



Environmental Workshop

***Presented by
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Environmental and Compliance Manager***

Enabling Legislation (2003)

- **Sec 8502.001 (d)**
“...preservation... for all useful purposes”
- **Sec 8502.004(b)**
“ The authority may provide... for the control and coordination of the regulation of the waters of the watershed of the Brazos River and its tributary streams as a unit.”
- **Sec 8502.017**
“...conserving ... for useful purposes?”



2007 Flooding of the Brazos River between Possum Kingdom and Granbury

Mission Statement

The Brazos River Authority exists to develop, manage and protect the water resources of the Brazos River basin.



Tonkawa Falls on Tonk Creek in McLennan County

Strategic Plan Section III

The BRA will protect water resources, and where possible improve water quality and habitat, to support responsible and efficient use of the Brazos River basin's natural resources.



Lake Belton

Clean Water Act – Major Elements

- 1. Water quality standards**
- 2. Antidegradation Policy**
- 3. Water Body Monitoring and Assessment**
- 4. Reports on Conditions of the Nation's Waters**
- 5. Total Maximum Daily Loads (TMDL)**
- 6. NPDES Permit Program**
- 7. Non-point sources**
- 8. Discharge of dredge or fill materials to wetlands**
- 9. State water quality certification**

Texas Clean Rivers Act

- **Enacted by the Texas Legislature in 1991**
- **Established the Texas Clean Rivers Program (CRP)**
 - **Address water quality issues**
 - **Address state Federal Clean Water Act obligations**
 - **Protect usability of water supply**
- **Mandated river authority participation**

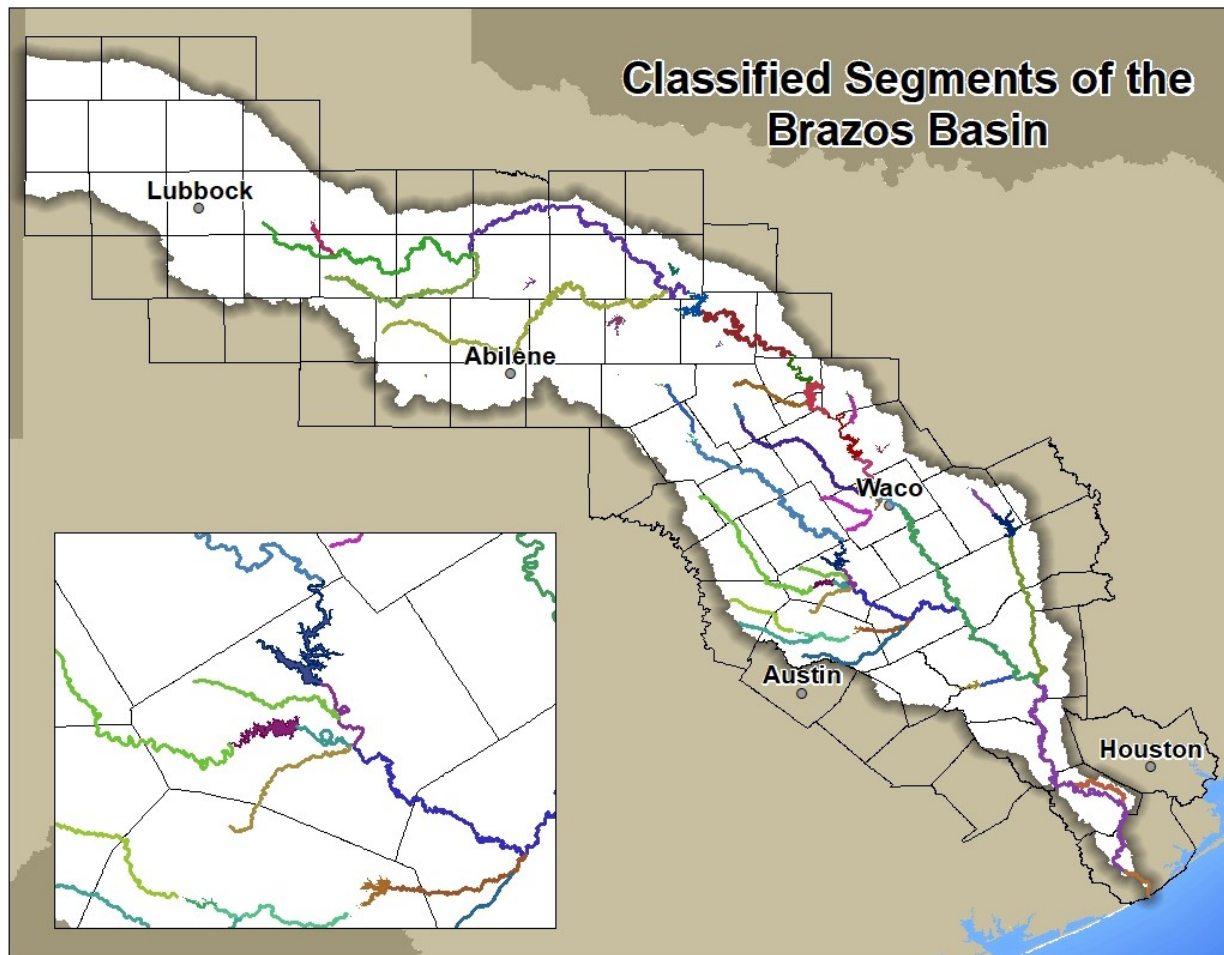
1998 EPA Delegation of Powers

- **EPA has delegated its several of its CWA responsibilities to TCEQ**
 - **TCEQ sets water quality standards, EPA approves**
 - **State criteria must provide same level of protection as EPA developed standards**
 - **TCEQ writes TPDES permits, EPA approves policies and procedures**
 - **TCEQ responsible for compliance monitoring and enforcement**
 - **TCEQ has authority to regulate stormwater**
 - **TCEQ must create a Pretreatment Program**

TCEQ Water Quality Standards

Classified Segments and Designated Uses

- **Identification of classified segments**
 - **Larger streams and reservoirs**
 - **59 classified segments in basin**
- **All classified segments assigned designated uses**
 - **Recreation (non-coastal beach)**
 - **Primary 1 – significant risk of ingesting water**
 - **Secondary 1 – limited body contact, low risk of ingesting water**
 - **Secondary 2 – Secondary 1 activities at sites with physical characteristics that limit physical access**
 - **Domestic Water Supply**
 - **Aquatic Life**
 - **Exceptional, High, Intermediate, Limited, Minimal**
 - **General Use**



TCEQ Water Quality Standards

Numeric Standards

- **Segment-specific standards developed for classified segments to assess attainment of designated uses**
 - **Water Temperature, pH, chloride, sulfate, total dissolved solids standards**
 - **Based on actual stream data**
- **Presumed standards used to assess attainment of aquatic life use and contact recreation**
 - **Assumption that uses are high aquatic life use and primary contact recreation**
 - **Dissolved oxygen and bacteria**
 - **Revised when segment-specific data becomes available**

TCEQ Water Quality Standards

Nutrient Standards

- **1998 - EPA published National Strategy for the Development of Regional Nutrient Criteria**
- **Mid-2000s - EPA mandates that states incorporate numerical nutrient criteria into water quality standards**
- **2010 - TCEQ submits chlorophyll a criteria for 75 reservoirs to EPA for approval**
 - **EPA approves 39 and rejects 36 for not being strong enough**
 - **10 approved chlorophyll a standards in Brazos Basin**
 - **Possum Kingdom**
 - **Stillhouse Hollow**
 - **Belton**
 - **Pat Cleburne**
 - **Graham**
 - **Hubbard Creek**
 - **Cisco**
 - **Stamford**
 - **White River**
 - **Georgetown**

TCEQ Water Quality Standards

Unclassified Segments

- **Small tributary streams**
- **Assumes tributaries will meet same segment-specific numeric standards as the classified segment they flow into for general use parameters**
- **Unless other data exists, unclassified water bodies are presumed to meet standards for:**
 - **High Aquatic Life Use**
 - **Primary Contact Recreation**

TCEQ Water Quality Screening Levels

- **Support general use**
- **Nutrient Parameters**
 - **Ammonia**
 - **Nitrate**
 - **Total Phosphorus**
 - **Chlorophyll a**
- **Different screening levels for streams and reservoirs**
- **Based on the 85th percentile values for each parameter in unclassified waterbodies**

Determination of Impairments and Concerns

- **Each parameter assessed differently**
- **Impairments are determined when assessment indicates waterbody is not compliant with numeric standards**
- **Concerns are identified when**
 - **Assessment indicates waterbody close to reaching non-compliance with numeric standards**
 - **When assessment indicates waterbody is not compliant with screening levels**

Texas Clean Rivers Program

- **Developed and run by the Texas Commission on Environmental Quality (TCEQ)**
- **Program Objectives**
 - **Provide quality-assured data for federal, state and local decision-making**
 - **Identify and evaluate water quality issues**
 - **Promote cooperative watershed planning**
 - **Recommend management strategies**
 - **Inform and engage stakeholders**
 - **Maintain efficient use of public funds**

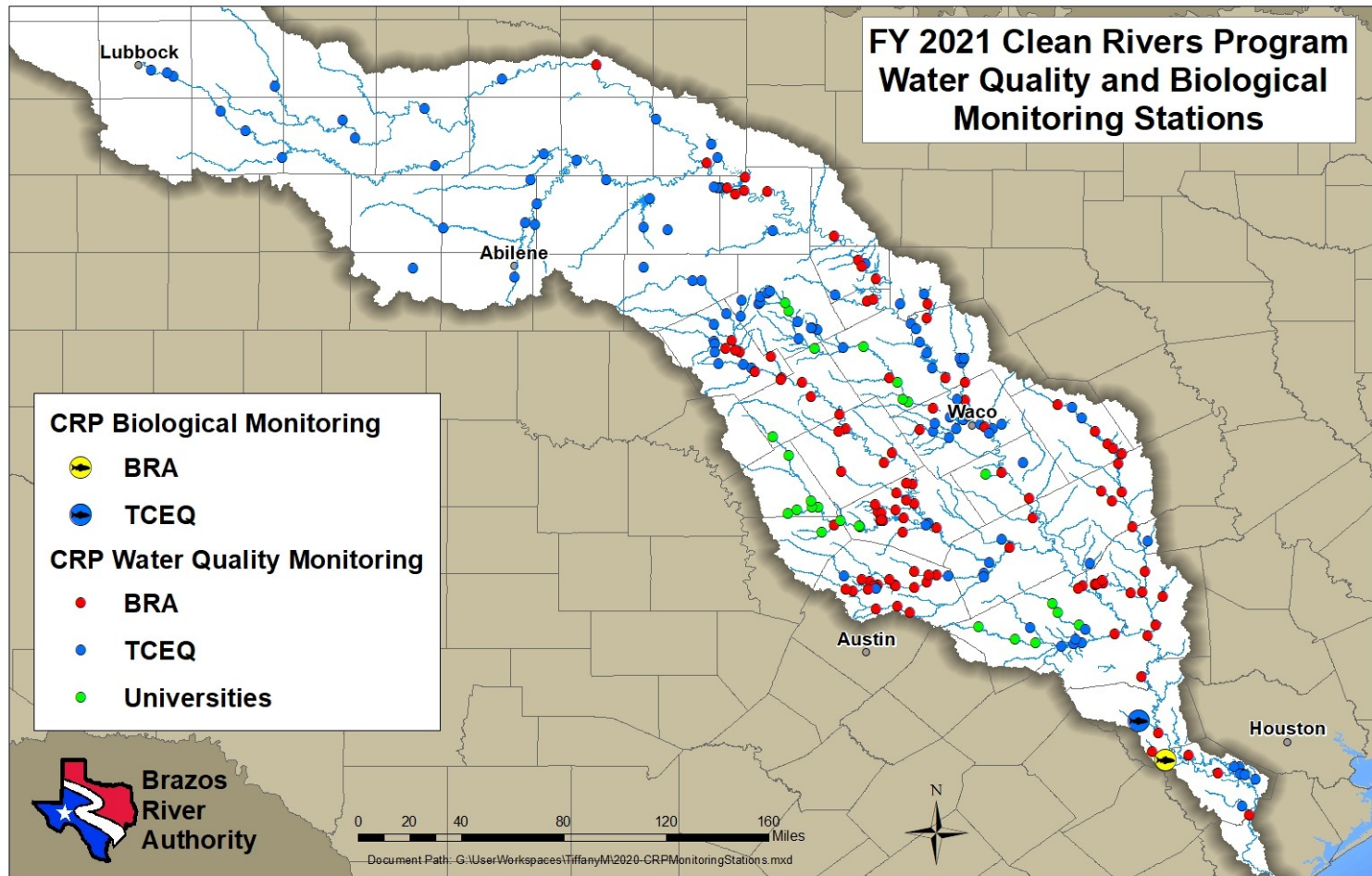
CRP Requirements of River Authorities

- **Ensure monitoring in all classified segments**
- **Follow stringent set of protocols for field data collection**
- **Data must be analyzed using NELAP Accredited Laboratory using EPA approved methods**
- **Meet CRP Quality Control/Quality Assurance standards**
- **Conduct annual monitoring coordination**
- **Public outreach**
- **Annual reporting and data analysis**
- **Trend analysis every five years**

CRP Coordinated Monitoring

- BRA hosts annually
- Reduced duplication of effort
- Maximize resources dedicated to water quality monitoring





Public Outreach

- Annual Steering Committee Meeting
- Presentations at community events
- Educational material on BRA webpage



Funding and Allocation

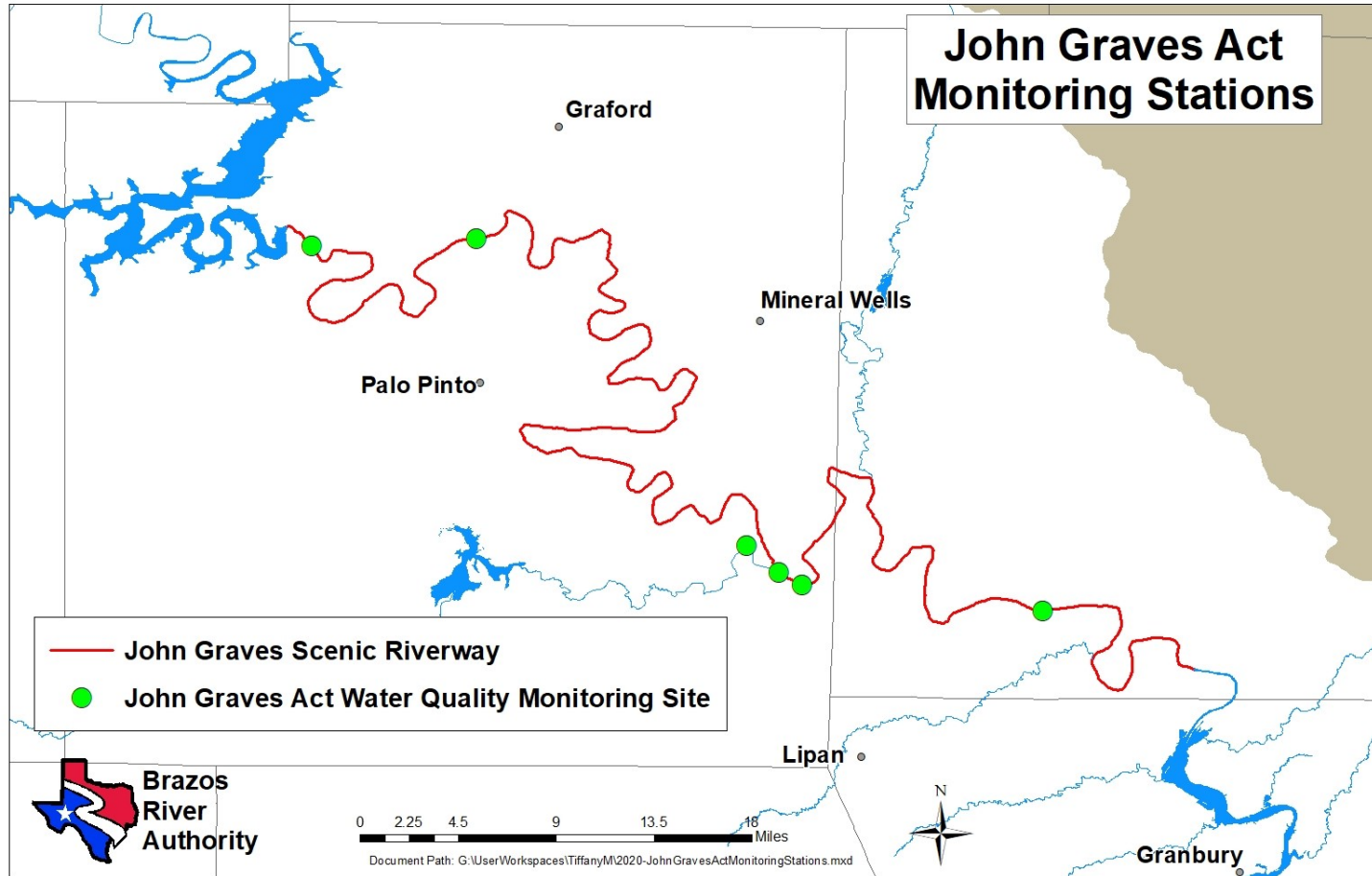
- **Funded by fees assessed on wastewater discharge permittees and water rights holders**
- **BRA receives \$796,318 each biennium to perform Clean Rivers Program Monitoring in the basin**
- **No match required**
- **Supplement with BRA funds to meet minimum requirements of program**
- **Funding crisis**
 - **Originally a dedicated fee, guaranteeing a stable amount of funding**
 - **In 2010 TCEQ rolled CRP into the Consolidated Fee**
 - **Caps on the Consolidated Fee**
 - **Funding has decreased since program inception**

John Graves Act

- **Enacted by the Texas Legislature in 2005**
- **Created John Graves Scenic Riverway**
- **TCEQ to develop permit specific for quarry/mining activities in the John Graves Scenic Waterway**
- **TCEQ, TPWD, and BRA to participate in biannual aerial and visual inspections**
- **BRA to conduct biannual water quality monitoring**



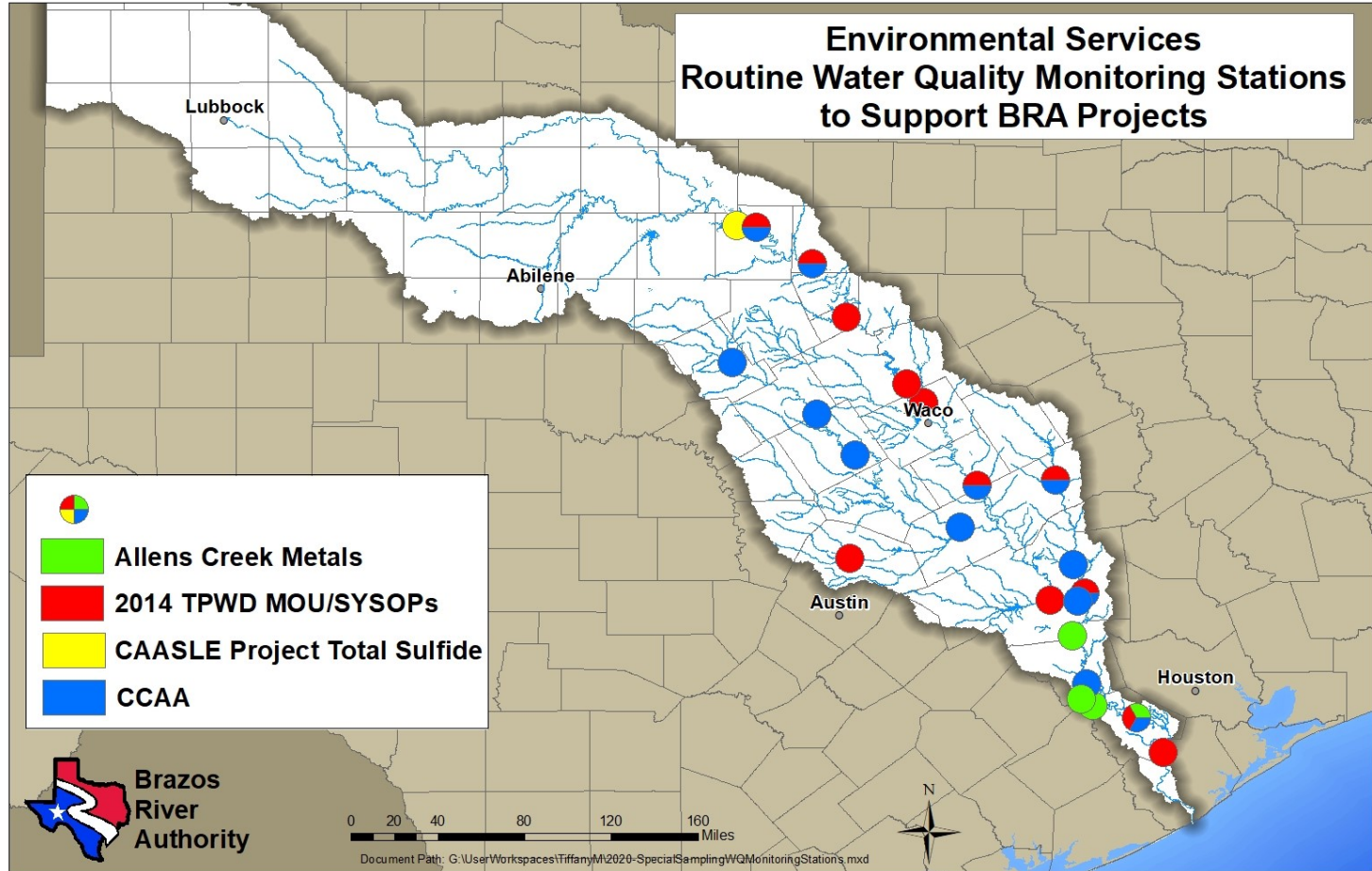
Sandstone quarry on the Brazos River
downstream from US 281



Water Quality Monitoring to Support BRA Projects and Programs

- **Routine**
 - 2014 TPWD MOU/SYSOPs
 - CAASLE Project Total Sulfide
 - Allens Creek Metals Sampling
 - CCAA
- **As needed**
 - TPDES Permit Renewal Monitoring
 - PK Septic System Investigations
 - Fish Kill Investigations
 - Spill Response





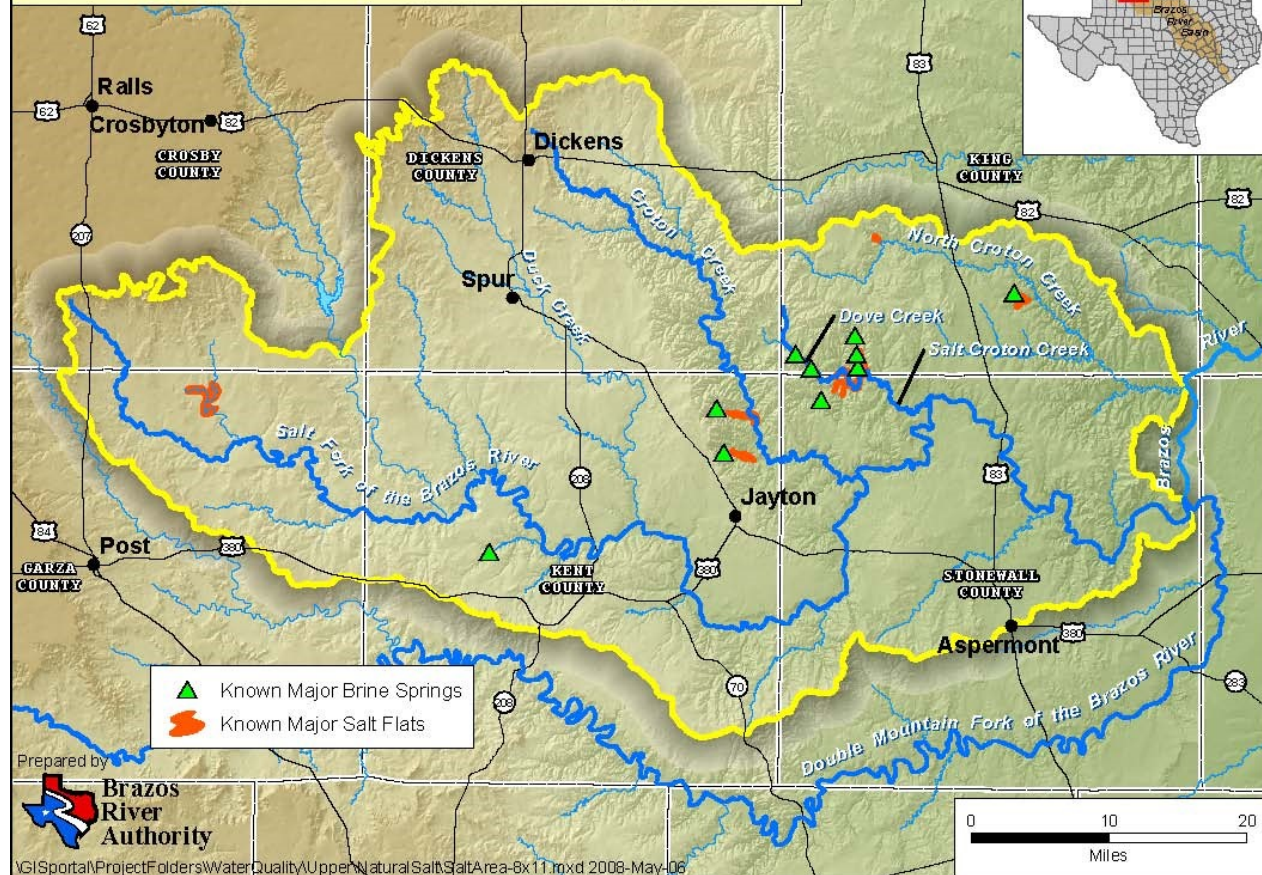
Current Status of Water Quality

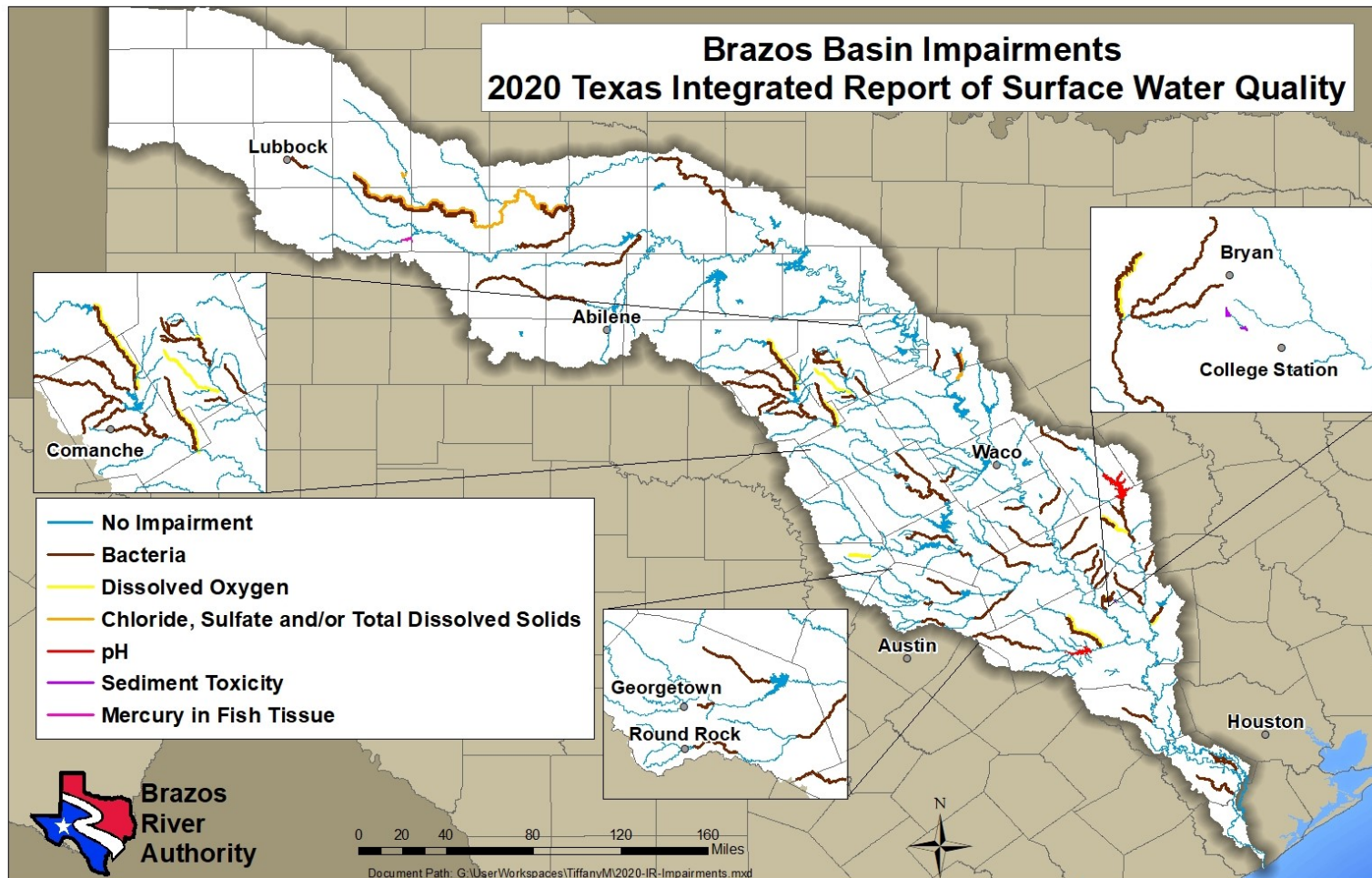
- Annual assessment
- Overall designated uses are obtained
- Natural chloride levels in mainstem
- Impairments or Concerns for
 - Dissolved oxygen
 - Bacteria
 - Nutrients
 - Suspended solids





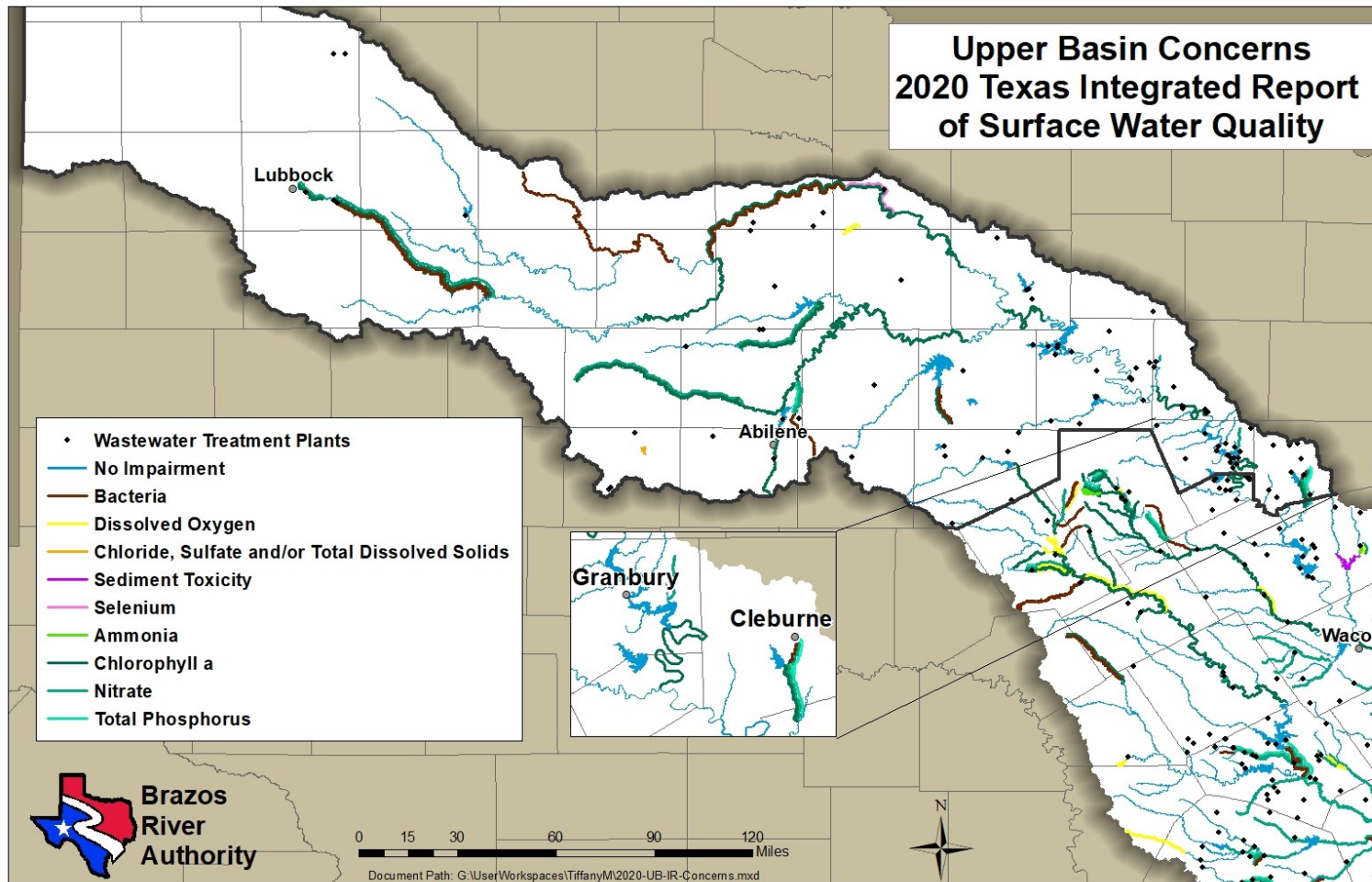
Natural Salt Producing Area



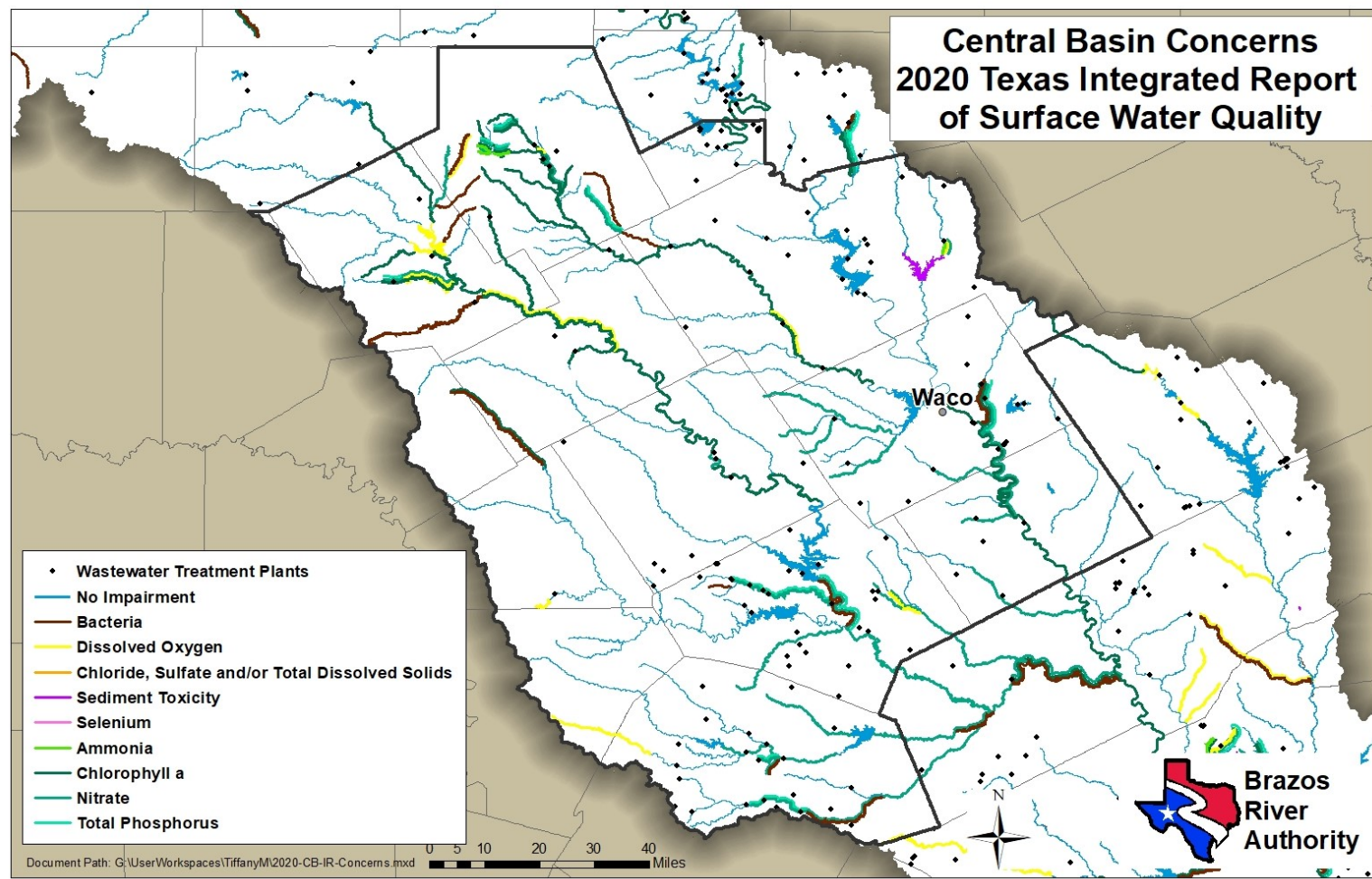


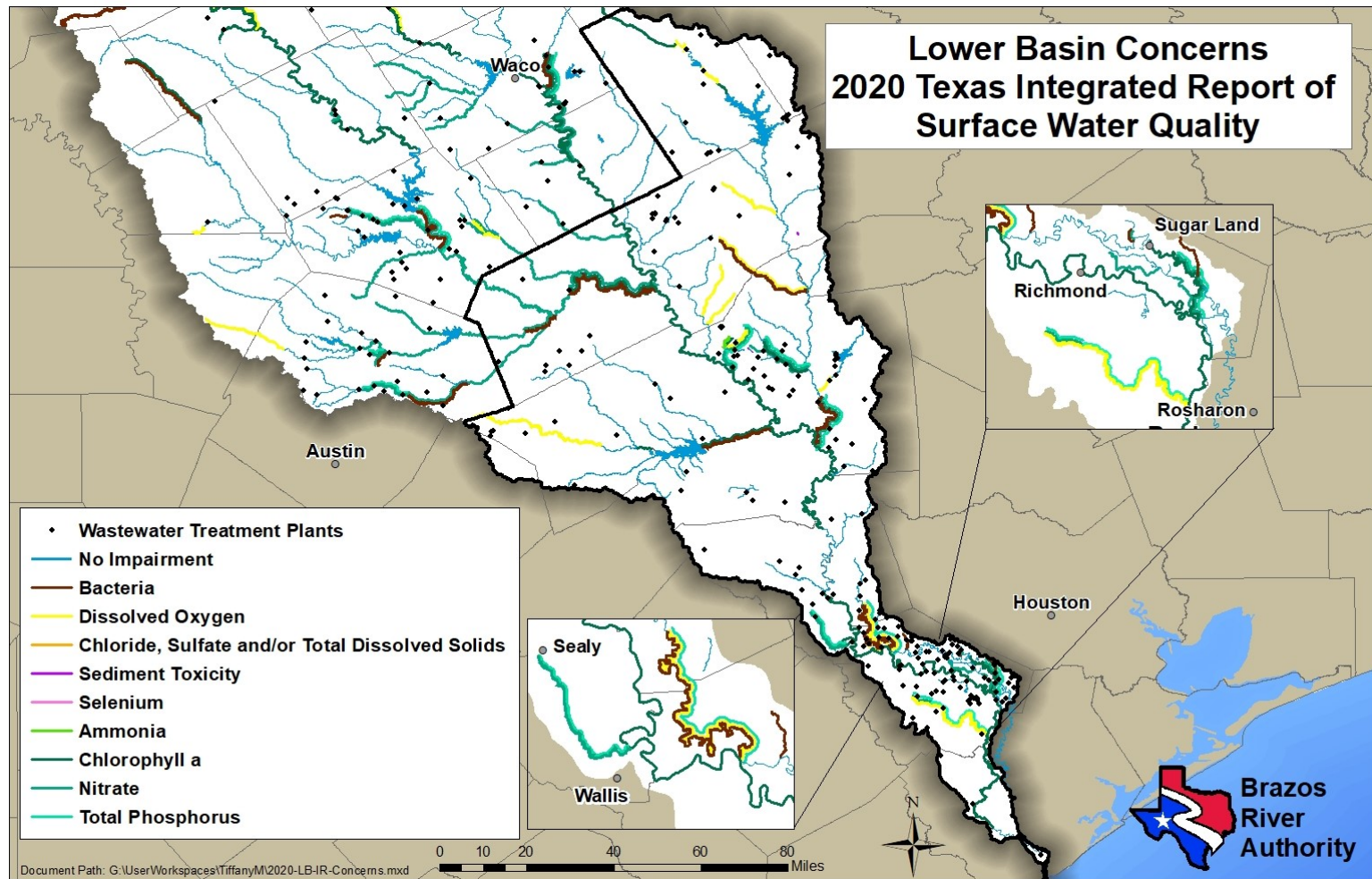


Upper Basin Concerns 2020 Texas Integrated Report of Surface Water Quality



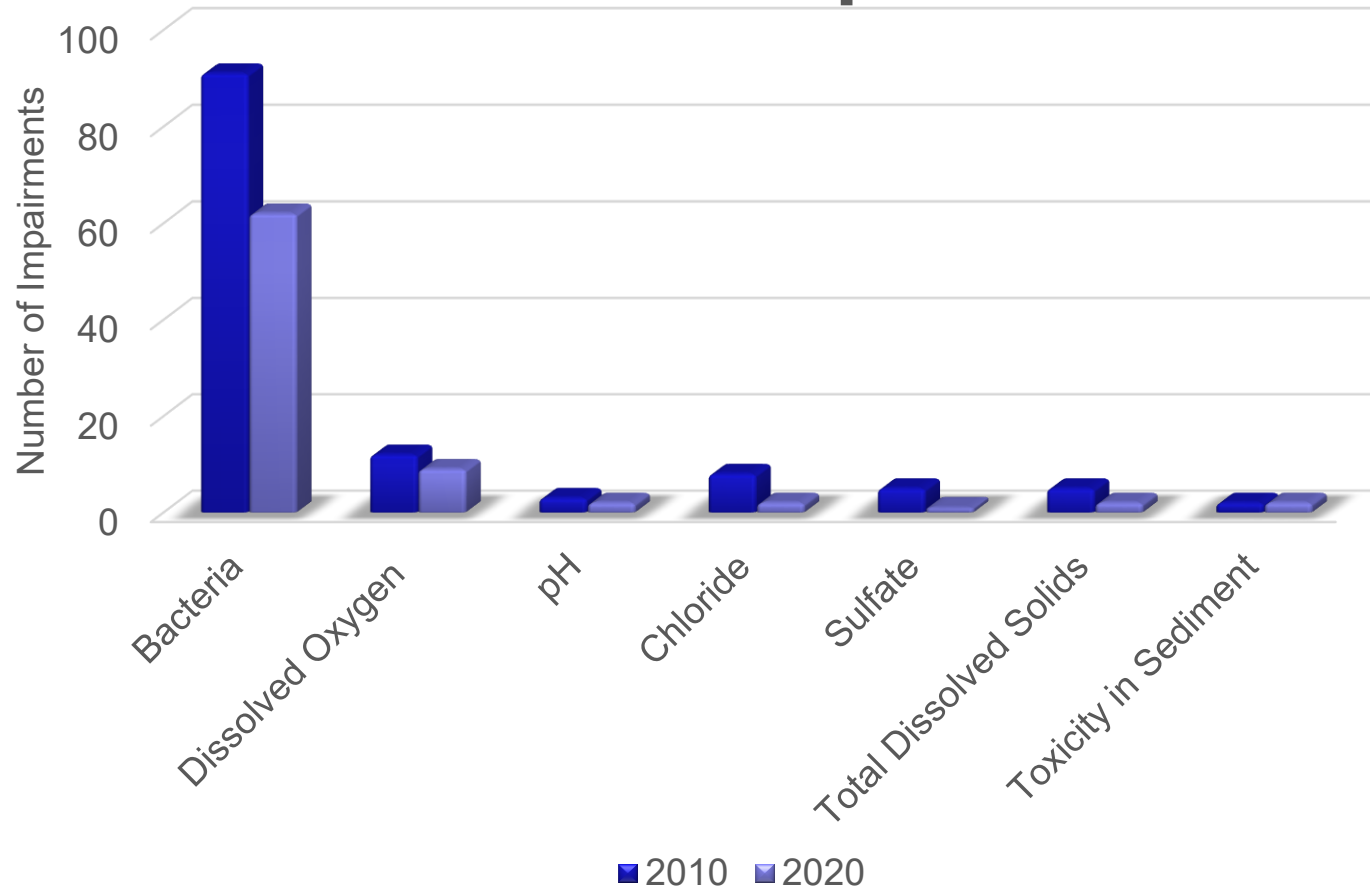
Central Basin Concerns 2020 Texas Integrated Report of Surface Water Quality





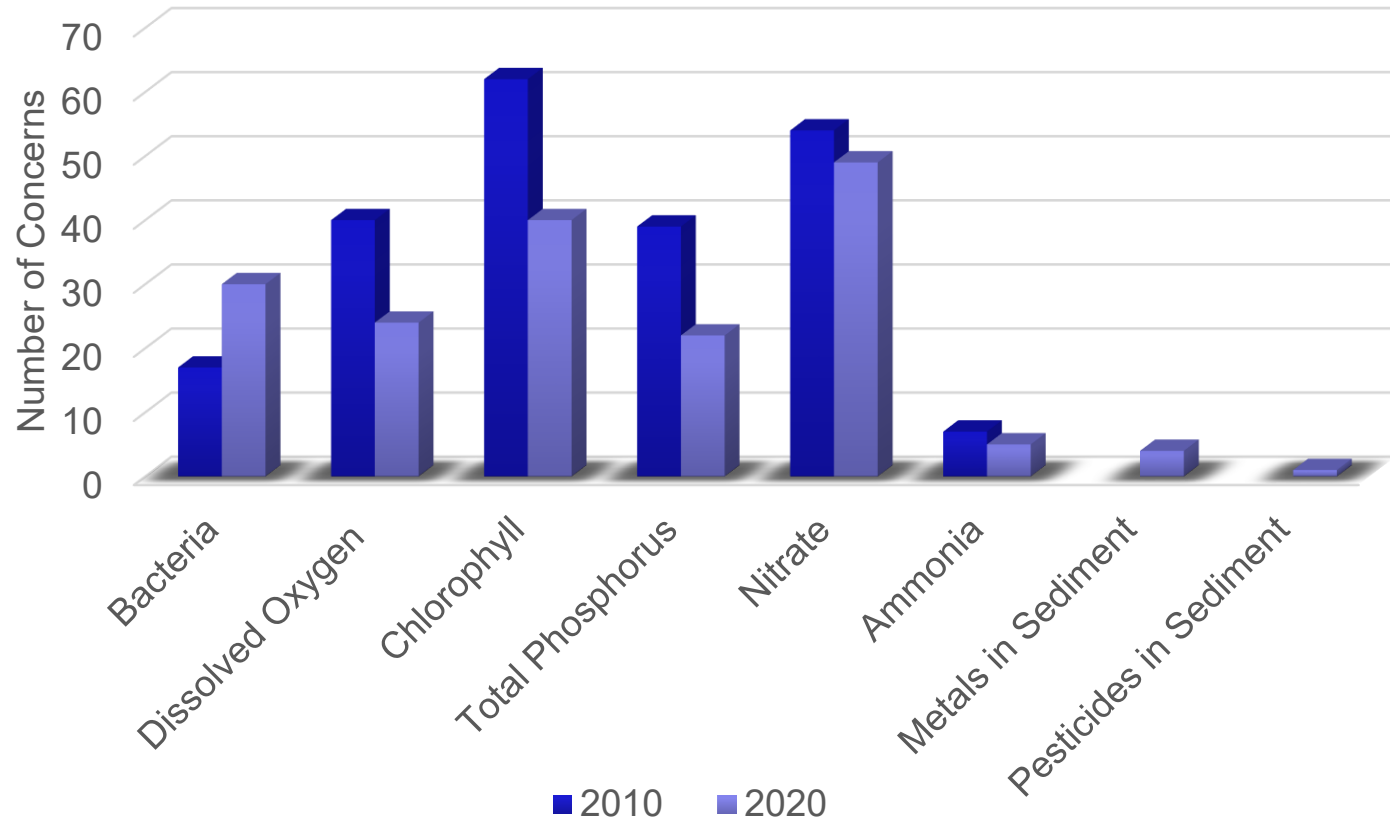


Brazos Basin Impairments



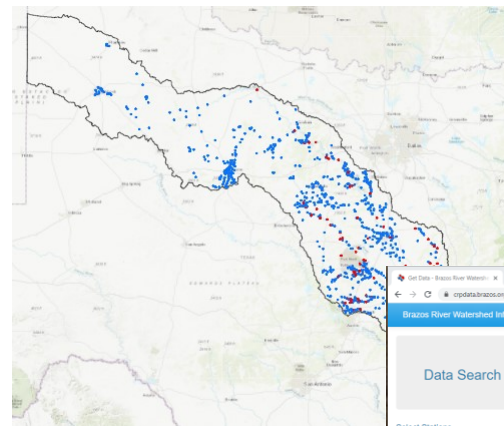


Brazos Basin Concerns



Water Quality Data Available Online

- Two ways to search
 - Map-based by site
 - www.brazos.org/About-Us/Environmental/Texas-Clean-Rivers-Program
 - Query-based by watershed or classified segment
 - www.crpdata.brazos.org/GetData
- Data downloadable to Excel
- Will direct to TCEQ database



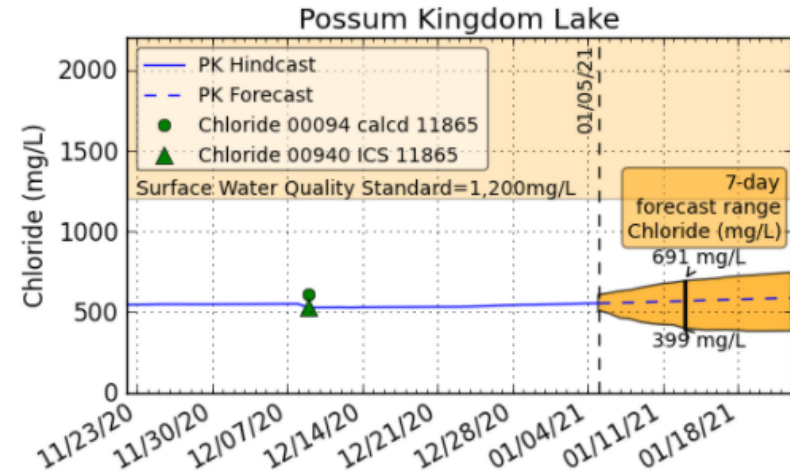
 A screenshot of a web browser displaying the 'Data Search' page of the Brazos River Watershed Information Center. The page has a blue header with navigation links: 'Data Search', 'About Watersheds', 'About Data', 'Instructions', and 'Contact Us'. The main content area is titled 'Data Search' and includes the Brazos River Authority logo. It features several search filters:

- Select Stations:** Three dropdown menus for 'Watershed', 'Stream Segment', and 'Station', each with a 'Select by Station' link.
- Date Range:** Two date pickers for 'Start Date' (set to 6/16/2019) and 'End Date' (set to 2/16/2022). A note below states: 'This site contains no data prior to September 2016'.
- Parameters:** Two columns of checkboxes for selecting data parameters:
 - Basic Water Quality Chemistry
 - Pathogens
 - Dissolved Solids
 - Total Suspended Solids
 - Volatile Organic Compounds
 - Semi Volatile Organic Compounds
 - Observational Field
 - Dissolved Minerals
 - Carbamates
 - Bacteriological
 - Dissolved Metals

 At the bottom, there are 'Get Data' and 'Clear Selection' buttons.

Chloride and Total Dissolved Solids Forecast

- Chloride and TDS levels important to mainstem customers
- 2011 – developed Chloride and TDS Predictive Tool
 - Possum Kingdom
 - Granbury
 - Whitney
- 2021 – updated
- Available online
 - www.brazos.org/chltds





Top 5 Concerns Related to Water Quality

- 1. Increase urbanization**
- 2. Increased eutrophication**
- 3. Water quality standard development for nutrients**
- 4. Further degradation of riparian communities**
- 5. Increased proliferation of reverse osmosis TPDES permits authorizing discharge of concentrated brine**



Snag sampling for macroinvertebrates

Biological, Physical Habitat, and Riparian Sampling

- **Routine**
 - 2014 TPWD MOU/SYSOPs
 - Allens Creek Fishery Assemblage Documentation
 - CCAA
 - Aquatic Life Monitoring
- **As needed**
 - TPDES Permit Renewal Monitoring
 - Fish Kill Investigations
 - Use Attainability Analyses
 - Aquatic Life Assessments
 - Recreational Use Attainability Analyses



Mussel identification and measurement on the Navasota River



Types of Biological Sampling

- **Native Species**
 - Fish
 - Macroinvertebrates
 - Freshwater Mussels
 - Algae
 - Aquatic Plants
- **Nuisance or Invasive Species**
 - Zebra Mussels
 - Aquatic Plants



Electrofishing on the Brazos River at FM 4

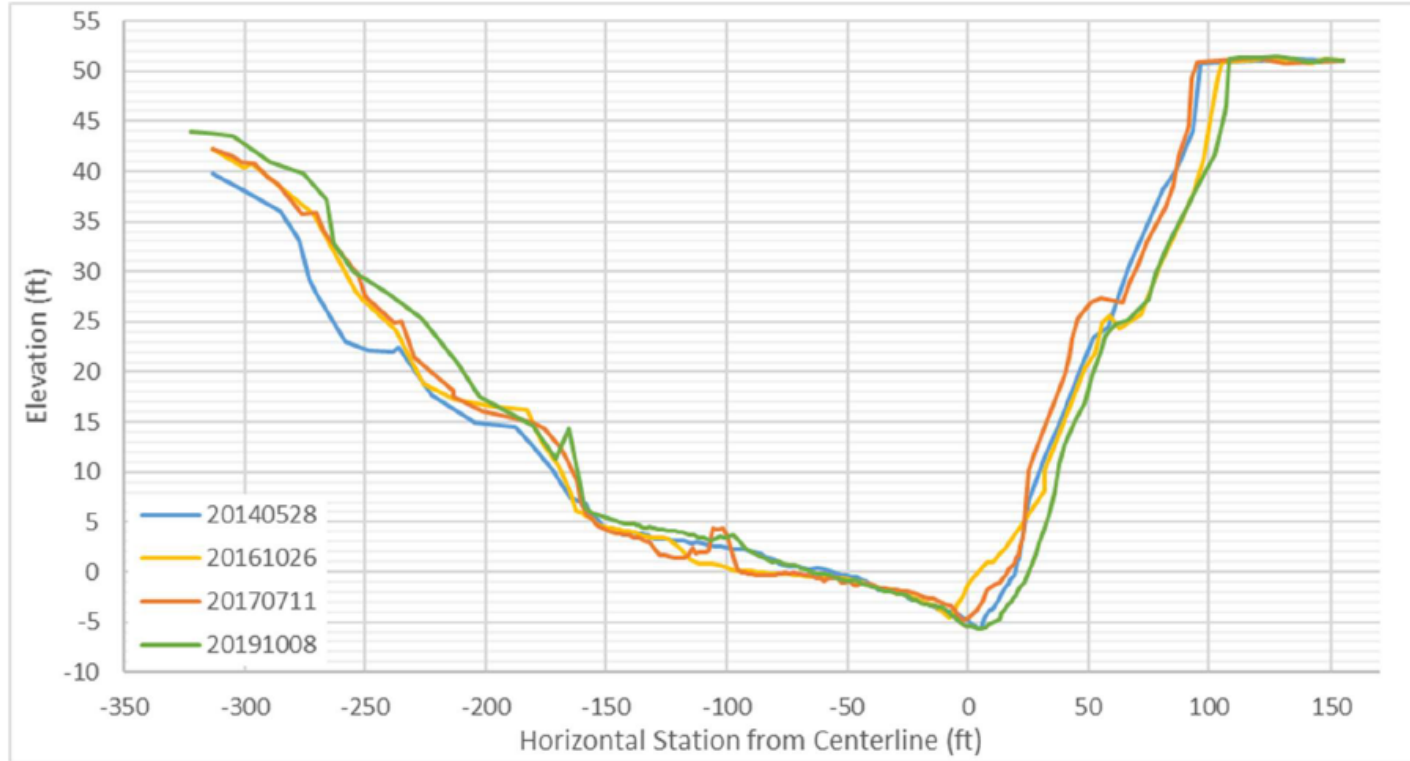
Physical Habitat Assessment

- Mesohabitat identification and mapping
- Substrate composition
- Channel morphology
- Instream cover
- Tree canopy cover
- Aesthetics
- Channel obstructions or modifications
- Velocity studies



Deposition over survey marker after Hurricane Harvey at the Brazos at Rosharon.

Channel survey results for the downstream transect of the Brazos River at Rosharon

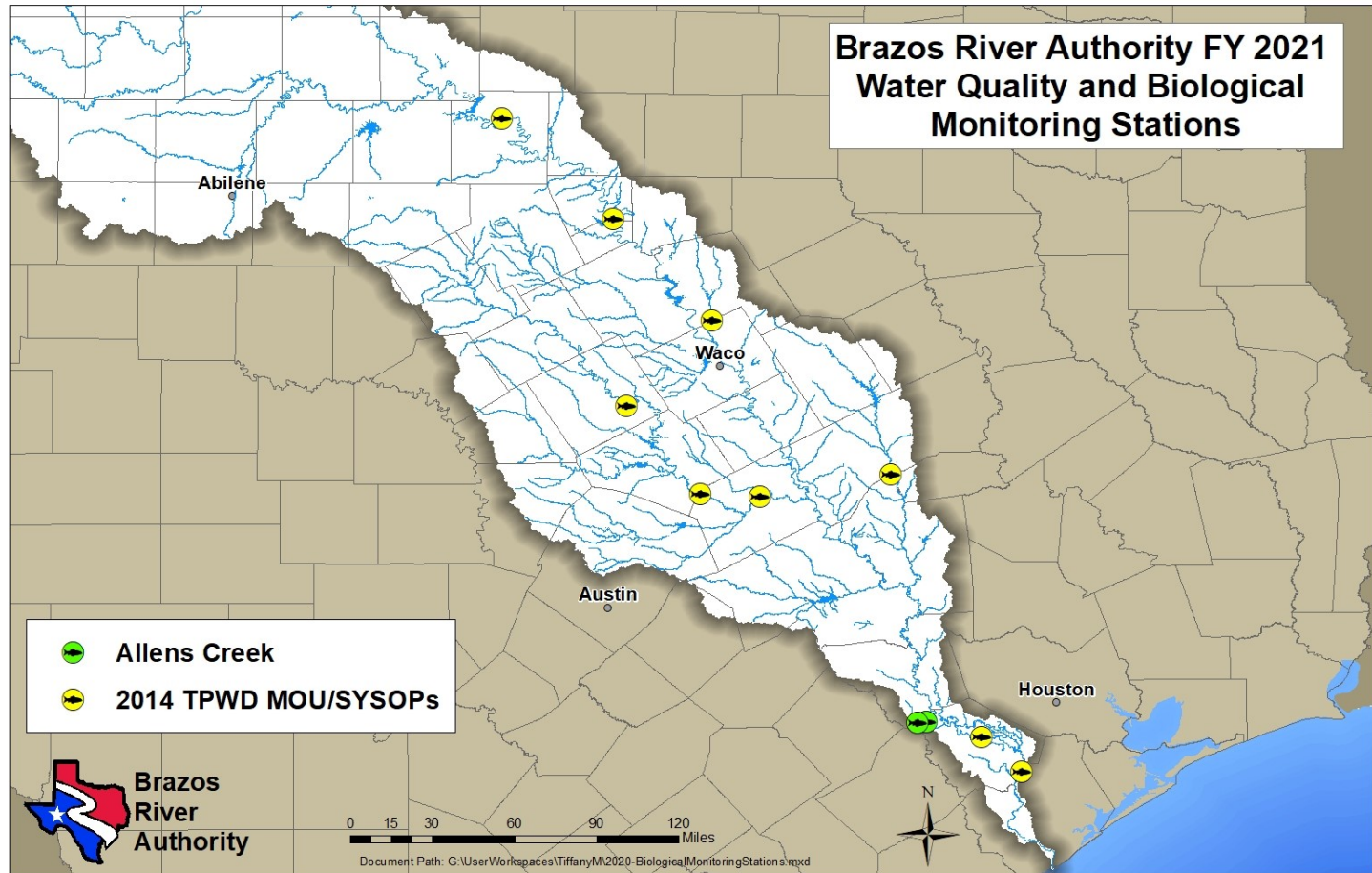


Riparian Zone Assessment

- **Tree Identification**
 - Seedlings
 - Saplings
 - Adults
- **Tree Coring**
- **Diameter at Breast Height measurement for all adults**
- **Change over time and flow events**



Riparian tree counting on Aquilla Creek.



Threatened and Endangered (T&E) Species

- **Endangered Species Act (ESA) is the nation's strongest conservation law**
- **ESA can and has affected state-based water rights and regulations in other states**
 - **Can limit the traditional exercise of established water rights**
 - **Restrict or modify new water projects**
 - **Any water use that results in the direct or incidental take or harm of listed species falls within the ESA's reach**
- **Most recent USFWS 5-Year Workplan contains 42 species known to occur in Texas**
- **Texas Parks and Wildlife Department (TPWD) produces state T&E list**

Current Federally Protected T&E Species of Concern in the Basin

- **Endangered**
 - Golden Cheek Warbler
 - Navasota Ladies' Tresses
 - Smalleye Shiner
 - Sharpnose Shiner
 - Georgetown Salamander
 - Houston Toad
- **Threatened**
 - Jollyville Plateau Salamander
 - Salado Creek Salamander



Salado Salamander
(photo courtesy of Nathan Bendik)

Freshwater Mussel Candidate Conservation Agreement with Assurances (CCAA)

- **2018 – BOD authorized staff to begin negotiations with USFWS on a CCAA**
- **Submitted for formal consideration in August 2020**
- **Published for Public Comment in October 2020**
 - **TPWD**
 - **Center for Biological Diversity**
 - **National Wildlife Foundation**

Candidate Conservation Agreement with Assurances for the False Spike and Texas Fawnsfoot in the Brazos River Basin



Developed Cooperatively by:

**U.S. Fish and Wildlife Service – Southwest Region
and**

Brazos River Authority

2020



Future Species of T&E Concern

- **Federal**
 - Alligator Snapping Turtle
 - Wester Chicken Turtle
 - Texas Salamander
 - Navasota False Foxglove
 - Monarch Butterfly
 - Frosted Elfin Butterfly
 - Other freshwater mussels
- **State**
 - **Brazos Water Snake**



Brazos Water Snake



Invasive Species

- **Invasive species of concern**
 - Zebra Mussels
 - Salt Cedar
 - Feral Hogs
 - Aquatic Plants
- **Cooperating with TPWD early detection monitoring in Basin Reservoirs**
 - Currently monitoring Lake Limestone
- **Cooperating with TPWD on salt cedar treatment in Upper basin**
- **Partnering with TPWD on water hyacinth treatment on Lake Limestone**



Settlement sampler infested with zebra mussels from Lake Granger



Golden Algae Sampling

- **Collect samples monthly from Possum Kingdom and Granbury**
- **Late fall – early spring**
- **Ship to TPWD**
 - **Cell Counts**
 - **Toxicity Testing**



2003 Golden Algae Fish Kill on Lake Granbury

Participation in Other Entities Projects

- **TCEQ/TWDB Brazos Basin and Bay Expert Science Team**
- **TCEQ**
 - **Advisory Committees**
 - **Total Maximum Daily Load Studies and Implementation Plans**
- **TSSWWCB Watershed Protection Plans**
- **TPWD Harmful Algal Bloom Workgroup**
- **Texas Comptroller – Freshwater Mussel Advisory Committee**
- **Various Universities - Recreation Use Attainability Assessments**

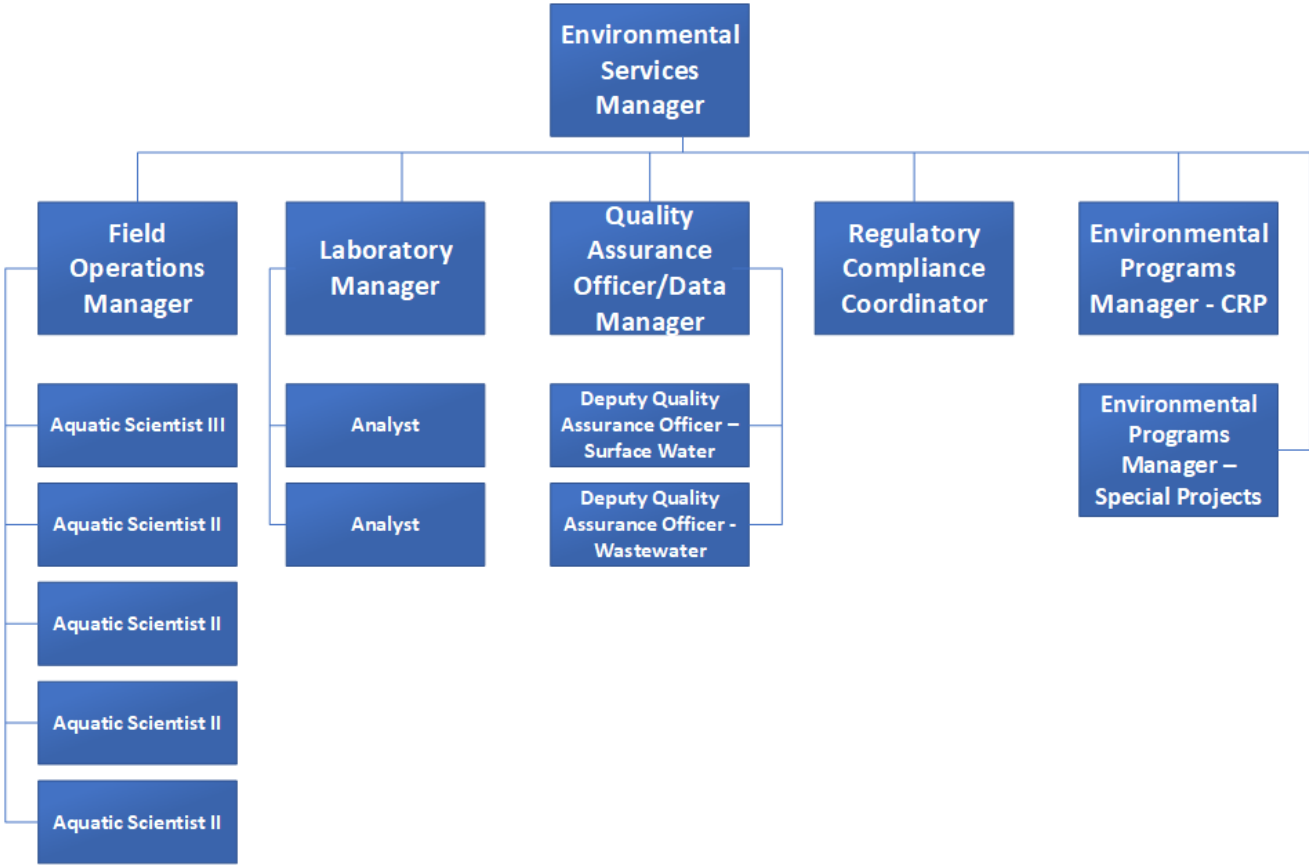


Top 7 General Environmental Concerns

- 1. Uncertainty and instability of regulatory climate**
- 2. Endangered Species Act**
- 3. Environmental flows**
- 4. Increased frequency of disturbance**
- 5. Invasive species**
- 6. Misinterpretation of BRA role and authority**
- 7. Population Growth**



Environmental Services





Field Operations Team

- **Water Quality Sampling**
- **Biological Monitoring**
- **Physical Habitat Assessment**
- **Riparian Zone Assessment**
- **Use Attainability Analyses**
- **Receiving Water Assessments**
- **Aquatic Life Assessments**



Flow Measurement on the Leon River at FM 1829

Surface Water Laboratory

- **Analyze samples collected by Field Team**
- **NELAP Accredited**
- **Parameters**
 - **Turbidity**
 - **Total Dissolved Solids**
 - **Total Suspended Solids**
 - **Ion Chromatography**
 - Chloride,
 - Nitrate,
 - Phosphate
 - Sulfate
 - **Advanced Nutrients**
 - Ammonia
 - Total Phosphorus
 - Total Kjeldahl Nitrogen
 - **Chlorophyll *a***
 - ***E. coli***
 - **Enterococcus**

National Environmental Laboratory Accreditation Program (NELAP)

- **In 2002, TCEQ adopted rules requiring NELAP accreditation for all data that may be used in agency decision making**
- **Goal is to generate data of known and documented quality across laboratories**
- **Must comply with the NELAC Institute Standards**
- **Quality Manual**
- **Biannual audit and recertification by TCEQ**
- **Proficiency Testing**
- **Ethics and Data Integrity**
- **Method Specific Standard Operating Procedures**
- **Corrective Action Procedure and Root Cause Investigations**

Quality Assurance and Data Management

- **Implementation and maintenance of Environmental Services Quality System**
- **Standard Operating Procedures**
- **Data Review for method and program compliance**
- **Internal Audits**
- **Biannual NELAP Audits**
- **Ethics, Data Integrity and SOP Training**
- **Quality Assurance Project Plans**
- **Laboratory Information Management System**
- **Data Analysis**
- **Data Reporting to TCEQ**
- **Data Requests and Request Tracking**



Regulatory Compliance Coordinator

- Reviewing Capital Projects and Operating Projects to identify environmental permitting requirements
- Work with project team to minimize permitting obligations
- Complete and file permit documents
- Training



Common Permits that Apply to Operations

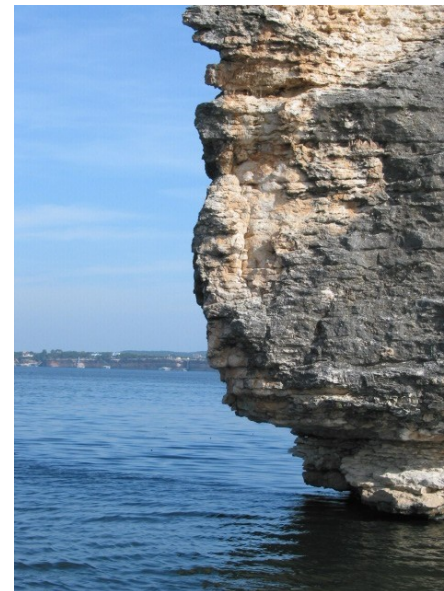
- **USACE**
 - Regional General Permit (RGP) 8 – Boat Ramps and Docks
 - Nationwide Permit (NWP) 3 – Maintenance
 - NWP 3 - Maintenance
 - NWP 6 – Survey Activities
 - NWP 5 – Scientific Measurement Devices
 - NWP 13 – Bank Stabilization
 - NWP 7 – Outfall and Intake Structures
 - NWP 11 – Temporary Recreational Structures
- **TCEQ**
 - 401 Certification
 - Pesticide Application
 - Stormwater Pollution Prevention
 - Spill Prevention, Control, and Countermeasures
- **TPWD**
 - Aquatic Resource Relocation
 - Sand, Gravel, and Marl

Environmental Programs Coordinators

- **Manage specific programs and projects**
 - **Clean Rivers Program**
 - **CCAA Implementation**
 - **Species specific projects**
 - **Watershed Assessment Projects**
 - **Watershed Action Planning**
- **Example Projects**
 - **Characterization of Water Quality and Identification of Possible Contributing Sources of Pollution**
 - Lake Somerville
 - Tehuacana Creek
 - Deer Creek
 - Cedar Creek
 - **Golden Algae Control Study**
 - **Aquatic Life Assessments**
 - Resley Creek
 - Duck Creek

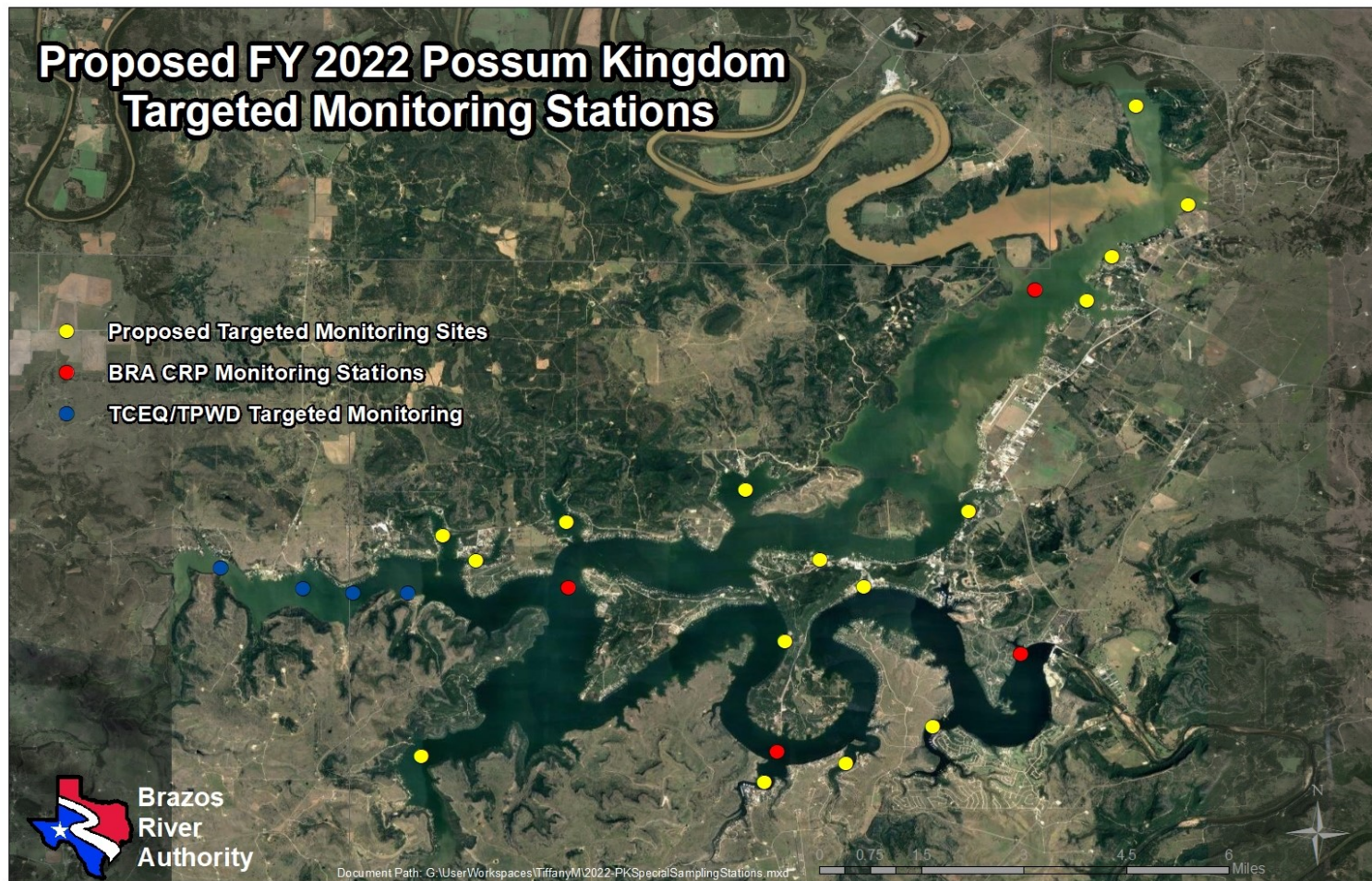
Proposed New Initiative for FY 2022

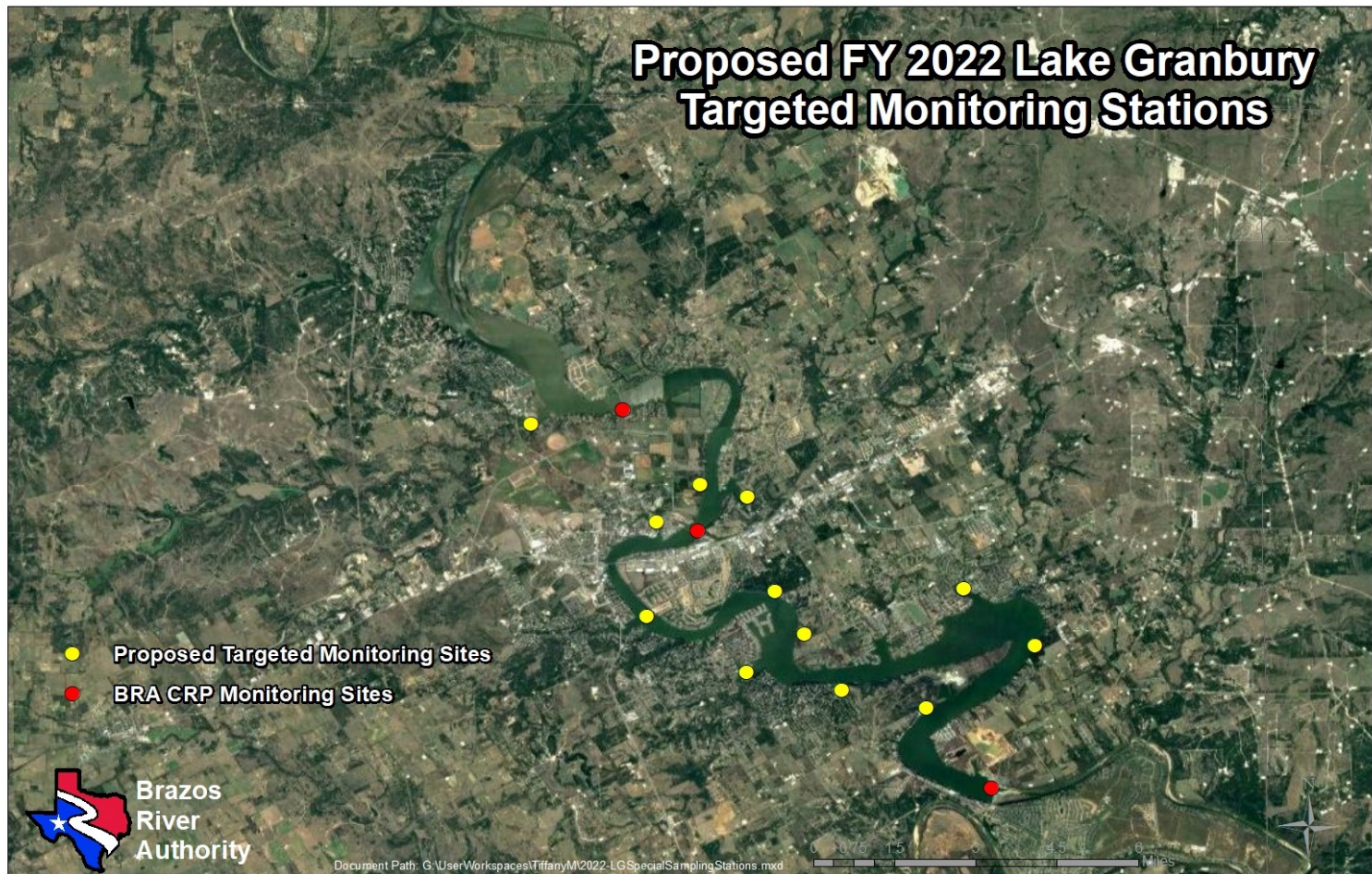
- **Extensive water quality monitoring on BRA lakes targeted in areas where development is anticipated to occur or is actively occurring**
- **Analytical focus on**
 - **Nutrients**
 - **Bacteria**
 - **Suspended Solids**
- **Will be included in ES FY 2022 Operating Budget**

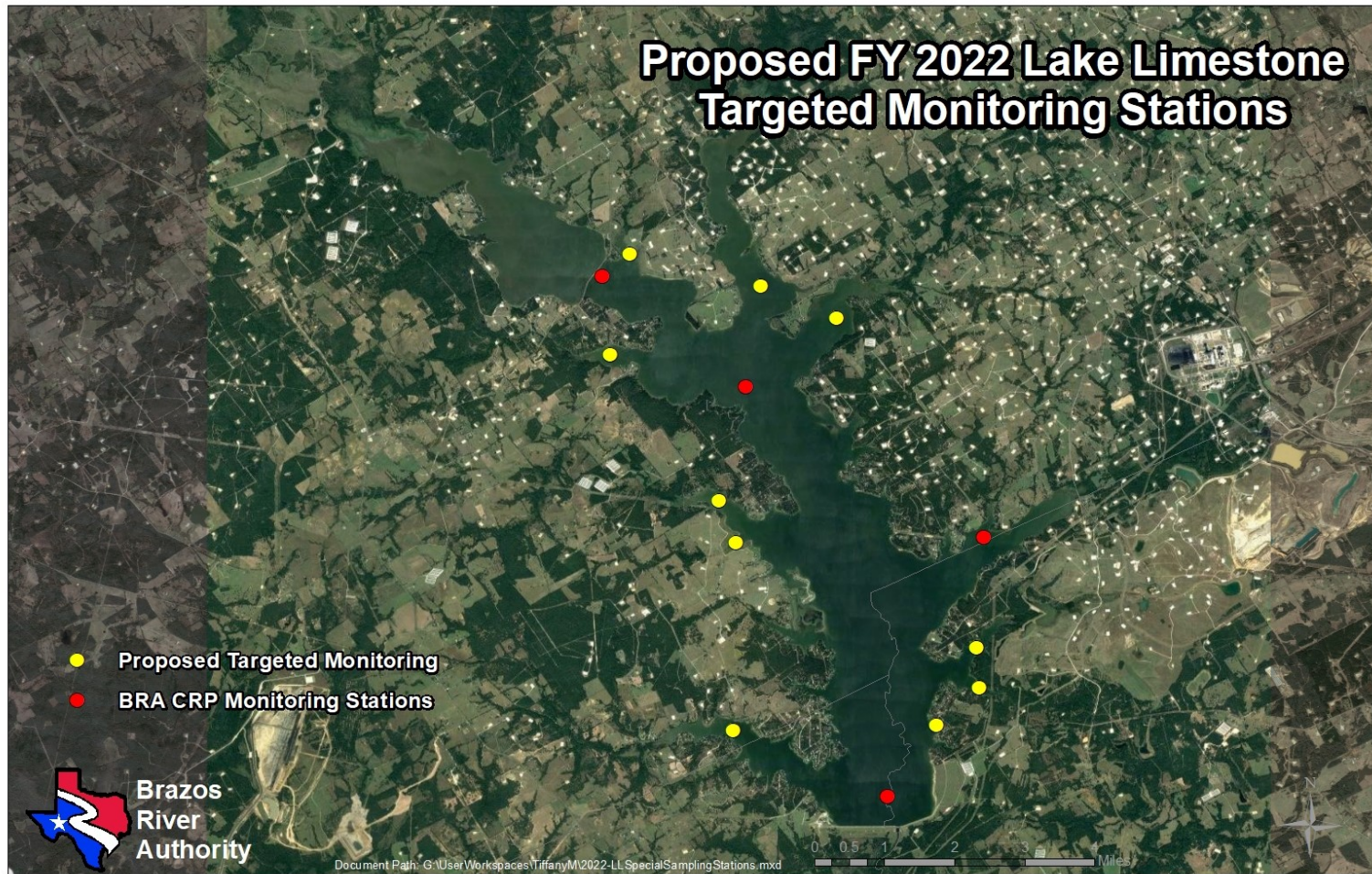


Possum Kingdom Lake

Proposed FY 2022 Possum Kingdom Targeted Monitoring Stations







Resource Limitations

- **Aquatic Scientists and Laboratory Analysts are working at maximum capacity**
- **Laboratory Size**
 - **Some equipment operating at maximum capacity**
 - **Inadequate space, no room for new equipment to expand sample volume or add new analytical capabilities**
 - **Any new analyses must be shipped to contract labs until additional space is found**



**Brazos
River
Authority**