SAN ANTONIO RIVER AUTHORITY

Tools for Stormwater Quality Management

July 18, 2025

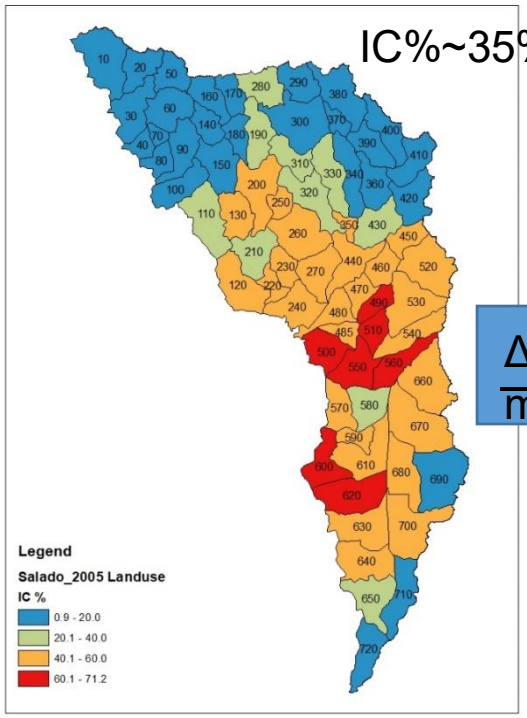
Sheeba M Thomas Dominguez, PE, PhD – Lead Technical Engineer

Agenda

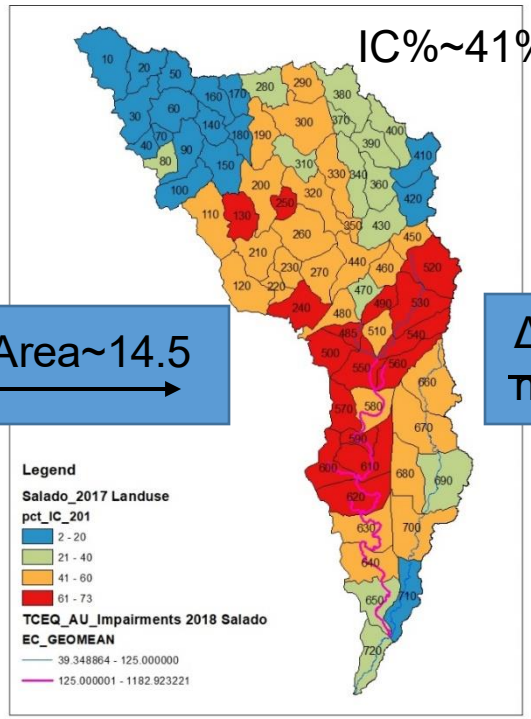
- Background
- Approach
- Models and Analysis
- Results
- WQ Improvement Implementation

Impaired Waterbodies for Primary Contact Recreation

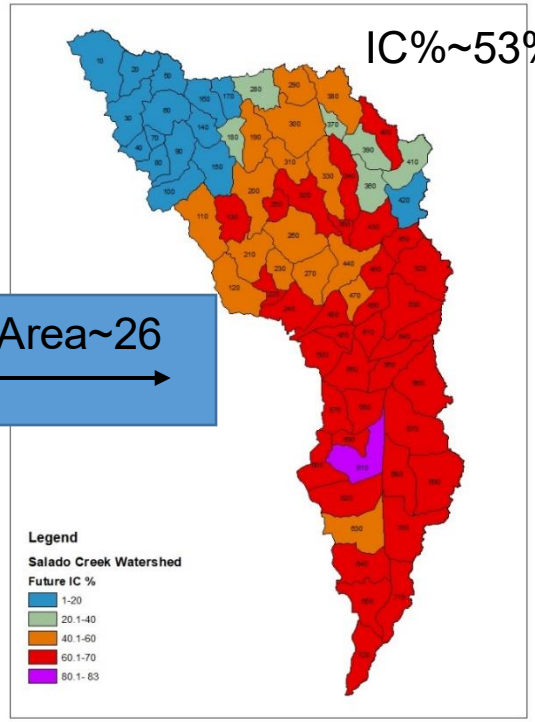
Salado Creek Watershed



Δ IC Area~14.5 mi^2



Δ IC Area~26 mi^2

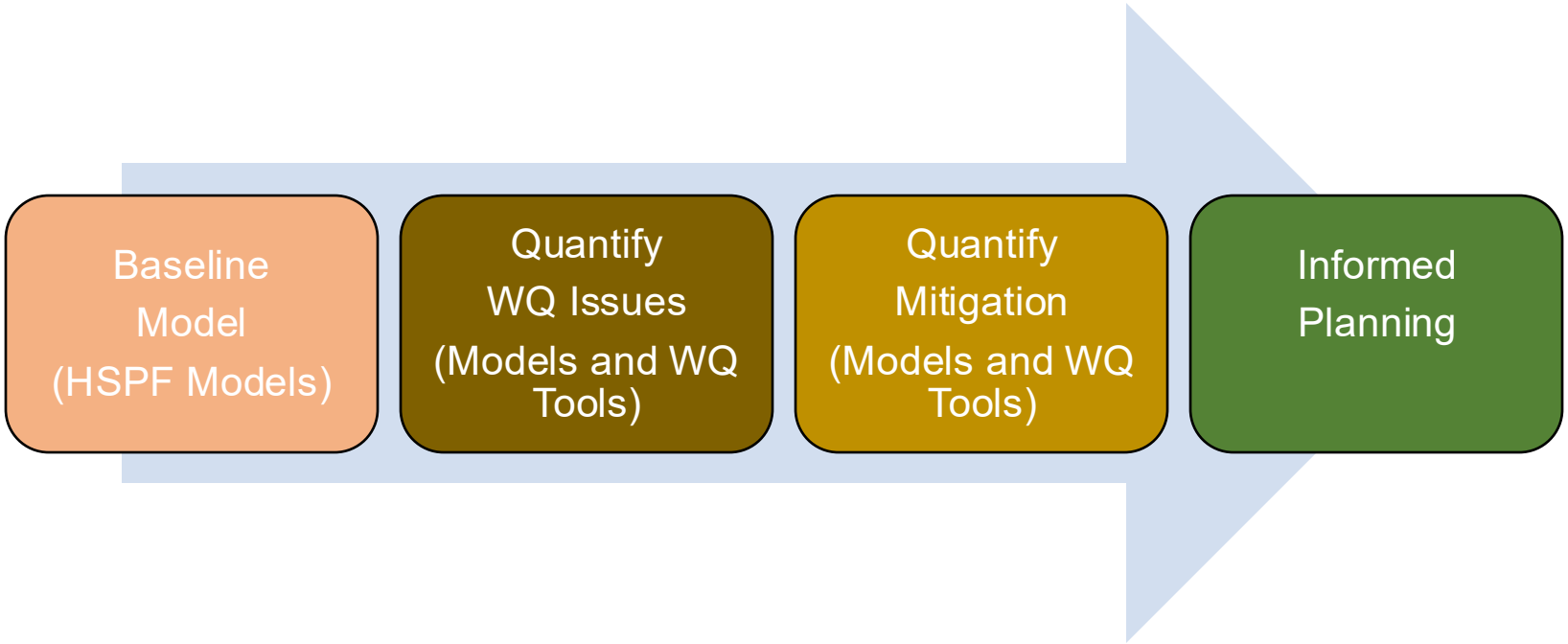


2005 Impervious Cover

2017 Impervious Cover

2040 Impervious Cover

Our Approach



SARA Project Team

Sheeba Thomas, PhD, P.E., PMP

Yu-Chun Su, PhD, PE,CPESC, CPSWQ

Paul Duda

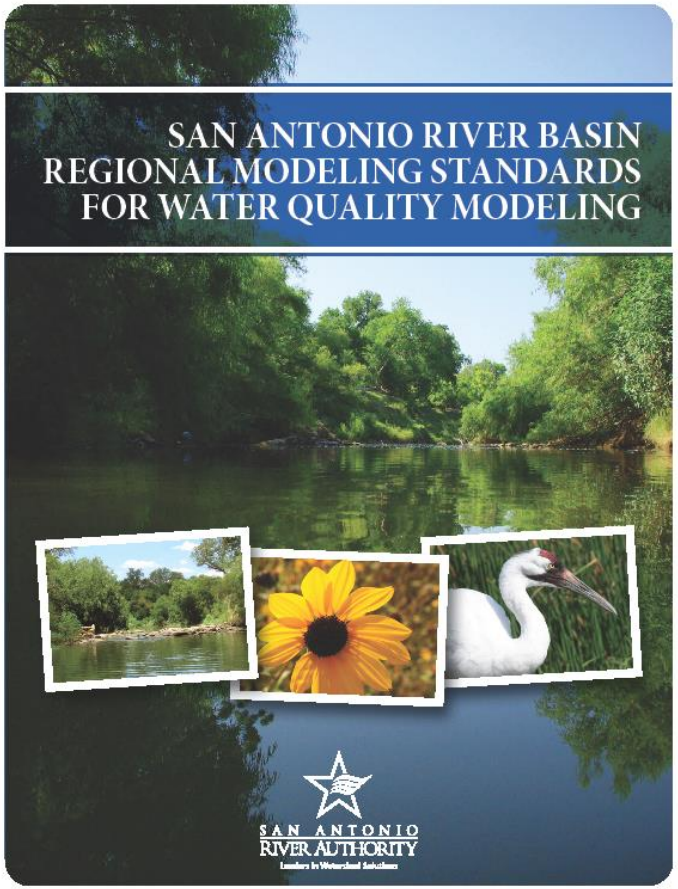
RESPEC (formerly Aqua Terra)

SARA Suite of WQ Modeling Tools

Approach and Tools to allow quantitative WQ planning:

- SARA WQ modeling standards
- WQ model development and calibration
  - HSPF
- Timeseries Utility Tool
- Load Reduction Tool
- SARA Enhanced BMP Tool
  - BMP Database

SARA WQ Modeling Standards



Data Needed for WQ Modeling

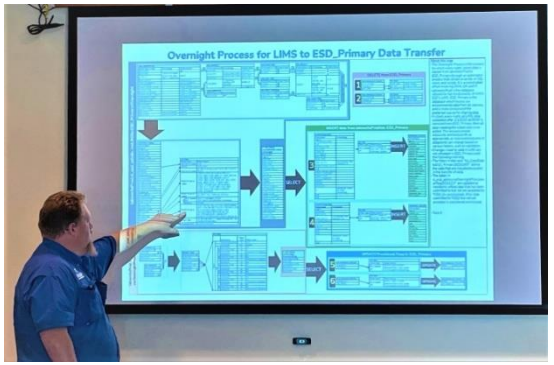
- DFIRM
  - Subbasin delineation
  - Stream shapefile
  - HEC-HMS
  - HEC-RAS
- Topography
  - DEM
  - Contours
- Channel XS
- Dams/reservoirs
- Aerial images
- SSURGO soil data
- Major development centers

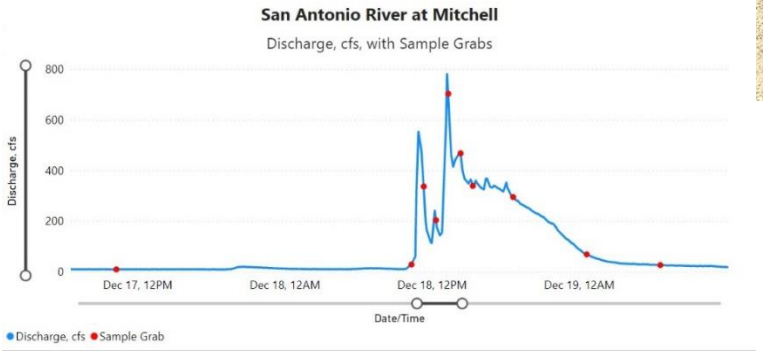
- Met data (NOAA)
- Rainfall
  - NOAA
  - EAA (gage, NEXRAD)
  - SARA
  - USGS
- Diversion
- USGS flow data
- Groundwater recharge & spring flow
- Latest 303(d)
- CRP Screening levels
- Landuse & IC%

- Water Quality
  - SWQM
  - USGS
- Wastewater data
- SSO
- OSSF (estimates)
- QUAL-TX models
- Atmospheric deposition
- Edwards Aquifer Infiltration Data
- Rural watershed data
  - Agricultural data
  - SELECT or EC loading estimates

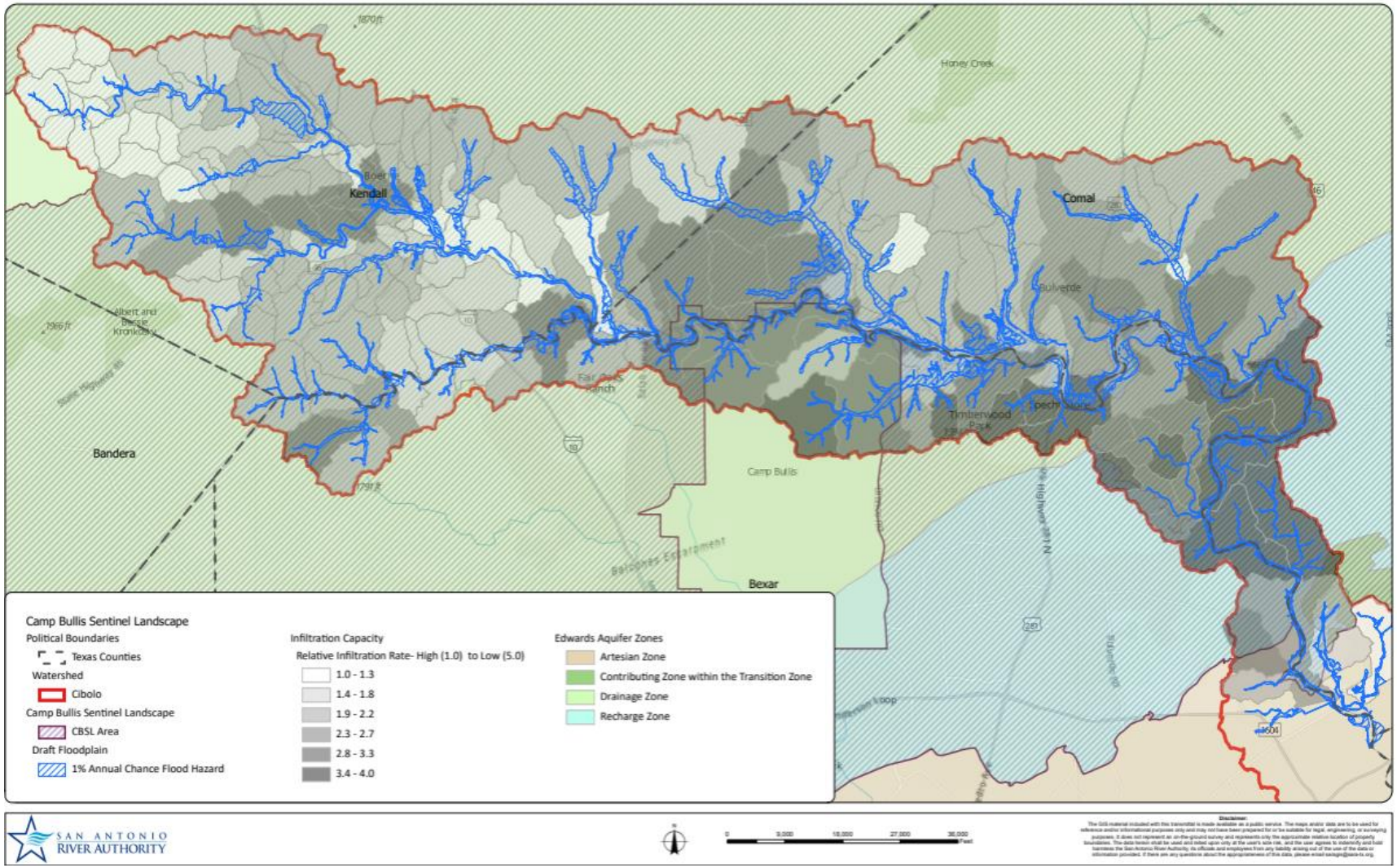
Water Quality Data

Environmental Services Department Superstars!

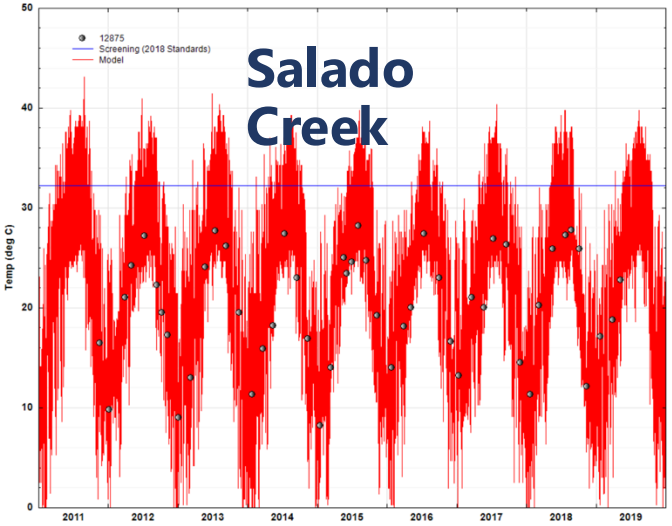


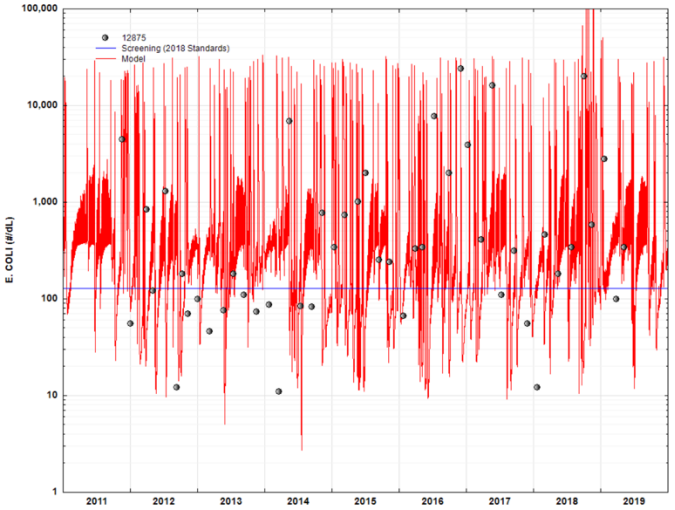


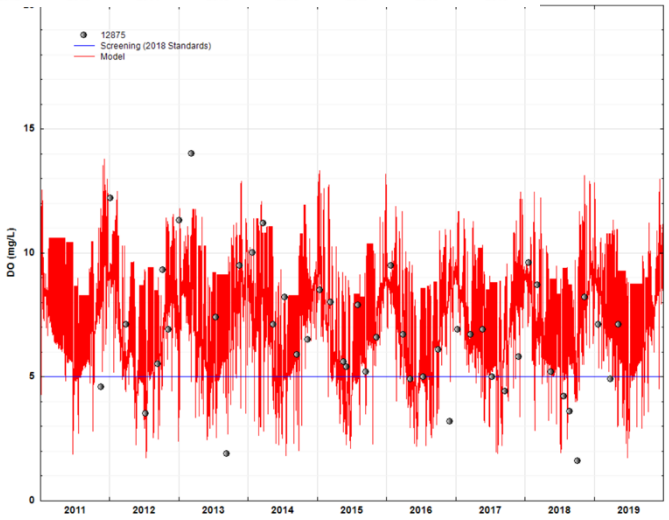
EAA's Relative Infiltration Data

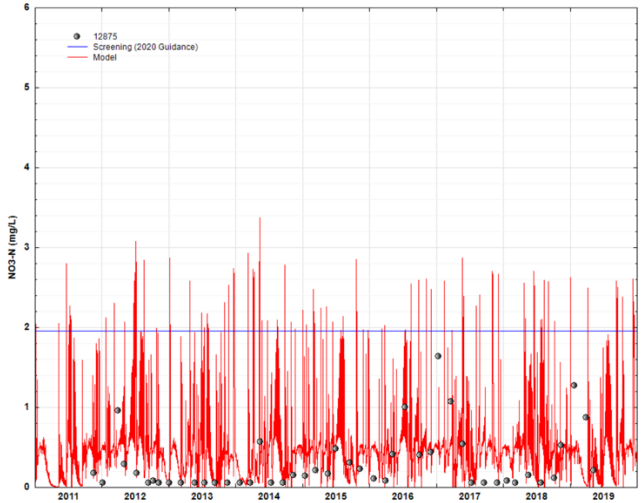


HSPF Calibration – Continued Simulation Thru Wet/Dry



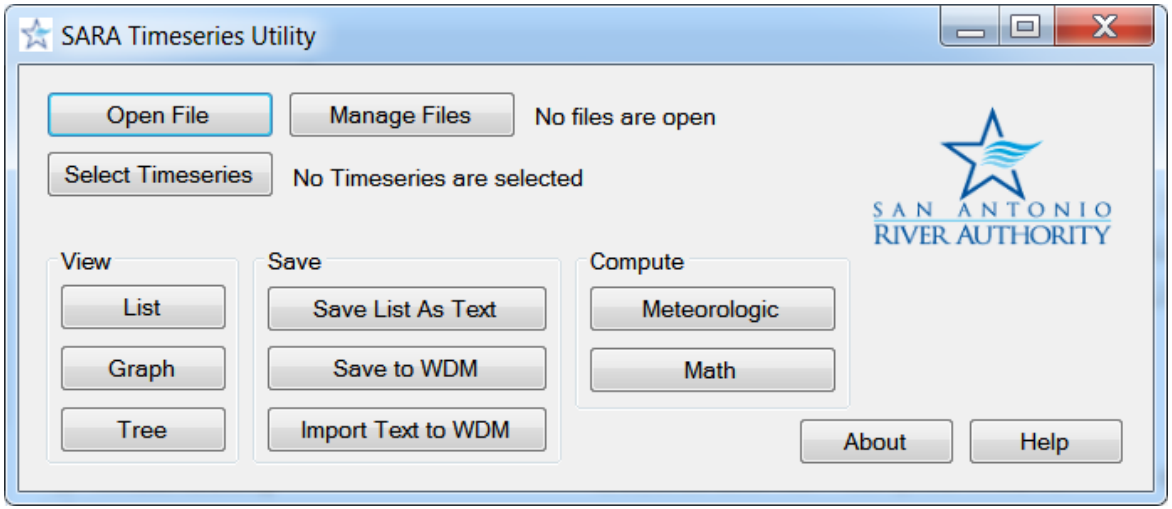




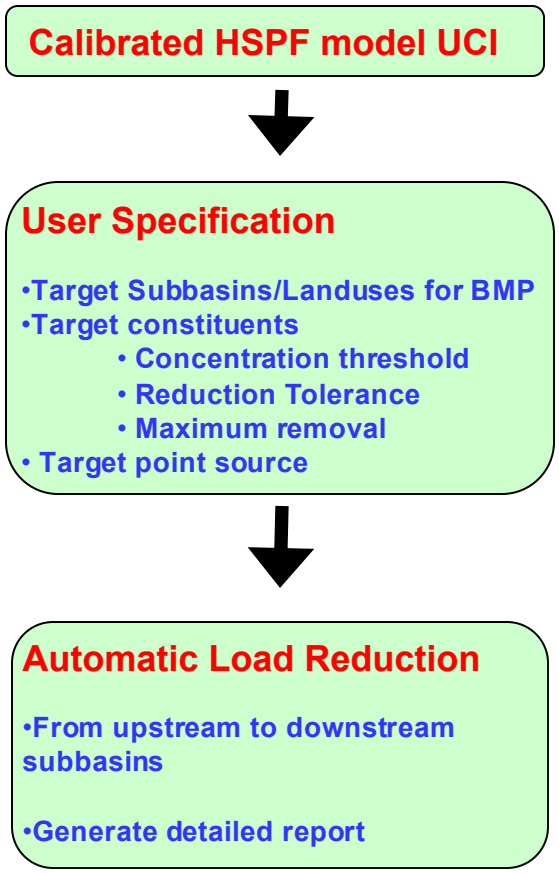


SARA Timeseries Utility Tool

- Enhanced efficiency in reading large timeseries records (e.g. HSPF binary output).
- Developed, tested, and released to public through EPA BASINS user community on 10/24/2013.
- Replaced WDMUtil



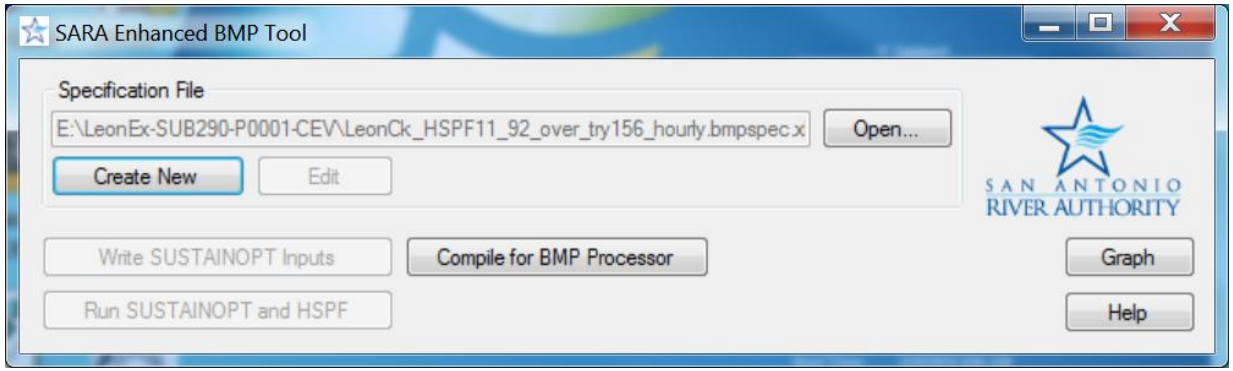
SARA Load Reduction Tool



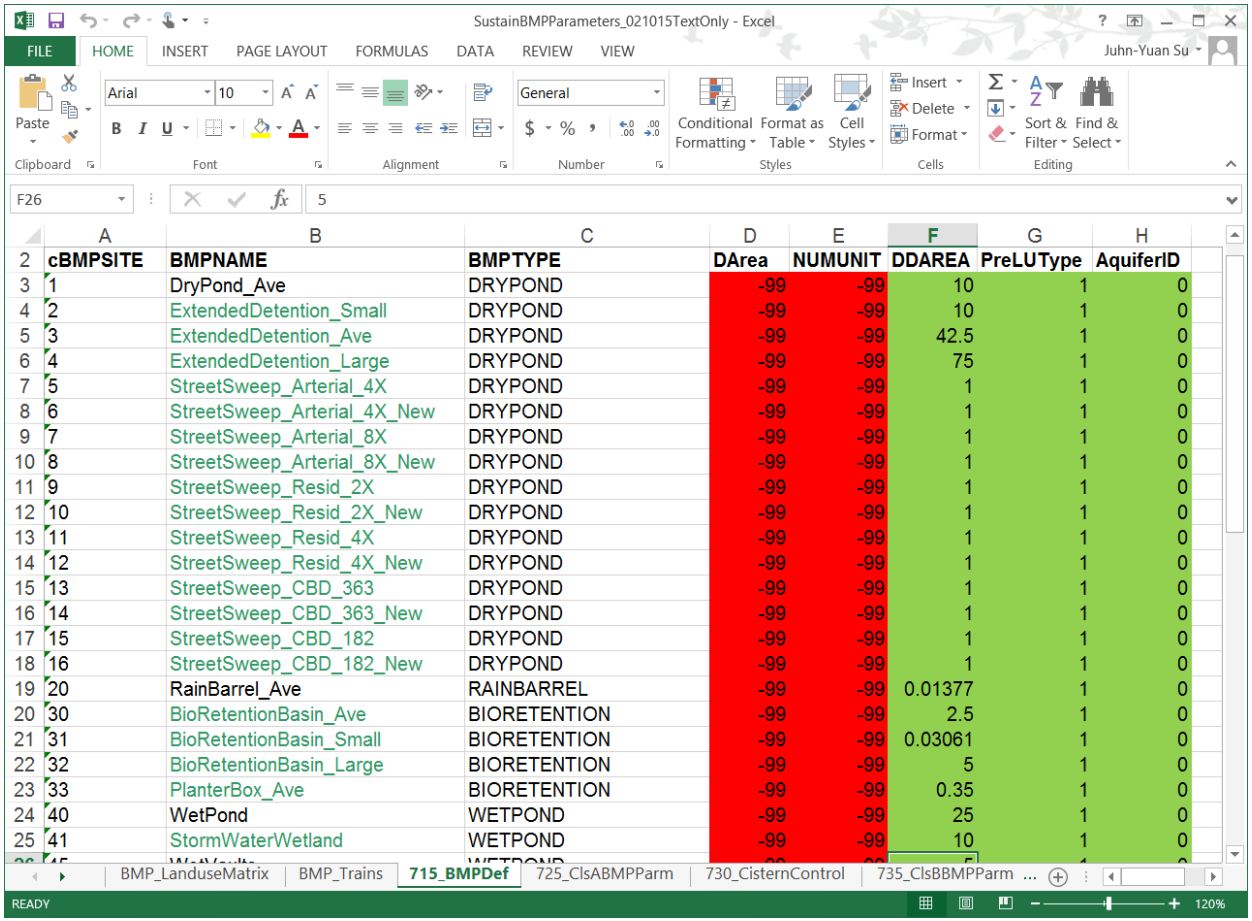
- Uses load reduction factors in HSPF BMP Module.
- Automates tedious process for large watershed models.
- Compared to manual processes.
- Developed, tested, and released to public through EPA BASINS user community on 5/09/2014.

SARA Enhanced BMP Tool

- Identify LID/BMPs to achieve needed load reductions.
- Use LRT results or any calibrated HSPF models.
- Combines robust land surface representation from HSPF with EPA SUSTAIN's BMP capabilities.
- Avoids ArcGIS version issue inherent in SUSTAIN by using non-GIS component (SUSTAINOPT)

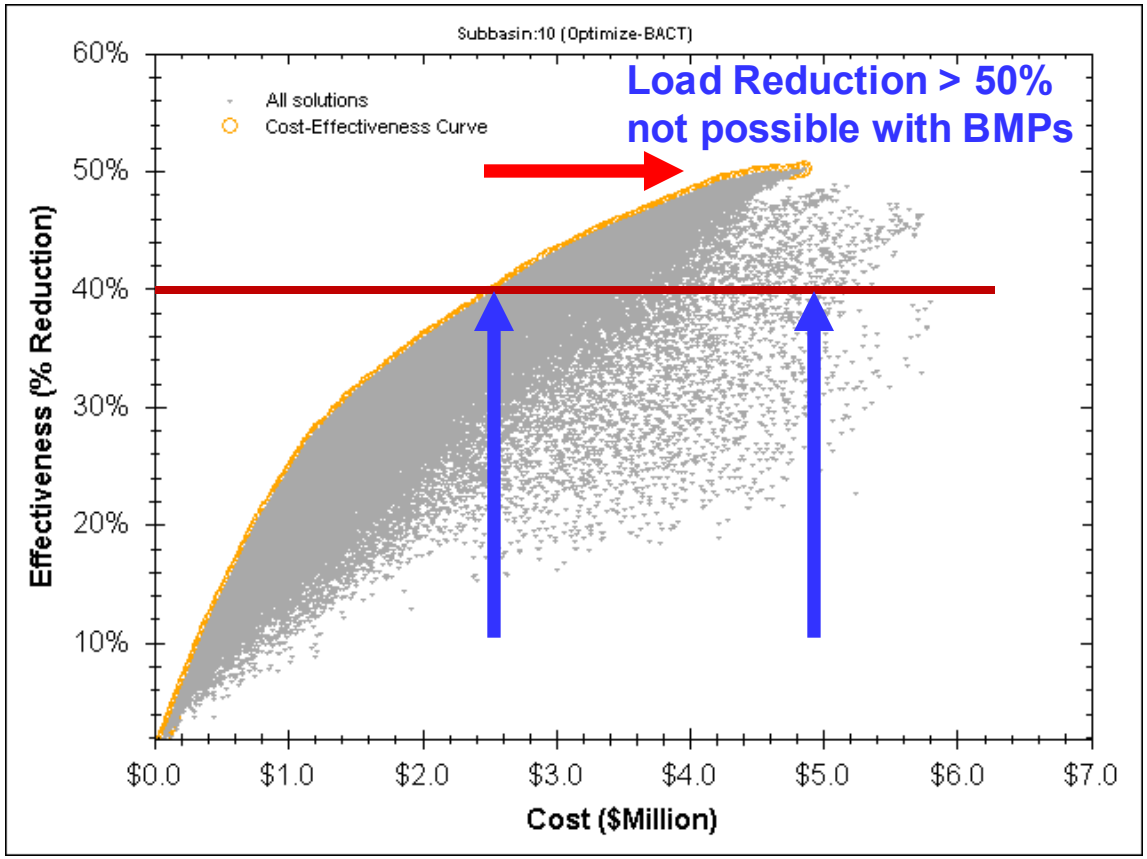


SARA BMP Tool Database



	A	B	C	D	E	F	G	H
2	cBMPSITE	BMPNAME	BMPTYPE	DArea	NUMUNIT	DDAREA	PreLUType	AquiferID
3	1	DryPond_Ave	DRYPOND	-99	-99	10	1	0
4	2	ExtendedDetention_Small	DRYPOND	-99	-99	10	1	0
5	3	ExtendedDetention_Ave	DRYPOND	-99	-99	42.5	1	0
6	4	ExtendedDetention_Large	DRYPOND	-99	-99	75	1	0
7	5	StreetSweep_Arterial_4X	DRYPOND	-99	-99	1	1	0
8	6	StreetSweep_Arterial_4X_New	DRYPOND	-99	-99	1	1	0
9	7	StreetSweep_Arterial_8X	DRYPOND	-99	-99	1	1	0
10	8	StreetSweep_Arterial_8X_New	DRYPOND	-99	-99	1	1	0
11	9	StreetSweep_Resid_2X	DRYPOND	-99	-99	1	1	0
12	10	StreetSweep_Resid_2X_New	DRYPOND	-99	-99	1	1	0
13	11	StreetSweep_Resid_4X	DRYPOND	-99	-99	1	1	0
14	12	StreetSweep_Resid_4X_New	DRYPOND	-99	-99	1	1	0
15	13	StreetSweep_CBD_363	DRYPOND	-99	-99	1	1	0
16	14	StreetSweep_CBD_363_New	DRYPOND	-99	-99	1	1	0
17	15	StreetSweep_CBD_182	DRYPOND	-99	-99	1	1	0
18	16	StreetSweep_CBD_182_New	DRYPOND	-99	-99	1	1	0
19	20	RainBarrel_Ave	RAINBARREL	-99	-99	0.01377	1	0
20	30	BioRetentionBasin_Ave	BIORETENTION	-99	-99	2.5	1	0
21	31	BioRetentionBasin_Small	BIORETENTION	-99	-99	0.03061	1	0
22	32	BioRetentionBasin_Large	BIORETENTION	-99	-99	5	1	0
23	33	PlanterBox_Ave	BIORETENTION	-99	-99	0.35	1	0
24	40	WetPond	WETPOND	-99	-99	25	1	0
25	41	StormWaterWetland	WETPOND	-99	-99	10	1	0

Cost Saving with Optimization



Target: 40% Load Reduction

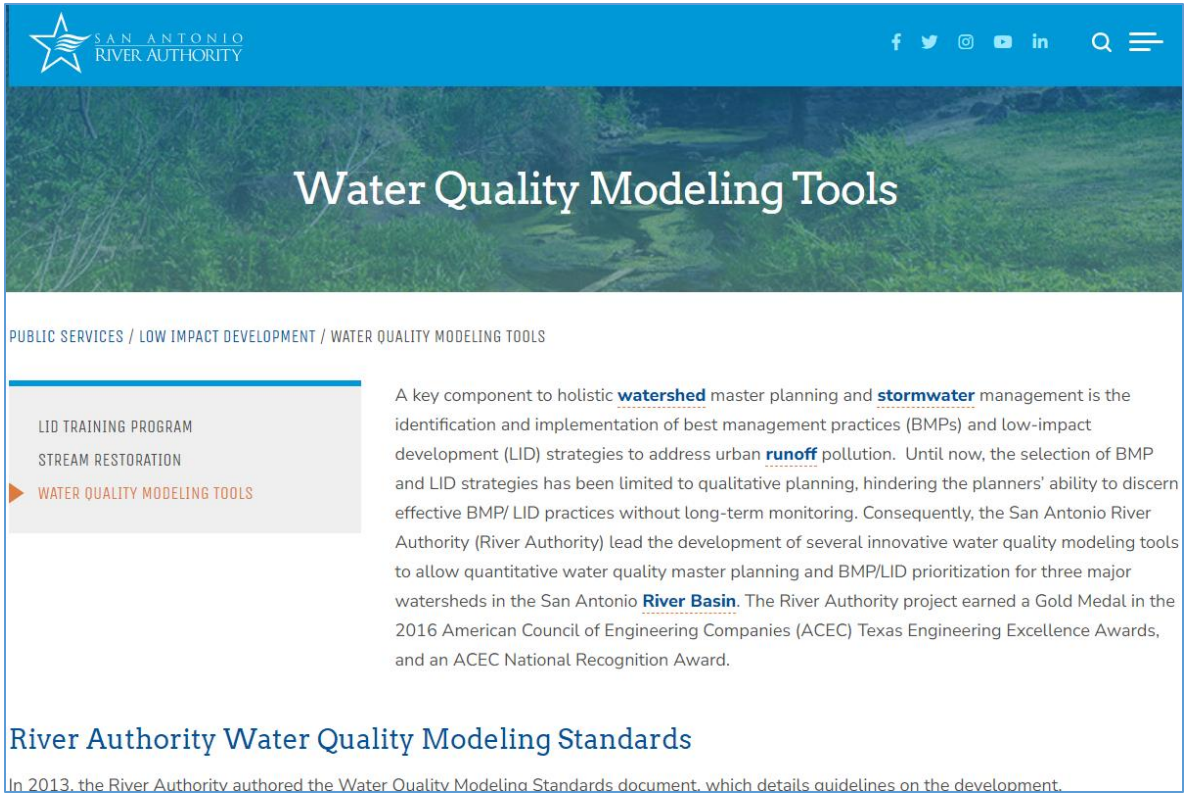
Optimal BMPs: $2.5 MM

Non-Optimal BMP Combinations: can be > $5MM

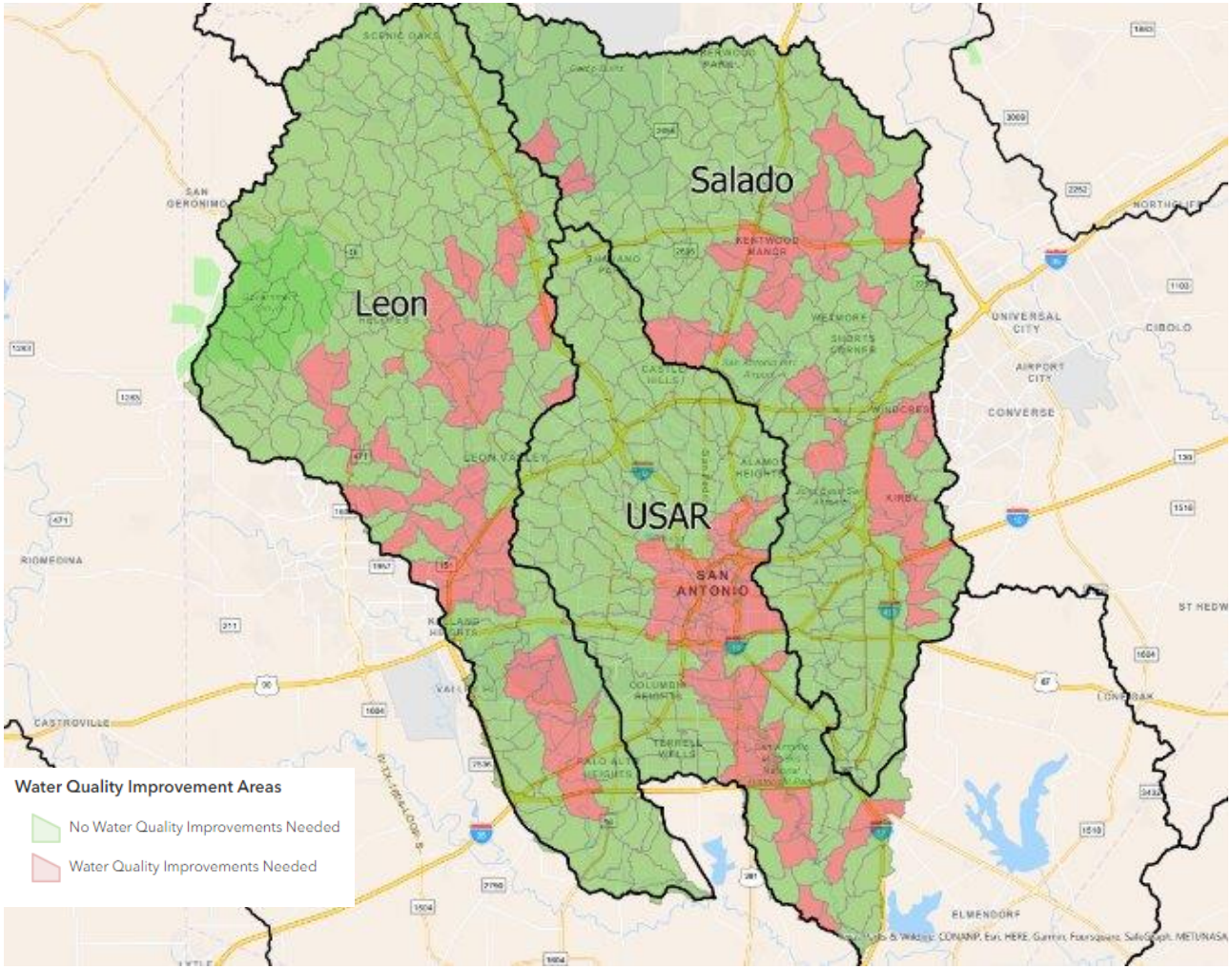
Cost Saving: can be $2.5 MM or 100%

Avoid building first then discover it won't work or too costly

SARA WQ Modeling Tools Download Website



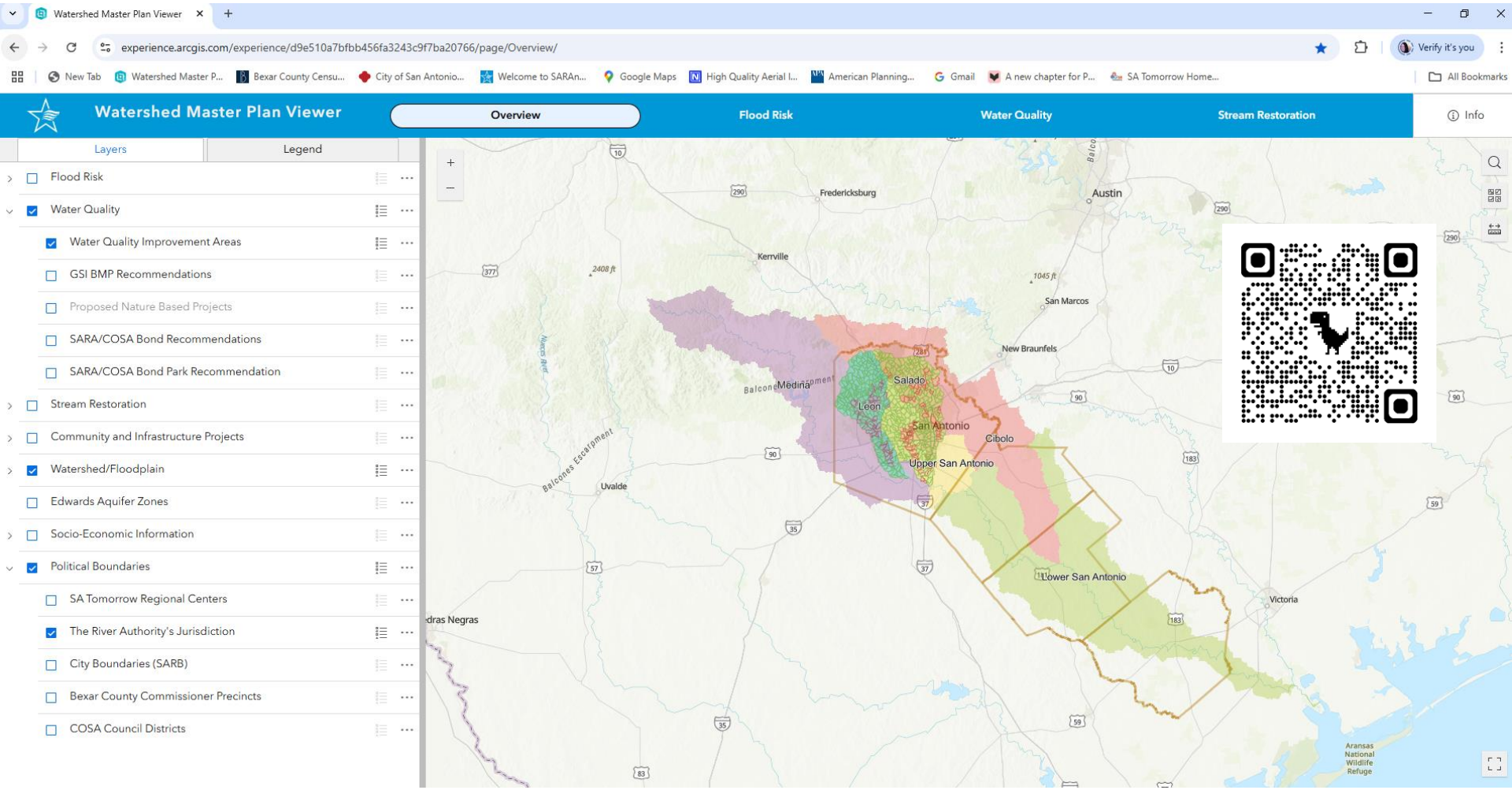
Water Quality Improvement Areas



Implementation of WQ Improvement and Collaboration

- Models and analysis provide information on where improvement strategies need to be implemented
- City of San Antonio
  - MS4
  - Bond Projects
- EAA is partly providing funding for the Cibolo Creek Watershed
- Team pursuing collaboration with other agencies for WQ improvement

Watershed Master Plan Viewer



Committed to Safe, Clean, Enjoyable Creeks and Rivers.

Thank you!

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