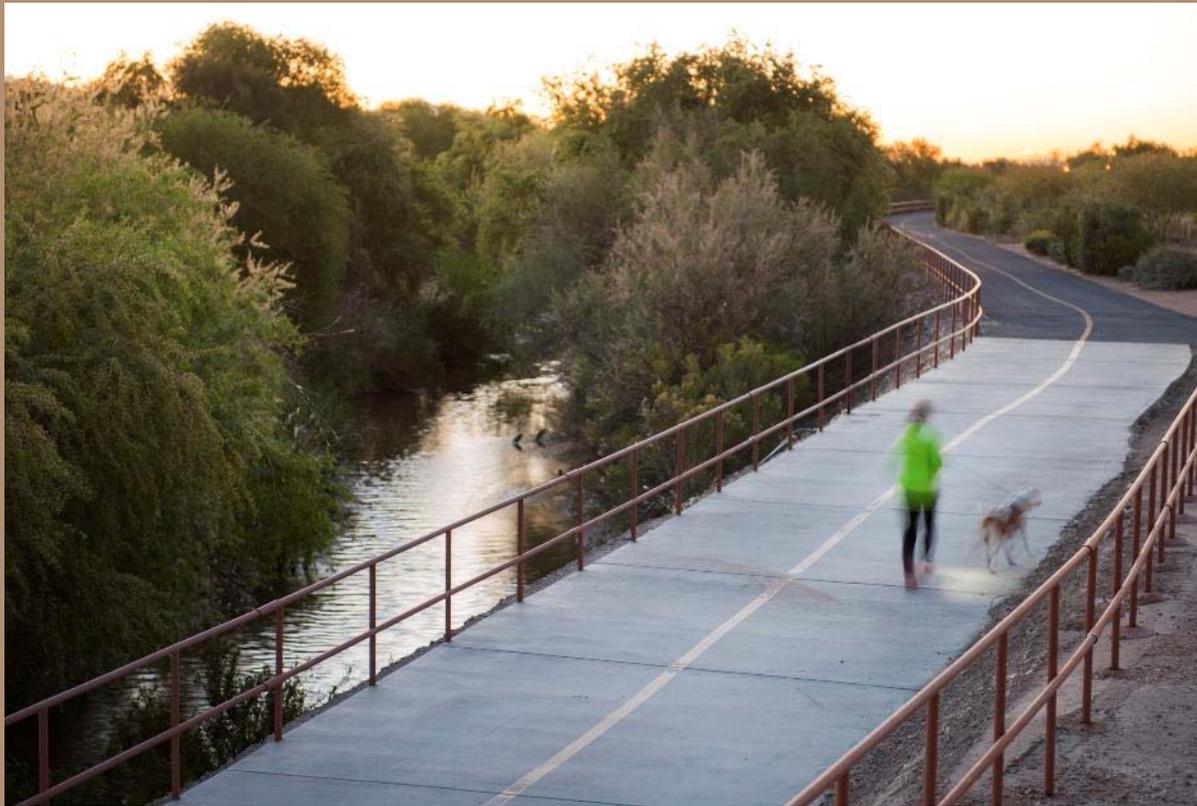


Santa Cruz River near Ina Road, 2014

T. Moody



How do we document changes?



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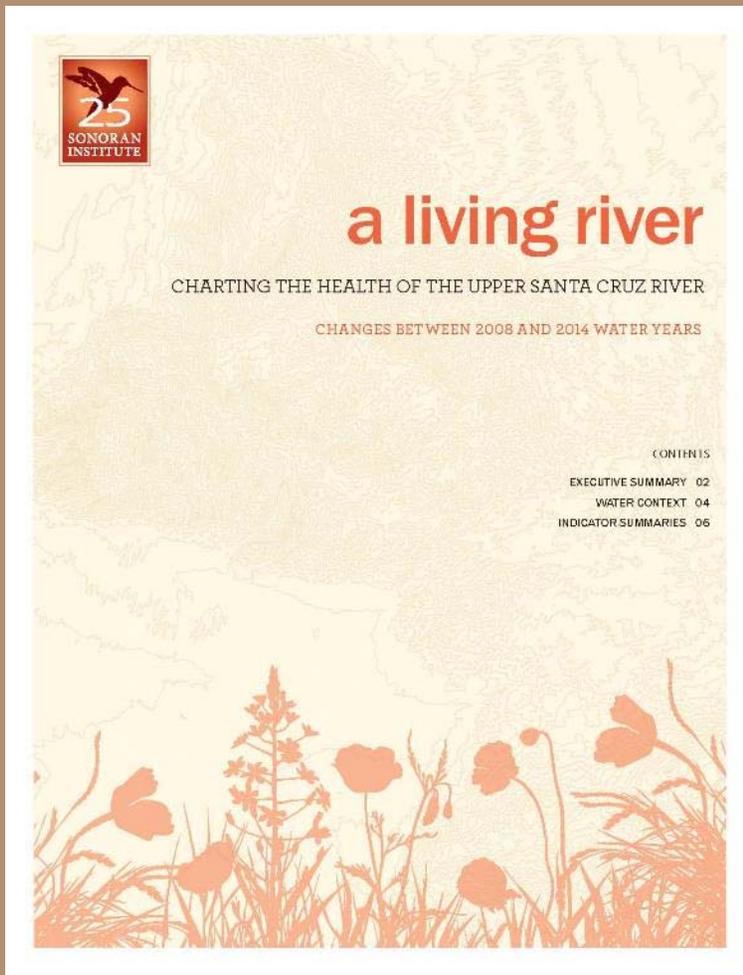
Living River report series tracks improvements on Upper Santa Cruz River



- Effluent stretch in Santa Cruz County
- 2008-2010 water years



Changes over between 2008-2014



Changes over between 2008-2014



a living

CHARTING THE HEALTH OF THE UPPER SANTA CRUZ RIVER

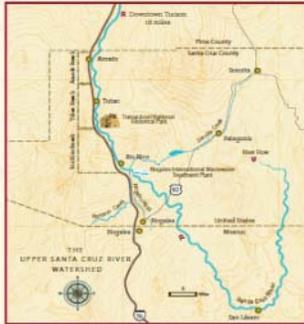
CHANGES BETWEEN 2008 AND 2014

Changes in

THE UPPER SANTA CRUZ RIVER: A LIVING ECOSYSTEM

The Upper Santa Cruz River in Santa Cruz County flows year round from its source in the ecologically diverse region. River flows are sustained by effluent discharge from the Nogales Wastewater Treatment Plant (NWTP) which treats and reclaims water from sewage in Nogales, Sonora. In the last seven years, two important changes in the river have occurred:

- Upgraded Treatment Plant:** In 2009 the NWTP completed significant upgrades that reduced levels of nitrogen in the released effluent.
- Wastewater Diversions:** In 2013 Nogales, Sonora completed construction of a wastewater diversion system that treats some of the wastewater that would otherwise be sent to NWTP. Effluent from this system flows south into Sonora.





E. COLI

2008-2014 Summary

Escherichia coli (*E. coli*) is one of the common species of bacteria living in the lower intestines of mammals, and its presence in water is an indication of fecal contamination. The discovery of *E. coli* indicates the potential presence of other pathogenic microorganisms such as bacteria and viruses that might be a health risk to people swimming or wading in the river. The ADEQ standard for a single sample maximum for full body contact (swimming) is 235 colony-forming units per 100 milliliters of water (CFU/100mL). For partial body contact (wading), the single sample maximum is 576 CFU/100mL. The results are compared to the stricter standard, thus samples with greater than 235 CFU/100mL do not meet the standard.

RIVER SUMMARY

nitrogen

water quality

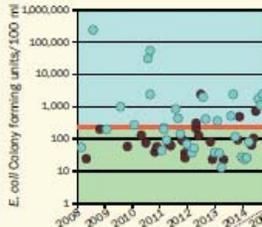
water treatment

water conservation

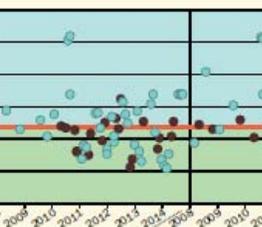
water use

Direction of Flow → → →

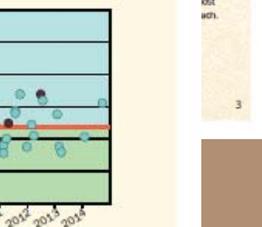
Rio Rico Reach



Tubac Reach

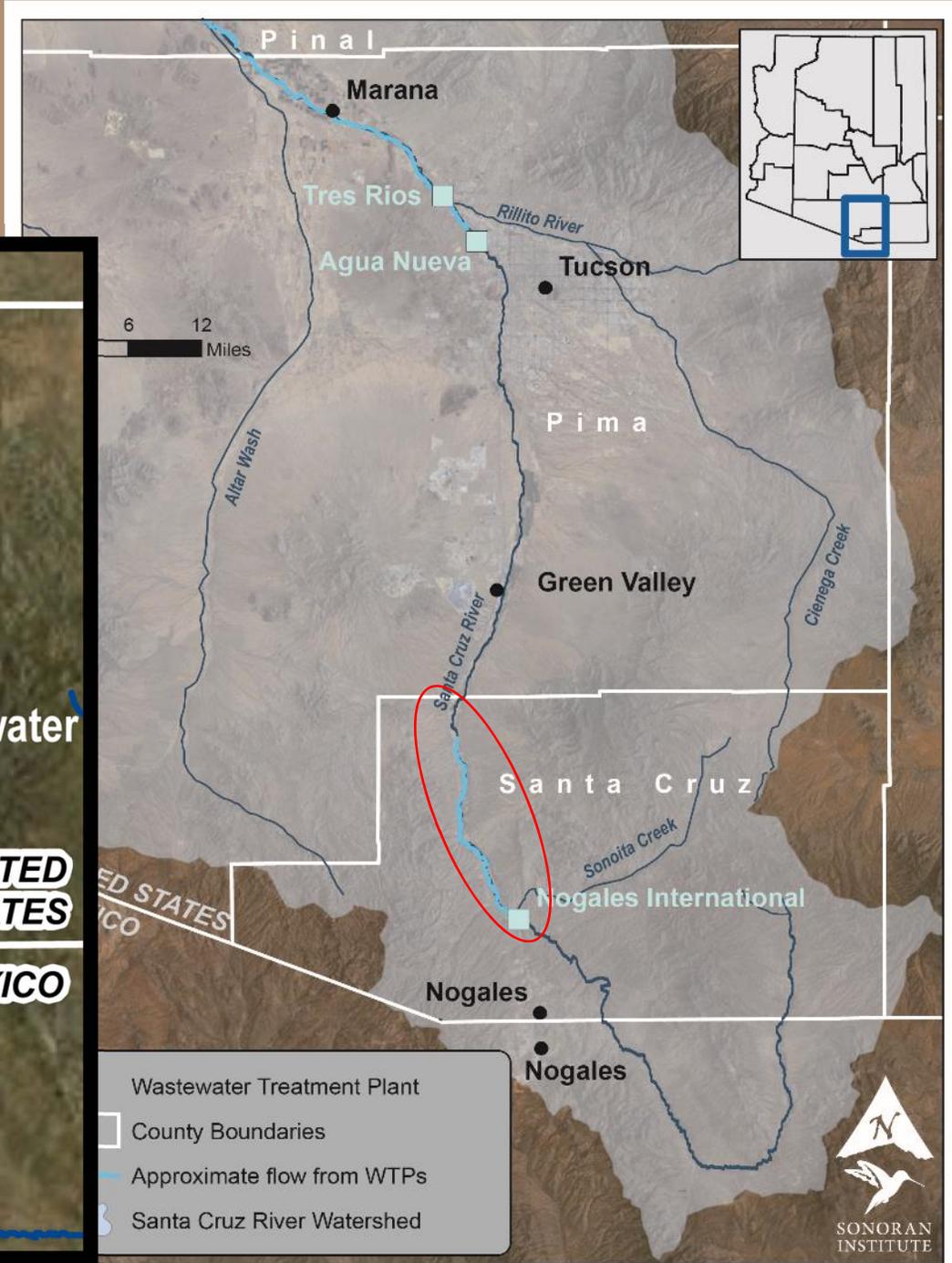


Amado Reach



E. coli Colony forming units/100 ml

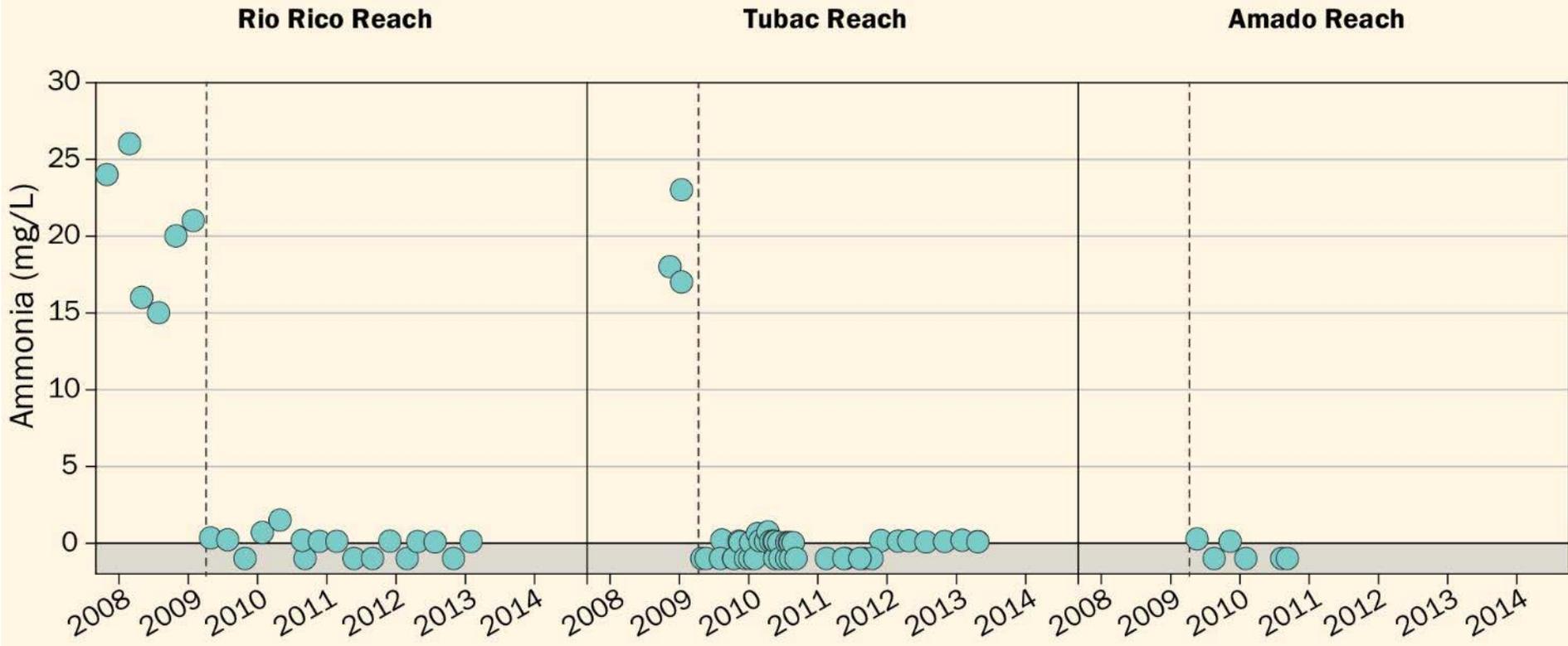
● Values measured during rainy seasons ■ Values in the green area meet the standard
● Values measured during dry seasons ■ Values in the blue area do not meet the standard
— ADEQ standard for full body contact (235 CFU/100mL)





Ammonia decreases

Direction of Flow >>>>



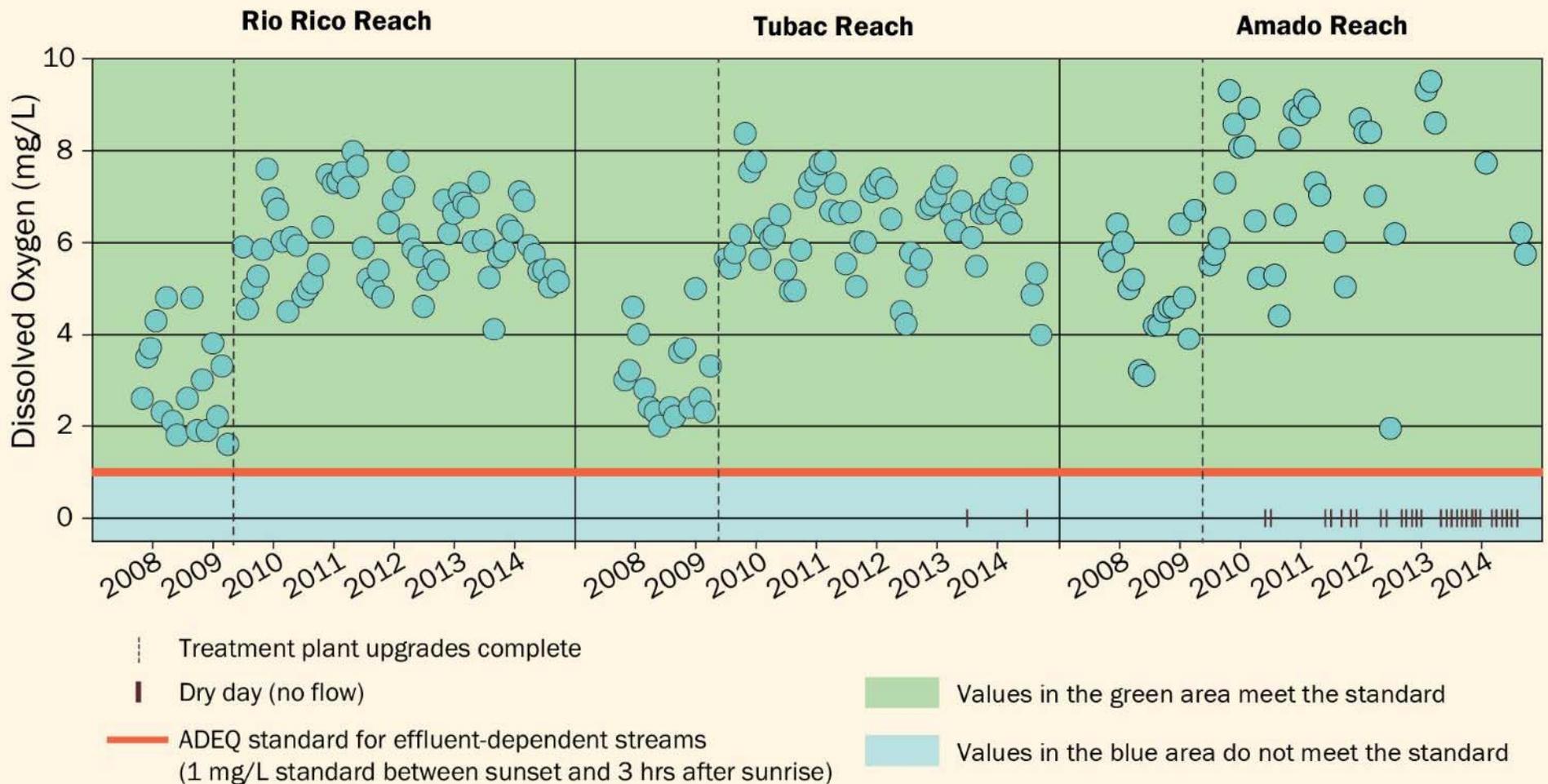
Note - Ammonia standards vary with temperature and pH and can't be graphed as a single line

--- Treatment plant upgrades complete
Ammonia not detected for points in the gray area



Oxygen increases

Direction of Flow >>>>

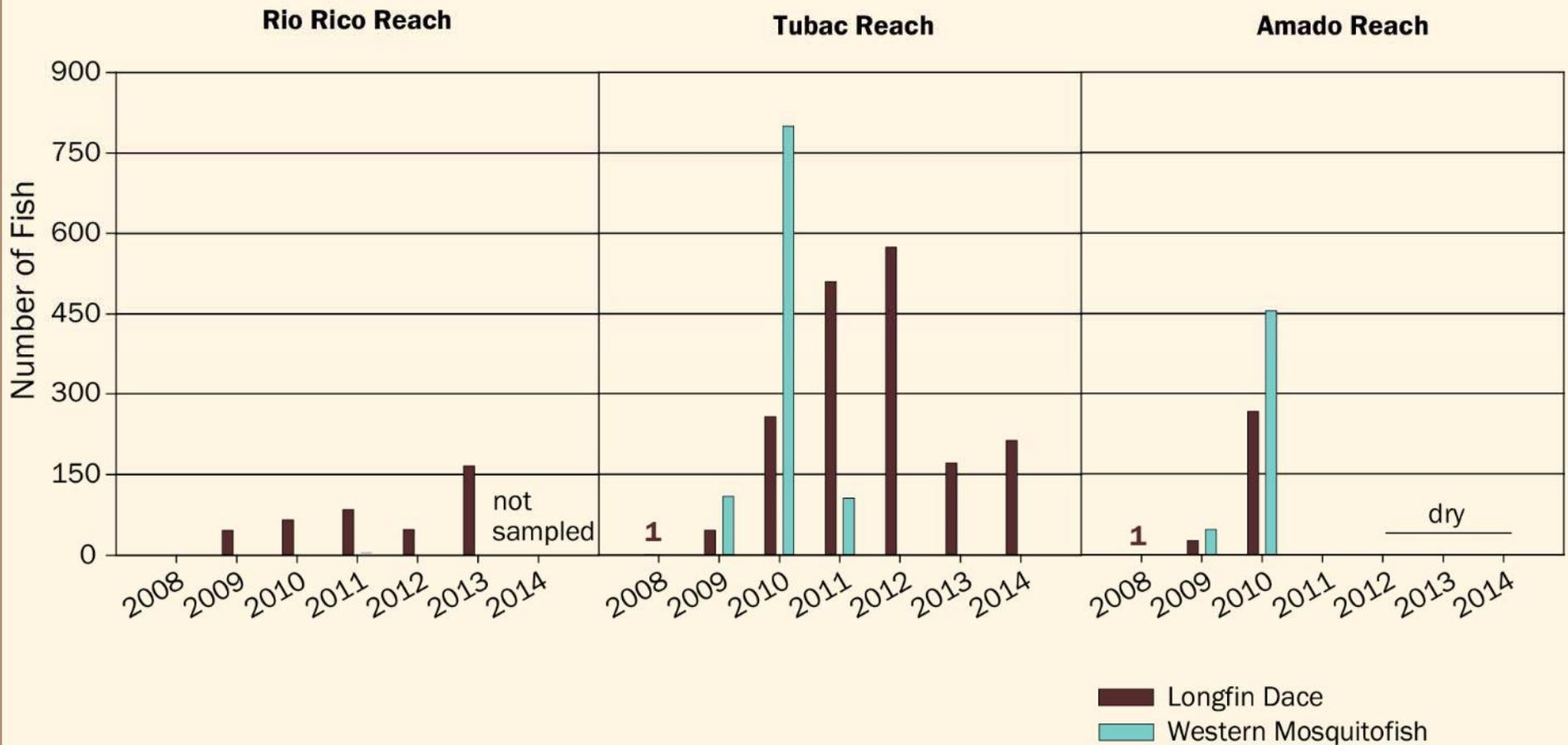






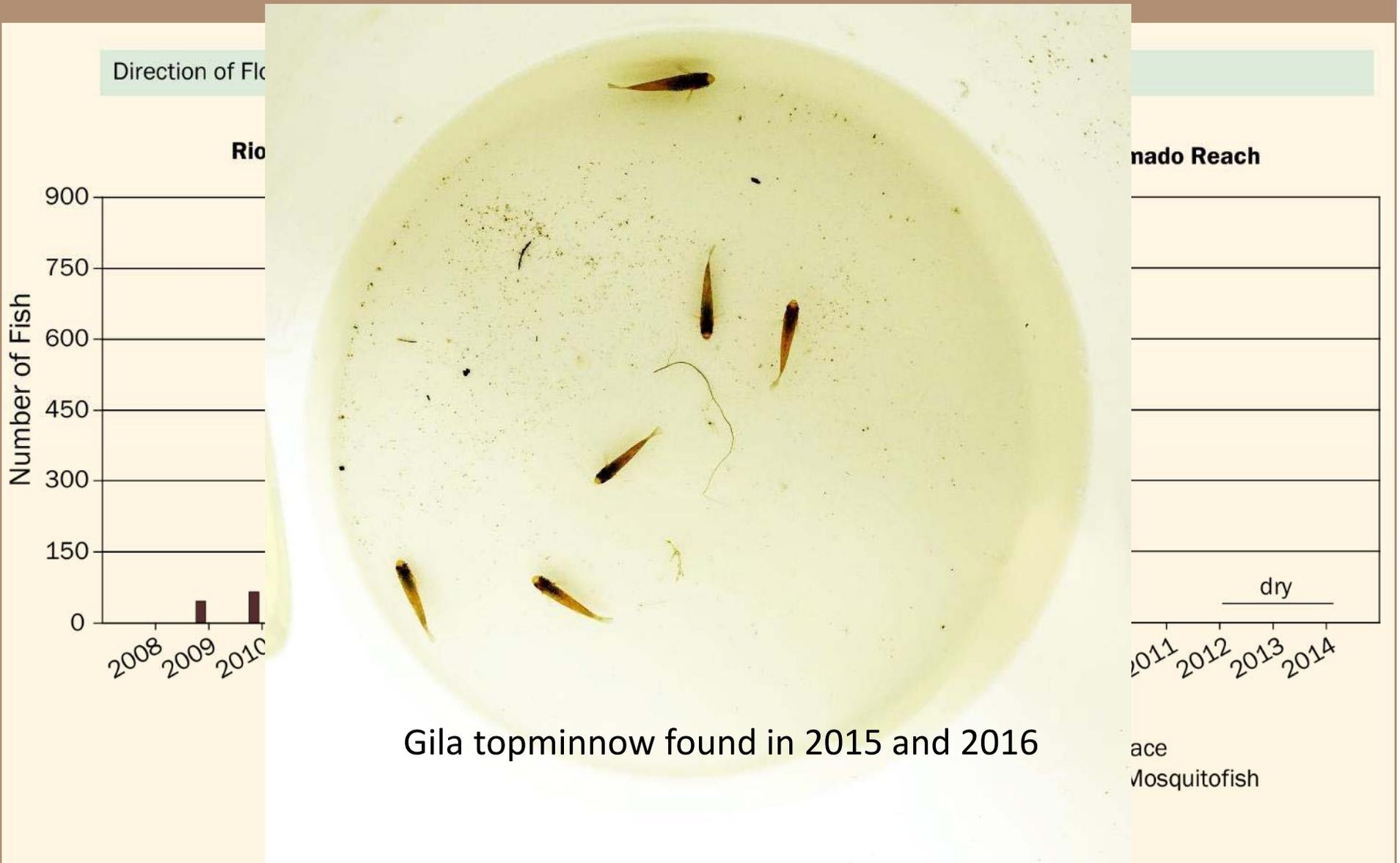
Fish return!

Direction of Flow >>>>



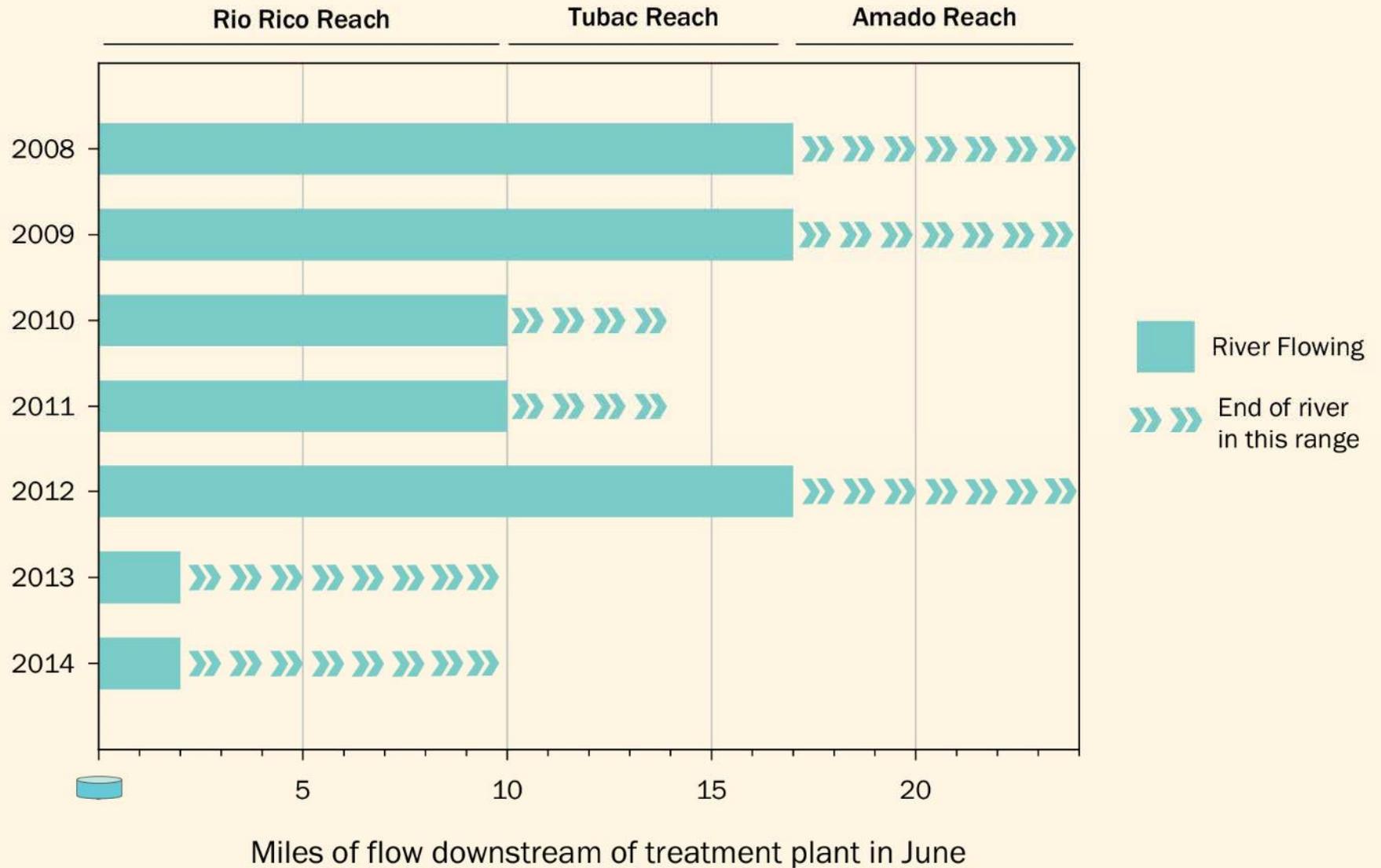


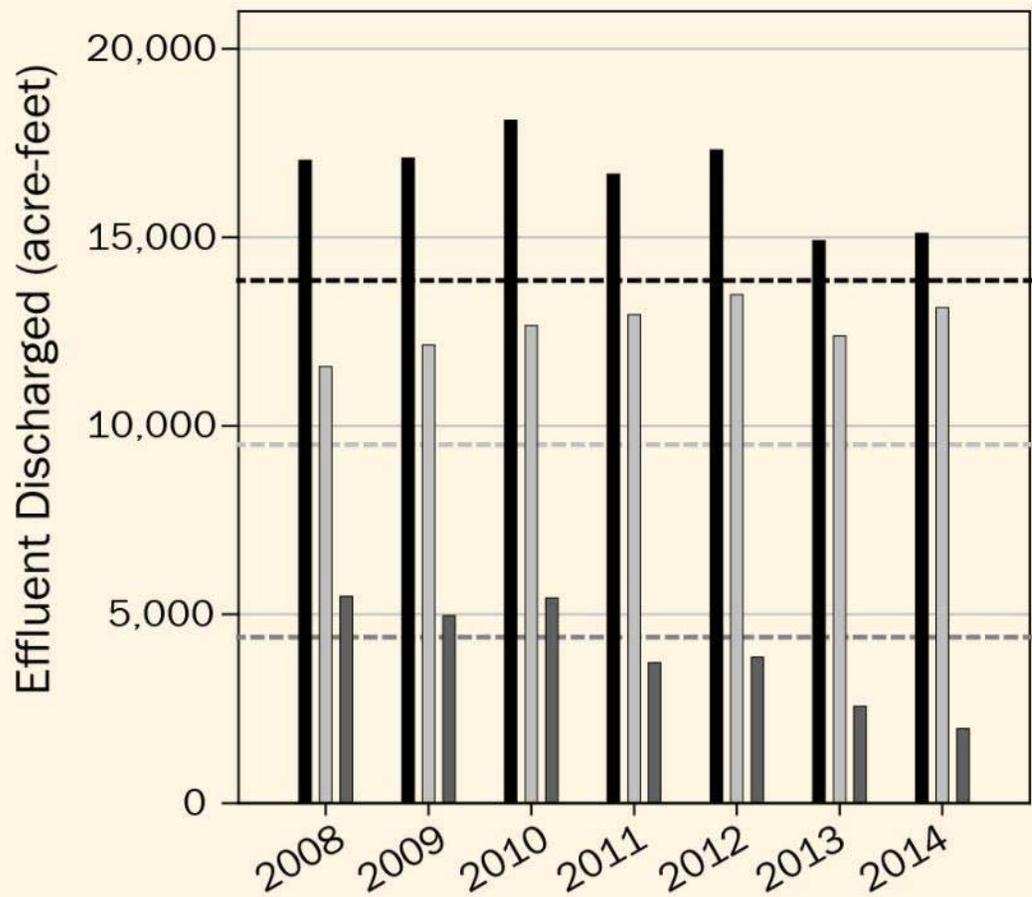
Fish return!





Fewer miles of flow in June





- Total Effluent
- Sonora Effluent
- Arizona Effluent
- Total Average (1995-2007 Water Years)
- Sonora Average (1995-2007 Water Years)
- Arizona Average (1995-2007 Water Years)



Trees stressed at end of reach



August 2010



Trees stressed at end of reach

March 2010





Trees stressed at end of reach

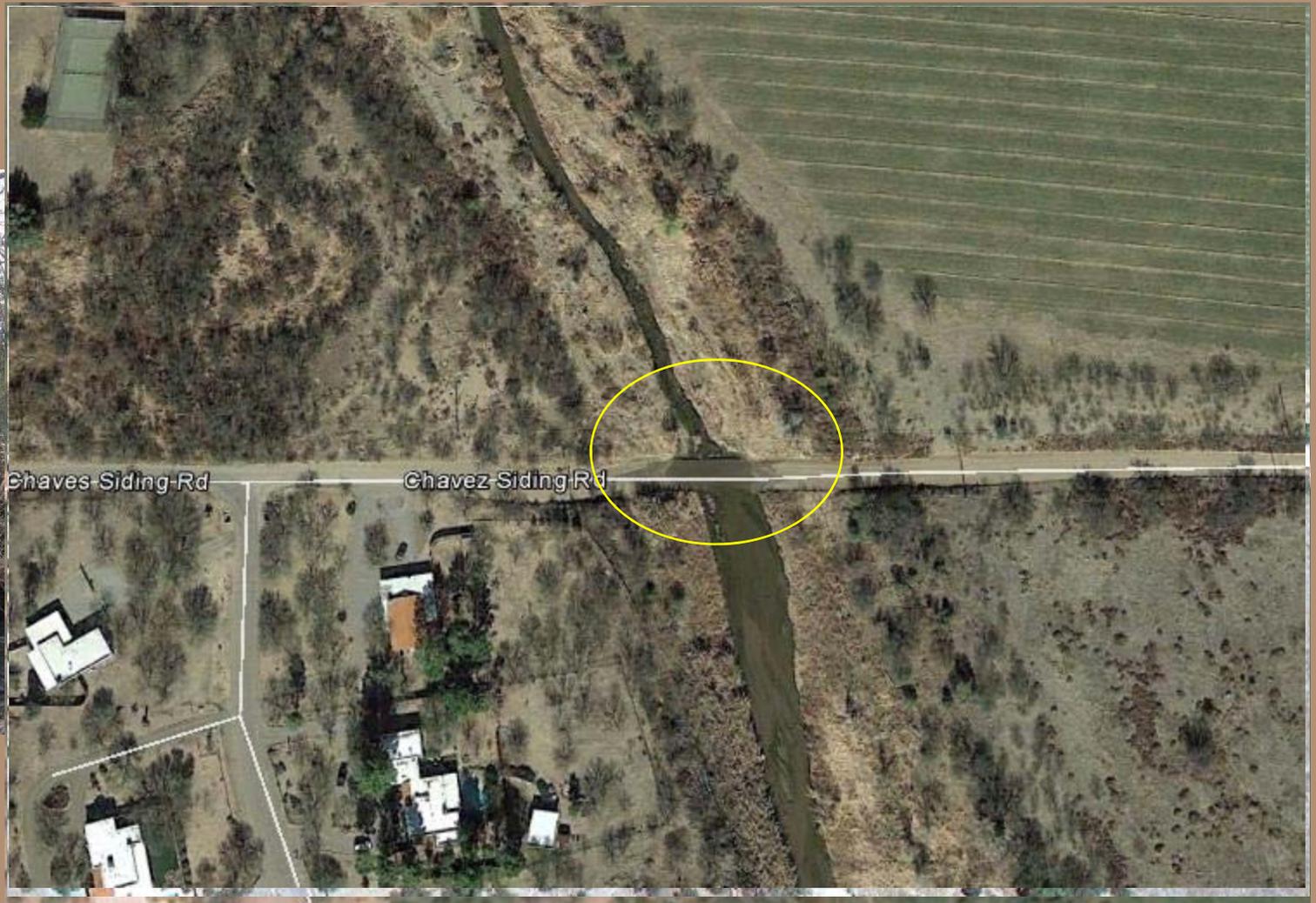
June 2011





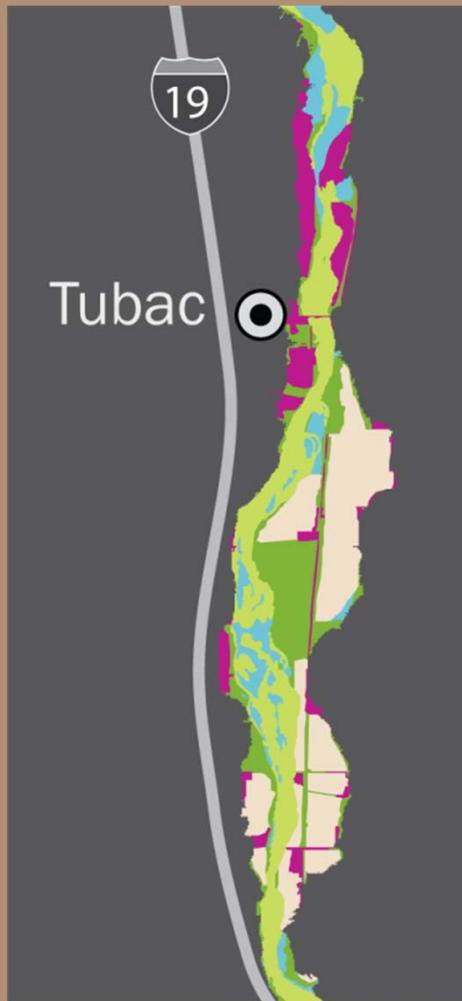
Trees stressed at end of reach

Jan 2016





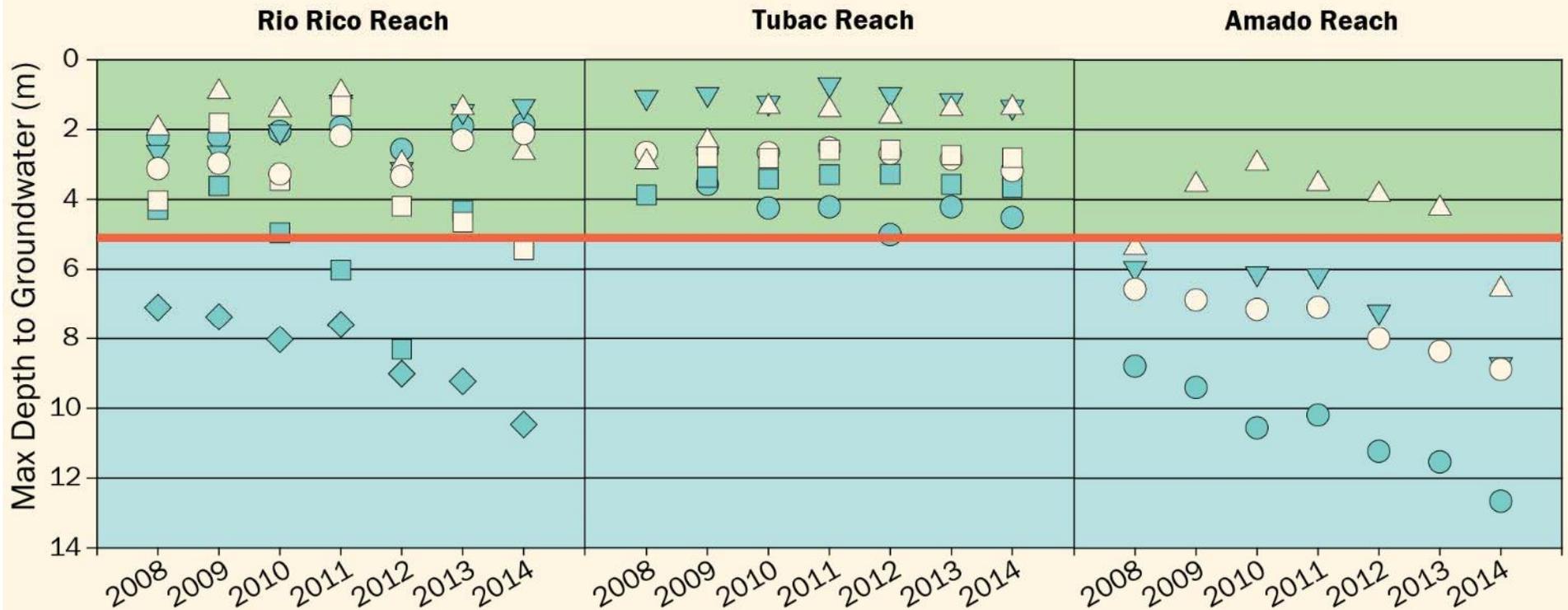
Trees likely stable in Tubac reach





Groundwater stable in Tubac

Direction of Flow >>>>



— Scientific standard to sustain mature cottonwood trees (max depth <5.1 m)

Values in the green area meet the standard
Values in the blue area do not meet the standard

Summary

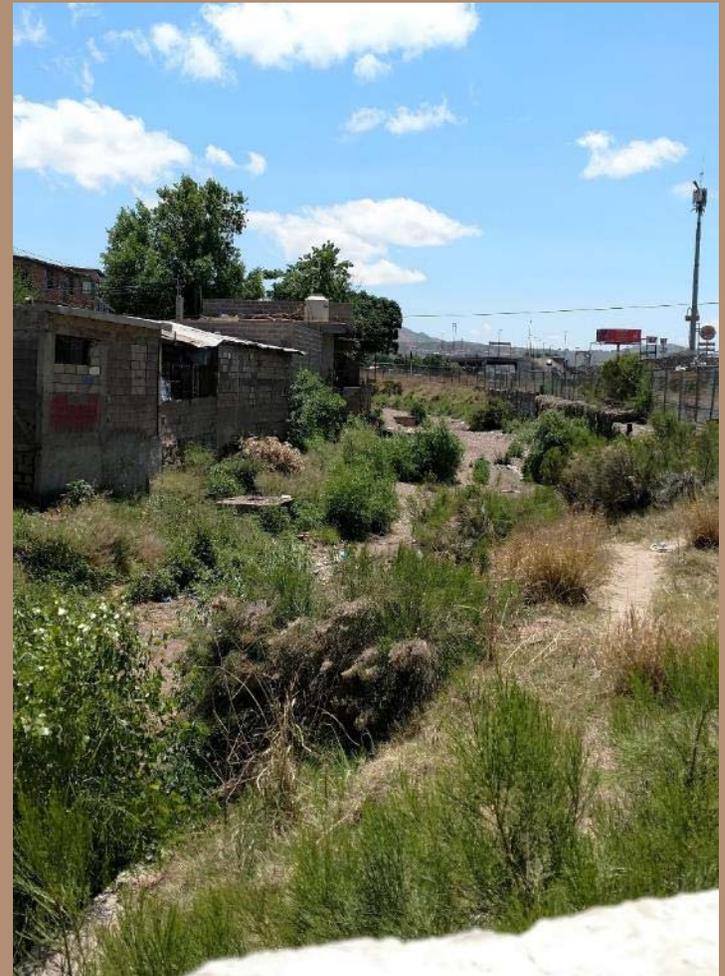
- River health improves
- Flow extent reduced
- Community vision
- Binational solutions



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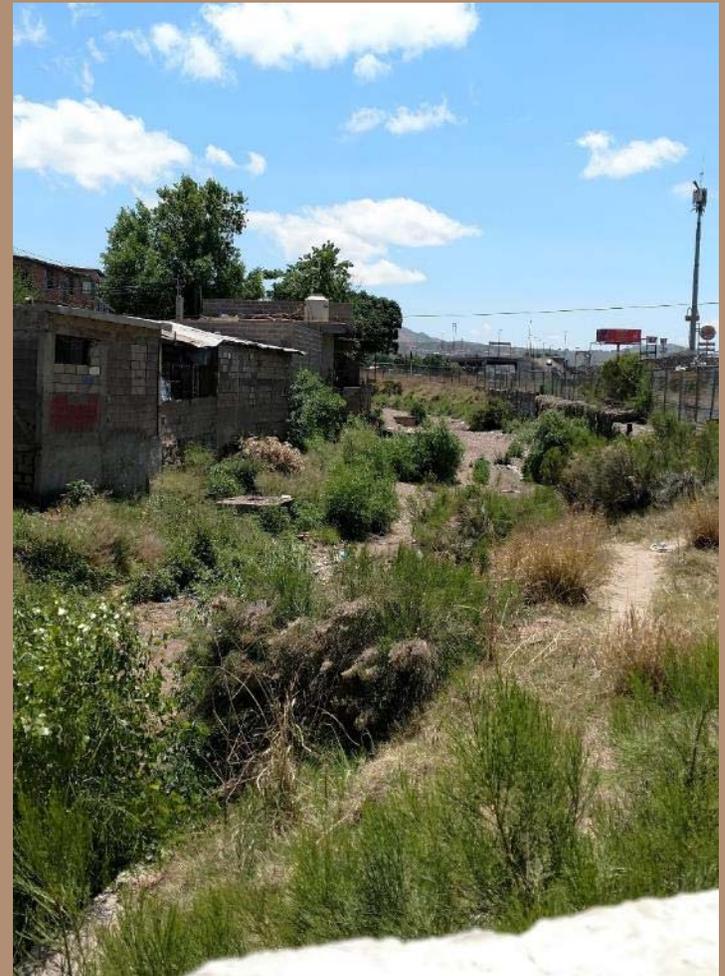
Next Steps

- SCR is a binational river
- Both countries rely upon its health
 - Water resources
 - Cultural link
 - Economic development
- Long-term solutions require a binational dialogue



Next Steps

- Solutions are complex but could include:
 - Addressing water quality and flooding concerns from Nogales Wash
 - Uncontained sewage
 - System overflows
 - Stormwater contaminants
 - Resolving the IOI issue
 - Water conservation in U.S.
 - Restoration of habitat



Questions?

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OUR FUNDERS

Community Members

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