

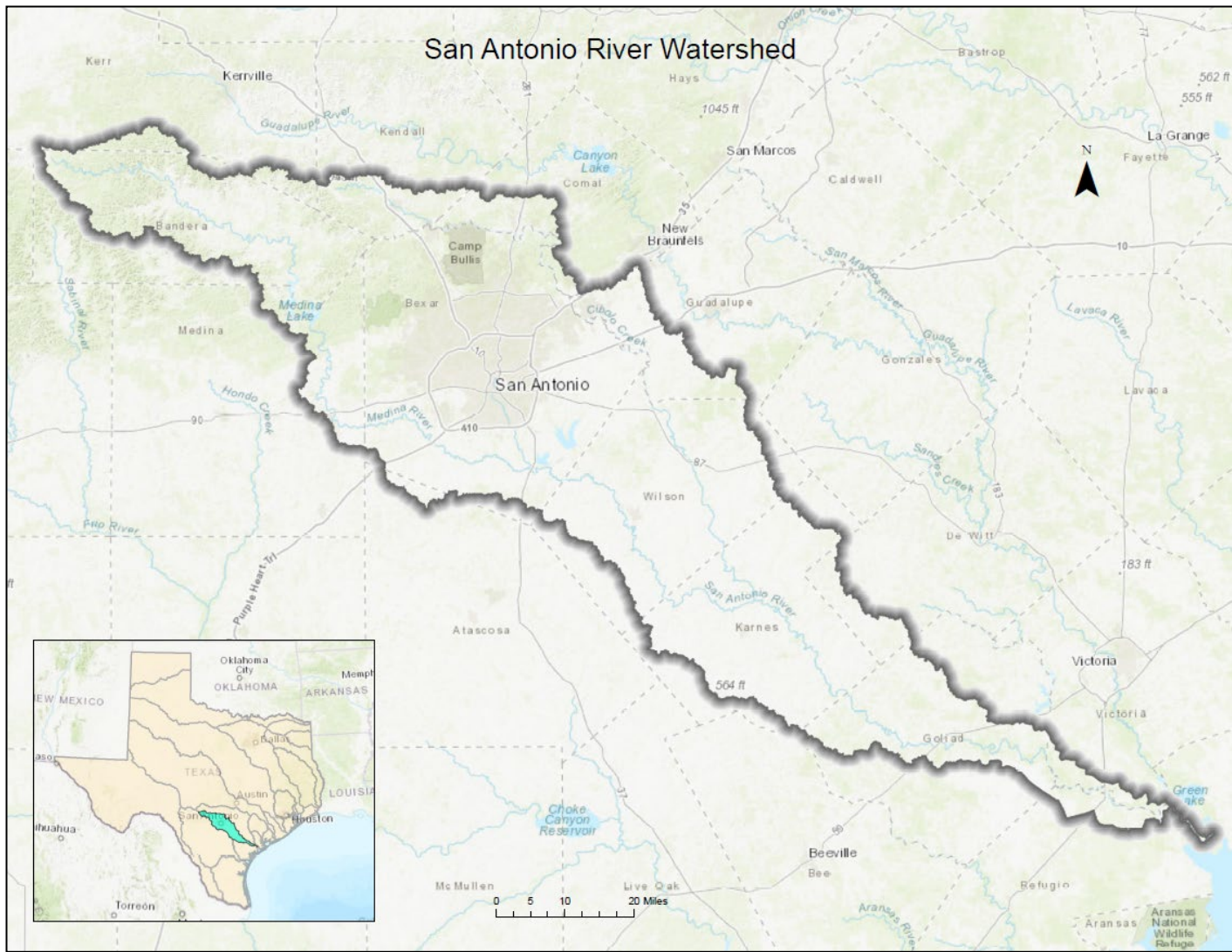


SAN ANTONIO  
RIVER AUTHORITY

# Applications of bacterial source tracking data in the San Antonio River Basin

Friday, April 1, 2022





# San Antonio River Watershed

- Drains ~4,180 mi.<sup>2</sup>
- Main stem ~240 mi.
- 13 classified segments



# Adaptive Three-Pronged Approach

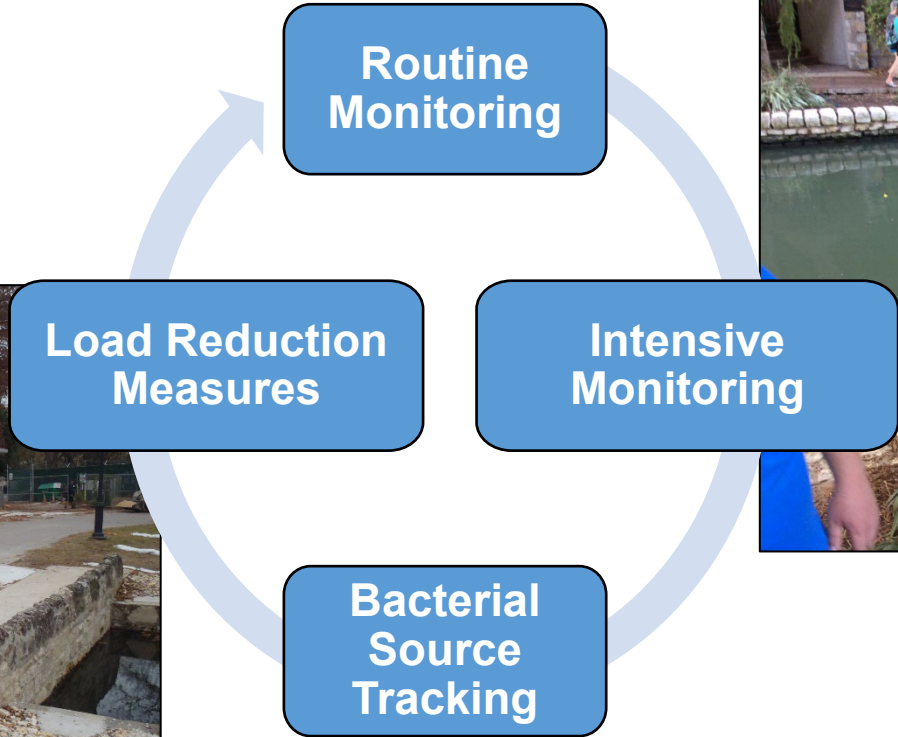
Routine  
Monitoring

Intensive  
Monitoring

Bacterial  
Source  
Tracking



# Adaptive Three-Pronged Approach



# Adaptive Three-Pronged Approach Time

Routine Monitoring

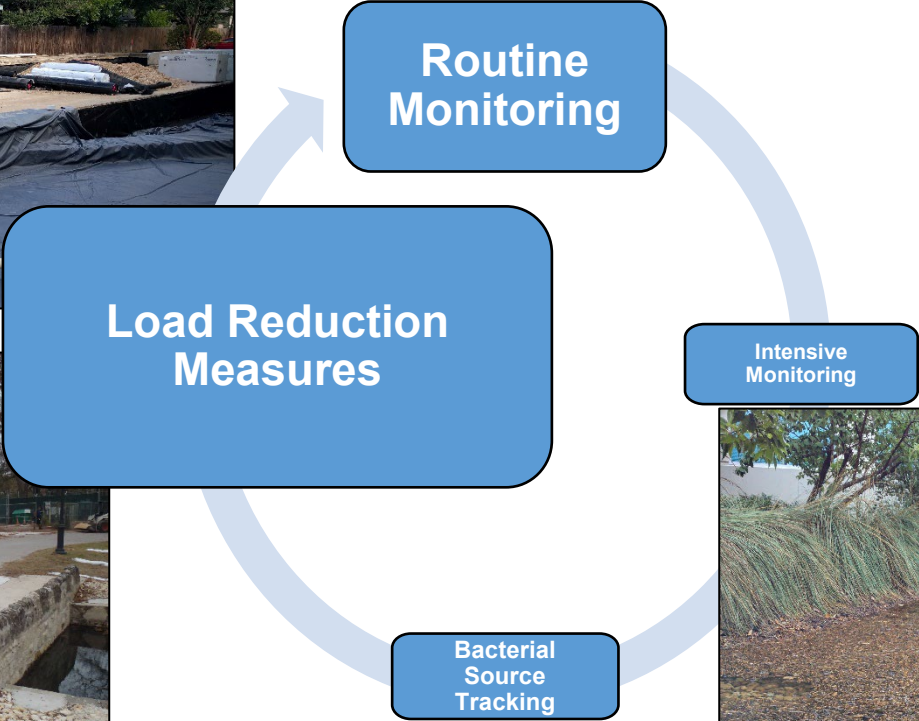
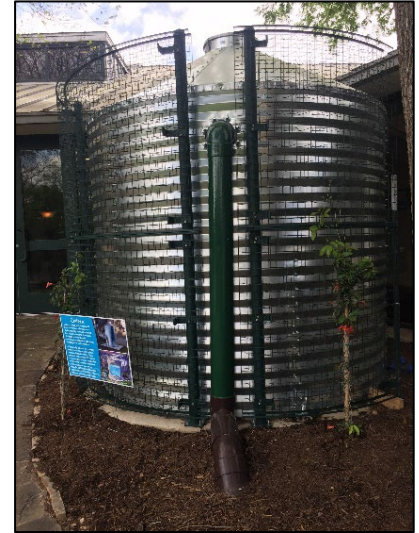
Load  
Reduction  
Measures

Intensive  
Monitoring

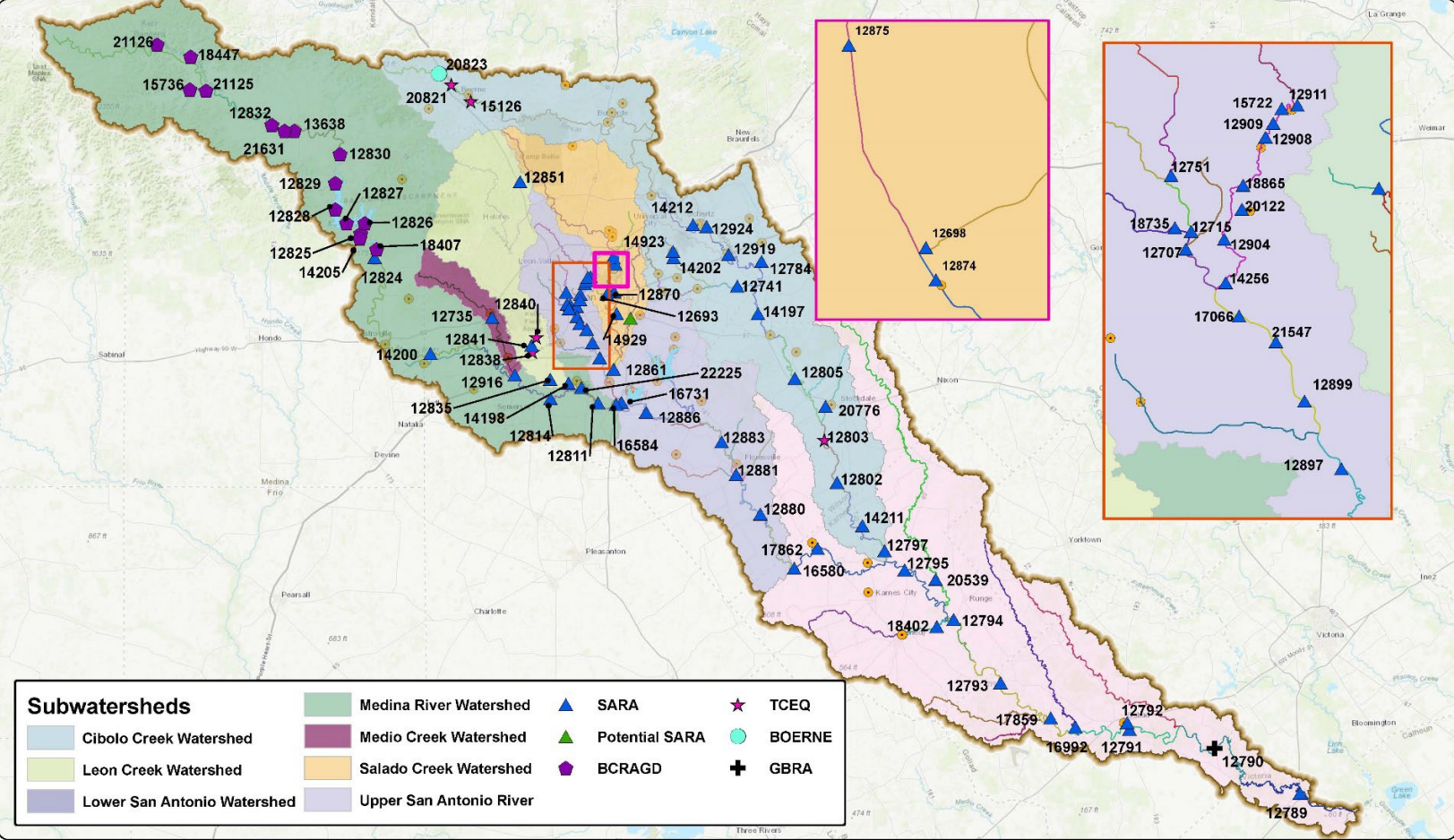
Bacterial  
Source  
Tracking



# Adaptive Three-Pronged Approach Money



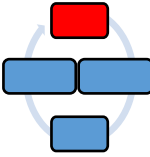
# 2022 Coordinated Monitoring Schedule



Subwatersheds	
	Medina River Watershed
	Cibolo Creek Watershed
	Leon Creek Watershed
	Lower San Antonio Watershed
	Medio Creek Watershed
	Salado Creek Watershed
	Upper San Antonio River
	SARA
	Potential SARA
	BCRAGD
	TCEQ
	BOERNE
	GBRA



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# River Authority Case Studies

- 1) Lower San Antonio River Implementation Plan (LSAR I-Plan)
- 2) San Pedro Creek Culture Park
- 3) Mid/Lower Cibolo Creek Watershed Protection Plan
- 4) Pollutant characterization assessment (Medina River)



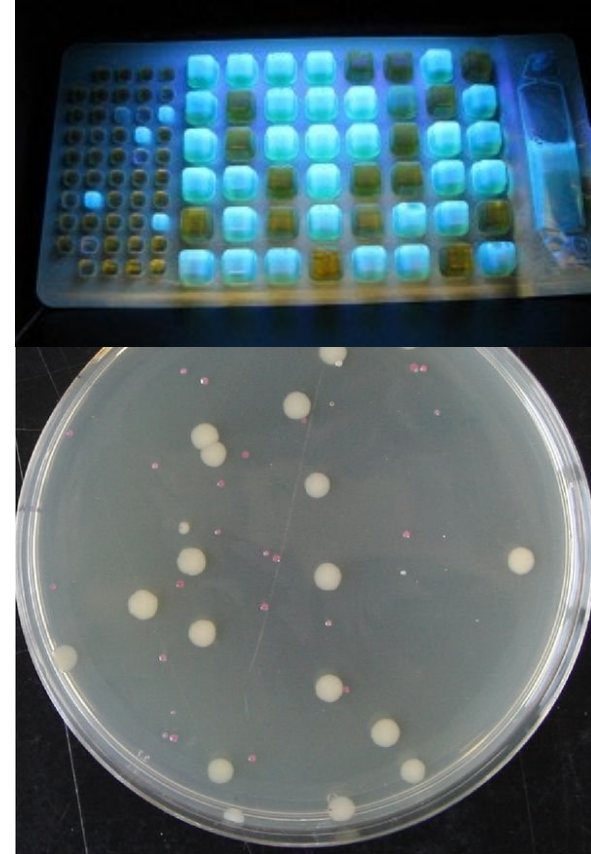
# River Authority Case Studies

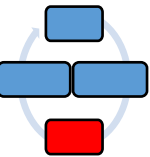
- 1) Lower San Antonio River Implementation Plan (LSAR I-Plan)
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- 4) Pollutant characterization assessment (Medina River)



# River Authority and AgriLife

- River Authority
  - Presence/absence only
  - HF183 method to identify human source
  - Bacteroides
- AgriLife
  - Determines **source** of *E. coli* through DNA fingerprinting
  - 3-way and 7-way splits





# Internal BST Dashboard

File Export Share Chat in Teams Get insights Subscribe
Reset to default Bookmarks View

## Bacterial Source Tracking - Library Dependent

7 Way Split - San Antonio River Watershed - All Stations - All Conditions

- Bexar
- Goliad
- Karnes
- Medina
- Ambient
- Stormwater

- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
- 2019

Events  
**109**

Isolates  
**1110**

09/09/2013 to 12/13/2021

### Isolates Per Station by County

Station ID & Name	Isolates
12707 - San Pedro Creek At Furnish	40
12741 - Martinez Creek On N Gable Rd	51
12797 - Cibolo Creek At FM 81	60
12805 - Cibolo Creek At FM 539	53
12813 - Medina River At Cassin Crossing	10
12818 - Medina River At FM 2536	10
12824 - Medina River At CR 2615	10
12879 - San Antonio River At FM 791	60
12897 - San Antonio River At IH 410	40
12904 - San Antonio River At Alamo St	40
12906 - San Antonio River At Pecan St	40
12909 - San Antonio River At Mulberry St	70
12919 - Cibolo Creek Downstream IH 10 US 90	50
14200 - Medina River At CR 484	10
14206 - Medina River At Hwy 90	10
14211 - Cibolo Creek At CR 389	52
17573 - Escondido Creek Downstream Nichols Creek	20
17858 - San Antonio River At US 59	62
18402 - Escondido Creek At CR 331	20
18859 - San Antonio River at Witte Museum	30
20117 - San Pedro Creek At Croft	20

### Source Categories

Wildlife, Non-Avian	39%
Unidentified	16%
Wildlife, Avian	14%
Cattle	9%
Livestock, Non-Avian	6%
Livestock, Avian	6%
Human	5%
Pets	4%



# LSAR I-Plan

- Approved August 8, 2018
- Extensive stakeholder involvement
  - 9 management measures
  - 2 control actions



Approved August 8, 2018

Implementation Plan for  
Five Total Maximum Daily  
Loads for Bacteria in the  
Lower San Antonio River  
Watershed

Segment 1901

Assessment Units 1901\_01, 1901\_02, 1901\_03,  
1901\_04, 1901\_05

Prepared by the San Antonio River Stakeholders

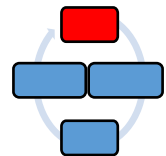
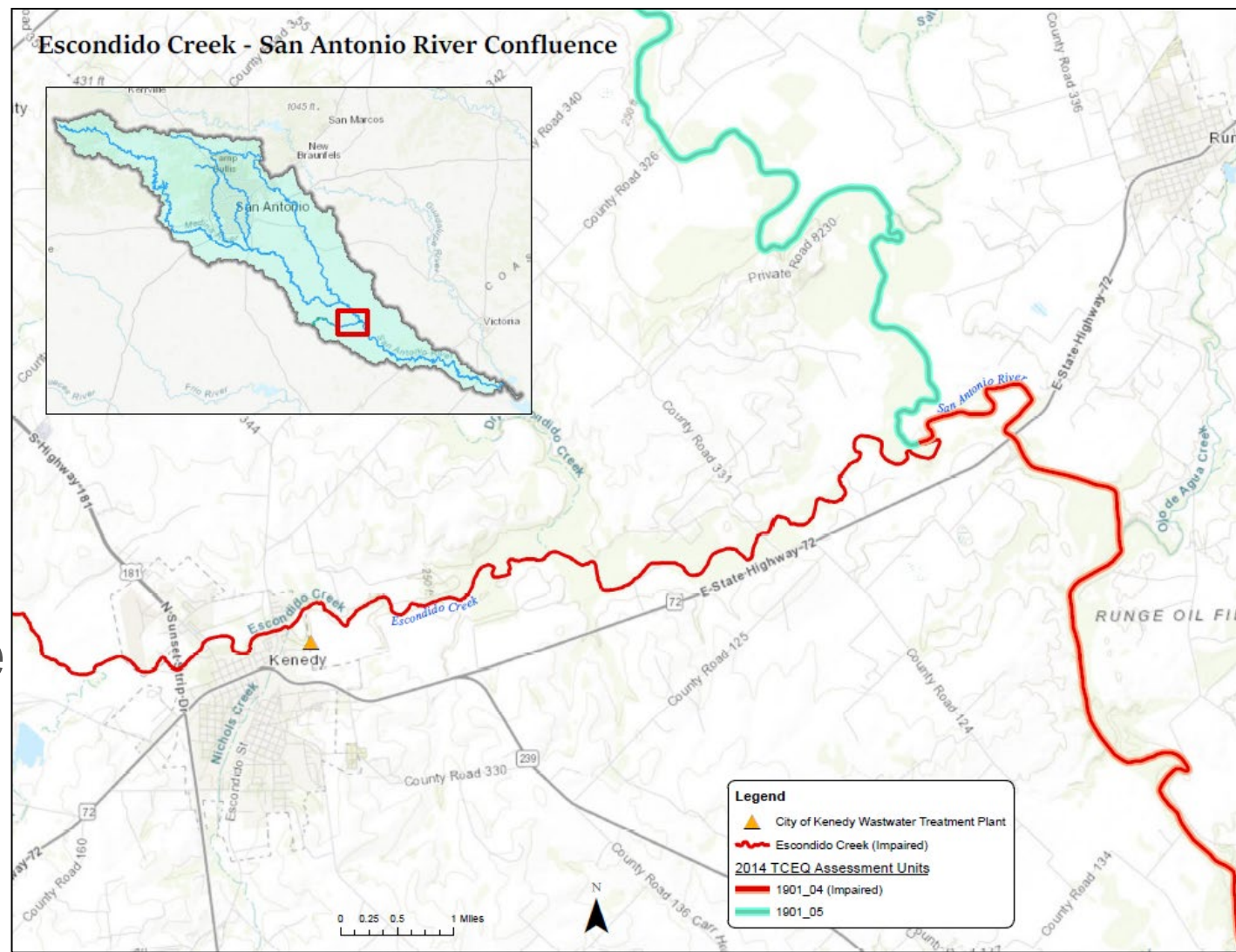
With Support from the TMDL Team, Water Quality Planning Division,  
Office of Water

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

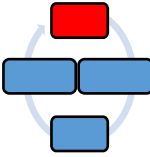
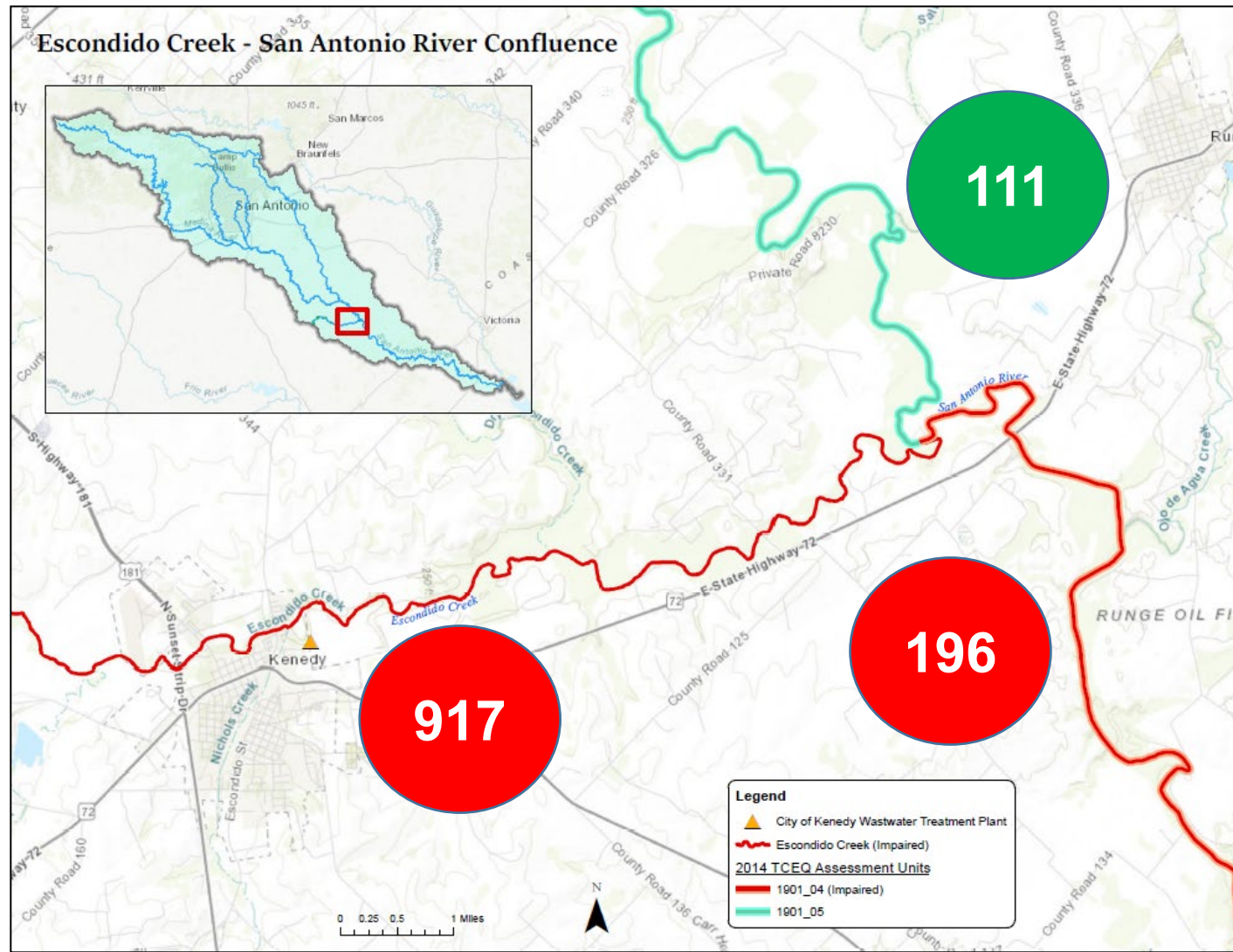
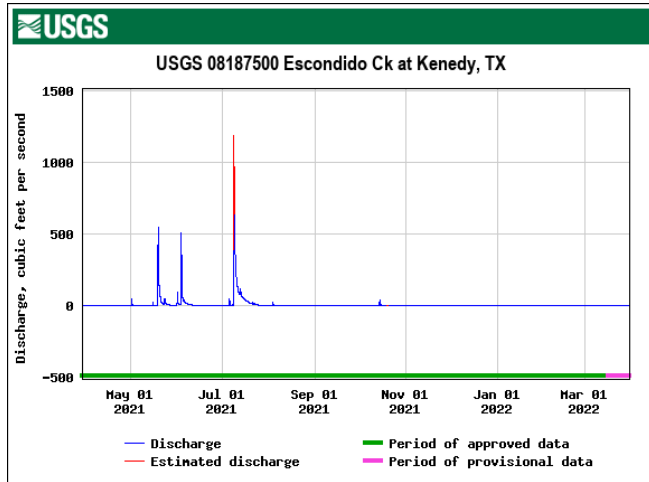


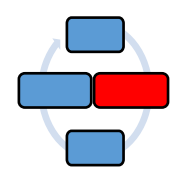
# Escondido Creek

- ~11 mi. long
- Bacterial impairment since 2010
- WWTP discharge receiving stream



# Escondido Creek



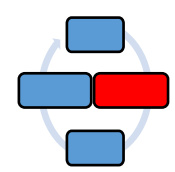


# Escondido Creek

	Station	Flow	<i>E. coli</i> (MPN)	Days Since Last Precip.
FLOW ↓	Escondido at FM 792	0.1	140	5
	Immediately upstream of Nichols Creek Confluence	0.0	96	5
	Nichols Creek	0.1	220	5
	TCEQ_17573 Downstream of Nichols Creek Confluence	0.1	210	5
	8 miles upstream SAR Confluence	0.1	240	5
	7 miles upstream SAR Confluence	0.1	1600	5
	6 miles upstream of SAR Confluence	0.7	520	5
	5 miles upstream of SAR Confluence	1.6	460	5
	4 miles upstream of SAR Confluence	1.3	770	5
	3 mi. upstream SAR Confluence	2.0	610	5
	2 mi. upstream SAR Confluence	1.6	410	5
	1 mi. upstream SAR Confluence	1.2	520	5
	Confluence	1.1	650	5



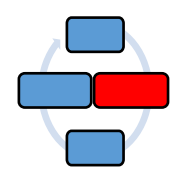




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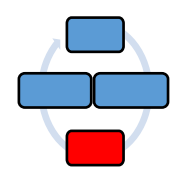




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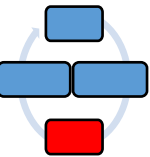




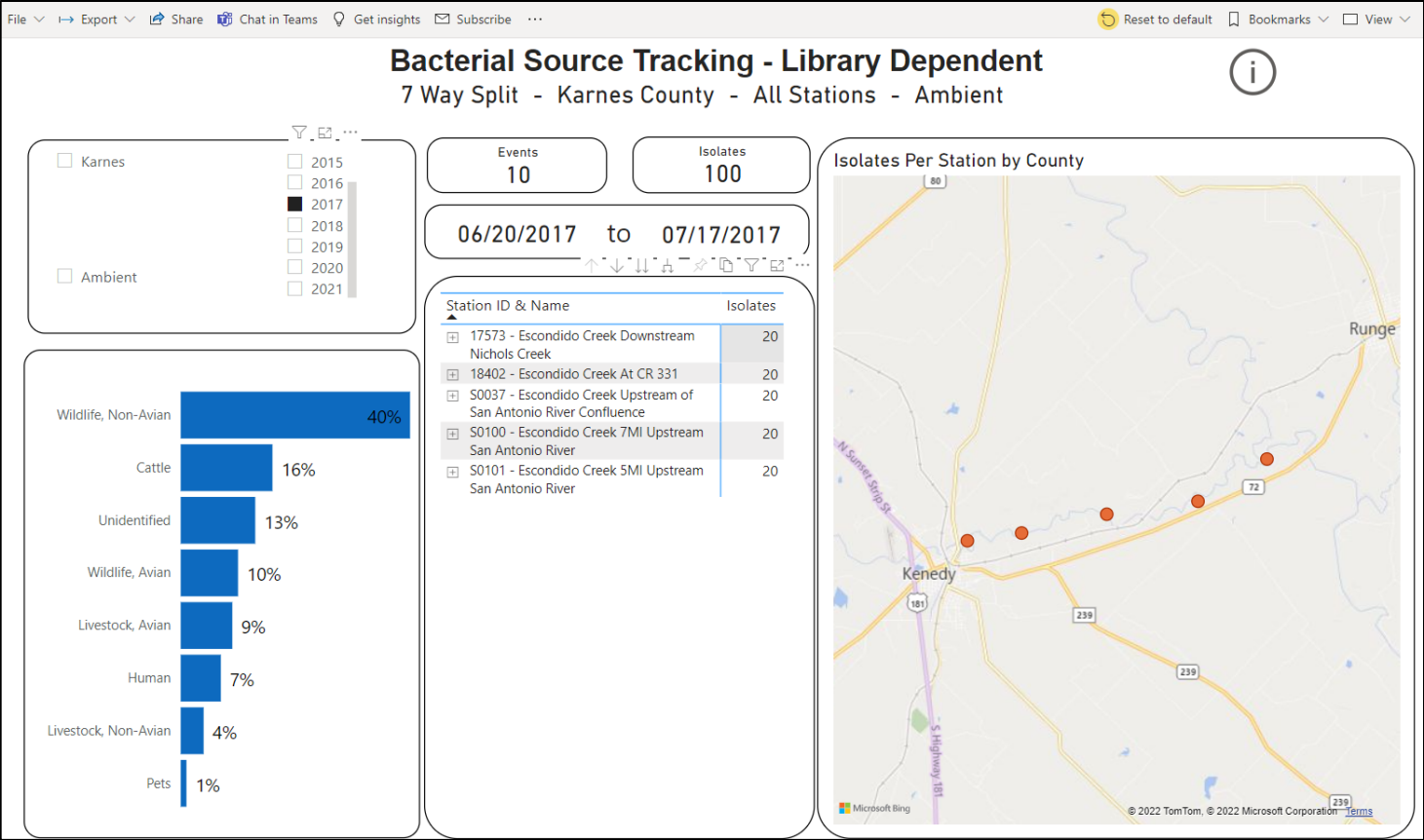
# Escondido Creek

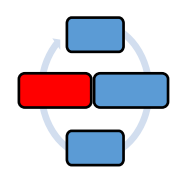
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# LSAR I-Plan





# LSAR I-Plan

- Management Measures:
  - Remove and manage feral hogs.
  - Restore and repair riparian zones; emphasize protection of riparian zones; advocate for educational and outreach materials.
  - Coordinate and expand existing water quality monitoring in the watershed.\*

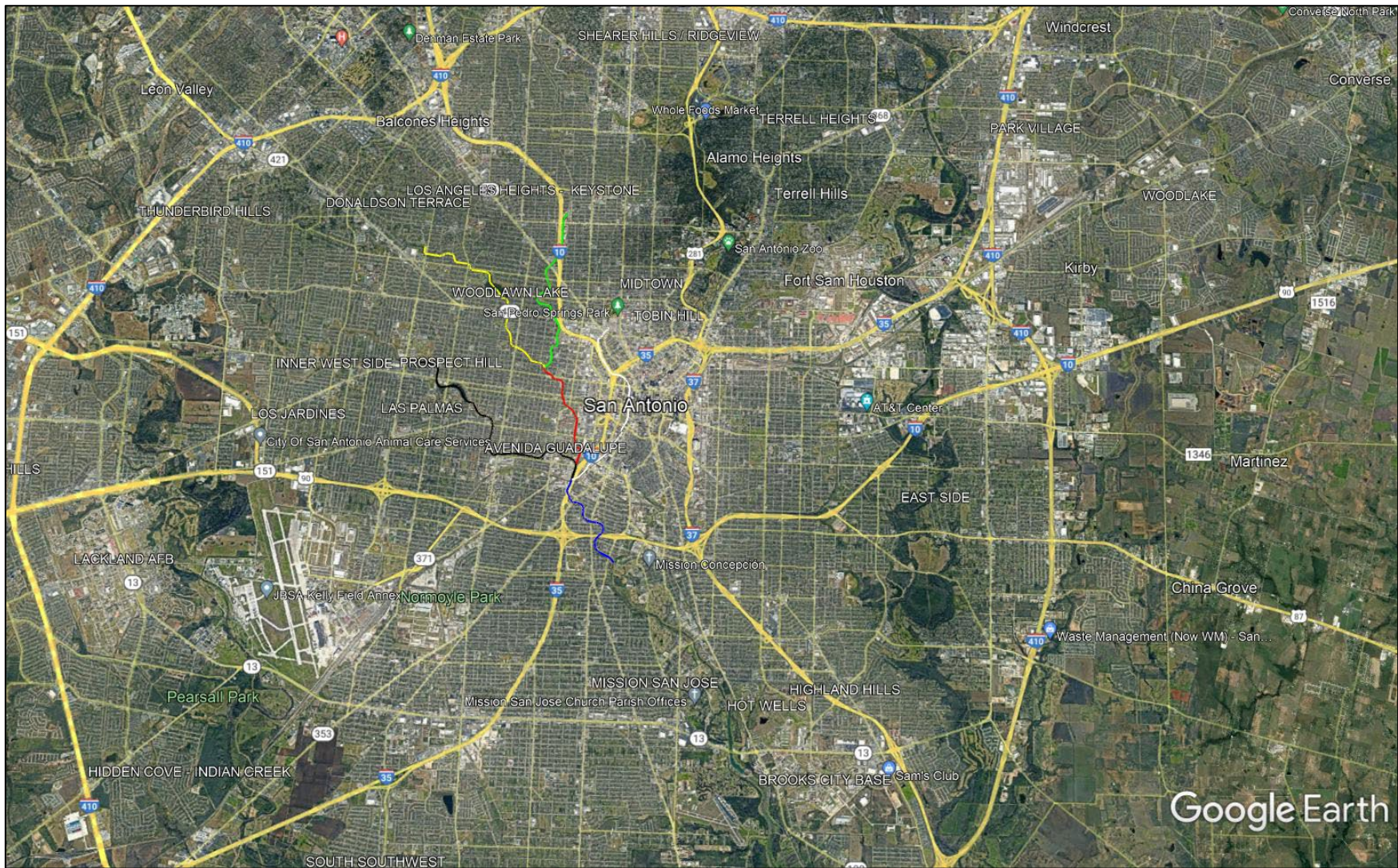


# LSAR I-Plan

Assessment Unit	2014 IR Geomean	Draft 2022 IR
1901_05	110.67	105.6
Escondido Creek	916.85	515.03
1901_04	195.75	135.31

LSAR I-Plan adopted August 8, 2018

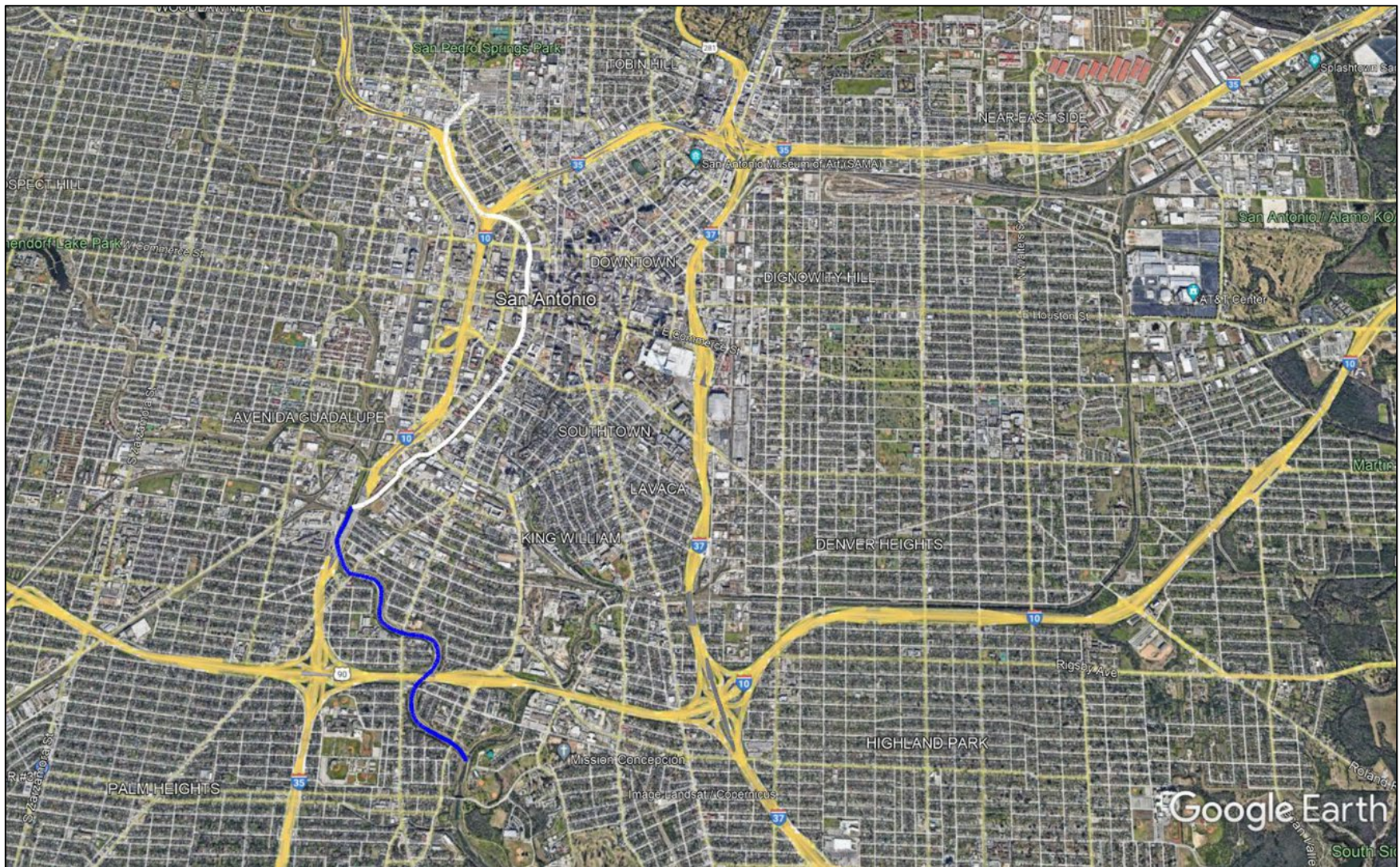




Google Earth

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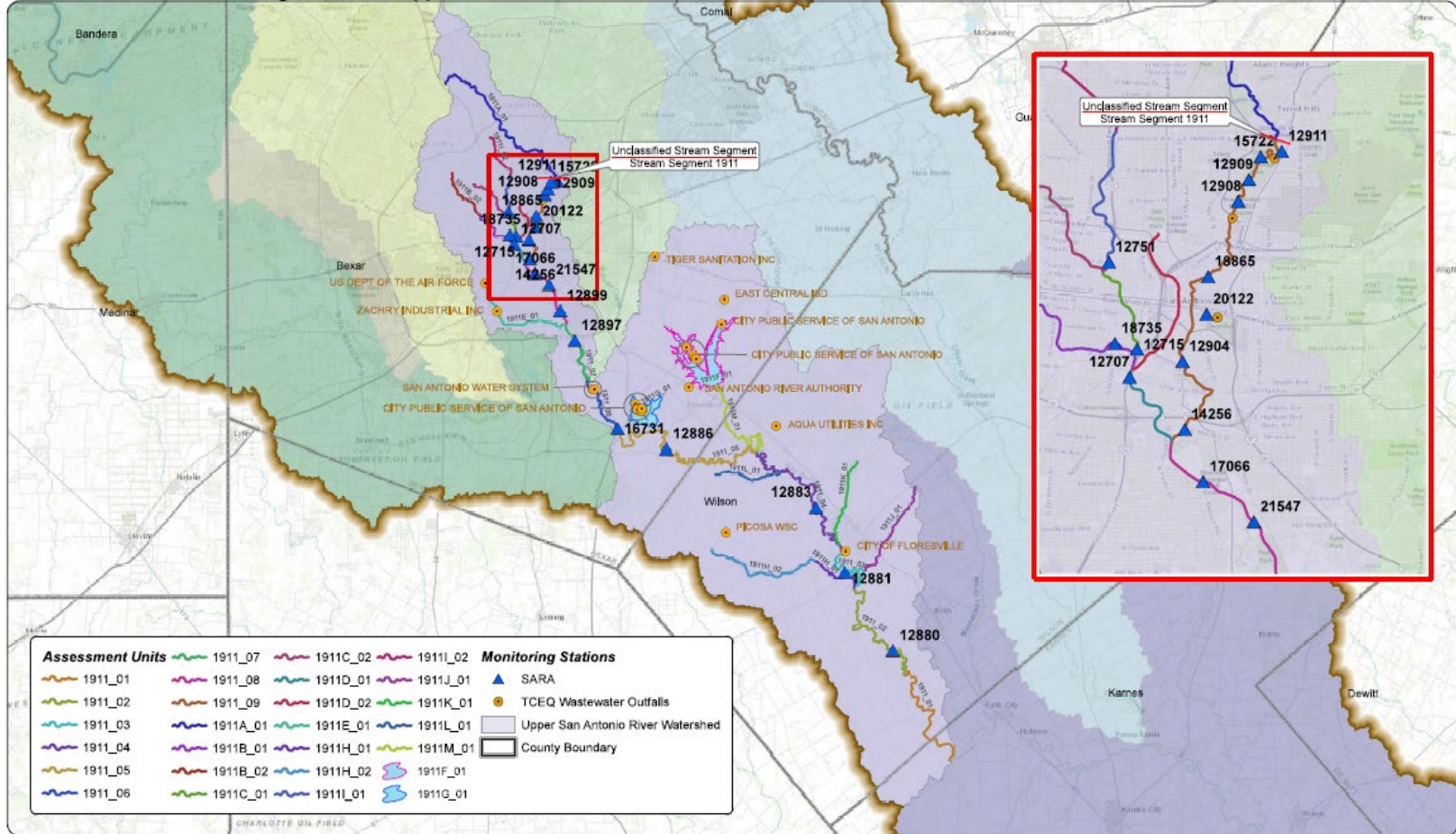
# San Pedro Creek



# San Pedro Creek



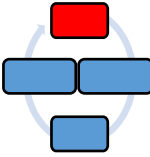
# 2022 Coordinated Monitoring Schedule - Upper San Antonio River Watershed



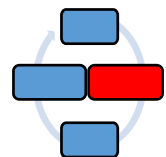
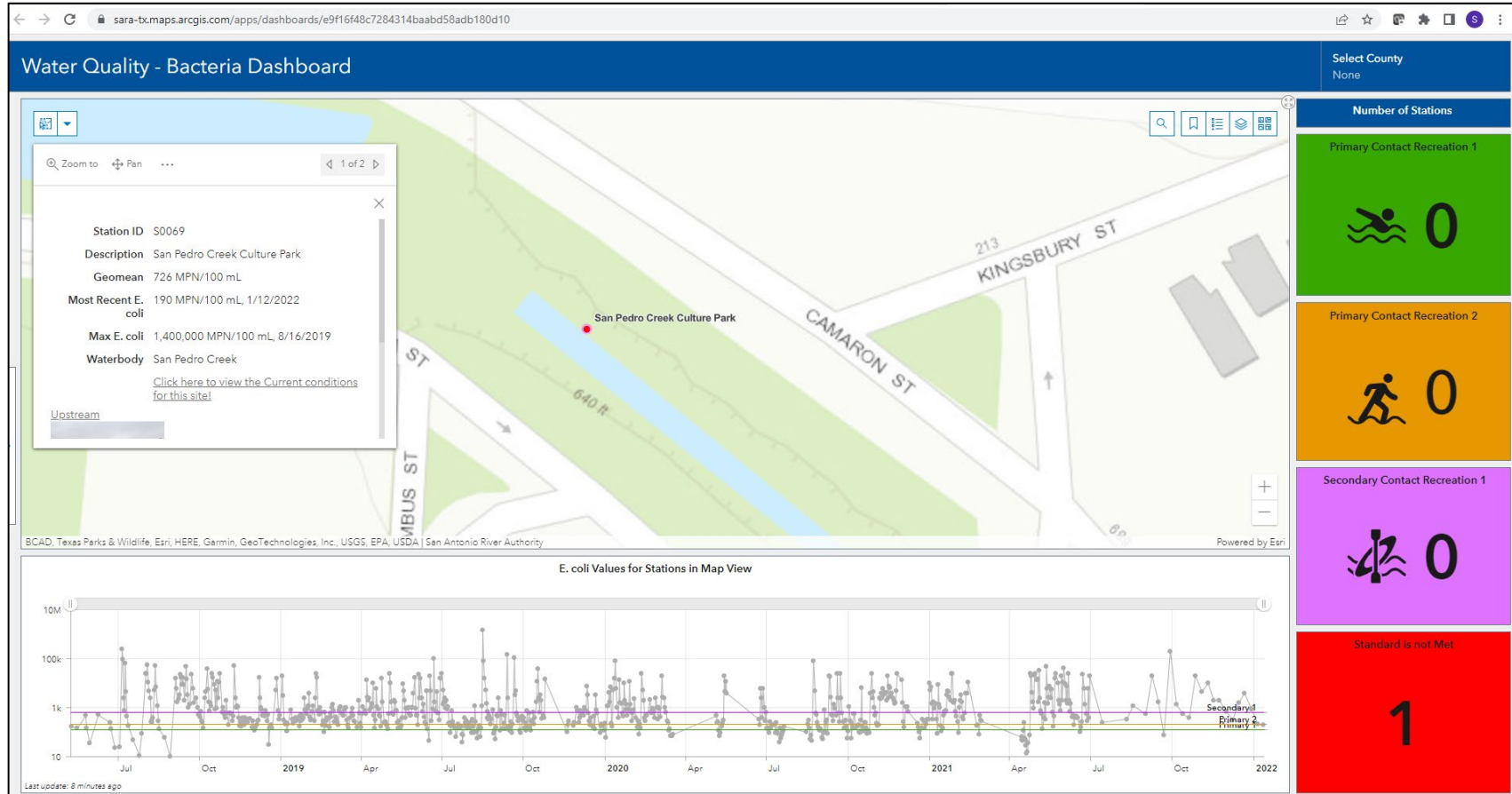
Assessment Units		Monitoring Stations	
1911_01	1911_07	1911C_02	1911I_02
1911_02	1911_08	1911D_01	1911J_01
1911_03	1911_09	1911D_02	1911K_01
1911_04	1911A_01	1911E_01	1911L_01
1911_05	1911B_01	1911H_01	1911M_01
1911_06	1911B_02	1911H_02	1911F_01
	1911C_01	1911I_01	1911G_01

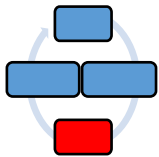


Disclaimer: The information included on this map is intended to be used as a public service. The maps and data are to be used for reference only and are not intended to be used for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate location of property boundaries. The data herein should not be used as a basis for any legal action. The data herein are provided as a public service and are not intended to be used for any other purpose. If there are any questions about the accuracy of the data, please contact the San Antonio River Authority at (214) 343-7000.

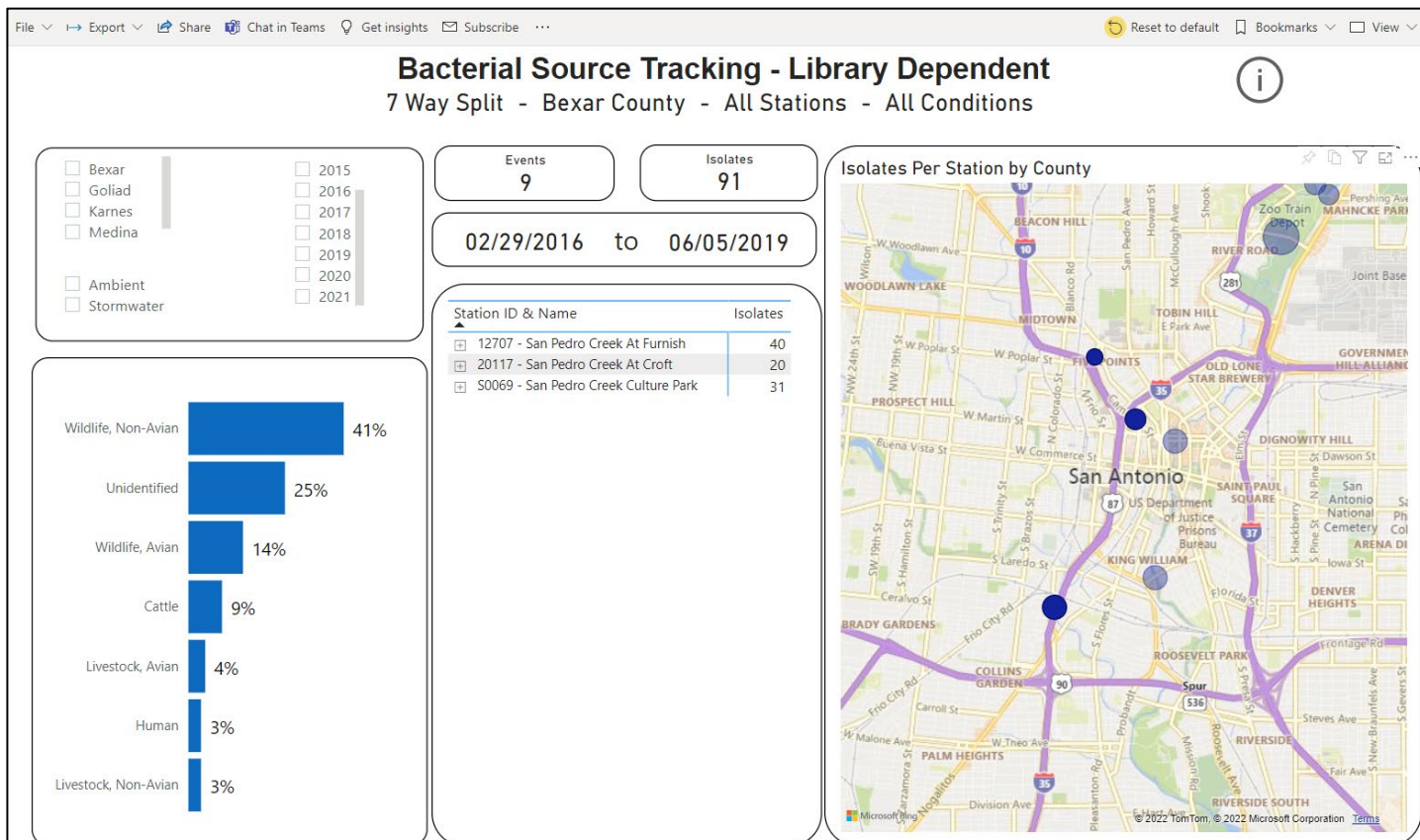


# Bacteria Dashboard





# San Pedro Creek



# San Pedro Creek



## WADE IN THE PLAZA DE FUNDACIÓN AT YOUR OWN RISK VADEA EN LA PLAZA DE FUNDACIÓN A TU PROPIO RIESGO

The Plaza de Fundación may be used for responsible water contact – shallow wading only. Caution, wading area may be slippery, there is no lifeguard on duty, and the creek water may occasionally contain high bacteria levels. By entering the Plaza de Fundación wading area, you take full responsibility for your protection and safety.

The San Pedro Creek Culture Park and the Plaza de Fundación are operated and maintained for public use and enjoyment. It is important to remember that the San Pedro Creek is a natural water body that has not been chlorinated, like a swimming pool, or treated to drinking water standards. Being situated in a highly urbanized area of downtown San Antonio, when it rains, the rainwater goes over parking lots, roof tops, and other impervious (hard) surfaces and into storm drains, picking up pollutants before discharging directly and untreated into the San Pedro Creek. This may cause Escherichia coli (E. coli) bacteria levels and other pollutants within the creek to become elevated. According to the Centers for Disease Control and Prevention, most strains of E. coli are harmless and naturally occur in the intestines of people and animals. However, some kinds of E. coli can cause illness in humans.

The San Antonio River Authority conducts water quality tests of the Plaza de Fundación and posts the results on the River Health page of its website. To see the latest water quality test results and learn how you can help protect the water quality of San Pedro Creek and the San Antonio River, please visit [sariverauthority.org](http://sariverauthority.org).

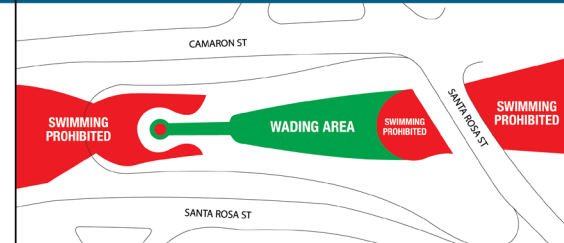
Given the potential water quality risks in an urbanized creek, when wading in the Plaza de Fundación, please do not ingest the creek water and wash your hands after recreating in the creek. This is good advice not only for enjoying the San Pedro Creek Culture Park, but also for any time you recreate in an outdoor body of water, be it a creek, river, lake, ocean, or even a swimming pool. Additionally, wading is not recommended in the Plaza de Fundación for at least 72 hours after the most recent rainfall as this is when E. coli levels are likely to be high.

El público puede tener contacto con el agua de la Plaza de Fundación responsablemente – al vadear en las áreas llanas. Se recomienda precaución ya que el área puede estar resbalosa, no hay salvavidas y el agua del arroyo puede tener altos niveles de bacteria ocasionalmente. Al entrar al área para vadear de la Plaza de Fundación, el público asume responsabilidad de su protección y seguridad.

El Parque Cultural del Arroyo San Pedro y la Plaza de Fundación son operadas y mantenidas para el uso y disfrute del público. Es importante recordar que el Arroyo San Pedro es un cuerpo de agua natural que no ha sido clorado como una piscina o ha sido tratado al nivel del agua potable. Al estar ubicado en un área altamente urbanizada del centro de la Ciudad de San Antonio, la lluvia que cae en los estacionamientos, techos y otras superficies impermeables va a los alcantarillados, recogiendo contaminantes, antes de descargarse directamente y sin tratamiento al Arroyo San Pedro. Esto puede causar que los niveles de bacteria como Escherichia coli (E. coli) y otros contaminantes dentro del arroyo se eleven. De acuerdo con el Centro de Control y Prevención de Enfermedades, la mayoría de las cepas de E. coli son inofensivas y ocurren naturalmente dentro de los intestinos de los humanos y animales. Sin embargo, existen algunos tipos de E. coli que si pueden causar enfermedad en los humanos.

Personal de San Antonio River Authority hacen pruebas de calidad acuática en la Plaza de Fundación y publica los resultados en la página "River Health" de su sitio web. Para ver los más recientes resultados de las pruebas de calidad acuática y para aprender cómo puedes ayudar a proteger la calidad acuática del Arroyo San Pedro y el Río San Antonio, visita [sariverauthority.org](http://sariverauthority.org).

Dado al potencial de riesgo debido a la calidad acuática en un arroyo urbanizado, al vadear en la Plaza de Fundación, favor de no ingerir el agua del arroyo y de lavarse las manos después de recrear en el arroyo. Esto es un buen consejo, no solo al disfrutar del Parque Cultural del Arroyo San Pedro, también al recrear en cualquier cuerpo de agua en las afueras, sea un arroyo, río, lago, océano, ¡hasta en una piscina! También se recomienda no vadear en la Plaza de Fundación 72 horas después de una reciente lluvia ya que es muy probable que los niveles de E. coli estén elevados.



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CITY CODE SECTION 22-88  
**PROHIBIDO NADAR:**  
SECCIÓN 22-88 CÓDIGO DE LA CIUDAD



# Lessons Learned

- Wildlife may dominate, but we can still act
  - Human, pets and livestock categories
- You can assume, but always verify
- BST is a powerful tool when properly contextualized







# Questions?

Shaun Donovan

San Antonio River Authority

[sdonovan@sariverauthority.org](mailto:sdonovan@sariverauthority.org)

(210)302-3258

