NORTH TEXAS MUNICIPAL WATER DISTRICT



BOIS D'ARC LAKE WATERSHED PROTECTION PLAN

Bois d'Arc Lake Watershed Partnership Meeting

August 11, 2021

9:00 AM

Derrell Hall Education Center



Bois d'Arc Lake – May, 2021

NORTH TEXAS MUNICIPAL WATER DISTRICT



BOIS D'ARC LAKE WATERSHED PROTECTION PLAN

Project Overview: The purpose of the Bois d'Arc Lake WPP is to…

- Identify current and potential sources of water pollution in the Bois d'Arc Lake watershed
- Encourage a voluntary and community-driven partnership focused on protecting and enhancing water quality in the watershed
- Identify and recommend specific management measures that will protect and improve water used for drinking, recreation and aquatic habitat for wildlife
- Facilitate the pursuit of federal nonpoint source program grant funds and other financial and technical assistance programs to support implementation of the plan



BOIS D'ARC LAKE WATERSHED PROTECTION PLAN

Bois d'Arc Lake WPP Outline

Chapter 1 – Watershed Management

Chapter 2 – Bois d'Arc Lake Watershed Partnership

Chapter 3 – Overview of the Watershed (characterization)

Chapter 4 – Water Quality

Chapter 5 – Pollutant Source Assessment

Chapter 6 – Management Measures

Chapter 7 – Measures of Success

Chapter 8 – Project Implementation



BOIS D'ARC LAKE WATERSHED PROTECTION PLAN

Agenda

- Recap of July Meeting
- Review & Approve the Ground Rules
- Review and Approve Chapters 1 & 3 (watershed planning & characterization)
- Introduce Chapter 4 (Water Quality)
- Introduce Chapter 5 (Pollutant Source Assessment)
- Open Discussion
- Next Steps

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BOIS D'ARC LAKE WATERSHED PROTECTION PLAN

Recap July Meeting

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BOIS D'ARC LAKE WATERSHED PROTECTION PLAN

Recap July Meeting

- The concept of watershed planning was introduced
- The organizational structure of the Bois d'Arc Lake Watershed Partnership was discussed
- Steering committee membership was discussed and affirmed
- Partnership ground rules were introduced
- An overview of the watershed characterization was provided

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BOIS D'ARC LAKE WATERSHED PROTECTION PLAN

Recap July Meeting

The concept of watershed planning was introduced

Step 1 – Establish a partnership

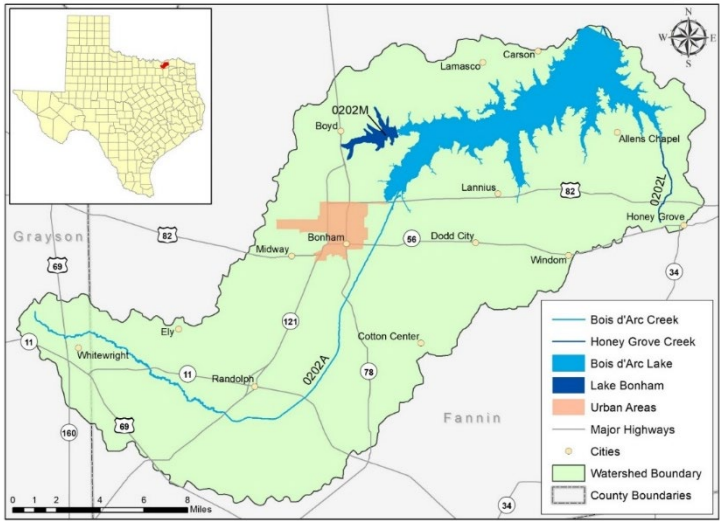
Step 2 – Characterize the watershed

Step 3 – Set goals and identify solutions

Step 4 – Design an implementation program

Step 5 – Implement the watershed plan

Step 6 – Measure progress and make adjustments





BOIS D'ARC LAKE WATERSHED PROTECTION PLAN

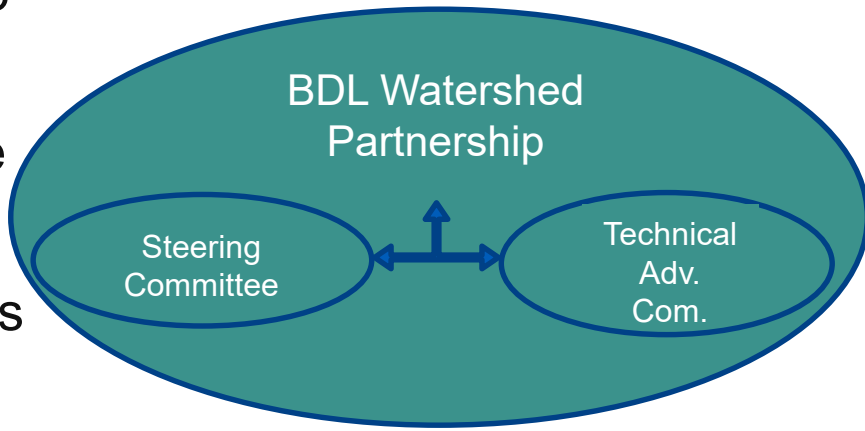
Recap July Meeting

Discussed Structure of the Bois d'Arc Lake Watershed Partnership

- The Partnership serves as a public forum for the planning process
- Members represent multiple interests from throughout watershed

Stakeholders can participate by:

- Participating in monthly partnership meetings
- Serving on the Steering Committee
- Serving on the Technical Advisory Committee – State/federal agencies to assist with technical tasks and resources





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Recap July Meeting

The Steering Committee:

- Represents major stakeholder groups and interests in the community (e.g. Ag producers and land owners, representatives from government, industry, schools etc.)
- Decision-making body for the Partnership with input from other stakeholders
- Decide watershed goals and management measures that are most likely to achieve the goals



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Recap July Meeting

Agreed to Steering Committee Representation:

Representation	Name	Affiliation
Academia	TBD	TAMU Commerce
Agriculture	Ronny Hart	Fannin SWCD
Business	Stuart Hall	Frontier Properties
County	Judge Randy Moore	Fannin County
County (Alt)	Com. Jerry Magness	Fannin County
Education/Rancher	Nathan Melson	Education
Landowner	Albert Pardo	Citizen
Municipality	Lance Capehart	City of Bonham
Municipality	Claude Caffee	Honey Grove
Nonprofit Org.	Lee Ellis	Bonham EDC

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Recap July Meeting

Reviewed Ground Rules:

- Role of the Steering Committee
- Decision making process
- Representativeness
- Replacements, additions, alternates, and proxies
- Time frame for the project

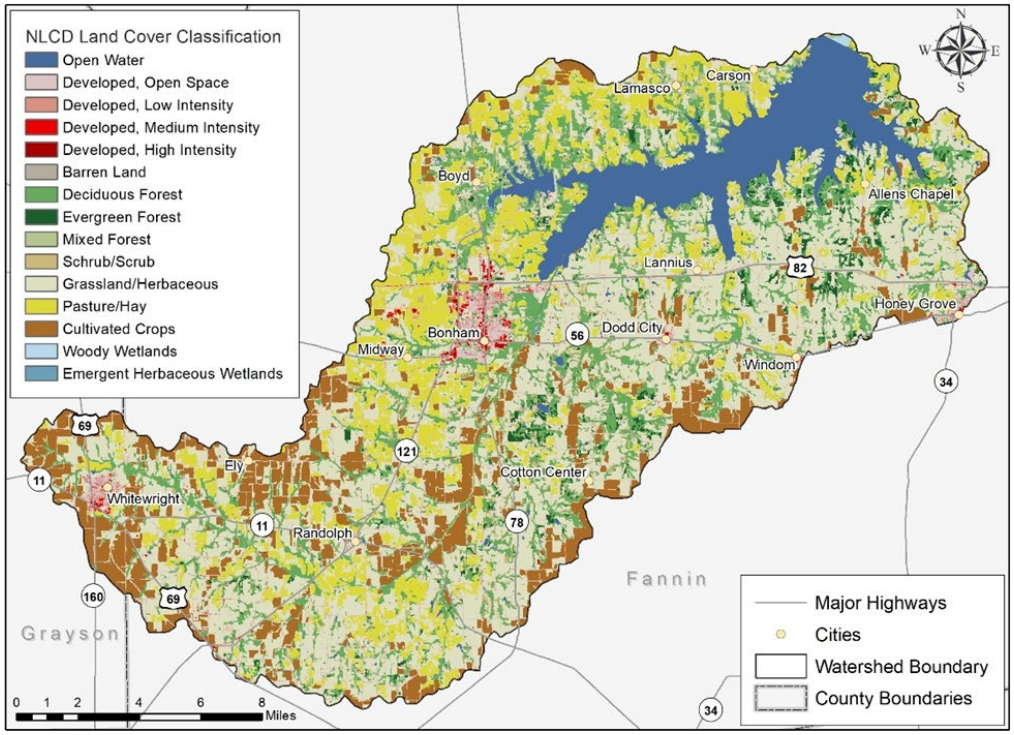


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Recap July Meeting

Watershed Characterization

- Water Resources
- Water Quality
- Geography
- Climate
- Soils
- Land Use
- Ecology



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Review and Adopt Ground Rules

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BOIS D'ARC LAKE WATERSHED PROTECTION PLAN

Review and Approve Chapters 1 & 3



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Review Changes to Chapters 1 & 3

Chapter 1

- Received no Comments

Chapter 3

- Include surface acreage for Lake Bonham in Water Resources section (p. 13)
- Include the Post Oak Savanah ecoregion in the Ecoregions Section (P. 10)
- Verify precipitation averages on the two charts on page 15 & 16
  - NOAA data from the Bonham rain gage
  - PRISM Climate Group from multiple sources across a larger geographic area

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Follow up on Action Items from July

- Establish a meeting time and location for October 13 or 29
- Seek a representative from local schools or TAMU Commerce to serve on the Steering Committee
- Request a representative from Texas Parks & Wildlife to serve in a technical advisory role
- Per a request made after the meeting, investigate the potential to support virtual meetings

BOIS D'ARC LAKE WPP CHAPTER 4: WATER QUALITY

Stephanie deVilleneuve, Allen Berthold- Texas Water Resources Institute
August 11, 2021

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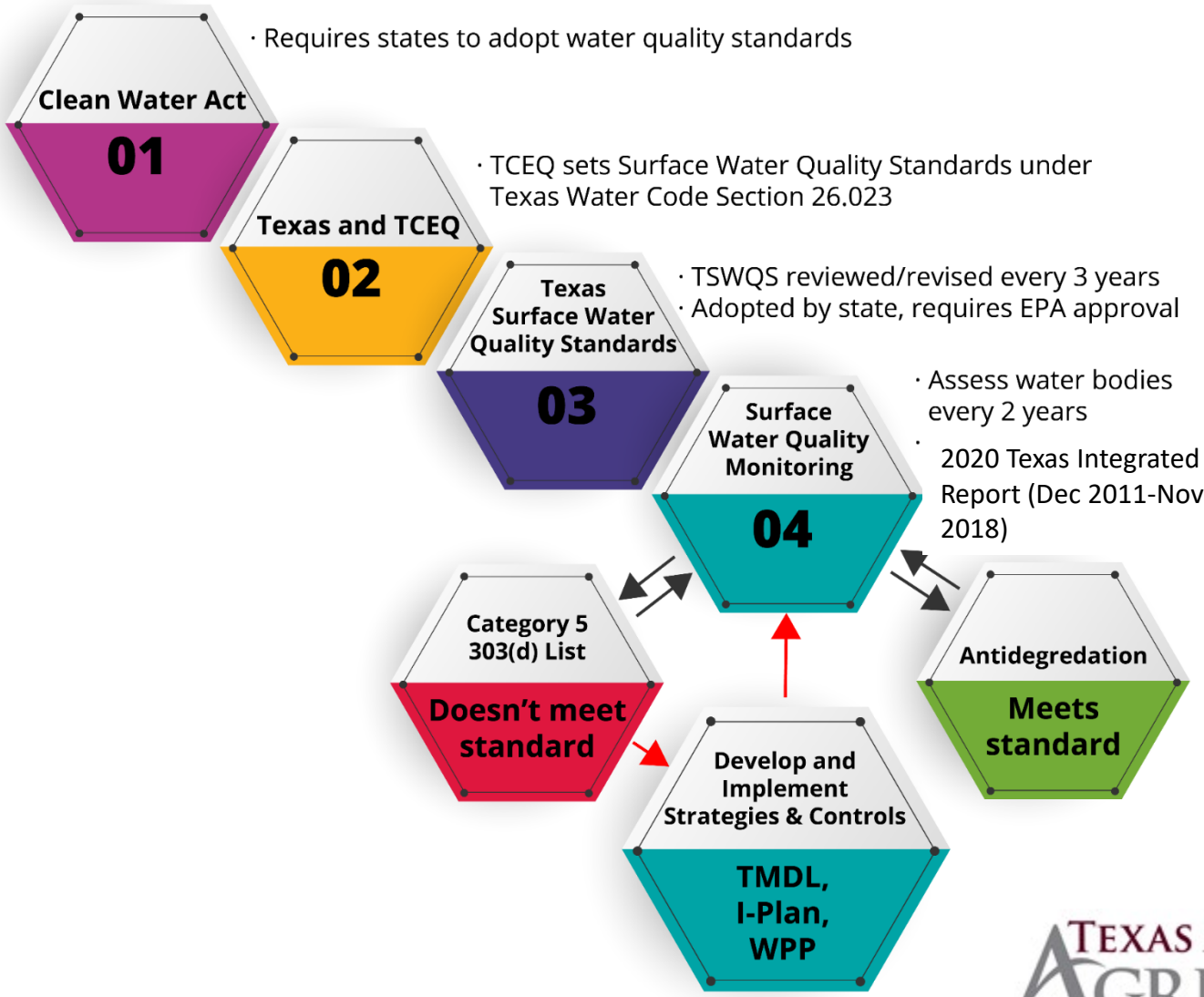
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Chapter 4 Description:

- Chapter focuses on reviewing historical water quality data in the Bois d'Arc Lake watershed. This includes flow, bacteria, nutrients, and dissolved oxygen
- This chapter also identifies potential sources of pollution in the watershed, both point sources and non-point sources

WATER QUALITY AND IMPAIRMENTS

Water Quality in Texas:



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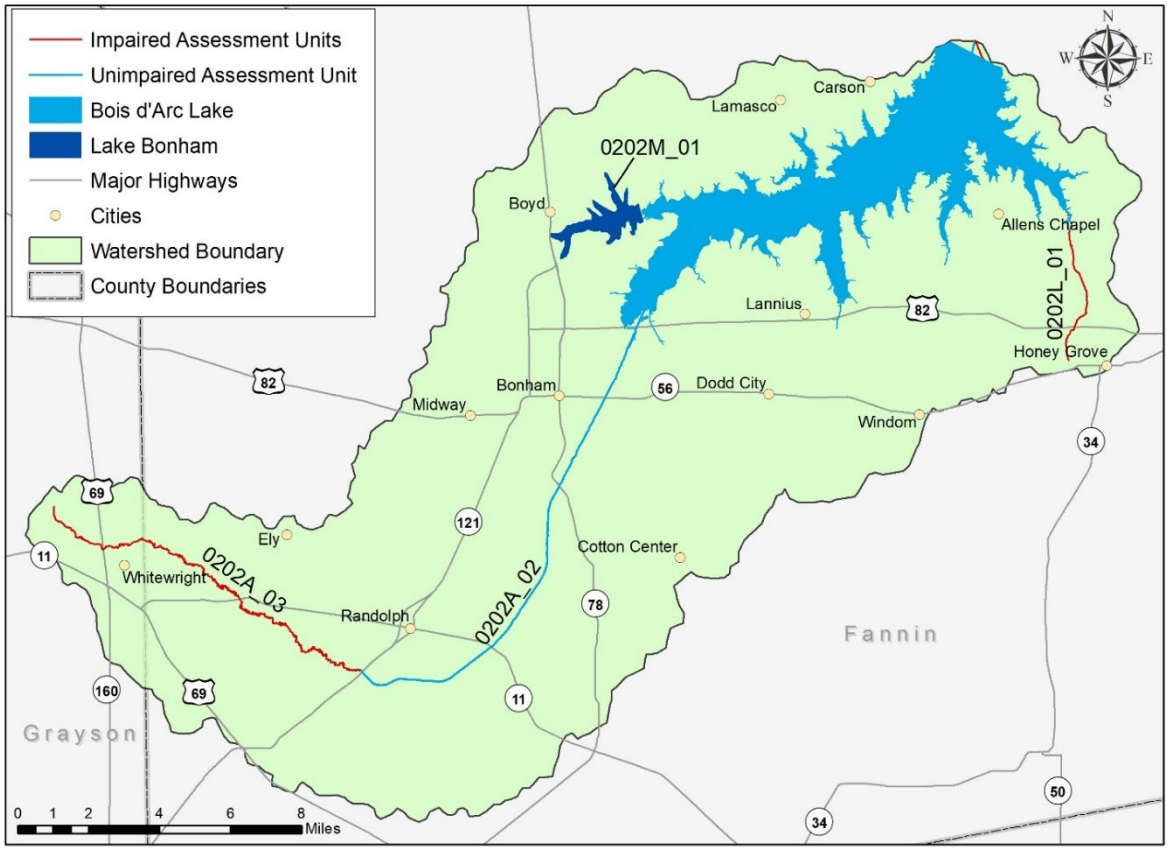
Texas Surface Water Quality Standards:

- Water quality standards are established by the state and approved by EPA to define a water body's ability to support its designated uses, which may include: aquatic life use (fish, shellfish, and wildlife protection and propagation), primary contact recreation (swimming), public water supply and fish consumption.
- Water quality indicators for these uses include DO (aquatic life use), *E. coli* (primary contact recreation), pH, temperature, total dissolved solids, sulfate and chloride (general uses) and a variety of toxins (fish consumption and public water supply)

Use	Use Category	Measure	Criteria
Contact Recreation	**Primary Contact Recreation 1**	**7-year geometric mean**	**126 MPN/100mL *E. coli***
Aquatic Life Use	High	<10% exceedance based on the binomial method	5.0/3.0 mg/L DO
	Intermediate		4.0/3.0 mg/L DO
	Minimal		2.0/1.5 mg/L DO
General Use Standards	The criteria for the general use includes aesthetic parameters, radiological substances, toxic substances, temperature (when surface samples are above 5℉ and not attained due to permitted thermal discharges) and nutrients (screening standards or site-specific nutrient criteria)		

Water Body Assessments:

- In the *Texas Integrated Report* water bodies are assessed at the Assessment Units (AU level). AUs are subunits of a segment. For example, there are 3 AUs on the Bois d'Arc Creek Segment
- In total, there are currently 4 AUs in the Bois d'Arc Lake watershed
- There are two impaired AUs due to elevated bacteria in the watershed: Bois d'Arc Creek AU 0202A_03 and Honey Grove Creek AU 0202L_01

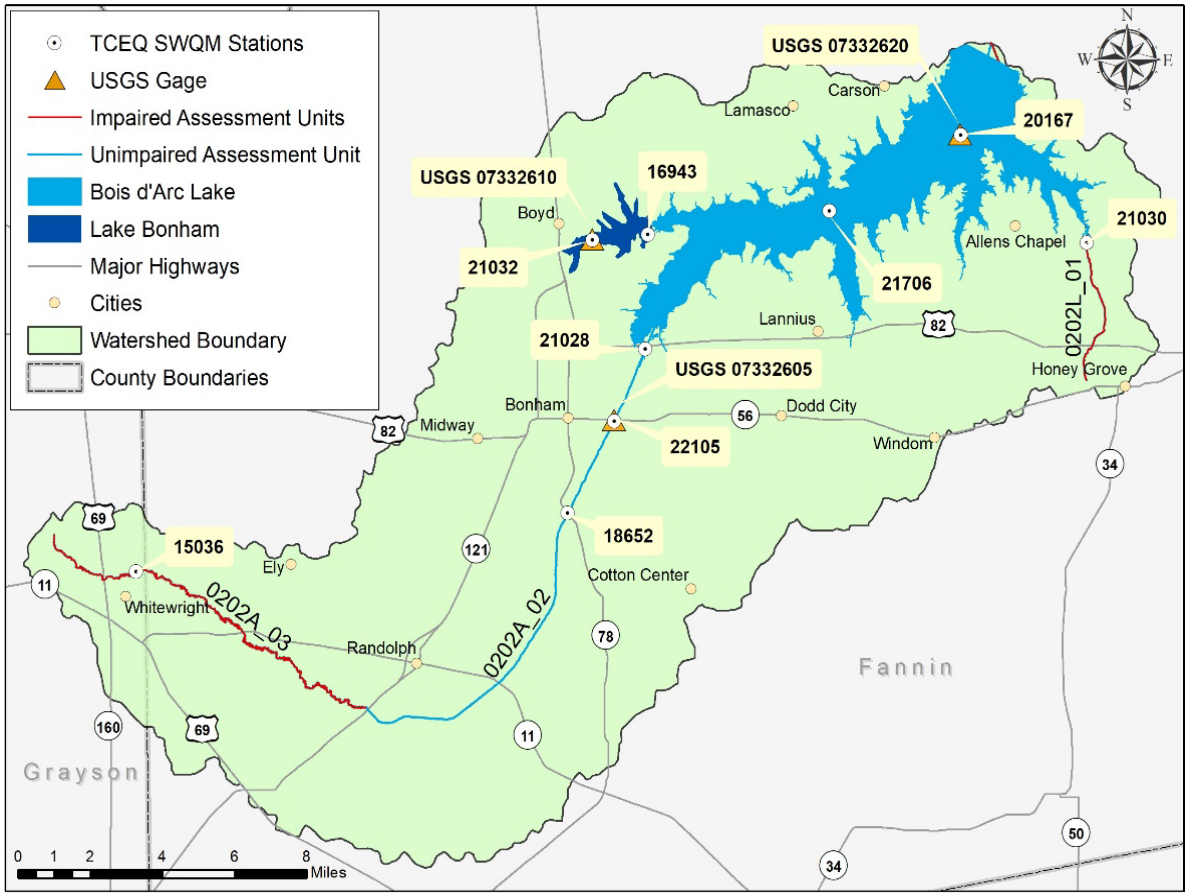


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Water Quality Monitoring:

- Water quality is currently monitored at 7 TCEQ sites (18652 and 21032 are not active) in the watershed and 2 USGS stations (station 07332620 is not active)
- Data is either collected monthly/quarterly by the Red River Authority or NTMWD. This data includes flow, bacteria, and nutrients, as well as other data.



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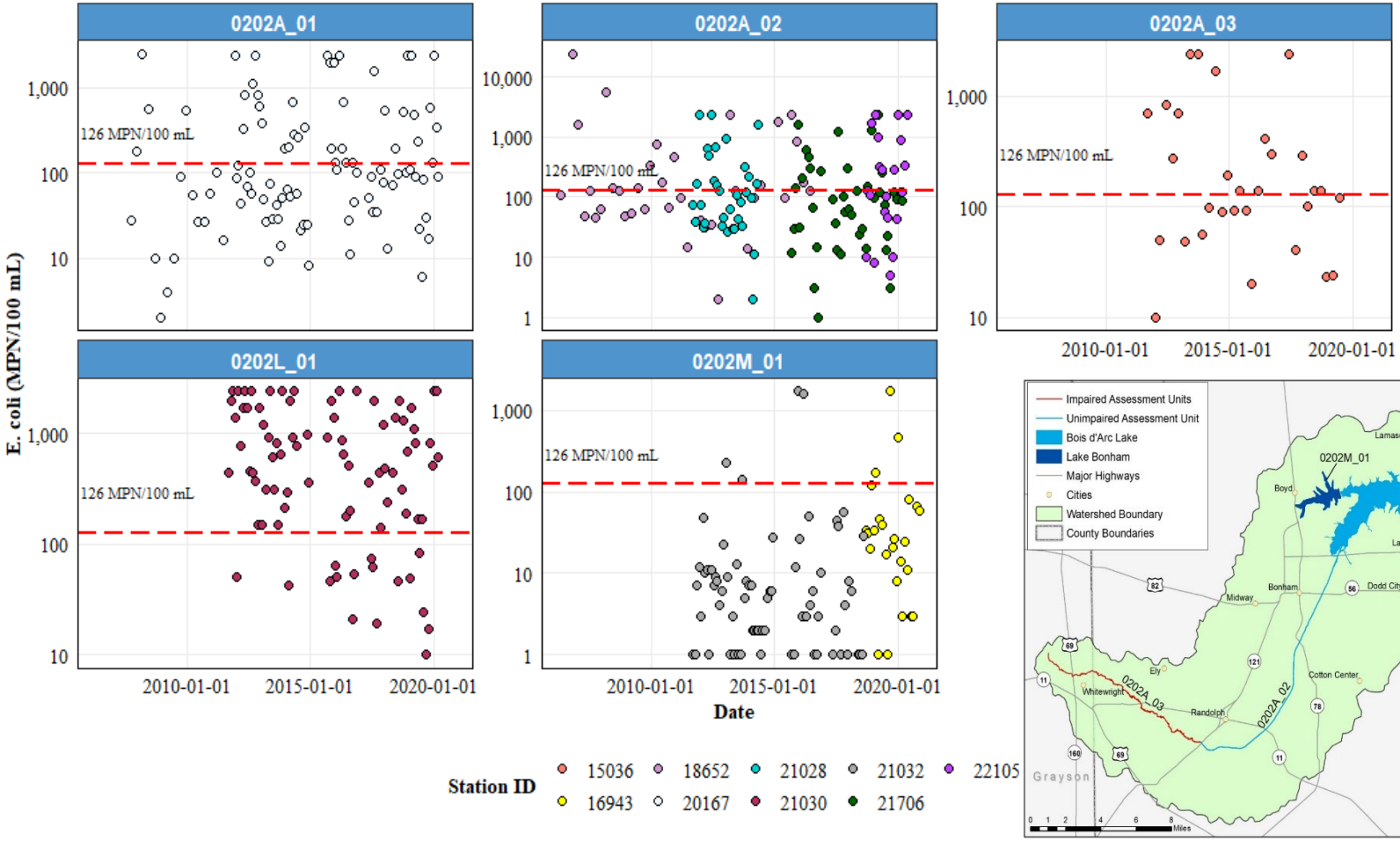
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Bacteria:

- Concentrations of fecal indicator bacteria are evaluated to assess the risk of illness during contact recreation
- In freshwater environments, concentrations of *E. coli* bacteria are measured to evaluate the presence of fecal contamination in water bodies from warm-blooded animals and other sources
- The water quality standard for *E.coli* in freshwater for primary contact recreation is a geometric mean of 126 Most Probable Number (MPN) of *E. coli* per 100 milliliters (mL) of water
- Two AUs [0202A_03 (Bois d'Arc Creek) and 0202L_01 (Honey Grove Creek)] are listed as impaired due to elevated indicator bacteria according to the *2020 Texas Integrated Report*

AU	Description	Current Standard	E. coli Geometric Mean (MPN/100mL)	Supporting/Not Supporting/Concern
0202A_02	Bois d'Arc Creek – Perennial stream from the confluence of Sandy Creek upstream to the confluence of Pace Creek	126 MPN/100 mL E. coli	126	Fully Supporting
0202A_03	Bois d'Arc Creek – From the confluence of Pace Creek upstream to the headwater northwest of Whitewright	126 MPN/100 mL E. coli	178	Not Supporting
0202L_01	Honey Grove Creek – Perennial stream from the confluence of the Brazos River upstream to the confluence of Dog Branch northwest of Lott	126 MPN/100 mL E. coli	444	Not Supporting
0202M_01	Lake Bonham – From the dam up to the normal pool elevation of 565 feet	126 MPN/100 mL E. coli	7	Fully Supporting

Historical Bacteria in the Watershed:



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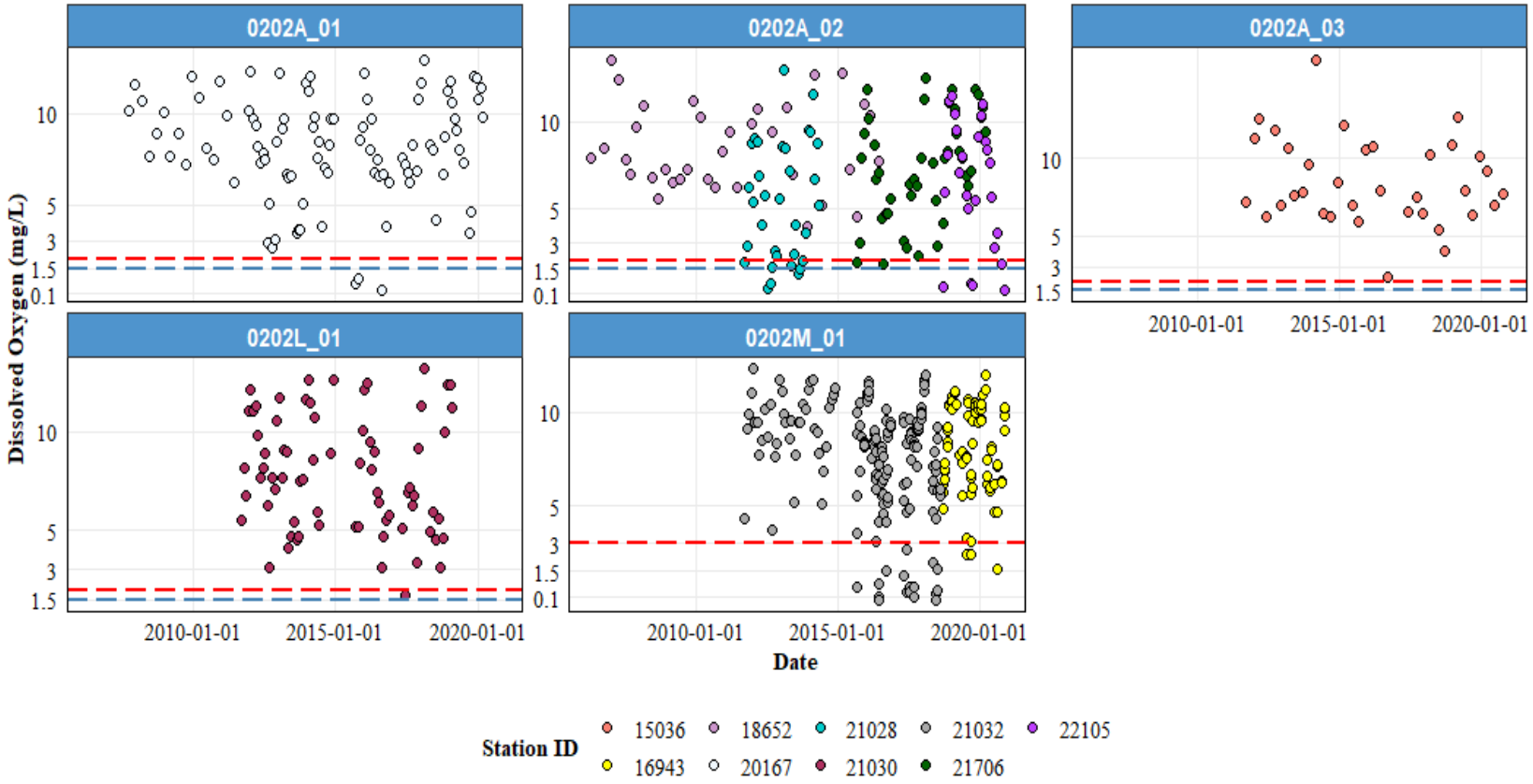
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Dissolved Oxygen (DO):

- DO is the main parameter used to determine a water body's ability to support and maintain aquatic life uses. If DO levels in a water body drop too low, fish and other aquatic species will not survive.
- Excessive organic matter (vegetative material, untreated wastewater, etc.) and nutrients from fertilizers and manures can result in depressed DO levels
- DO is evaluated by TCEQ using grab sample screening levels and grab sample minimums. The difference is the grab minimum criteria is based on 24 hour DO measurements.
- Under the *2020 Texas Integrated Report*, none of the AUs in the watershed were listed as impaired for depressed DO

AU	Waterbody	DO Grab Screening Level (mg/L)	DO Grab Minimum (mg/L)
0202A_01	Bois d'Arc Creek	5	3
0202A_02	Bois d'Arc Creek	4	3
0202A_03	Bois d'Arc Creek	2	1.5
0202L_01	Honey Grove Creek	2	1.5
0202M_01	Lake Bonham	3	3

Historical Dissolved Oxygen in the Watershed:



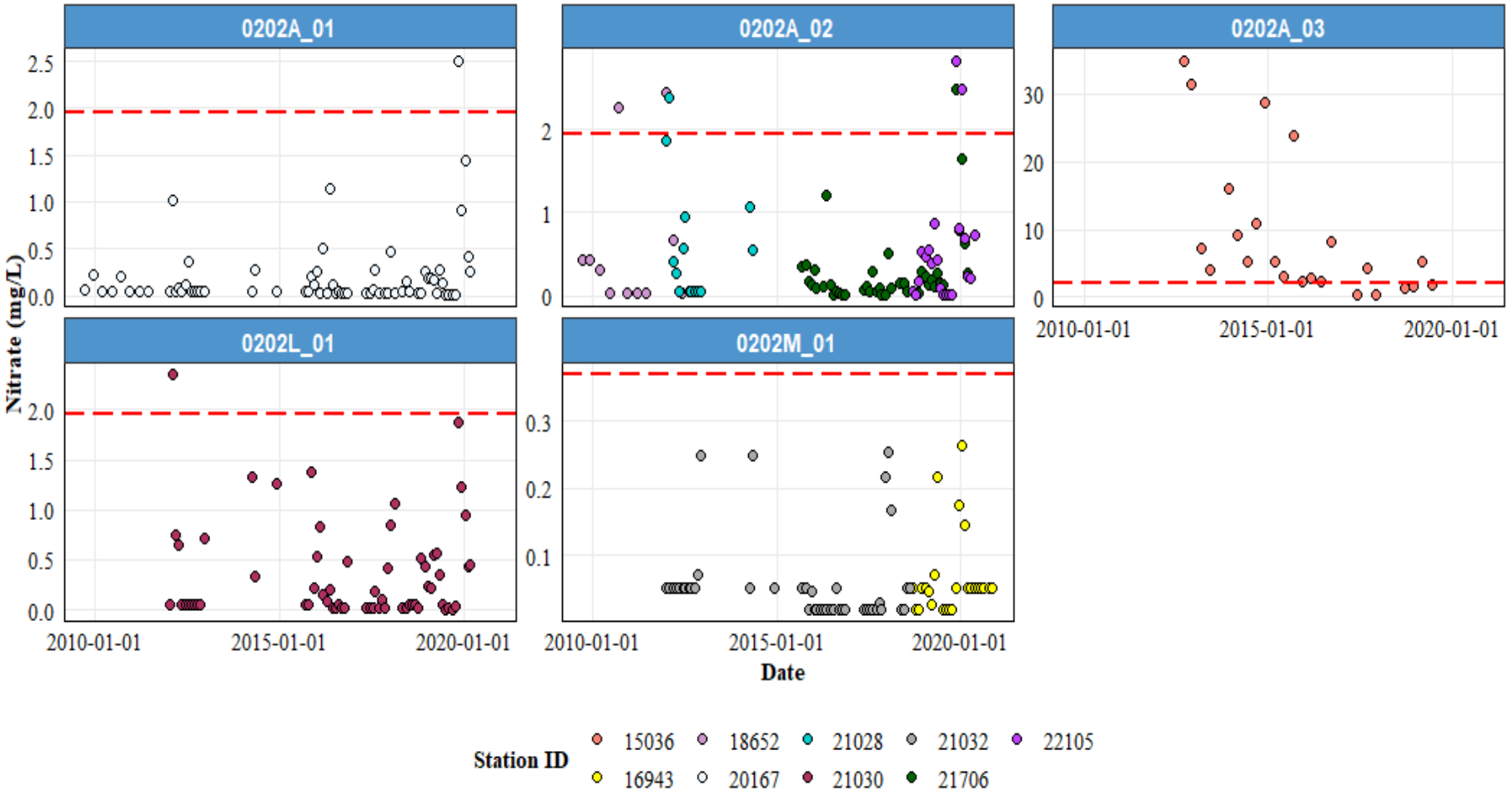
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Nutrients:

- Excessive nutrients can lead to plant and algal blooms, which will result in reduced dissolved oxygen levels. High levels of nitrates and nitrites can directly affect respiration in fish.
- Currently, TCEQ does not have approved numeric criteria for nutrients in water bodies. However, nutrient screening levels developed for statewide use were established to protect water bodies from excessive nutrient loadings.
- Screening levels have been designated for ammonia, nitrate, orthophosphorus, total phosphorus and chlorophyll-a.
- Lakes have different screening levels than the freshwater streams. TCEQ will be developing standards for Bois d'arc Lake
- The *2020 Texas Integrated Report* identified screening concerns for nitrate and total phosphorus in Bois d'Arc Creek AU 0202A_03 and total phosphorus in Honey Grove Creek AU 0202L_01
- Chlorophyll-a is above current TCEQ screening levels (14.1 µg/L) for Bois d'Arc Creek AU 0202A_02 and Honey Grove Creek AU 0202L_01.
- Elevated chlorophyll-a can be indicative of possible imbalances and nutrient loading occurring in the system.

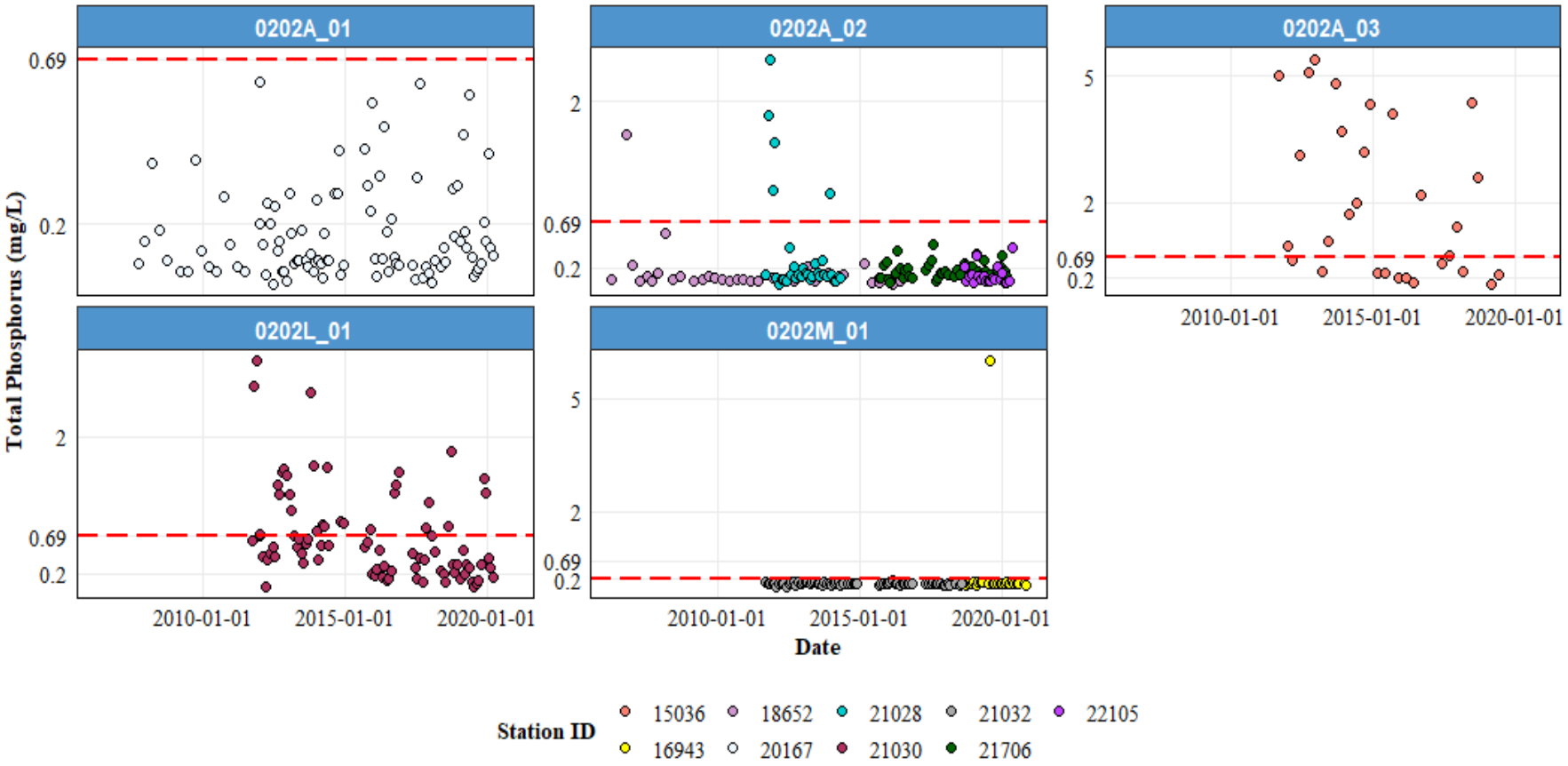
Historical Nitrate in the Watershed:



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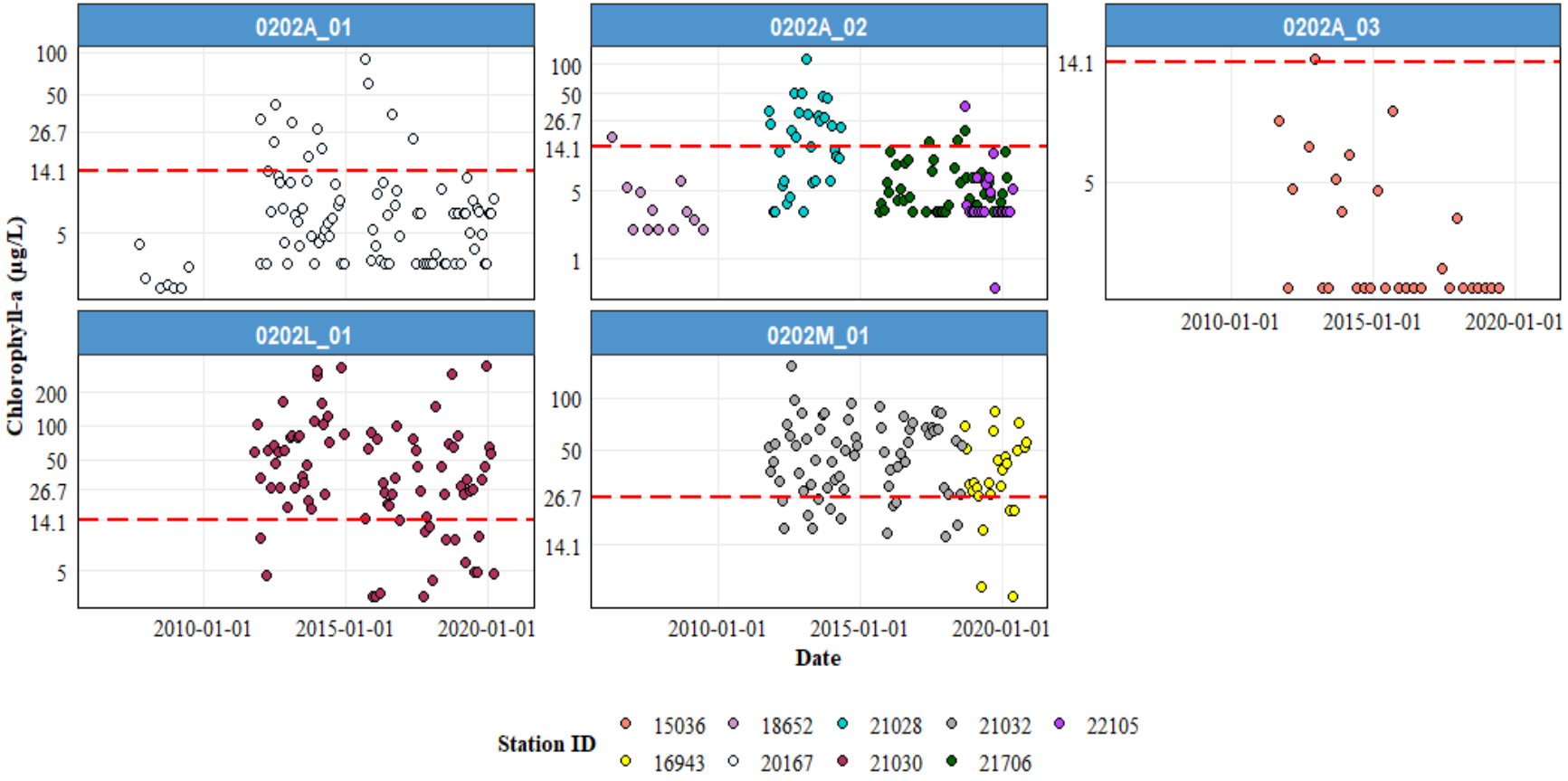
Historical Total Phosphorus in the Watershed:



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Historical Chlorophyll-a in the Watershed:

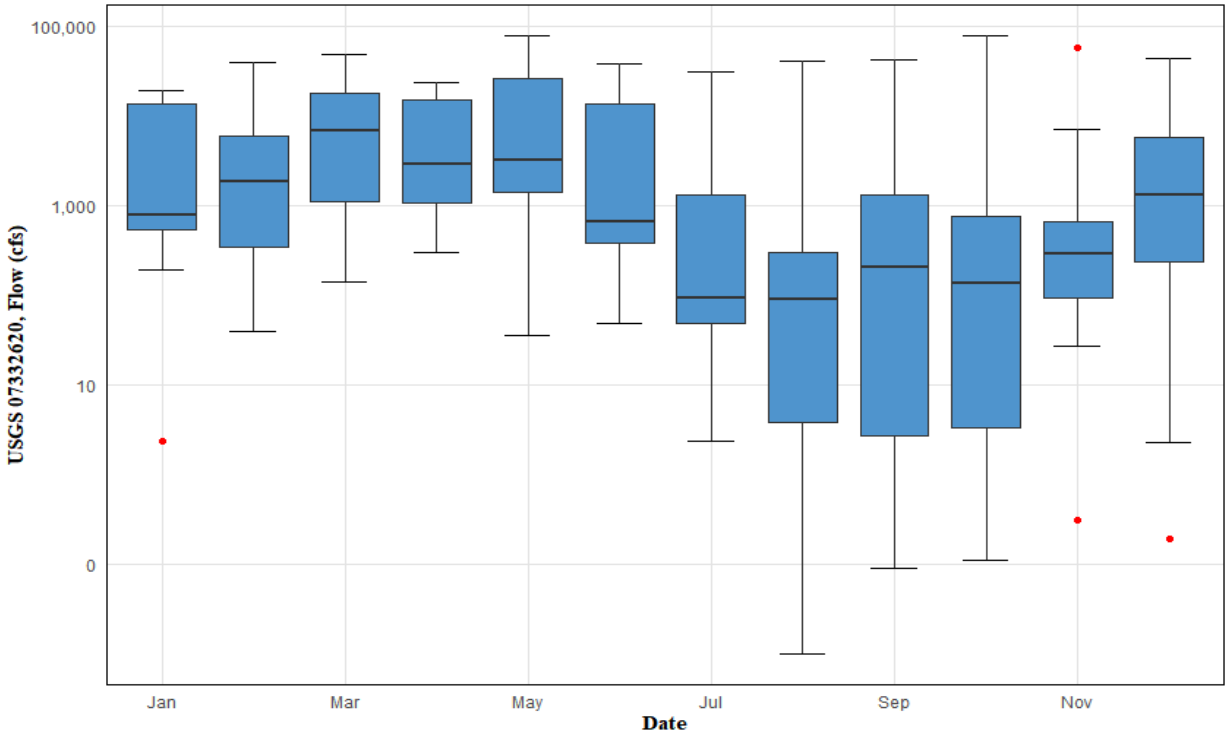


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Flow:

- Regarding water quality, streamflow is important because it influences the ability of a water body to assimilate pollutants
- One active USGS gage collects streamflow data in the watershed. USGS streamflow gage 07332605 is located at SWQM Station 22105 in Bois d'Arc Creek.
- USGS streamflow gage (07332620), located at SWQM station 20167, was removed in October 2019 prior to the filling of Bois d'Arc Lake. Instantaneous streamflow information was available at that station dating back to July 2006



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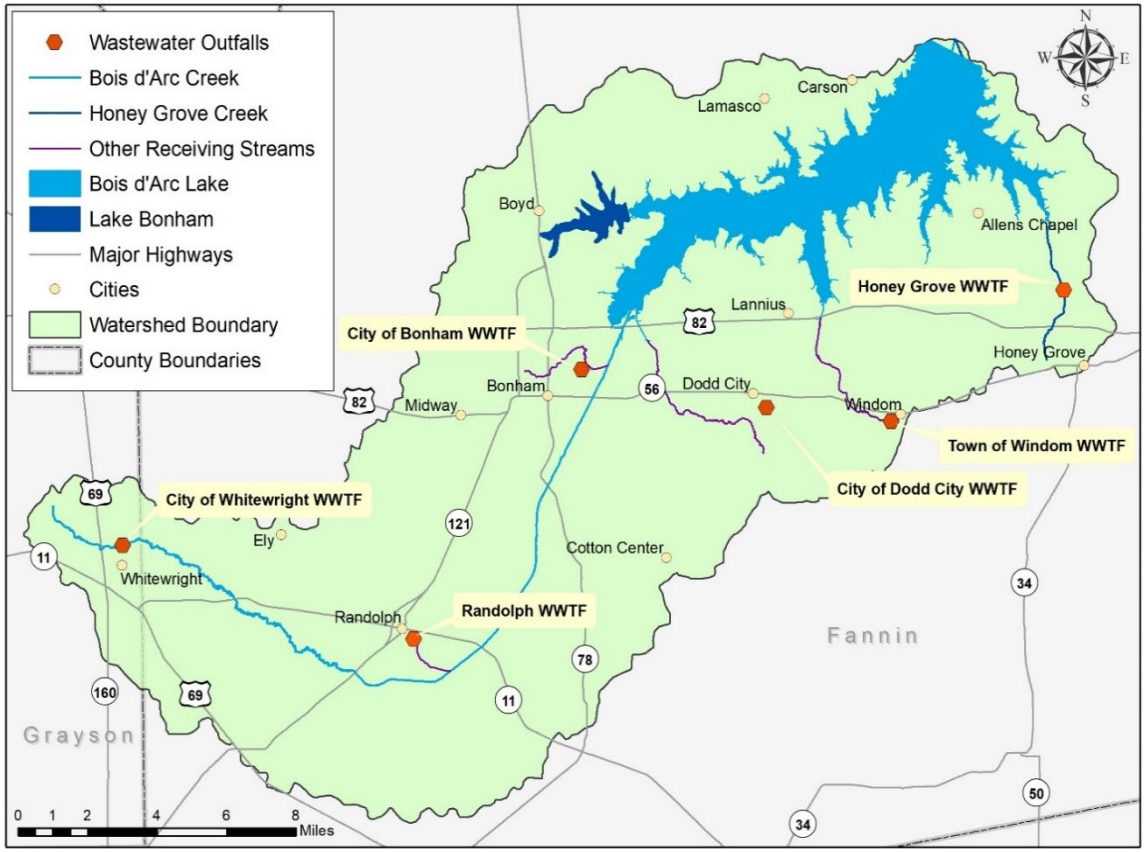
POTENTIAL SOURCES OF POLLUTION

Types of Pollution:

- Pollution sources are categorized as either point or non-point sources
- Point Sources: enter receiving waters at identifiable locations, such as a pipe
- Non-point Sources: include anything that is not a point source and enters receiving waters by runoff moving over and/or through the ground

Potential Point Source: Wastewater Treatment Facilities (WWTFs)

- There are currently six WWTFs in the Bois d'Arc Lake watershed
- All have experienced non-compliance issues and five of the facilities have reported exceedances in bacteria concentration limits
- None of the bacteria effluent violations were reported as "significant" non-compliance



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Potential Point Source: Wastewater Treatment Facilities (WWTFs)

Facility Name (TPDES Permit No.)	Receiving Stream	Flow (MGD)		Bacteria (MPN/100 mL)		Number of Quarters in Violation for Exceedance from 01/2017-12/2019
		Final Permitted	Reported (3-year avg.)	Permitted (Daily Average)	Reported (3-year avg.)	
City of Bonham WWTF (WQ0010070-001)	Pig Branch to Bois d'Arc Creek (0202A)	2.50	1.16	126	7.7	**1** (1 Ammonia daily avg., 1 Ammonia daily max.)
Town of Windom WWTF (WQ0010666-001)	Burnett Creek to Bullard Creek to Bois d'Arc Lake	0.032	0.12	126	343.6	**12** (5 DO monthly min., 10 BOD daily avg., 4 pH max, 1 pH min., 4 TSS daily avg., 7 Flow daily avg., 2 Chlorine monthly min., 3 *E. coli* daily avg., 2 *E. coli* single grab)
Randolph WWTF (WQ0014752-001)	Unnamed Tributary to Bois d'Arc Creek (0202A)	0.0218	0.0099	126	796.4	**12** (3 DO monthly min., 12 BOD daily avg., 4 BOD single grab, 2 pH max, 2 TSS daily avg., 4 Flow daily avg., 8 *E. coli* daily avg., 9 *E. coli* single grab)
City of Whitewright WWTF (WQ0010644-001)	Bois d'Arc Creek (0202A)	0.627	0.25	126	19.5	**9** (3 TSS daily avg., 2 TSS daily max., 3 Ammonia daily avg., 4 Ammonia daily max., 2 Flow daily avg., 1 *E. coli* daily avg., 2 *E. coli* daily max.)
City of Dodd City WWTF (WQ0010538-001)	Long Branch Creek to Sloans Creek to Bois d'Arc Creek (0202A)	0.048	0.024	126	602.8	**9** (5 DO monthly min., 8 BOD daily avg., 1 BOD single grab, 3 TSS daily avg., 7 pH max., 1 Chlorine monthly min., 5 Flow daily avg., 7 *E. coli* daily avg., 6 *E. coli* daily max.)
Honey Grove WWTF (WQ0010710-003)	Honey Grove Creek (0202L)	0.5	0.304	126	26.2	**5** (1 DO monthly min., 3 Flow daily avg., 2 *E. coli* daily avg., 2 *E. coli* daily max.)

Numbers shown in averages are measured from treated effluent and self reported and not the same as ambient stream monitoring done by NTMWD, RRA and TCEQ.

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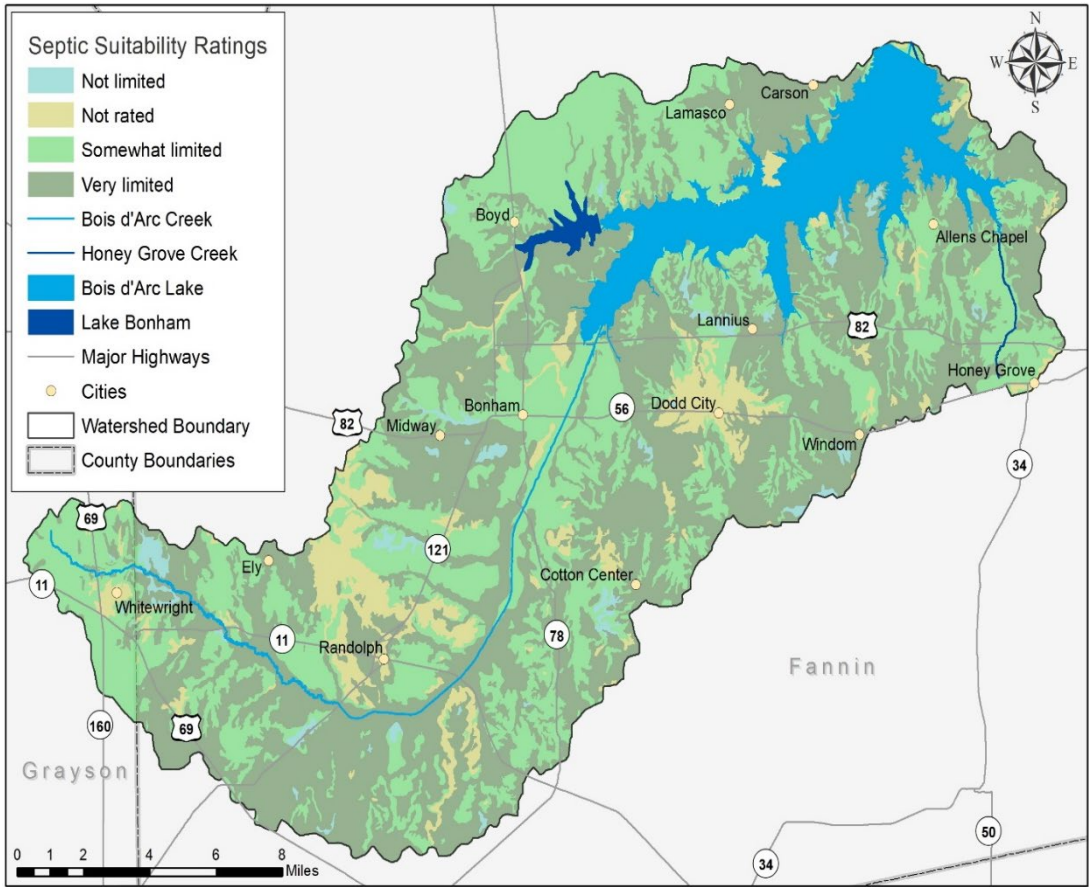
Potential Point Source: Sanitary Sewer Overflows (SSOs)

- SSOs occur when sanitary sewers, sewers that collect and transport wastewater, release raw sewage due to: blockages, line breaks, inflow&infiltration (I&I), etc.
- These overflows can reach waterbodies and result in substantial periodic bacteria loading
- Nine SSO events have occurred since 2017 in the watershed and almost half of the events were caused by blockages.
- These numbers are self reported by each entity as part of their TPDES permit.

Facility	Date	Gallons	Cause
City of Bonham WWTF	11/30/2017	7,500	Line Blockage (non-grease)
City of Bonham WWTF	7/25/2018	5,000	Line Blockage (non-grease)
City of Bonham WWTF	8/14/2018	200	Equipment Failure
City of Bonham WWTF	8/27/2018	1,000	Grease Blockage
City of Bonham WWTF	12/26/2018	3,500	I&I
City of Bonham WWTF	2/5/2019	10,000	Line Break
City of Bonham WWTF	9/24/2019	50,000	I&I
Randolph WWTF	4/4/2018	2,000	Line Blockage (non-grease)
City of Whitewright WWTF	4/26/2018	500	Line Blockage (non-grease)

Potential Non-point Source: On-site Sewage Facilities (OSSFs)

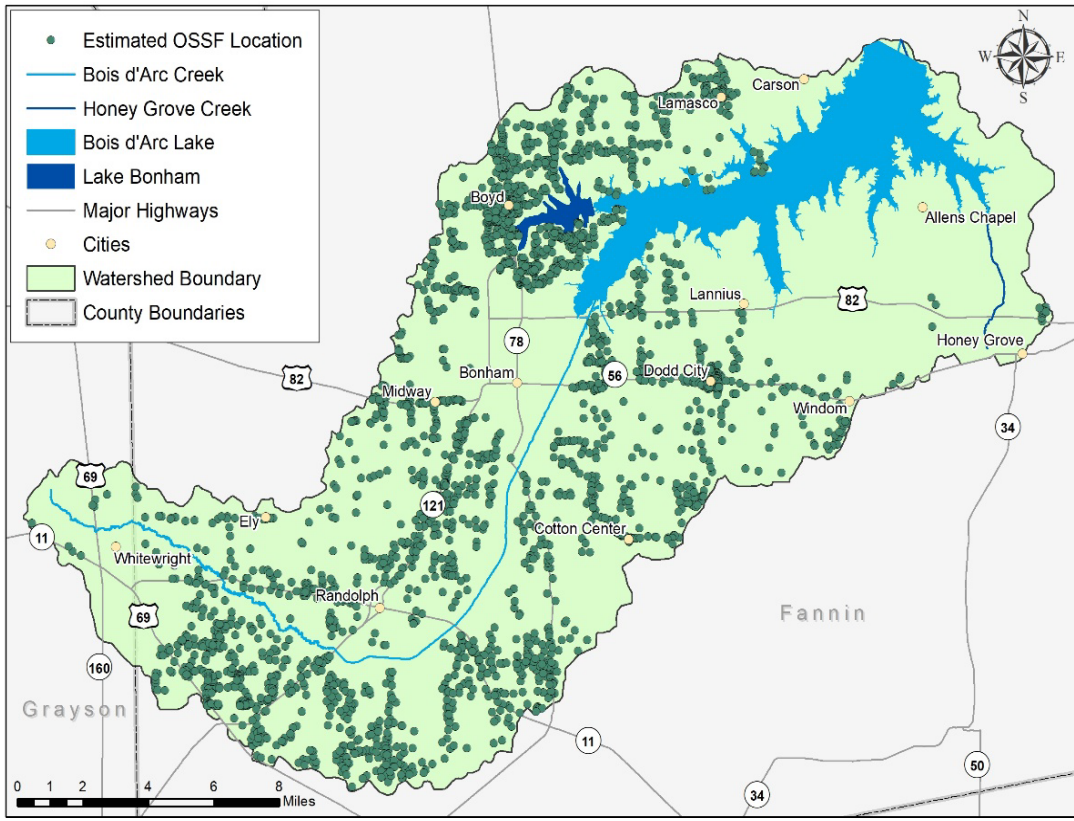
- OSSFs typically are either 1. anaerobic systems with a septic tank and drainage field or 2. aerobic systems with aerated holding tanks and above ground sprinkler system
- When OSSF fail due to age, improper design, or improper function from lack of maintenance they can contribute pollutants.
- Soil suitability rankings were developed to evaluate a soils ability to treat wastewater based on soil characteristics.
- OSSFs in somewhat or very limited pose an increased risk of failure if not properly designed, installed or maintained
- Most of the soils in the watershed are rated as “Very Limited”



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Potential Non-point Source: On-site Sewage Facilities (OSSFs)

- The number of OSSFs in the watershed were estimated using 911 addresses, 2010 census data and recent aerial imagery
- All addresses within the WWTF service areas were taken out
- The estimated OSSFs within the watershed is 2,781



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Potential Non-point Source: Livestock

- The grazing of livestock (cattle, goats, horses, sheep, etc.) occurs throughout the Bois d'Arc Lake watershed
- They graze over large tracks of land and deposit fecal matter onto to the land surface which can runoff into water bodies, or they deposit directly into the water bodies.
- Livestock values were estimated using the 2017 National Agricultural Statistics Service data. Cattle stocking rates were applied to pasture and range land use types.
- The stocking rates used for cattle were: 10 acres/animal unit for rangeland and 3 acres/animal unit for pasture. Thoughts?

Cattle	Horses	Goats/Sheep	Pigs/Hogs	Poultry
19,204	1,061	2,358	177	3,392

Potential Non-point Source: Wildlife and Feral Hogs

- Riparian (next to a creeks and rivers) areas provide the most suitable wildlife habitat in the watershed. Fecal deposition is directly related to time spent in a given area, so wildlife feces are considered a major source in the watershed
- Deer: the White-tailed deer population in the watershed was estimated using a TPWD survey in the area from 2005 to 2015. The population was estimated at 26.69 ac/deer and applied to every land use class except for open water, barren land and developed land. Estimated total deer was 6,646 in the watershed. Thoughts?
- Feral Hogs: Using literature values the density of feral hogs in the watershed was estimated at 33.3 ac/hog for non-developed land use/land cover. In total, 5,326 feral hogs were estimated. Thoughts?

Potential Non-point Source: Pets

- Dogs and cats can contribute to fecal bacteria loading when waste and bacteria runoff from lawns, parks and other areas.
- The American Veterinary Medical Association estimated the average household in the U.S. has 0.614 dogs and 0.457 cats.
- We multiplied these averages to the number of homes in the watershed. We then estimated the number of dogs is 5,174 and cats is 3,851

Thank you!

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BOIS D'ARC LAKE WATERSHED PROTECTION PLAN

Next Steps

- Next Partnership Meeting – September 8
- Approve Chapters 4 & 5
- Review Chapter 6 (Management Measures)
- Guest Speaker or Stream Trailer Demonstration?





BOIS D'ARC LAKE WATERSHED PROTECTION PLAN

Project Web Site

Information clearinghouse for the project

- Meeting information
- Sign up for updates via email
- Maps, data, publications
- Draft reports
- Contacts

- https://boisdarclake.org/construction/the-bois-darc-lake-watershed/



BOIS D'ARC LAKE WATERSHED PROTECTION PLAN

Contacts

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THANK YOU!