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**Houston-Galveston Area Council**

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December 13, 2018

Earlene Lambeth (MC 203)  
TMDL Project Manager  
Water Quality Division  
Texas Commission on Environmental Quality  
12100 Park 35 Circle, Bldg. F  
Austin, Texas 78753

RE: December 2018 Progress Report for Contract 582-18-81222, Work Order 2.

Dear Ms. Lambeth:

Enclosed is one (1) copy of the FY 2019 1<sup>st</sup> Progress Report for Contract No. 582-18-81222-02. It covers all deliverable/task activities for the project period September 1, 2018 through November 30, 2018. Financial Statements, HUB report and Voucher will be submitted separately.

Included in this Report are:

1. One copy of the quarterly progress report for September 1, 2018 thru November 30, 2018.
2. Copies of meeting summaries and other pertinent materials from project related meetings.

We hope you find the quarterly report satisfactory. Any comments you have will be appreciated. If you have any questions, please contact me by phone (713-993-4549) or E-mail (todd.running@h-gac.com).

Sincerely,

Todd Running  
Water Resources Program Manager  
Community & Environmental Planning Dept.

CC Jason Leifester  
Chris Loft

TR/srj  
Enclosures



**TMDL Program****Date: December 13, 2018****FY 2019 Progress Report #1****Time Period Covered: 09/01/2018 – 11/30/2018****Name of Project: Watershed Characterization for Big Creek****Contract No./Work Order 582-18-81222-02****TASK #1. PROJECT ADMINISTRATION**

<b>Deliverable(s)</b>	<b>Due Date</b>	<b>Status</b>
List all deliverables under the task described above	List the due dates for each deliverable	If the deliverable has been completed, enter the date submitted to the TCEQ. If the deliverable has not been completed, briefly describe the status of each deliverable.
Monthly Progress Report	December 15, 2018	Monthly report for Work Order submitted electronically and hard copy on December 13, 2018
Invoice	December 15, 2018	Invoices will be submitted under another cover.
Weekly Reports	Weekly	Provided as an attachment.

**Work Performed This Period – detail all activities for this task and briefly describe the progress on each deliverable:**

Work performed for this task during this period included writing and assembling the monthly report. Copies of weekly emails are attached.

**TASK #2. PUBLIC EDUCATION AND OUTREACH**

<b>Deliverable(s)</b>	<b>Due Date</b>	<b>Status</b>
List all deliverables under the task described above	List the due dates for each deliverable	If the deliverable has been completed, enter the date submitted to the TCEQ. If the deliverable has not been completed, briefly describe the status of each deliverable.
Development of meeting materials (Task 2.1)	Draft meeting materials will be sent to the TCEQ Project Manager at least two weeks prior to distribution for each meeting	No meetings held this quarter.
Host two, and up to four total, watershed stakeholder meetings (Task 2.2)	As needed	No meetings held this quarter.
Summary of meetings (Task 2.3)	Within 2 weeks after meetings	No updates needed.
List of general stakeholders (Task 2.4)	With PRs	Building stakeholder list.
Facilitate delivery of education programs (Task 2.5)	As needed	No education programs provided this quarter.
Public participation/outreach summaries (Task 2)	With PRs	No updates needed.

**Work Performed This Period – detail all activities for this task and briefly describe the progress on each deliverable:**

No meetings related to this task were initiated or held during the report period. Staff began building the stakeholder list. Staff also made initial contact with some of the stakeholders with knowledge of the watershed hydrology to assist with task 4.

### TASK #3 EXISTING DATA QAPP

Deliverable(s)	Due Date	Status
List all deliverables under the task described above	List the due dates for each deliverable	If the deliverable has been completed, enter the date submitted to the TCEQ. If the deliverable has not been completed, briefly describe the status of each deliverable.
Draft Acquired Data QAPP (3.1)	45 days after issuance of notice to proceed.	Provided October 31, 2018.
Final QAPP (3.2)	Two weeks after receipt of TCEQ comments	Comments were timely addressed. Document was in final approval process in late November 2018.
QAPP amendments (Task 3.3)	As needed	No update needed.
QAPP Annual Update	Annually, as needed.	No update needed.
QAPP CARs (Task 3.5)	As needed	No CARs required.
Quality assurance audits (Task 3.6)	Will participate as needed	No audits performed.

#### Work Performed This Period

The draft acquired data QAPP was submitted on October 31, 2018 for TCEQ approval. H-GAC worked with TCEQ TMDL staff to address the comments in a timely manner. The QAPP was in final approval process at the end of November.

### TASK #4 WATERSHED CHARACTERIZATION REPORT

Deliverable(s)	Due Date	Status
List all deliverables under the task described above	List the due dates for each deliverable	If the deliverable has been completed, enter the date submitted to the TCEQ. If the deliverable has not been completed, briefly describe the status of each deliverable.
Draft Report (Task 4.1)	July 15, 2019	Began initial work began with development of the draft watershed boundary. Boundary was needed for the QAPP.
Final TSD (Task 4.2)	Two weeks after receipt of TCEQ comments	

#### Work Performed This Period – detail all activities for this task and briefly describe the progress on each deliverable:

No data gathering was performed during the report period. A draft watershed boundary was created using NHDplus to develop a project map for the QAPP. Boundary will be finalized with TCEQ and stakeholders in the second project quarter. Data gathering will also commence once the QAPP is final.

#### PROJECT RELATED MEETINGS, WORKSHOPS, TRAINING OR EVENTS

- 1) Presentations:
  - a. No presentations were given during the quarter on the project.
- 2) Meetings, Events and Conferences:
  - a. Staff did not attend any events or conferences in support of the project.
- 3) Associated Implementation Projects and Programs
  - a. No associated implementation has been carried out in the project area.

#### BRIEF DESCRIPTION OF OVERALL FINDINGS:

H-GAC focused on completing the draft QAPP and working with TCEQ to address any comments. Staff also reached out to watershed stakeholders to assist in developing a watershed boundary. The boundary was needed for the QAPP.

**Significant Problems (describe any scheduling shortfalls, detail significant problems and how these problems were resolved, etc.):**

No problems were encountered this quarter.



## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Tuesday, October 2, 2018 8:56 AM  
**To:** Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)  
**Cc:** Jason Leifester (Jason.leifester@tceq.texas.gov); Bower, Justin  
**Subject:** FY 19 WO #2 Weekly Reports (Sept 3 - Sept 7; Sept 10 - Sept 14; Sept 17 - Sept 21; and Sept 24 - Sept 28)

Good Morning, Earlene – Below you will find the weekly reports for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

### Sept. 3 – Sept. 7<sup>th</sup>:

#### **Task 1** Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date ():** \$ **Remaining Budget Amount:** \$85,000

#### **Task 2** Public Education and Outreach Activities

- Staff discussing project with stakeholders.

#### **Task 3** Quality Assurance

- Staff discussing project with TCEQ staff
- Creating a watershed map for use in the QAPP

#### **Task 4** Characterization Report

- No activities to report

### Sept. 10 – Sept. 14<sup>th</sup>:

#### **Task 1** Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date ():** \$ **Remaining Budget Amount:** \$85,000

#### **Task 2** Public Education and Outreach Activities

- Staff discussing project with TCEQ staff and stakeholders.

#### **Task 3** Quality Assurance

- Staff discussing project with TCEQ staff
- Creating a watershed map for use in the QAPP

#### **Task 4** Characterization Report

- No activities to report

### Sept. 17 – Sept. 21<sup>st</sup>:

#### **Task 1** Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date ():** \$ **Remaining Budget Amount:** \$85,000

**Task 2** Public Education and Outreach Activities

- Staff discussing project with TCEQ staff and stakeholders.

**Task 3** Quality Assurance

- Staff discussing project with TCEQ staff
- Creating a watershed map for use in the QAPP
- Drafting QAPP

**Task 4** Characterization Report

- No activities to report

Sept. 24 – Sept. 28<sup>th</sup>:

**Task 1** Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date ():** \$ **Remaining Budget Amount:** \$85,000

**Task 2** Public Education and Outreach Activities

- Staff discussing project with TCEQ staff and stakeholders.

**Task 3** Quality Assurance

- Staff discussing project with TCEQ staff
- Watershed map created for use in the QAPP
- Drafting QAPP

**Task 4** Characterization Report

- No activities to report

Steven Johnston  
 Senior Planner  
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[steven.johnston@h-gac.com](mailto:steven.johnston@h-gac.com)  
<http://h-gac.com/community/water/tmdl/big/default.aspx>

## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Sunday, October 14, 2018 6:12 PM  
**To:** Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)  
**Cc:** Jason Leifester (Jason.leifester@tceq.texas.gov); Bower, Justin  
**Subject:** FY 19 WO #2 Weekly Reports (Oct 1 - Oct 5 and Oct 8 - Oct 12)

Good Afternoon, Earlene – Below you will find the weekly reports for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

### Oct. 1<sup>st</sup> – Oct. 5<sup>th</sup>:

#### **Task 1** Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date ():** \$ **Remaining Budget Amount:** \$85,000

#### **Task 2** Public Education and Outreach Activities

- Staff discussing project with TCEQ staff and stakeholders.

#### **Task 3** Quality Assurance

- Drafting QAPP

#### **Task 4** Characterization Report

- No activities to report

### Oct. 8<sup>th</sup> – Oct. 12<sup>th</sup>:

#### **Task 1** Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date ():** \$ **Remaining Budget Amount:** \$85,000

#### **Task 2** Public Education and Outreach Activities

- Staff discussing project with TCEQ staff and stakeholders.

#### **Task 3** Quality Assurance

- Drafting QAPP

#### **Task 4** Characterization Report

- No activities to report

Steven Johnston  
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[steven.johnston@h-gac.com](mailto:steven.johnston@h-gac.com)

<http://h-gac.com/community/water/tmdl/big/default.aspx>

## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Friday, October 26, 2018 4:07 PM  
**To:** Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)  
**Cc:** Jason Leifester (Jason.leifester@tceq.texas.gov); Bower, Justin  
**Subject:** FY 19 WO #2 Weekly Report (Oct 15 - Oct 19)

Good Afternoon, Earlene – Below you will find the weekly report for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

Oct. 15<sup>th</sup> – Oct. 19<sup>th</sup>:

### **Task 1** Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date ():** \$ **Remaining Budget Amount:** \$85,000
- An update to the spending will be provided with the next report.

### **Task 2** Public Education and Outreach Activities

- Staff discussing project with TCEQ staff and stakeholders (Brazos Bend State Park, Fort Bend Drainage District and local stakeholders).

### **Task 3** Quality Assurance

- Finished drafting QAPP. QAPP will be submitted the week of October 22, 2018.

### **Task 4** Characterization Report

- No activities to report

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## Johnston, Steven

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**From:** Johnston, Steven  
**Sent:** Monday, October 29, 2018 4:30 PM  
**To:** Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)  
**Cc:** Jason Leifester (Jason.leifester@tceq.texas.gov); Bower, Justin  
**Subject:** FY 19 WO #2 Weekly Report (Oct 22 - Oct 26)

Good Afternoon, Earlene – Below you will find the weekly report for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

Oct. 22<sup>nd</sup> – Oct. 26<sup>th</sup>:

### **Task 1** Project Administration

- ***Anticipate Spend Down August 2019?:*** Yes.
- ***Is spending by categories going as expected?:*** Yes at this time.
- ***Last Invoice:*** N/A.
- ***Original Budget Amount:*** \$85,000
- ***Total Spent to Date: (\$208.65) Remaining Budget Amount:*** \$84,791.35

### **Task 2** Public Education and Outreach Activities

- Staff discussing project with TCEQ staff and stakeholders (Brazos Bend State Park, Fort Bend Drainage District and local stakeholders).

### **Task 3** Quality Assurance

- QAPP was submitted the week of October 22, 2018.
- Had QAPP planning call with TCEQ PM

### **Task 4** Characterization Report

- No activities to report

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<http://h-gac.com/community/water/tmdl/big/default.aspx>



## Johnston, Steven

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**From:** Johnston, Steven  
**Sent:** Tuesday, November 6, 2018 5:33 PM  
**To:** Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)  
**Cc:** Jason Leifester (Jason.leifester@tceq.texas.gov); Bower, Justin  
**Subject:** RE: FY 19 WO #2 Weekly Report (Oct 29 - Nov 2)

Good Evening, Earlene – Below you will find the weekly report for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

Oct. 29<sup>th</sup> – Nov. 2<sup>nd</sup>:

### **Task 1** Project Administration

- ***Anticipate Spend Down August 2019?:*** Yes.
- ***Is spending by categories going as expected?:*** Yes at this time.
- ***Last Invoice:*** N/A.
- ***Original Budget Amount:*** \$85,000
- ***Total Spent to Date: (September 30, 2018)*** \$208.65 ***Remaining Budget Amount:*** \$84,791.35

### **Task 2** Public Education and Outreach Activities

- Staff discussing project with TCEQ staff and stakeholders (Brazos Bend State Park, Fort Bend Drainage District and local stakeholders).

### **Task 3** Quality Assurance

- Received comments to the draft Acquired Data QAPP. Will addressed and resubmitted during the week on Nov. 5<sup>th</sup>.

### **Task 4** Characterization Report

- No activities to report

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<http://h-gac.com/community/water/tmdl/big/default.aspx>



## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Monday, November 12, 2018 5:02 PM  
**To:** Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)  
**Cc:** Jason Leifester (Jason.leifester@tceq.texas.gov); Bower, Justin  
**Subject:** FY 19 WO #2 Weekly Report (Nov 5 - Nov 9)

Good Afternoon, Earlene – Below you will find the weekly report for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

Nov. 5<sup>th</sup> – Nov. 9<sup>th</sup>:

### **Task 1** Project Administration

- ***Anticipate Spend Down August 2019?:*** Yes.
- ***Is spending by categories going as expected?:*** Yes at this time.
- ***Last Invoice:*** N/A.
- ***Original Budget Amount:*** \$85,000
- ***Total Spent to Date: (September 30, 2018)*** \$208.65 ***Remaining Budget Amount:*** \$84,791.35
- Will update spend down with next report.

### **Task 2** Public Education and Outreach Activities

- Staff continues to discuss project with area stakeholders (Brazos Bend State Park, Fort Bend Drainage District and local stakeholders).

### **Task 3** Quality Assurance

- Revised and resubmitted draft Acquired Data QAPP.

### **Task 4** Characterization Report

- No activities to report

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## Johnston, Steven

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**From:** Johnston, Steven  
**Sent:** Wednesday, November 28, 2018 6:02 PM  
**To:** Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)  
**Cc:** Jason Leifester (Jason.leifester@tceq.texas.gov); Bower, Justin  
**Subject:** FY 19 WO #2 Weekly Report (Nov 12 - Nov 16)

Good Afternoon, Earlene – Below you will find the weekly report for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

Nov. 12<sup>th</sup> – Nov. 16<sup>th</sup>:

### **Task 1** Project Administration

- ***Anticipate Spend Down August 2019?:*** Yes.
- ***Is spending by categories going as expected?:*** Yes at this time.
- ***Last Invoice:*** N/A.
- ***Original Budget Amount:*** \$85,000
- ***Total Spent to Date: (October 31, 2018)*** \$3,214.11 ***Remaining Budget Amount:*** \$81,785.89

### **Task 2** Public Education and Outreach Activities

- Staff continues to discuss project with area stakeholders.

### **Task 3** Quality Assurance

- Acquired Data QAPP submitted for approval.

### **Task 4** Characterization Report

- No activities to report

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<http://h-gac.com/community/water/tmdl/big/default.aspx>



## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Wednesday, November 28, 2018 6:12 PM  
**To:** Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)  
**Cc:** Jason Leifester (Jason.leifester@tceq.texas.gov); Bower, Justin  
**Subject:** FY 19 WO #2 Weekly Report (Nov 19 - Nov 23)

Good Evening, Earlene – Below you will find the weekly report for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

Nov. 19<sup>th</sup> – Nov. 23<sup>rd</sup>: (Please note, there are no changes reported this week as staff were out)

### Task 1 Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (October 31, 2018)** \$3,214.11 **Remaining Budget Amount:** \$81,785.89

### Task 2 Public Education and Outreach Activities

- Staff continues to discuss project with area stakeholders.

### Task 3 Quality Assurance

- Acquired Data QAPP submitted for approval.

### Task 4 Characterization Report

- No activities to report

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<http://h-gac.com/community/water/tmdl/big/default.aspx>



## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Wednesday, December 12, 2018 5:05 PM  
**To:** Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)  
**Cc:** Jason Leifester (Jason.leifester@tceq.texas.gov); Bower, Justin  
**Subject:** FY 19 WO #2 Weekly Reports (Nov 26 - Nov 30) and (Dec 3 - Dec 7)

Good Afternoon, Earlene – Below you will find the weekly reports for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

Nov. 26<sup>th</sup> – Nov. 30<sup>th</sup>:

### Task 1 Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (October 31, 2018)** \$3,214.11 **Remaining Budget Amount:** \$81,785.89

### Task 2 Public Education and Outreach Activities

- Staff continues to discuss project with area stakeholders.

### Task 3 Quality Assurance

- Received approval to secure signatures.

### Task 4 Characterization Report

- No activities to report

Dec. 3<sup>rd</sup> – Dec. 7<sup>th</sup>:

### Task 1 Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (November 30, 2018)** \$5,170.90 **Remaining Budget Amount:** \$79,829.10

### Task 2 Public Education and Outreach Activities

- Staff continues to discuss project with area stakeholders.

### Task 3 Quality Assurance

- QAPP approved and executed.

### Task 4 Characterization Report

- No activities to report

Steven Johnston  
Senior Planner  
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**Houston-Galveston Area Council**

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March 16, 2019

Earlene Lambeth (MC 203)  
TMDL Project Manager  
Water Quality Division  
Texas Commission on Environmental Quality  
12100 Park 35 Circle, Bldg. F  
Austin, Texas 78753

RE: March 2019 Progress Report for Contract 582-18-81222, Work Order 2.

Dear Ms. Lambeth:

Enclosed is one (1) copy of the FY 2019 2<sup>nd</sup> Progress Report for Contract No. 582-18-81222-02. It covers all deliverable/task activities for the project period December 1, 2018 through February 28, 2019. Financial Statements, HUB report and Voucher will be submitted separately.

Included in this Report are:

1. One copy of the quarterly progress report for December 1, 2018 thru February 28, 2019.
2. Copies of meeting summaries and other pertinent materials from project related meetings.

We hope you find the quarterly report satisfactory. Any comments you have will be appreciated. If you have any questions, please contact me by phone (713-993-4549) or E-mail (todd.running@h-gac.com).

Sincerely,

Todd Running  
Water Resources Program Manager  
Community & Environmental Planning Dept.

CC Jason Leifester  
Chris Loft  
Justin Bower

TR/srj  
Enclosures



**TMDL Program  
FY 2019 Progress Report #2**

**Date: March 16, 2019**

**Time Period Covered: 12/01/2018 – 2/28/2019**

**Name of Project: Watershed Characterization for Big Creek**

**Contract No./Work Order 582-18-81222-02**

**TASK #1. PROJECT ADMINISTRATION**

<b>Deliverable(s)</b>	<b>Due Date</b>	<b>Status</b>
List all deliverables under the task described above	List the due dates for each deliverable	If the deliverable has been completed, enter the date submitted to the TCEQ. If the deliverable has not been completed, briefly describe the status of each deliverable.
Monthly Progress Report	March 15, 2019	Monthly report for Work Order submitted an electronic copy on March 16, 2019
Invoice	March 31, 2019	Invoices will be submitted under another cover.
Weekly Reports	Weekly	Provided as an attachment.

**Work Performed This Period – detail all activities for this task and briefly describe the progress on each deliverable:**

Work performed for this task during this period included writing and assembling the monthly report. Copies of weekly emails are attached. Staff worked with TCEQ PM and Team Leader on the FY 2020 draft work order and budget.

**TASK #2. PUBLIC EDUCATION AND OUTREACH**

<b>Deliverable(s)</b>	<b>Due Date</b>	<b>Status</b>
List all deliverables under the task described above	List the due dates for each deliverable	If the deliverable has been completed, enter the date submitted to the TCEQ. If the deliverable has not been completed, briefly describe the status of each deliverable.
Development of meeting materials (Task 2.1)	Draft meeting materials will be sent to the TCEQ Project Manager at least two weeks prior to distribution for each meeting	No meetings held this quarter.
Host two, and up to four total, watershed stakeholder meetings (Task 2.2)	As needed	No meetings held this quarter.
Summary of meetings (Task 2.3)	Within 2 weeks after meetings	No updates needed.
List of general stakeholders (Task 2.4)	With PRs	Preliminary stakeholder list attached.
Facilitate delivery of education programs (Task 2.5)	As needed	Planning for a field outing for local interested parties was developed during this quarter. H-GAC assisted the JB Harrison Foundation in logistics for a wildlife and habitat survey of a property adjacent to Big Creek with significant best management practice implementation. H-GAC will use the results of the survey to inform the characterization and additional contacts to increase our reach.
Public participation/outreach summaries (Task 2)	With PRs	H-GAC held conversations with several stakeholders during this period to further understanding of the watershed and engender interest in the upcoming public meetings. Entities with whom H-GAC communicated include Fort Bend County (Drainage), Brazos Bend State Park, the WCA Fort Bend

		County Landfill, the JB Harrison Foundation, and representatives from state agencies with activity in the area (TSSWCB, et al.).
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Work Performed This Period – detail all activities for this task and briefly describe the progress on each deliverable:

No meetings related to this task were initiated or held during the report period. Staff completed a preliminary stakeholder list (attached). Staff continued to make preliminary contact with stakeholders to assist in developing the characterization.

### TASK #3 EXISTING DATA QAPP

Deliverable(s)	Due Date	Status
List all deliverables under the task described above	List the due dates for each deliverable	If the deliverable has been completed, enter the date submitted to the TCEQ. If the deliverable has not been completed, briefly describe the status of each deliverable.
Draft Acquired Data QAPP (3.1)	45 days after issuance of notice to proceed.	Provided October 31, 2018.
Final QAPP (3.2)	Two weeks after receipt of TCEQ comments	Final QAPP approved November 30, 2018.
QAPP amendments (Task 3.3)	As needed	No update needed.
QAPP Annual Update	Annually, as needed.	No update needed.
QAPP CARs (Task 3.5)	As needed	No CARs required.
Quality assurance audits (Task 3.6)	Will participate as needed	No audits performed.

#### Work Performed This Period

The draft acquired data QAPP was approved on November 30, 2018. H-GAC initiated work under the QAPP subsequent to its final approval.

### TASK #4 WATERSHED CHARACTERIZATION REPORT

Deliverable(s)	Due Date	Status
List all deliverables under the task described above	List the due dates for each deliverable	If the deliverable has been completed, enter the date submitted to the TCEQ. If the deliverable has not been completed, briefly describe the status of each deliverable.
Draft Report (Task 4.1)	July 15, 2019	Substantial mapping and data collection activities were completed this quarter, along with sections of characterization text. Load duration curve analysis and will be completed in early Q3, for review with stakeholders at public meetings.
Final TSD (Task 4.2)	Two weeks after receipt of TCEQ comments	

Work Performed This Period – detail all activities for this task and briefly describe the progress on each deliverable:

Subsequent to the approval of the QAPP, H-GAC staff worked with local stakeholders to refine knowledge of the watershed and transmute that information to the development of the GIS and begin analysis of potential sources of contamination in the watershed. The development of load duration curves in early Q3 will complete the primary technical analysis for the project.

### PROJECT RELATED MEETINGS, WORKSHOPS, TRAINING OR EVENTS

- 1) Presentations:

- a. No presentations were given during the quarter on the project.
- 2) Meetings, Events and Conferences:
  - a. Staff attended the following meetings at which they represented the project or received information relevant to the project
    - i. Texas State BMP/Wetland Coordinating Committee (as committee member), Texas Forest Service 12/10/18.
    - ii. Texas Watershed Coordinator Roundtable meeting in Waco, 1/31/19
    - iii. Texas Forests and Drinking Water Forum Workshop (as committee member), 2/6/19
    - iv. Galveston Bay Estuary Program Water and Sediment Quality subcommittee (as vice-chair), 3/5/19
  - 3) Associated Implementation Projects and Programs
    - a. BMP/wildlife management tour scheduled for 3/16/19. (H-GAC did not produce materials for this event; our primary role was to identify stakeholders, assist in planning, and to attend on 3/16/19.)
    - b. No associated implementation has been carried out in the project area.

**BRIEF DESCRIPTION OF OVERALL FINDINGS:**

H-GAC focused on making appreciable progress in the technical assessment of the waterway while continuing to lay the groundwork for stakeholder involvement. Planning for meetings in Q3 and Q4 is underway pending a discussion with TCEQ PM and local stakeholders.

**Significant Problems (describe any scheduling shortfalls, detail significant problems and how these problems were resolved, etc.):**

No problems were encountered this quarter.



Stakeholder Entity	Contact	email	phone	category
Fort Bend County Drainage	Jeffrey Janecek	jeffrey.janecek@fortbendcountytx.gov	(281) 342-2863	Local Government
City of Thompsons	Mayor Freddie Newsome	TBD	(281) 343-9929	Local Government
City of Rosenberg	TBD	TBD	832-595-3300	Local Government
Texas State Soil and Water Conservation Board	Brian Koch	bkoch@tsswcb.texas.gov	NA	State Government
Texas Parks and Wildlife Brazos Bend State Park	David Heinicke	david.heinicke@tpwd.texas.gov	NA	State Government
Lower Brazos Riverwatch	Bruce Bodson	bruce.bodson@lowerbrazosriverwatch.org	NA	Local Organization
JB Harrison Foundation	Hannah Muegge	hannah@jbhfound.org	(832)-544-8093	Local Organization
WCA Landfill	Troy Leitschuh	ispinks@wcamerica.com	832-684-7474	Industry
NRG WA Parish Plant	John Kush	john.kush@nrg.com	NA	Industry
Citizen - wildlife	Ron Weeks	ronweeks@sboglobal.net	NA	Citizen
USDA NRCS	Karissa H. Graves	Karissa.Graves@tx.usda.gov	(281) 232-6898 x 101	National Government
Agrilife Extension Fort Bend County	Derrick Banks	derrick_banks@ag.tamu.edu	281.342.3034	State Government
City of Peak	TBD	TBD	TBD	Local Government
City of Fairchilds	TBD	TBD	TBD	Local Government
City of Needville	TBD	TBD	TBD	Local Government
Coastal Plains Soil and Water Conservation District	Linda Freund	Linda.Freund@tx.nacdn.net	(281) 232-6898 ext. 3	State Government
George Ranch Historical Park	TBD	TBD	TBD	Local Organization
Brazos River Authority	Tiffany Morgan	TiffanVM@brazos.org	254.761.3151	River Authority



## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Wednesday, December 12, 2018 5:05 PM  
**To:** Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)  
**Cc:** Jason Leifester (Jason.leifester@tceq.texas.gov); Bower, Justin  
**Subject:** FY 19 WO #2 Weekly Reports (Nov 26 - Nov 30) and (Dec 3 - Dec 7)

Good Afternoon, Earlene – Below you will find the weekly reports for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

### Nov. 26<sup>th</sup> – Nov. 30<sup>th</sup>:

#### Task 1 Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (October 31, 2018)** \$3,214.11 **Remaining Budget Amount:** \$81,785.89

#### Task 2 Public Education and Outreach Activities

- Staff continues to discuss project with area stakeholders.

#### Task 3 Quality Assurance

- Received approval to secure signatures.

#### Task 4 Characterization Report

- No activities to report

### Dec. 3<sup>rd</sup> – Dec. 7<sup>th</sup>:

#### Task 1 Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (November 30, 2018)** \$5,170.90 **Remaining Budget Amount:** \$79,829.10

#### Task 2 Public Education and Outreach Activities

- Staff continues to discuss project with area stakeholders.

#### Task 3 Quality Assurance

- QAPP approved and executed.

#### Task 4 Characterization Report

- No activities to report

Steven Johnston  
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<http://h-gac.com/community/water/tmdl/big/default.aspx>

## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Wednesday, December 19, 2018 4:53 PM  
**To:** Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)  
**Cc:** Jason Leifester (Jason.leifester@tceq.texas.gov); Bower, Justin  
**Subject:** FY 19 WO #2 Weekly Report (Dec 10 - Dec 14)

Good Afternoon, Earlene – Below you will find the weekly report for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

Dec. 10<sup>th</sup> – Dec. 14<sup>th</sup>:

### **Task 1** Project Administration

- ***Anticipate Spend Down August 2019?:*** Yes.
- ***Is spending by categories going as expected?:*** Yes at this time.
- ***Last Invoice:*** N/A.
- ***Original Budget Amount:*** \$85,000
- ***Total Spent to Date: (November 30, 2018)*** \$5,170.90 ***Remaining Budget Amount:*** \$79,829.10
- Progress Report #1 submitted to TCEQ PM.

### **Task 2** Public Education and Outreach Activities

- Staff continues to discuss project with area stakeholders.

### **Task 3** Quality Assurance

- QAPP approved and executed.

### **Task 4** Characterization Report

- Initiated data gathering activities.

Have a wonderful Christmas break!

Thanks,

Steve

Steven Johnston  
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<http://h-gac.com/community/water/tmdl/big/default.aspx>



## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Wednesday, December 26, 2018 6:05 PM  
**To:** Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)  
**Cc:** Jason Leifester (Jason.leifester@tceq.texas.gov); Bower, Justin  
**Subject:** FY 19 WO #2 Weekly Report (Dec 17 - Dec 21)

Good Afternoon, Earlene – Below you will find the weekly report for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

Dec. 17<sup>th</sup> – Dec. 21<sup>st</sup>:

**Task 1** Project Administration

- ***Anticipate Spend Down August 2019?:*** Yes.
- ***Is spending by categories going as expected?:*** Yes at this time.
- ***Last Invoice:*** N/A.
- ***Original Budget Amount:*** \$85,000
- ***Total Spent to Date: (November 30, 2018) \$5,170.90 Remaining Budget Amount: \$79,829.10***

**Task 2** Public Education and Outreach Activities

- Staff continues to discuss project with area stakeholders.

**Task 3** Quality Assurance

- QAPP approved and executed.

**Task 4** Characterization Report

- Data gathering activities underway.

Thanks,

Steve

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<http://h-gac.com/community/water/tmdl/big/default.aspx>



## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Monday, December 31, 2018 2:04 PM  
**To:** Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)  
**Cc:** Jason Leifester (Jason.leifester@tceq.texas.gov); Bower, Justin  
**Subject:** FY 19 WO #2 Weekly Report (Dec 24 - Dec 28)

Good Afternoon, Earlene – Below you will find the weekly report for Work Order #2 under 582-18-81222. Please let me know if you have any questions. No changes have been reported for the week as staff were out for the Holiday.

Dec. 24<sup>th</sup> – Dec. 28<sup>th</sup>:

**Task 1** Project Administration

- ***Anticipate Spend Down August 2019?:*** Yes.
- ***Is spending by categories going as expected?:*** Yes at this time.
- ***Last Invoice:*** N/A.
- ***Original Budget Amount:*** \$85,000
- ***Total Spent to Date: (November 30, 2018) \$5,170.90 Remaining Budget Amount: \$79,829.10***

**Task 2** Public Education and Outreach Activities

- Staff continues to discuss project with area stakeholders.

**Task 3** Quality Assurance

- QAPP approved and executed.

**Task 4** Characterization Report

- Data gathering activities underway.

Thanks,

Steve

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<http://h-gac.com/community/water/tmdl/big/default.aspx>



## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Monday, January 14, 2019 4:47 PM  
**To:** Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)  
**Cc:** Jason Leifester (Jason.leifester@tceq.texas.gov); Bower, Justin  
**Subject:** RE: FY 19 WO #2 Weekly Reports (Dec 31 - Jan 4) and (Jan 7 - Jan 11)

Good Afternoon, Earlene – Below you will find the weekly reports for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

### Dec. 31<sup>st</sup> – Jan. 4th:

#### **Task 1** Project Administration

- ***Anticipate Spend Down August 2019?:*** Yes.
- ***Is spending by categories going as expected?:*** Yes at this time.
- ***Last Invoice:*** N/A.
- ***Original Budget Amount:*** \$85,000
- ***Total Spent to Date: (November 30, 2018)*** \$5,170.90 ***Remaining Budget Amount:*** \$79,829.10

#### **Task 2** Public Education and Outreach Activities

- Staff continues to discuss project with area stakeholders.

#### **Task 3** Quality Assurance

- QAPP approved and executed.

#### **Task 4** Characterization Report

- Data gathering activities continued.

### Jan 7<sup>th</sup> – Jan. 11th:

#### **Task 1** Project Administration

- ***Anticipate Spend Down August 2019?:*** Yes.
- ***Is spending by categories going as expected?:*** Yes at this time.
- ***Last Invoice:*** N/A.
- ***Original Budget Amount:*** \$85,000
- ***Total Spent to Date: (November 30, 2018)*** \$5,170.90 ***Remaining Budget Amount:*** \$79,829.10

#### **Task 2** Public Education and Outreach Activities

- Staff continues to discuss project with area stakeholders.

#### **Task 3** Quality Assurance

- QAPP approved and executed.

#### **Task 4** Characterization Report

- Data gathering activities continued.

Thanks,

Steve

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<http://h-gac.com/community/water/tmdl/big/default.aspx>

## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Monday, February 4, 2019 5:32 PM  
**To:** 'Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)'  
**Cc:** 'Jason Leifester (Jason.leifester@tceq.texas.gov)'; Bower, Justin; Chris Loft  
**Subject:** FY 19 WO #2 Weekly Reports (Jan 21 - Jan 25) and (Jan 28 - Feb 1)

Good Evening, Earlene – Below you will find the weekly report for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

### Jan 21<sup>st</sup> – Jan. 25<sup>th</sup>:

#### **Task 1** Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (December 31, 2018) \$7,042.19 Remaining Budget Amount: \$77,957.81**

#### **Task 2** Public Education and Outreach Activities

- Staff planning stakeholder outreach visits to a land foundation, Brazos Bend State Park, WA Parish Plant
- Will begin to plan first stakeholder meeting once initial visits are complete

#### **Task 3** Quality Assurance

- QAPP approved and executed.

#### **Task 4** Characterization Report

- Data gathering activities continued.

### Jan 21<sup>st</sup> – Jan. 25<sup>th</sup>:

#### **Task 1** Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (December 31, 2018) \$7,042.19 Remaining Budget Amount: \$77,957.81**

#### **Task 2** Public Education and Outreach Activities

- Staff planning stakeholder outreach visits to a land foundation, Brazos Bend State Park, WA Parish Plant
- Will begin to plan first stakeholder meeting once initial visits are complete

#### **Task 3** Quality Assurance

- QAPP approved and executed.

#### **Task 4** Characterization Report

- Data gathering activities continued
- Will begin LDC development soon

Thanks,

Steve

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<http://h-gac.com/community/water/tmdl/big/default.aspx>

## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Monday, January 21, 2019 5:55 PM  
**To:** Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)  
**Cc:** Jason Leifester (Jason.leifester@tceq.texas.gov); Bower, Justin; Chris Loft  
**Subject:** RE: FY 19 WO #2 Weekly Report (Jan 14 - Jan 18)

Good Evening, Earlene – Below you will find the weekly report for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

Jan 14<sup>th</sup> – Jan. 18th:

**Task 1** Project Administration

- ***Anticipate Spend Down August 2019?:*** Yes.
- ***Is spending by categories going as expected?:*** Yes at this time.
- ***Last Invoice:*** N/A.
- ***Original Budget Amount:*** \$85,000
- ***Total Spent to Date: (November 30, 2018) \$5,170.90 Remaining Budget Amount:*** \$79,829.10
- ***Updated numbers will be provided with next week's report***

**Task 2** Public Education and Outreach Activities

- Staff continues to discuss project with area stakeholders.

**Task 3** Quality Assurance

- QAPP approved and executed.

**Task 4** Characterization Report

- Data gathering activities continued.

Thanks,

Steve

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<http://h-gac.com/community/water/tmdl/big/default.aspx>



## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Thursday, February 28, 2019 4:14 PM  
**To:** 'Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)'  
**Cc:** 'Jason Leifester (Jason.leifester@tceq.texas.gov)'; Bower, Justin; 'Chris Loft'  
**Subject:** FY 19 WO #2 Weekly Reports (Feb 4 - Feb 8), (Feb 11 - Feb 15) and (Feb 18 - Feb 22)

Good Afternoon, Earlene – Below you will find the weekly reports for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

### Feb. 4<sup>th</sup> – Feb. 8<sup>th</sup>:

#### **Task 1** Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (January 31, 2019)** \$9,743.70 **Remaining Budget Amount:** \$75,256.30

#### **Task 2** Public Education and Outreach Activities

- Staff planning stakeholder outreach visits to a land foundation, Brazos Bend State Park, WA Parish Plant. Meetings have been held up due to rain, particularly at Brazos Bend State Park, much of which has been underwater.
- Will begin to plan first stakeholder meeting once initial visits are complete

#### **Task 3** Quality Assurance

- QAPP approved and executed.

#### **Task 4** Characterization Report

- Data gathering activities continued
- Will begin LDC development soon

### Feb. 11<sup>th</sup> – Feb. 15<sup>th</sup>:

#### **Task 1** Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (January 31, 2019)** \$9,743.70 **Remaining Budget Amount:** \$75,256.30

#### **Task 2** Public Education and Outreach Activities

- Staff planning stakeholder outreach visits to Brazos Bend State Park. Meetings have been held up due to rain, particularly at Brazos Bend State Park, much of which has been underwater.
- Will begin to plan first stakeholder meeting once initial visits are complete

#### **Task 3** Quality Assurance

- QAPP approved and executed.

#### **Task 4** Characterization Report

- Data gathering activities continued
- Will begin LDC development soon

Feb. 18<sup>th</sup> – Feb. 22<sup>nd</sup>:

**Task 1** Project Administration

- ***Anticipate Spend Down August 2019?:*** Yes.
- ***Is spending by categories going as expected?:*** Yes at this time.
- ***Last Invoice:*** N/A.
- ***Original Budget Amount:*** \$85,000
- ***Total Spent to Date: (January 31, 2019)*** \$9,743.70 ***Remaining Budget Amount:*** \$75,256.30

**Task 2** Public Education and Outreach Activities

- Staff planning stakeholder outreach visits to Brazos Bend State Park. Meetings have been held up due to rain, particularly at Brazos Bend State Park, much of which has been underwater.
- Will begin to plan first stakeholder meeting once initial visits are complete

**Task 3** Quality Assurance

- QAPP approved and executed.

**Task 4** Characterization Report

- Data gathering activities continued
- Staff began LDC development

Thanks,

Steve

Steven Johnston  
Senior Planner  
Community & Environmental Department | Houston-Galveston Area Council  
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<http://h-gac.com/community/water/tmdl/big/default.aspx>

## Johnston, Steven

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**From:** Johnston, Steven  
**Sent:** Tuesday, March 5, 2019 4:29 PM  
**To:** 'Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)'  
**Cc:** 'Jason Leifester (Jason.leifester@tceq.texas.gov)'; Bower, Justin; 'Chris Loft'  
**Subject:** FY 19 WO #2 Weekly Report (Feb 25 - Mar 1)

Good Afternoon, Earlene – Below you will find the weekly report for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

Feb. 25<sup>th</sup> – Mar. 1<sup>st</sup>:

**Task 1** Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (January 31, 2019) \$9,743.70 Remaining Budget Amount: \$75,256.30**

**Task 2** Public Education and Outreach Activities

- Staff planning stakeholder outreach visits to Brazos Bend State Park.
- Staff will be attending the JB Harrison Foundation outreach event (Land Trust in Big Creek) on March 16<sup>th</sup>.
- Will begin to plan first stakeholder meeting once initial visits are complete

**Task 3** Quality Assurance

- QAPP approved and executed.

**Task 4** Characterization Report

- Data gathering activities continued
- Staff began LDC development

Thanks,

Steve

Steven Johnston  
Senior Planner  
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<http://h-gac.com/community/water/tmdl/big/default.aspx>





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**Houston-Galveston Area Council**

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June 13, 2019

Earlene Lambeth (MC 203)  
TMDL Project Manager  
Water Quality Division  
Texas Commission on Environmental Quality  
12100 Park 35 Circle, Bldg. F  
Austin, Texas 78753

RE: June 2019 Progress Report for Contract 582-18-81222, Work Order 2.

Dear Ms. Lambeth:

Enclosed is one (1) copy of the FY 2019 3<sup>rd</sup> Progress Report for Contract No. 582-18-81222-02. It covers all deliverable/task activities for the project period March 1, 2019 through May 31, 2019. Financial Statements, HUB report and Voucher will be submitted separately.

Included in this Report are:

1. One copy of the quarterly progress report for March 1, 2019 thru May 31, 2019.
2. Copies of meeting summaries and other pertinent materials from project related meetings.

We hope you find the quarterly report satisfactory. Any comments you have will be appreciated. If you have any questions, please contact me by phone (713-993-4549) or E-mail (todd.running@h-gac.com).

Sincerely,

Todd Running  
Water Resources Program Manager  
Community & Environmental Planning Dept.

CC Jason Leifester  
Chris Loft  
Justin Bower

TR/srj  
Enclosures



**TASK #1. PROJECT ADMINISTRATION**

<b>Deliverable(s)</b>	<b>Due Date</b>	<b>Status</b>
List all deliverables under the task described above	List the due dates for each deliverable	If the deliverable has been completed, enter the date submitted to the TCEQ. If the deliverable has not been completed, briefly describe the status of each deliverable.
Monthly Progress Report	March 15, 2019	Monthly report for Work Order submitted an electronic copy on March 13, 2019
Invoice	March 31, 2019	Invoices will be submitted under another cover.
Weekly Reports	Weekly	Provided as an attachment.

**Work Performed This Period – detail all activities for this task and briefly describe the progress on each deliverable:**

Work performed for this task during this period included writing and assembling the monthly report. Copies of weekly emails are attached.

**TASK #2. PUBLIC EDUCATION AND OUTREACH**

<b>Deliverable(s)</b>	<b>Due Date</b>	<b>Status</b>
List all deliverables under the task described above	List the due dates for each deliverable	If the deliverable has been completed, enter the date submitted to the TCEQ. If the deliverable has not been completed, briefly describe the status of each deliverable.
Development of meeting materials (Task 2.1)	Draft meeting materials will be sent to the TCEQ Project Manager at least two weeks prior to distribution for each meeting	No meetings held this quarter.
Host two, and up to four total, watershed stakeholder meetings (Task 2.2)	As needed	No meetings held this quarter.
Summary of meetings (Task 2.3)	Within 2 weeks after meetings	No updates needed.
List of general stakeholders (Task 2.4)	With PRs	No updates at this time.
Facilitate delivery of education programs (Task 2.5)	As needed	No updates at this time.
Public participation/outreach summaries (Task 2)	With PRs	No updates at this time.

**Work Performed This Period – detail all activities for this task and briefly describe the progress on each deliverable:**

No meetings related to this task were initiated or held during the report period. Staff continued to contact stakeholders to seek assistance with the characterization report. Staff in the initial stages for determining a meeting location and a date. Foresee the first stakeholder meeting in July.

### TASK #3 EXISTING DATA QAPP

Deliverable(s)	Due Date	Status
List all deliverables under the task described above	List the due dates for each deliverable	If the deliverable has been completed, enter the date submitted to the TCEQ. If the deliverable has not been completed, briefly describe the status of each deliverable.
Draft Acquired Data QAPP (3.1)	45 days after issuance of notice to proceed.	Provided October 31, 2018.
Final QAPP (3.2)	Two weeks after receipt of TCEQ comments	Final QAPP approved November 30, 2018.
QAPP amendments (Task 3.3)	As needed	No update needed.
QAPP Annual Update	Annually, as needed.	No update needed.
QAPP CARs (Task 3.5)	As needed	No CARs required.
Quality assurance audits (Task 3.6)	Will participate as needed	No audits performed.

#### Work Performed This Period

QAPP was approved on November 30, 2018. H-GAC initiated work under the QAPP after its final approval.

### TASK #4 WATERSHED CHARACTERIZATION REPORT

Deliverable(s)	Due Date	Status
List all deliverables under the task described above	List the due dates for each deliverable	If the deliverable has been completed, enter the date submitted to the TCEQ. If the deliverable has not been completed, briefly describe the status of each deliverable.
Draft Report (Task 4.1)	July 15, 2019	All data and information acquisition was completed in this quarter. Began writing the text for the report.
Final TSD (Task 4.2)	Two weeks after receipt of TCEQ comments	

#### Work Performed This Period – detail all activities for this task and briefly describe the progress on each deliverable:

All data and information acquisition were completed in this quarter. LDCs were also completed. Text for the document was started.

### PROJECT RELATED MEETINGS, WORKSHOPS, TRAINING OR EVENTS

- 1) Presentations:
  - a. No presentations were given during the quarter on the project.
- 2) Meetings, Events and Conferences:
  - a. Staff attended the following meetings at which they represented the project or received information relevant to the project
    - i. Galveston Bay Estuary Program Water and Sediment Quality subcommittee (as vice-chair), 3/5/19
    - ii. JB Harrison Foundation Outreach Event (Land Trust in Big Creek) on April 13, 2019.
- 3) Associated Implementation Projects and Programs
  - a. No associated implementation has been carried out in the project area.

**BRIEF DESCRIPTION OF OVERALL FINDINGS:**

H-GAC completed data acquisition and information gathering for the Characterization Report and data analysis. Data analysis was completed and LDCs were made. Initial document text was written.

**Significant Problems (describe any scheduling shortfalls, detail significant problems and how these problems were resolved, etc.):**

No problems were encountered this quarter.



## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Tuesday, March 5, 2019 4:29 PM  
**To:** 'Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)'  
**Cc:** 'Jason Leifester (Jason.leifester@tceq.texas.gov)'; Bower, Justin; 'Chris Loft'  
**Subject:** FY 19 WO #2 Weekly Report (Feb 25 - Mar 1)

Good Afternoon, Earlene – Below you will find the weekly report for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

Feb. 25<sup>th</sup> – Mar. 1<sup>st</sup>:

### **Task 1** Project Administration

- ***Anticipate Spend Down August 2019?:*** Yes.
- ***Is spending by categories going as expected?:*** Yes at this time.
- ***Last Invoice:*** N/A.
- ***Original Budget Amount:*** \$85,000
- ***Total Spent to Date: (January 31, 2019)*** \$9,743.70 ***Remaining Budget Amount:*** \$75,256.30

### **Task 2** Public Education and Outreach Activities

- Staff planning stakeholder outreach visits to Brazos Bend State Park.
- Staff will be attending the JB Harrison Foundation outreach event (Land Trust in Big Creek) on March 16<sup>th</sup>.
- Will begin to plan first stakeholder meeting once initial visits are complete

### **Task 3** Quality Assurance

- QAPP approved and executed.

### **Task 4** Characterization Report

- Data gathering activities continued
- Staff began LDC development

Thanks,

Steve

Steven Johnston  
Senior Planner  
Community & Environmental Department | Houston-Galveston Area Council  
3555 Timmons, Suite 120 Houston, TX 77027 | [www.h-gac.com](http://www.h-gac.com)  
832.681.2579 | 713.627.3200 | fax: 713.993.4503  
[steven.johnston@h-gac.com](mailto:steven.johnston@h-gac.com)  
<http://h-gac.com/community/water/tmdl/big/default.aspx>



## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Saturday, March 16, 2019 5:54 PM  
**To:** 'Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)'  
**Cc:** 'Jason Leifester (Jason.leifester@tceq.texas.gov)'; Bower, Justin; 'Chris Loft'  
**Subject:** FY 19 WO #2 Weekly Reports (Mar 4 - Mar 8) and (Mar 11 - Mar 15)  
**Attachments:** PR2\_16Mar2019.pdf

Good Afternoon, Earlene – Below you will find the weekly reports for Work Order #2 under 582-18-81222. Additionally, I have attached the 2<sup>nd</sup> progress report. Please let me know if you have any questions.

Mar 4<sup>th</sup> – Mar. 8<sup>th</sup>:

### Task 1 Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (January 31, 2019)** \$9,743.70 **Remaining Budget Amount:** \$75,256.30

### Task 2 Public Education and Outreach Activities

- Staff planning stakeholder outreach visits to Brazos Bend State Park.
- Staff will be attending the JB Harrison Foundation outreach event (Land Trust in Big Creek) on March 16<sup>th</sup>.
- Will begin to plan first stakeholder meeting once initial visits are complete

### Task 3 Quality Assurance

- QAPP approved and executed.

### Task 4 Characterization Report

- Data gathering activities continued
- Staff began LDC development

Mar 4<sup>th</sup> – Mar. 8<sup>th</sup>:

### Task 1 Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (January 31, 2019)** \$9,743.70 **Remaining Budget Amount:** \$75,256.30
- **Completed 2<sup>nd</sup> progress report**

### Task 2 Public Education and Outreach Activities

- Staff planning stakeholder outreach visits to Brazos Bend State Park.
- Staff will be attending the JB Harrison Foundation outreach event (Land Trust in Big Creek) on March 16<sup>th</sup>.
- Planning for first stakeholder meeting in the 3<sup>rd</sup> quarter.

### Task 3 Quality Assurance

- QAPP approved and executed.

**Task 4 Characterization Report**

- Data gathering activities continued
- Staff developing LDC

Thanks,

Steve

Steven Johnston  
Senior Planner  
Community & Environmental Department | Houston-Galveston Area Council  
3555 Timmons, Suite 120 Houston, TX 77027 | [www.h-gac.com](http://www.h-gac.com)  
832.681.2579 | 713.627.3200 | fax: 713.993.4503  
[steven.johnston@h-gac.com](mailto:steven.johnston@h-gac.com)  
<http://h-gac.com/community/water/tmdl/big/default.aspx>

## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Sunday, March 31, 2019 5:16 PM  
**To:** 'Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)'  
**Cc:** 'Jason Leifester (Jason.leifester@tceq.texas.gov)'; Bower, Justin; 'Chris Loft'  
**Subject:** FY 19 WO #2 Weekly Reports (Mar 18 - Mar 22)

Good Afternoon, Earlene – Below you will find the weekly report for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

Mar 18<sup>th</sup> – Mar. 22<sup>nd</sup>:

### **Task 1** Project Administration

- ***Anticipate Spend Down August 2019?:*** Yes.
- ***Is spending by categories going as expected?:*** Yes at this time.
- ***Last Invoice:*** N/A.
- ***Original Budget Amount:*** \$85,000
- ***Total Spent to Date: (February 28, 2019)*** \$12,797.71 ***Remaining Budget Amount:*** \$72,202.29

### **Task 2** Public Education and Outreach Activities

- Staff planning stakeholder outreach visits to Brazos Bend State Park.
- Staff will be attending the JB Harrison Foundation outreach event (Land Trust in Big Creek) on April 13<sup>th</sup>. Meeting date was changed.
- Planning for first stakeholder meeting in the 3<sup>rd</sup> quarter.

### **Task 3** Quality Assurance

- QAPP approved and executed.

### **Task 4** Characterization Report

- Data gathering activities continued
- Staff developing LDC

Thanks,

Steve

Steven Johnston  
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832.681.2579 | 713.627.3200 | fax: 713.993.4503  
[steven.johnston@h-gac.com](mailto:steven.johnston@h-gac.com)  
<http://h-gac.com/community/water/tmdl/big/default.aspx>



## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Tuesday, April 23, 2019 4:14 PM  
**To:** 'Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)'  
**Cc:** 'Jason Leifester (Jason.leifester@tceq.texas.gov)'; Bower, Justin; 'Chris Loft'  
**Subject:** RE: FY 19 WO #2 Weekly Reports (Mar 25 - Mar 29) and (Apr 1 - Apr 5)

Good Afternoon, Earlene – Below you will find the weekly report for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

### Mar 25<sup>th</sup> – Mar. 29<sup>th</sup>:

#### **Task 1** Project Administration

- ***Anticipate Spend Down August 2019?:*** Yes.
- ***Is spending by categories going as expected?:*** Yes at this time.
- ***Last Invoice:*** N/A.
- ***Original Budget Amount:*** \$85,000
- ***Total Spent to Date: (March 31, 2019)*** \$16,228.27 ***Remaining Budget Amount:*** \$68,771.73

#### **Task 2** Public Education and Outreach Activities

- Staff scheduling stakeholder outreach visit with Brazos Bend State Park.
- Staff will be attending the JB Harrison Foundation outreach event (Land Trust in Big Creek) on April 13<sup>th</sup>.
- Planning for first stakeholder meeting May/June.

#### **Task 3** Quality Assurance

- QAPP approved and executed.

#### **Task 4** Characterization Report

- Data gathering activities continued
- Staff developing LDC
- Began writing text

### Apr 1<sup>st</sup> – Apr. 5<sup>th</sup>:

#### **Task 1** Project Administration

- ***Anticipate Spend Down August 2019?:*** Yes.
- ***Is spending by categories going as expected?:*** Yes at this time.
- ***Last Invoice:*** N/A.
- ***Original Budget Amount:*** \$85,000
- ***Total Spent to Date: (March 31, 2019)*** \$16,228.27 ***Remaining Budget Amount:*** \$68,771.73

#### **Task 2** Public Education and Outreach Activities

- Staff scheduling stakeholder outreach visit with Brazos Bend State Park.
- Staff will be attending the JB Harrison Foundation outreach event (Land Trust in Big Creek) on April 13<sup>th</sup>.
- Planning for first stakeholder meeting May/June.

#### **Task 3** Quality Assurance

- QAPP approved and executed.

**Task 4 Characterization Report**

- Data gathering activities continued
- Staff developing LDC
- Writing text

Thanks,

Steve

Steven Johnston  
Senior Planner  
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[steven.johnston@h-gac.com](mailto:steven.johnston@h-gac.com)  
<http://h-gac.com/community/water/tmdl/big/default.aspx>

## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Sunday, May 5, 2019 3:10 PM  
**To:** 'Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)'  
**Cc:** 'Jason Leifester (Jason.leifester@tceq.texas.gov)'; Bower, Justin; 'Chris Loft'  
**Subject:** FY 19 WO #2 Weekly Reports (Apr 8 - Apr 12) and (Apr 15 - Apr 19)

Good Afternoon, Earlene – Below you will find the weekly report for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

### Apr 8<sup>th</sup> – Apr. 12<sup>th</sup>:

#### **Task 1** Project Administration

- ***Anticipate Spend Down August 2019?:*** Yes.
- ***Is spending by categories going as expected?:*** Yes at this time.
- ***Last Invoice:*** N/A.
- ***Original Budget Amount:*** \$85,000
- ***Total Spent to Date: (March 31, 2019)*** \$16,228.27 ***Remaining Budget Amount:*** \$68,771.73

#### **Task 2** Public Education and Outreach Activities

- Staff scheduling stakeholder outreach visit with Brazos Bend State Park.
- Staff will be attending the JB Harrison Foundation outreach event (Land Trust in Big Creek) on April 13<sup>th</sup>.
- Planning for first stakeholder meeting May or June.

#### **Task 3** Quality Assurance

- QAPP approved and executed.

#### **Task 4** Characterization Report

- Data gathering activities continued
- Staff developing LDC
- Writing text

### Apr 15<sup>th</sup> – Apr. 19<sup>th</sup>:

#### **Task 1** Project Administration

- ***Anticipate Spend Down August 2019?:*** Yes.
- ***Is spending by categories going as expected?:*** Yes at this time.
- ***Last Invoice:*** N/A.
- ***Original Budget Amount:*** \$85,000
- ***Total Spent to Date: (March 31, 2019)*** \$16,228.27 ***Remaining Budget Amount:*** \$68,771.73

#### **Task 2** Public Education and Outreach Activities

- Planning for first stakeholder meeting May or June.

#### **Task 3** Quality Assurance

- QAPP approved and executed.

#### **Task 4** Characterization Report

- Data gathering activities wrapping up.
- Staff developing LDC

- Writing text

Thanks,

Steve

Steven Johnston  
Senior Planner  
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[steven.johnston@h-gac.com](mailto:steven.johnston@h-gac.com)  
<http://h-gac.com/community/water/tmdl/big/default.aspx>

## Johnston, Steven

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**From:** Johnston, Steven  
**Sent:** Sunday, May 19, 2019 5:23 PM  
**To:** 'Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)'  
**Cc:** 'Jason Leifester (Jason.leifester@tceq.texas.gov)'; Bower, Justin; 'Chris Loft'  
**Subject:** FY 19 WO #2 Weekly Reports (Apr 22 - Apr 26) and (Apr 29 - May 3)

Good Afternoon, Earlene – Below you will find the weekly reports for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

### Apr 22<sup>nd</sup> – Apr. 26<sup>th</sup>:

#### Task 1 Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (March 31, 2019)** \$16,228.27 **Remaining Budget Amount:** \$68,771.73

#### Task 2 Public Education and Outreach Activities

- Planning for first stakeholder meeting May or June.

#### Task 3 Quality Assurance

- QAPP approved and executed.

#### Task 4 Characterization Report

- Data gathering activities wrapping up.
- Staff developing LDC
- Writing text

### Apr 29<sup>th</sup> – May 3<sup>rd</sup>:

#### Task 1 Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (March 31, 2019)** \$16,228.27 **Remaining Budget Amount:** \$68,771.73

#### Task 2 Public Education and Outreach Activities

- Planning for first stakeholder meeting May or June.

#### Task 3 Quality Assurance

- QAPP approved and executed.

#### Task 4 Characterization Report

- Data gathering activities wrapping up.
- Staff developing LDC
- Writing text

Thanks,

Steve

Steven Johnston  
Senior Planner  
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<http://h-gac.com/community/water/tmdl/big/default.aspx>

## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Monday, May 20, 2019 11:33 AM  
**To:** 'Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)'  
**Cc:** 'Jason Leifester (Jason.leifester@tceq.texas.gov)'; Bower, Justin; 'Chris Loft'  
**Subject:** FY 19 WO #2 Weekly Reports (May 6 - May 10) and (May 13 - May 17)

Good Morning, Earlene – Below you will find the weekly reports for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

### May 6<sup>th</sup> – May 10<sup>th</sup>:

#### **Task 1** Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (March 31, 2019)** \$16,228.27 **Remaining Budget Amount:** \$68,771.73

#### **Task 2** Public Education and Outreach Activities

- Planning for first stakeholder meeting May or June. Waiting on completion of LDCs to set a meeting date.

#### **Task 3** Quality Assurance

- QAPP approved and executed.

#### **Task 4** Characterization Report

- Data gathering activities are complete.
- Staff finishing LDCs
- Writing text

### May 13<sup>th</sup> – May 17<sup>th</sup>:

#### **Task 1** Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (March 31, 2019)** \$16,228.27 **Remaining Budget Amount:** \$68,771.73

#### **Task 2** Public Education and Outreach Activities

- Planning for first stakeholder meeting May or June. Waiting on completion of LDCs to set a meeting date.

#### **Task 3** Quality Assurance

- QAPP approved and executed.

#### **Task 4** Characterization Report

- Data gathering activities are complete.
- Staff finishing LDCs
- First draft of text completed

Thanks,

Steve

Steven Johnston  
Senior Planner  
Community & Environmental Department | Houston-Galveston Area Council  
3555 Timmons, Suite 120 Houston, TX 77027 | [www.h-gac.com](http://www.h-gac.com)  
832.681.2579 | 713.627.3200 | fax: 713.993.4503  
[steven.johnston@h-gac.com](mailto:steven.johnston@h-gac.com) |  
<http://h-gac.com/community/water/tmdl/big/default.aspx>

## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Wednesday, June 12, 2019 7:55 AM  
**To:** 'Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)'  
**Cc:** 'Jason Leifester (Jason.leifester@tceq.texas.gov)'; Bower, Justin; 'Chris Loft'  
**Subject:** RE: FY 19 WO #2 Weekly Reports (May 20 - May 24) and (May 27 - May 31)

Good Morning, Earlene – Below you will find the weekly reports for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

### May 20<sup>th</sup> – May 24<sup>th</sup>:

#### Task 1 Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (April 30, 2019)** \$20,419.16 **Remaining Budget Amount:** \$64,850.84

#### Task 2 Public Education and Outreach Activities

- Planning for first stakeholder meeting May or June. Waiting on completion of LDCs to set a meeting date.

#### Task 3 Quality Assurance

- QAPP approved and executed.

#### Task 4 Characterization Report

- Data gathering activities are complete.
- Staff finishing LDCs
- First draft of text completed

### May 27<sup>th</sup> – May 31<sup>st</sup>:

#### Task 1 Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (April 30, 2019)** \$20,419.16 **Remaining Budget Amount:** \$64,850.84

#### Task 2 Public Education and Outreach Activities

- Planning for first stakeholder meeting in June.

#### Task 3 Quality Assurance

- QAPP approved and executed.

#### Task 4 Characterization Report

- Data gathering activities are complete.
- LDCs are completed
- First draft of text completed, adjusting document to incorporate the LDCs.

Thanks,

Steve

Steven Johnston  
Senior Planner  
Community & Environmental Department | Houston-Galveston Area Council  
3555 Timmons, Suite 120 Houston, TX 77027 | [www.h-gac.com](http://www.h-gac.com)  
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[steven.johnston@h-gac.com](mailto:steven.johnston@h-gac.com)  
<http://h-gac.com/community/water/tmdl/big/default.aspx>



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**Houston-Galveston Area Council**

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July 17, 2019

Earlene Lambeth (MC 203)  
TMDL Project Manager  
Water Quality Division  
Texas Commission on Environmental Quality  
12100 Park 35 Circle, Bldg. F  
Austin, Texas 78753

RE: July 2019 Progress Report for Contract 582-18-81222, Work Order 2.

Dear Ms. Lambeth:

Enclosed is one (1) copy of the FY 2019 4<sup>th</sup> Progress Report for Contract No. 582-18-81222-02. It covers all deliverable/task activities for the project period June 1, 2019 through June 30, 2019. Financial Statements, HUB report and Voucher will be submitted separately.

Included in this Report are:

1. One copy of the quarterly progress report for June 1, 2019 thru June 30, 2019.
2. Copies of meeting summaries and other pertinent materials from project related meetings.

We hope you find the quarterly report satisfactory. Any comments you have will be appreciated. If you have any questions, please contact me by phone (713-993-4549) or E-mail ([todd.running@h-gac.com](mailto:todd.running@h-gac.com)).

Sincerely,

Todd Running  
Water Resources Program Manager  
Community & Environmental Planning Dept.

CC Jason Leifester  
Chris Loft  
Justin Bower

TR/srj  
Enclosures



**TMDL Program**  
**FY 2019 Progress Report #4**  
**Time Period Covered: 6/01/2019 – 6/30/2019**  
**Name of Project: Watershed Characterization for Big Creek**  
**Contract No./Work Order 582-18-81222-02**

**Date: July 17, 2019**

**TASK #1. PROJECT ADMINISTRATION**

<b>Deliverable(s)</b>	<b>Due Date</b>	<b>Status</b>
List all deliverables under the task described above	List the due dates for each deliverable	If the deliverable has been completed, enter the date submitted to the TCEQ. If the deliverable has not been completed, briefly describe the status of each deliverable.
Monthly Progress Report	July 15, 2019	Monthly report for Work Order submitted an electronic copy on July 17, 2019
Invoice	July 15, 2019	Invoices will be submitted under another cover.
Weekly Reports	Weekly	Provided as an attachment.

**Work Performed This Period – detail all activities for this task and briefly describe the progress on each deliverable:**

Work performed for this task during this period included writing and assembling the monthly report. Copies of weekly emails are attached.

**TASK #2. PUBLIC EDUCATION AND OUTREACH**

<b>Deliverable(s)</b>	<b>Due Date</b>	<b>Status</b>
List all deliverables under the task described above	List the due dates for each deliverable	If the deliverable has been completed, enter the date submitted to the TCEQ. If the deliverable has not been completed, briefly describe the status of each deliverable.
Development of meeting materials (Task 2.1)	Draft meeting materials will be sent to the TCEQ Project Manager at least two weeks prior to distribution for each meeting	No meetings held this month.
Host two, and up to four total, watershed stakeholder meetings (Task 2.2)	As needed	No meetings held this month.
Summary of meetings (Task 2.3)	Within 2 weeks after meetings	No updates needed.
List of general stakeholders (Task 2.4)	With PRs	No updates at this time.
Facilitate delivery of education programs (Task 2.5)	As needed	No updates at this time.
Public participation/outreach summaries (Task 2)	With PRs	No updates at this time.

**Work Performed This Period – detail all activities for this task and briefly describe the progress on each deliverable:**

No meetings related to this task were initiated or held during the report period. Staff continued to contact stakeholders to seek assistance with the characterization report. Staff in the initial stages for determining a meeting location and a date. Foresee the first stakeholder meeting in July.

### TASK #3 EXISTING DATA QAPP

<b>Deliverable(s)</b>	<b>Due Date</b>	<b>Status</b>
List all deliverables under the task described above	List the due dates for each deliverable	If the deliverable has been completed, enter the date submitted to the TCEQ. If the deliverable has not been completed, briefly describe the status of each deliverable.
Draft Acquired Data QAPP (3.1)	45 days after issuance of notice to proceed.	Provided October 31, 2018.
Final QAPP (3.2)	Two weeks after receipt of TCEQ comments	Final QAPP approved November 30, 2018.
QAPP amendments (Task 3.3)	As needed	No update needed.
QAPP Annual Update	Annually, as needed.	No update needed.
QAPP CARs (Task 3.5)	As needed	No CARs required.
Quality assurance audits (Task 3.6)	Will participate as needed	No audits performed.

#### Work Performed This Period

QAPP was approved on November 30, 2018. H-GAC initiated work under the QAPP after its final approval.

### TASK #4 WATERSHED CHARACTERIZATION REPORT

<b>Deliverable(s)</b>	<b>Due Date</b>	<b>Status</b>
List all deliverables under the task described above	List the due dates for each deliverable	If the deliverable has been completed, enter the date submitted to the TCEQ. If the deliverable has not been completed, briefly describe the status of each deliverable.
Draft Report (Task 4.1)	July 15, 2019	Draft report finished and under review.
Final TSD (Task 4.2)	Two weeks after receipt of TCEQ comments	

#### Work Performed This Period – detail all activities for this task and briefly describe the progress on each deliverable:

The draft characterization report has been finished. The document is under review. Anticipate potential changes following the first stakeholder meeting scheduled for July 11, 2019. Staff will incorporate any changes and the document should be submitted around the July 15, 2019 deadline.

### PROJECT RELATED MEETINGS, WORKSHOPS, TRAINING OR EVENTS

- 1) Presentations:
  - a. No presentations were given during the quarter on the project.
- 2) Meetings, Events and Conferences:
  - a. Staff attended the following meetings at which they represented the project or received information relevant to the project
    - i. Galveston Bay Estuary Program Water and Sediment Quality subcommittee (as vice-chair), 6/20/19
- 3) Associated Implementation Projects and Programs
  - a. No associated implementation has been carried out in the project area.

**BRIEF DESCRIPTION OF OVERALL FINDINGS:**

H-GAC completed text for the draft characterization report. Draft is under review. Staff expects to adjust the document should any comments or information result from the July 11, 2019 stakeholder meeting.

**Significant Problems (describe any scheduling shortfalls, detail significant problems and how these problems were resolved, etc.):**

No problems were encountered this quarter.



## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Wednesday, June 12, 2019 7:59 AM  
**To:** 'Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)'  
**Cc:** 'Jason Leifester (Jason.leifester@tceq.texas.gov)'; Bower, Justin; 'Chris Loft'  
**Subject:** FY 19 WO #2 Weekly Report (June 3 - June 7)

Good Morning, Earlene – Below you will find the weekly report for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

June 3<sup>rd</sup> – June 7<sup>th</sup>:

**Task 1** Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (May 31, 2019)** \$33,695.11 **Remaining Budget Amount:** \$51,304.89

**Task 2** Public Education and Outreach Activities

- Planning for first stakeholder meeting in June.

**Task 3** Quality Assurance

- QAPP approved and executed.

**Task 4** Characterization Report

- Finalizing first draft in preparation to send to TCEQ PM.

Thanks,

Steve

Steven Johnston  
Senior Planner  
Community & Environmental Department | Houston-Galveston Area Council  
3555 Timmons, Suite 120 Houston, TX 77027 | [www.h-gac.com](http://www.h-gac.com)  
832.681.2579 | 713.627.3200 | fax: 713.993.4503  
[steven.johnston@h-gac.com](mailto:steven.johnston@h-gac.com)  
<http://h-gac.com/community/water/tmdl/big/default.aspx>



## Johnston, Steven

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**From:** Johnston, Steven  
**Sent:** Saturday, June 22, 2019 12:11 PM  
**To:** 'Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)'  
**Cc:** 'Jason Leifester (Jason.leifester@tceq.texas.gov)'; Bower, Justin; 'Chris Loft'  
**Subject:** RE: FY 19 WO #2 Weekly Report (June 10 - June 14) and (June 17 - June 21)

Sorry, I had to fix the dates as I was using July dates -

---

**From:** Johnston, Steven  
**Sent:** Saturday, June 22, 2019 12:08 PM  
**To:** 'Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)' <Earlene.lambeth@tceq.texas.gov>  
**Cc:** 'Jason Leifester (Jason.leifester@tceq.texas.gov)' <Jason.leifester@tceq.texas.gov>; Bower, Justin <Justin.Bower@h-gac.com>; 'Chris Loft' <Chris.Loft@tceq.texas.gov>  
**Subject:** FY 19 WO #2 Weekly Report (June 10 - June 14) and (June 17 - June 21)

Good Afternoon, Earlene – Below you will find the weekly reports for Work Order #2 under 582-18-81222. I will be out on vacation from June 29 – July 2. Please let me know if you have any questions.

### June 10<sup>th</sup> – June 14<sup>th</sup>:

#### **Task 1** Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (May 31, 2019) \$33,695.11 Remaining Budget Amount: \$51,304.89**
- Submitted 3<sup>rd</sup> Progress Report on June 13<sup>th</sup>.

#### **Task 2** Public Education and Outreach Activities

- Scheduling a meeting with Brazos Bend State Park.

#### **Task 3** Quality Assurance

- QAPP approved and executed.

#### **Task 4** Characterization Report

- Finalizing first draft in preparation to send to TCEQ PM.

### June 17<sup>th</sup> – June 21<sup>st</sup>:

#### **Task 1** Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (May 31, 2019) \$33,695.11 Remaining Budget Amount: \$51,304.89**

#### **Task 2** Public Education and Outreach Activities

- Met with Brazos Bend State Park on June 19<sup>th</sup>.

- Working to schedule a stakeholder meeting in July. Coordinating with TCEQ PM.

**Task 3** Quality Assurance

- QAPP approved and executed.

**Task 4** Characterization Report

- Finalizing first draft in preparation to send to TCEQ PM.

Thanks,

Steve

Steven Johnston  
Senior Planner  
Community & Environmental Department | Houston-Galveston Area Council  
3555 Timmons, Suite 120 Houston, TX 77027 | [www.h-gac.com](http://www.h-gac.com)  
832.681.2579 | 713.627.3200 | fax: 713.993.4503  
[steven.johnston@h-gac.com](mailto:steven.johnston@h-gac.com)  
<http://h-gac.com/community/water/tmdl/big/default.aspx>

## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Sunday, July 7, 2019 5:06 PM  
**To:** 'Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)'  
**Cc:** 'Jason Leifester (Jason.leifester@tceq.texas.gov)'; Bower, Justin; 'Chris Loft'  
**Subject:** FY 19 WO #2 Weekly Report (June 24 - June 28) and (July 1 - July 5)

Good Afternoon, Earlene – Below you will find the weekly reports for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

### June 24<sup>th</sup> – June 28<sup>th</sup>:

#### **Task 1** Project Administration

- ***Anticipate Spend Down August 2019?:*** Yes.
- ***Is spending by categories going as expected?:*** Yes at this time.
- ***Last Invoice:*** N/A.
- ***Original Budget Amount:*** \$85,000
- ***Total Spent to Date: (May 31, 2019)*** \$33,695.11 ***Remaining Budget Amount:*** \$51,304.89

#### **Task 2** Public Education and Outreach Activities

- Schedule a stakeholder meeting for July 11, 2019.

#### **Task 3** Quality Assurance

- QAPP approved and executed.

#### **Task 4** Characterization Report

- Finalizing first draft in preparation to send to TCEQ PM.

### July 1<sup>st</sup> – July 5<sup>th</sup>:

#### **Task 1** Project Administration

- ***Anticipate Spend Down August 2019?:*** Yes.
- ***Is spending by categories going as expected?:*** Yes at this time.
- ***Last Invoice:*** N/A.
- ***Original Budget Amount:*** \$85,000
- ***Total Spent to Date: (May 31, 2019)*** \$33,695.11 ***Remaining Budget Amount:*** \$51,304.89

#### **Task 2** Public Education and Outreach Activities

- Schedule a stakeholder meeting for July 11, 2019.

#### **Task 3** Quality Assurance

- QAPP approved and executed.

#### **Task 4** Characterization Report

Finalizing first draft in preparation to send to TCEQ PM.

Thanks,

Steve

Steven Johnston  
Senior Planner  
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832.681.2579 | 713.627.3200 | fax: 713.993.4503  
[steven.johnston@h-gac.com](mailto:steven.johnston@h-gac.com)  
<http://h-gac.com/community/water/tmdl/big/default.aspx>



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**Houston-Galveston Area Council**

---

August 15, 2019

Earlene Lambeth (MC 203)  
TMDL Project Manager  
Water Quality Division  
Texas Commission on Environmental Quality  
12100 Park 35 Circle, Bldg. F  
Austin, Texas 78753

RE: August 2019 Progress Report for Contract 582-18-81222, Work Order 2.

Dear Ms. Lambeth:

Enclosed is one (1) copy of the FY 2019 5<sup>th</sup> Progress Report for Contract No. 582-18-81222-02. It covers all deliverable/task activities for the project period July 1, 2019 through July 31, 2019. Financial Statements, HUB report and Voucher will be submitted separately.

Included in this Report are:

1. One copy of the quarterly progress report for July 1, 2019 thru July 31, 2019.
2. Copies of meeting summaries and other pertinent materials from project related meetings.

We hope you find the quarterly report satisfactory. Any comments you have will be appreciated. If you have any questions, please contact me by phone (713-993-4549) or E-mail ([todd.running@h-gac.com](mailto:todd.running@h-gac.com)).

Sincerely,

Todd Running  
Water Resources Program Manager  
Community & Environmental Planning Dept.

CC Jason Leifester  
Chris Loft  
Justin Bower

TR/stj  
Enclosures



**TMDL Program****Date: August 15, 2019****FY 2019 Progress Report #5****Time Period Covered: 7/01/2019 – 7/31/2019****Name of Project: Watershed Characterization for Big Creek****Contract No./Work Order 582-18-81222-02****TASK #1. PROJECT ADMINISTRATION**

<b>Deliverable(s)</b>	<b>Due Date</b>	<b>Status</b>
List all deliverables under the task described above	List the due dates for each deliverable	If the deliverable has been completed, enter the date submitted to the TCEQ. If the deliverable has not been completed, briefly describe the status of each deliverable.
Monthly Progress Report	August 15, 2019	Monthly report for Work Order submitted an electronic copy on August 15, 2019
Invoice	August 15, 2019	Invoices will be submitted under another cover.
Weekly Reports	Weekly	Provided as an attachment.

**Work Performed This Period – detail all activities for this task and briefly describe the progress on each deliverable:**

Work performed for this task during this period included writing and assembling the monthly report. Copies of weekly emails are attached.

**TASK #2. PUBLIC EDUCATION AND OUTREACH**

<b>Deliverable(s)</b>	<b>Due Date</b>	<b>Status</b>
List all deliverables under the task described above	List the due dates for each deliverable	If the deliverable has been completed, enter the date submitted to the TCEQ. If the deliverable has not been completed, briefly describe the status of each deliverable.
Development of meeting materials (Task 2.1)	Draft meeting materials will be sent to the TCEQ Project Manager at least two weeks prior to distribution for each meeting	The first BIG Creek stakeholder meeting was held on July 11, 2019. Meeting materials were sent to TCEQ PM for review on July 9, 2019.
Host two, and up to four total, watershed stakeholder meetings (Task 2.2)	As needed	<ul style="list-style-type: none"> <li>• July 11, 2019 – first stakeholder meeting held.</li> <li>• August 28, 2019 – second stakeholder meeting is scheduled.</li> </ul>
Summary of meetings (Task 2.3)	Within 2 weeks after meetings	A summary was provided with the weekly reports. Attendance sheet was attached to the report. A full meeting summary will be provided to the TCEQ PM in August.
List of general stakeholders (Task 2.4)	With PRs	No updates at this time.
Facilitate delivery of education programs (Task 2.5)	As needed	No updates at this time.
Public participation/outreach summaries (Task 2)	With PRs	No updates at this time.

Work Performed This Period – detail all activities for this task and briefly describe the progress on each deliverable:

H-GAC contacted the BIG Creek stakeholders in June to announce the first stakeholder meeting set for July 11, 2019. H-GAC prepared for the meeting and provided an agenda and presentation for the TCEQ PM to review. Final meeting reminders were sent out in July prior to the meeting.

July 11, 2019 – Stakeholder meeting was held at the George Memoria Library in Richmond. Nineteen stakeholders were in attendance. H-GAC presented on data used to characterize the Big Creek watershed. H-GAC reviewed water quality data and potential sources with the attendees. Watershed planning and the TMDL process was discussed.

### TASK #3 EXISTING DATA QAPP

<b>Deliverable(s)</b>	<b>Due Date</b>	<b>Status</b>
List all deliverables under the task described above	List the due dates for each deliverable	If the deliverable has been completed, enter the date submitted to the TCEQ. If the deliverable has not been completed, briefly describe the status of each deliverable.
Draft Acquired Data QAPP (3.1)	45 days after issuance of notice to proceed.	Provided October 31, 2018.
Final QAPP (3.2)	Two weeks after receipt of TCEQ comments	Final QAPP approved November 30, 2018.
QAPP amendments (Task 3.3)	As needed	No update needed.
QAPP Annual Update	Annually, as needed.	No update needed.
QAPP CARs (Task 3.5)	As needed	No CARs required.
Quality assurance audits (Task 3.6)	Will participate as needed	No audits performed.

#### Work Performed This Period

QAPP was approved on November 30, 2018.

### TASK #4 WATERSHED CHARACTERIZATION REPORT

<b>Deliverable(s)</b>	<b>Due Date</b>	<b>Status</b>
List all deliverables under the task described above	List the due dates for each deliverable	If the deliverable has been completed, enter the date submitted to the TCEQ. If the deliverable has not been completed, briefly describe the status of each deliverable.
Draft Report (Task 4.1)	July 15, 2019	Draft report finished and under review. Expect to deliver in August.
Final TSD (Task 4.2)	Two weeks after receipt of TCEQ comments	

#### Work Performed This Period – detail all activities for this task and briefly describe the progress on each deliverable:

The draft characterization report has been finished. Staff are wrapping up final changes to the document and will be submitting to the TCEQ in August.

### PROJECT RELATED MEETINGS, WORKSHOPS, TRAINING OR EVENTS

- 1) Presentations:
  - a. No presentations were given during this report period.
- 2) Meetings, Events and Conferences:
  - a. No associated meetings were attended during this report period.
- 3) Associated Implementation Projects and Programs
  - a. No associated implementation has been carried out in the project area.

**BRIEF DESCRIPTION OF OVERALL FINDINGS:**

H-GAC completed text for the draft characterization report. Document is under review and staff expects to report to be delivered in August.

**Significant Problems (describe any scheduling shortfalls, detail significant problems and how these problems were resolved, etc.):**

No problems were encountered this quarter.



## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Sunday, July 7, 2019 5:06 PM  
**To:** 'Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)'  
**Cc:** 'Jason Leifester (Jason.leifester@tceq.texas.gov)'; Bower, Justin; 'Chris Loft'  
**Subject:** FY 19 WO #2 Weekly Report (June 24 - June 28) and (July 1 - July 5)

Good Afternoon, Earlene – Below you will find the weekly reports for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

### June 24<sup>th</sup> – June 28<sup>th</sup>:

#### **Task 1** Project Administration

- ***Anticipate Spend Down August 2019?:*** Yes.
- ***Is spending by categories going as expected?:*** Yes at this time.
- ***Last Invoice:*** N/A.
- ***Original Budget Amount:*** \$85,000
- ***Total Spent to Date: (May 31, 2019)*** \$33,695.11 ***Remaining Budget Amount:*** \$51,304.89

#### **Task 2** Public Education and Outreach Activities

- Schedule a stakeholder meeting for July 11, 2019.

#### **Task 3** Quality Assurance

- QAPP approved and executed.

#### **Task 4** Characterization Report

- Finalizing first draft in preparation to send to TCEQ PM.

### July 1<sup>st</sup> – July 5<sup>th</sup>:

#### **Task 1** Project Administration

- ***Anticipate Spend Down August 2019?:*** Yes.
- ***Is spending by categories going as expected?:*** Yes at this time.
- ***Last Invoice:*** N/A.
- ***Original Budget Amount:*** \$85,000
- ***Total Spent to Date: (May 31, 2019)*** \$33,695.11 ***Remaining Budget Amount:*** \$51,304.89

#### **Task 2** Public Education and Outreach Activities

- Schedule a stakeholder meeting for July 11, 2019.

#### **Task 3** Quality Assurance

- QAPP approved and executed.

#### **Task 4** Characterization Report

Finalizing first draft in preparation to send to TCEQ PM.

Thanks,

Steve

Steven Johnston  
Senior Planner  
Community & Environmental Department | Houston-Galveston Area Council  
3555 Timmons, Suite 120 Houston, TX 77027 | [www.h-gac.com](http://www.h-gac.com)  
832.681.2579 | 713.627.3200 | fax: 713.993.4503  
[steven.johnston@h-gac.com](mailto:steven.johnston@h-gac.com)  
<http://h-gac.com/community/water/tmdl/big/default.aspx>

## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Wednesday, July 17, 2019 10:28 PM  
**To:** 'Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)'  
**Cc:** 'Jason Leifester (Jason.leifester@tceq.texas.gov)'; Bower, Justin; 'Chris Loft'  
**Subject:** FY 19 WO #2 Weekly Report (July 8 - July 12)  
**Attachments:** PR4\_July2019.pdf

Good Evening, Earlene – Below you will find the weekly report for Work Order #2 under 582-18-81222. I have attached PR4 for your review. Please let me know if you have any questions.

### July 8<sup>th</sup> – July 12<sup>th</sup>:

#### **Task 1** Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (May 31, 2019)** \$49,959.24 **Remaining Budget Amount:** \$35,040.76

#### **Task 2** Public Education and Outreach Activities

- July 11, 2019 – Stakeholder meeting was held at the George Memoria Library in Richmond. Nineteen stakeholders were in attendance. H-GAC presented on data used to characterize the Big Creek watershed. H-GAC reviewed water quality data and potential sources with the attendees. Watershed planning and the TMDL process was discussed.

#### **Task 3** Quality Assurance

- QAPP approved and executed.

#### **Task 4** Characterization Report

- Finalizing first draft in preparation to send to TCEQ PM.

Thanks,

Steve

Steven Johnston  
Senior Planner  
Community & Environmental Department | Houston-Galveston Area Council  
3555 Timmons, Suite 120 Houston, TX 77027 | [www.h-gac.com](http://www.h-gac.com)  
832.681.2579 | 713.627.3200 | fax: 713.993.4503  
[steven.johnston@h-gac.com](mailto:steven.johnston@h-gac.com)  
<http://h-gac.com/community/water/tmdl/big/default.aspx>



## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Sunday, July 21, 2019 3:03 PM  
**To:** 'Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)'  
**Cc:** 'Jason Leifester (Jason.leifester@tceq.texas.gov)'; Bower, Justin; 'Chris Loft'  
**Subject:** FY 19 WO #2 Weekly Report (July 15 - July 19)

Good Afternoon, Earlene – Below you will find the weekly report for Work Order #2 under 582-18-81222. I have attached PR4 for your review. Please let me know if you have any questions.

### July 15<sup>th</sup> – July 19<sup>th</sup>:

#### **Task 1** Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (May 31, 2019)** \$49,959.24 **Remaining Budget Amount:** \$35,040.76
- Prepared and submitted PR4, for June 1, 2019 to June 30, 2019

#### **Task 2** Public Education and Outreach Activities

- No outreach activities conducted.

#### **Task 3** Quality Assurance

- QAPP approved and executed.

#### **Task 4** Characterization Report

- Finalizing first draft in preparation to send to TCEQ PM.

Thanks,

Steve

Steven Johnston  
Senior Planner  
Community & Environmental Department | Houston-Galveston Area Council  
3555 Timmons, Suite 120 Houston, TX 77027 | [www.h-gac.com](http://www.h-gac.com)  
832.681.2579 | 713.627.3200 | fax: 713.993.4503  
[steven.johnston@h-gac.com](mailto:steven.johnston@h-gac.com)  
<http://h-gac.com/community/water/tmdl/big/default.aspx>



## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Wednesday, July 31, 2019 5:38 PM  
**To:** 'Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)'  
**Cc:** 'Jason Leifester (Jason.leifester@tceq.texas.gov)'; Bower, Justin; 'Chris Loft'  
**Subject:** FY 19 WO #2 Weekly Report (July 22 - July 26)

Good Afternoon, Earlene – Below you will find the weekly report for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

July 22<sup>nd</sup> – July 26<sup>th</sup>:

**Task 1** Project Administration

- ***Anticipate Spend Down August 2019?:*** Yes.
- ***Is spending by categories going as expected?:*** Yes at this time.
- ***Last Invoice:*** N/A.
- ***Original Budget Amount:*** \$85,000
- ***Total Spent to Date: (May 31, 2019)*** \$49,959.24 ***Remaining Budget Amount:*** \$35,040.76

**Task 2** Public Education and Outreach Activities

- No outreach activities conducted.

**Task 3** Quality Assurance

- QAPP approved and executed.

**Task 4** Characterization Report

- Finalizing first draft in preparation to send to TCEQ PM.

Thanks,

Steve

Steven Johnston  
Senior Planner  
Community & Environmental Department | Houston-Galveston Area Council  
3555 Timmons, Suite 120 Houston, TX 77027 | [www.h-gac.com](http://www.h-gac.com)  
832.681.2579 | 713.627.3200 | fax: 713.993.4503  
[steven.johnston@h-gac.com](mailto:steven.johnston@h-gac.com)  
<http://h-gac.com/community/water/tmdl/big/default.aspx>



## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Tuesday, August 13, 2019 5:37 PM  
**To:** 'Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)'  
**Cc:** 'Jason Leifester (Jason.leifester@tceq.texas.gov)'; Bower, Justin; 'Chris Loft'  
**Subject:** FY 19 WO #2 Weekly Report (July 29 - Aug. 2)

Good Afternoon, Earlene – Below you will find the weekly report for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

July 29<sup>th</sup> – Aug. 2<sup>nd</sup>:

### **Task 1** Project Administration

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (May 31, 2019)** \$49,959.24 **Remaining Budget Amount:** \$35,040.76

### **Task 2** Public Education and Outreach Activities

- Working to schedule a stakeholder meeting for late August.

### **Task 3** Quality Assurance

- QAPP approved and executed.

### **Task 4** Characterization Report

- Finalizing first draft in preparation to send to TCEQ PM.

Thanks,

Steve

Steven Johnston  
Senior Planner  
Community & Environmental Department | Houston-Galveston Area Council  
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[steven.johnston@h-gac.com](mailto:steven.johnston@h-gac.com)  
<http://h-gac.com/community/water/tmdl/big/default.aspx>



# Big Creek Watershed Characterization

## Public Information Meeting

George Memorial Library, Room 2C

1001 Golfview Drive, Richmond, TX 77469

July 11, 2019

1:30 – 3:30 p.m.

1:30 **Welcome and Introductions**

1:35 **Big Creek Watershed Overview**

Discussion of water quality issues impacting Big Creek; potential sources of contamination in the watershed; and future challenges.

2:30 **Break**

2:40 **Addressing Water Quality Issues**

Discussion of potential paths forward in addressing water quality issues in the watershed; next steps in the watershed characterization process; and opportunities for stakeholder feedback.

3:15 **Open Discussion**

- Upcoming opportunities and events
- Public feedback

3:30 **Adjournment**

### Contact info:

Justin Bower  
Senior Planner, Community and Environmental Planning  
Houston-Galveston Area Council  
phone: 713-499-6653  
email: [justin.bower@h-gac.com](mailto:justin.bower@h-gac.com)





# Big Creek Watershed Informational Meeting


## June 11, 2019

Name	Organization	Email or phone
Robt Quarles	FIB County	robert.quarles@fibcountytexas.gov
Bruce Bodson	Lower Brazos Riverwatch	bruce.bodson@lowerbrazosi-riverwatch.org
Carol Barrero	FBE COMMUNITY DEV. DEPT.	carol.barrero@fortbendcountytx.gov
Robert Been	NRG Energy	robert.been@nrg.com
Troy Heitschuh	WCA	theitschuh@wcamerica.com
Bairn Kott	TSS WCB	
Jason Castle	TPWD	
Leslie McLuigan	TPADD	leslie.mcluigan@TPADD.Texas.gov
Rigo Lalorain	City of Rosenhorn	ralorain@rosenhorn.tx.gov
Polly Shaver	BIG CREEK LTD Little Dell Polly LTD	polly@shaverworldinvestments.com

# Big Creek Watershed Informational Meeting

## June 11, 2019

Name	Organization	Email or phone
Glenn Jarrett	WetTech (consultant)	glenn@wet-tech.net
Hannah Muegge	The James B Harrison Foundation	hannah@jbrfund.org
Barrett Davis	"	barrett@jbrfund.org
Landon Kuhlman	Fort Bend Sfr	landonk@fortbend.sfr.com
Adam Wright	Fort Bend County	on file
Jennifer Globacki	WCA	jglobacki@wcanerica.com
JEFF STAVEER	FRCBD	jeffrey.jamece@fortbendcountytx.gov
Matt Minor	St. Rep Stephenson	matt.minor@house.texas.gov
Brandon Aluniz	Rep. Stephenson	Brandon.Aluniz@house.texas.gov



# Watershed Characterization of Big Creek, Fort Bend County

Public Meeting, George Memorial Library  
7/11/19



Houston-Galveston  
Area Council

# Agenda

- Project Overview
- Watershed Overview
- Addressing Water Quality
- Open Discussion with Maps



# Project Overview

**Intent** – Support efforts to improve surface water quality in Big Creek, by providing:

- Characterization
  - Hydrology description
  - Water quality data assessment
  - Improvement modeling
  - Potential source survey
- Preliminary Stakeholder outreach



# Project Overview



## Who We Are

- Texas Commission on Environmental Quality – lead state environmental protection agency.

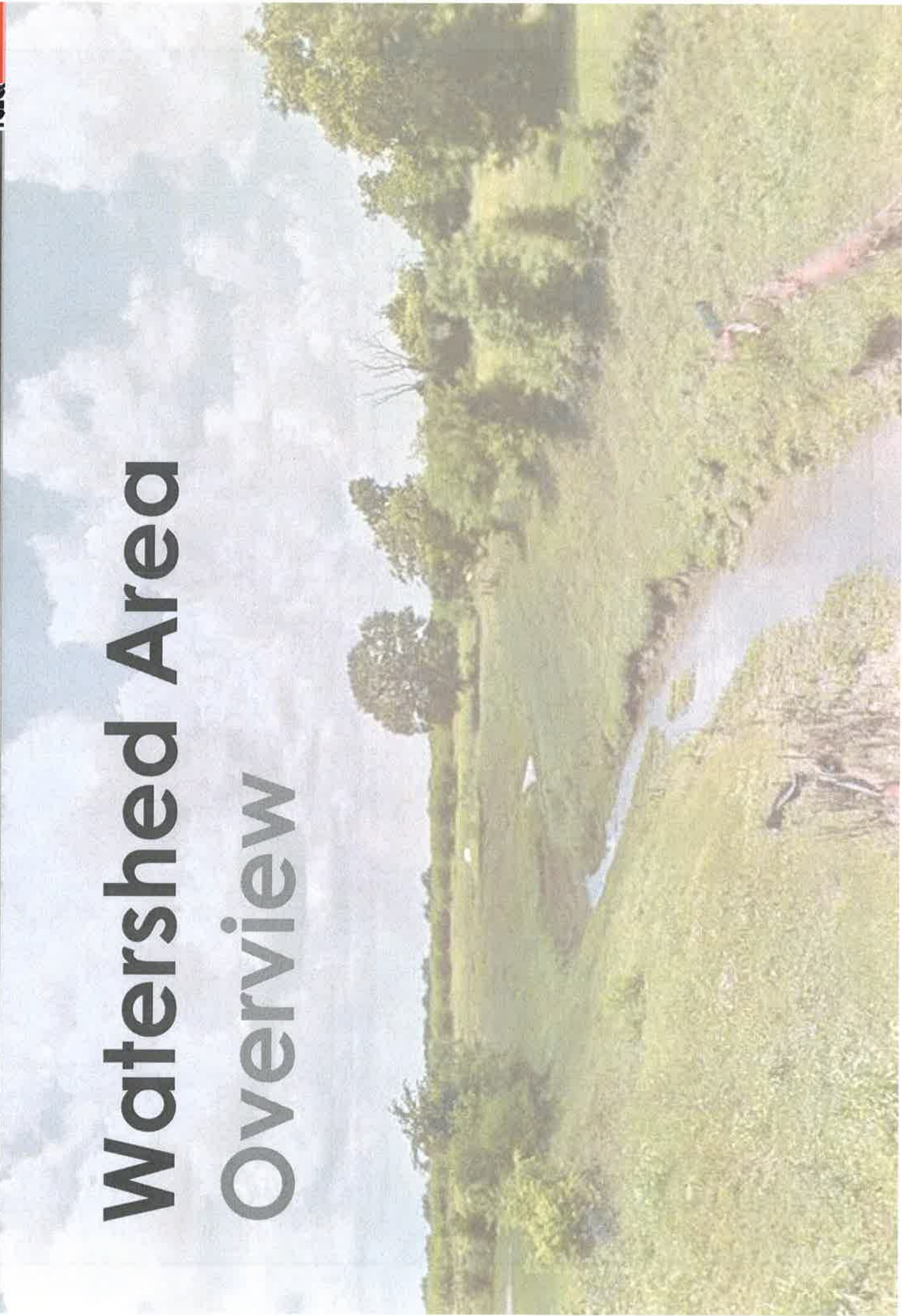
- Houston-Galveston Area Council – Regional Council of Governments

## What This Project is About

- Surface water quality (not water supply, flooding, drinking water, etc.)



# Watershed Area Overview



# The Big Creek Watershed

Fort Bend County

Sugar Land

Brazos River

Thompsons

Brazos Bend

Rosenberg

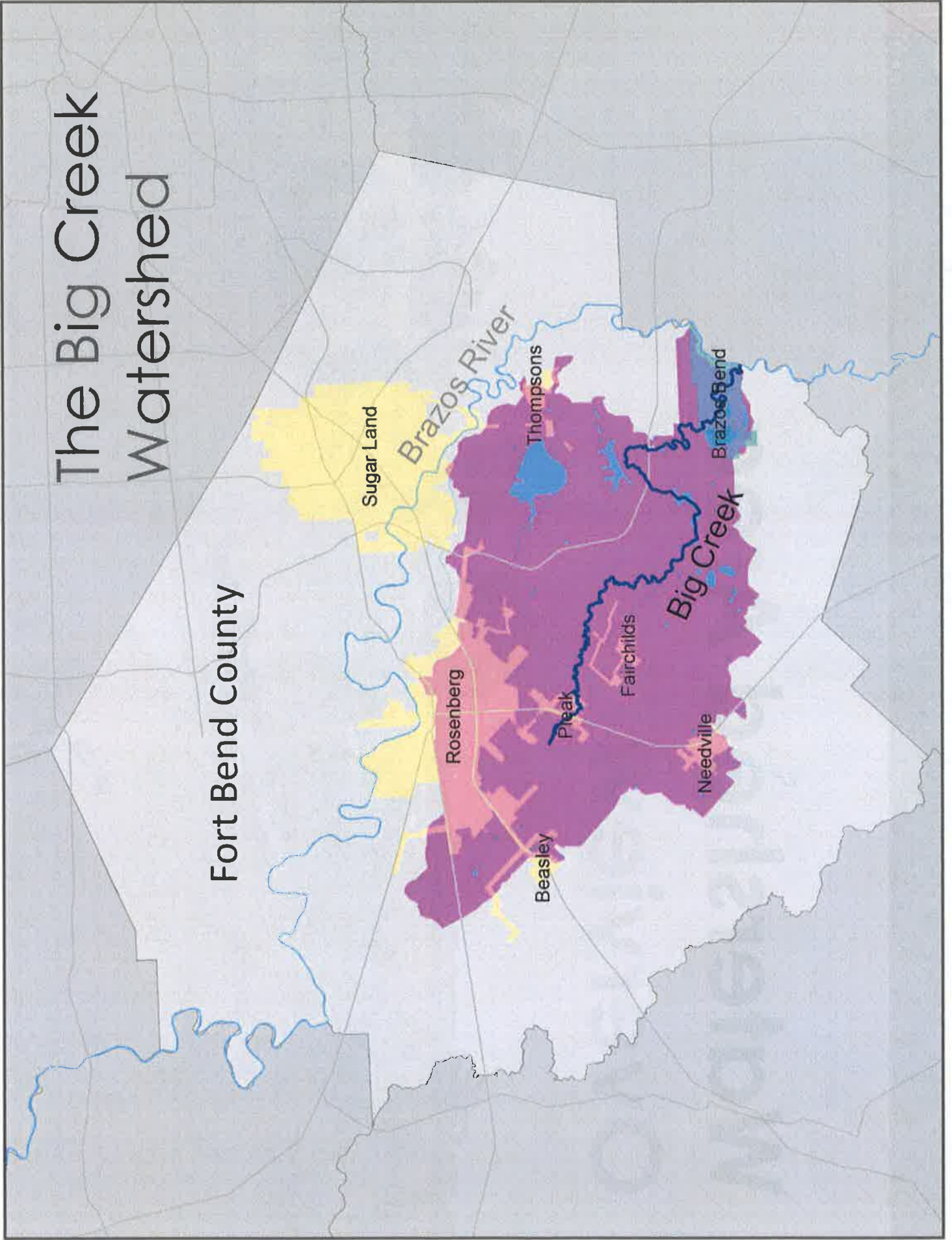
Peak

Fairchilds

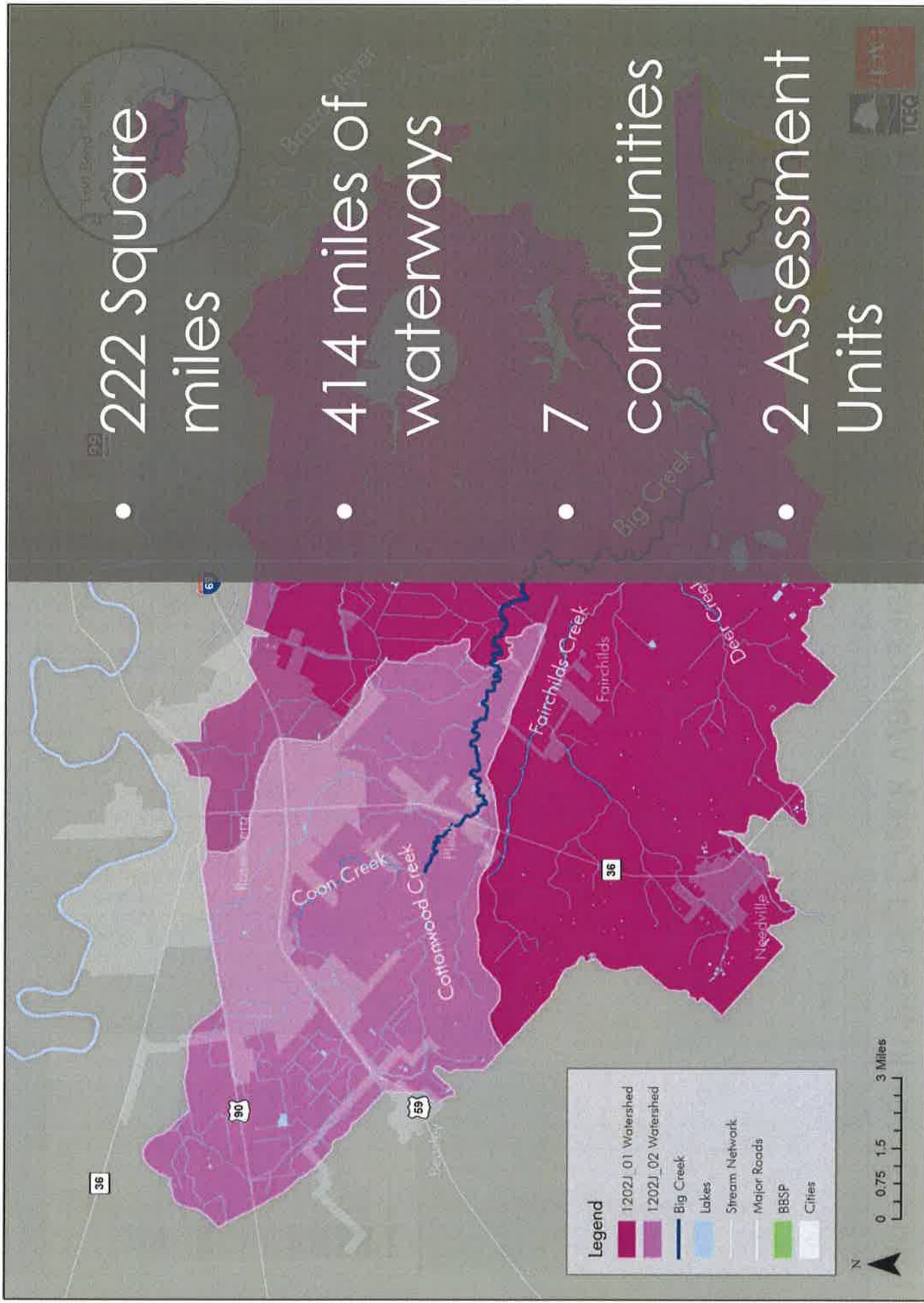
Big Creek

Needville

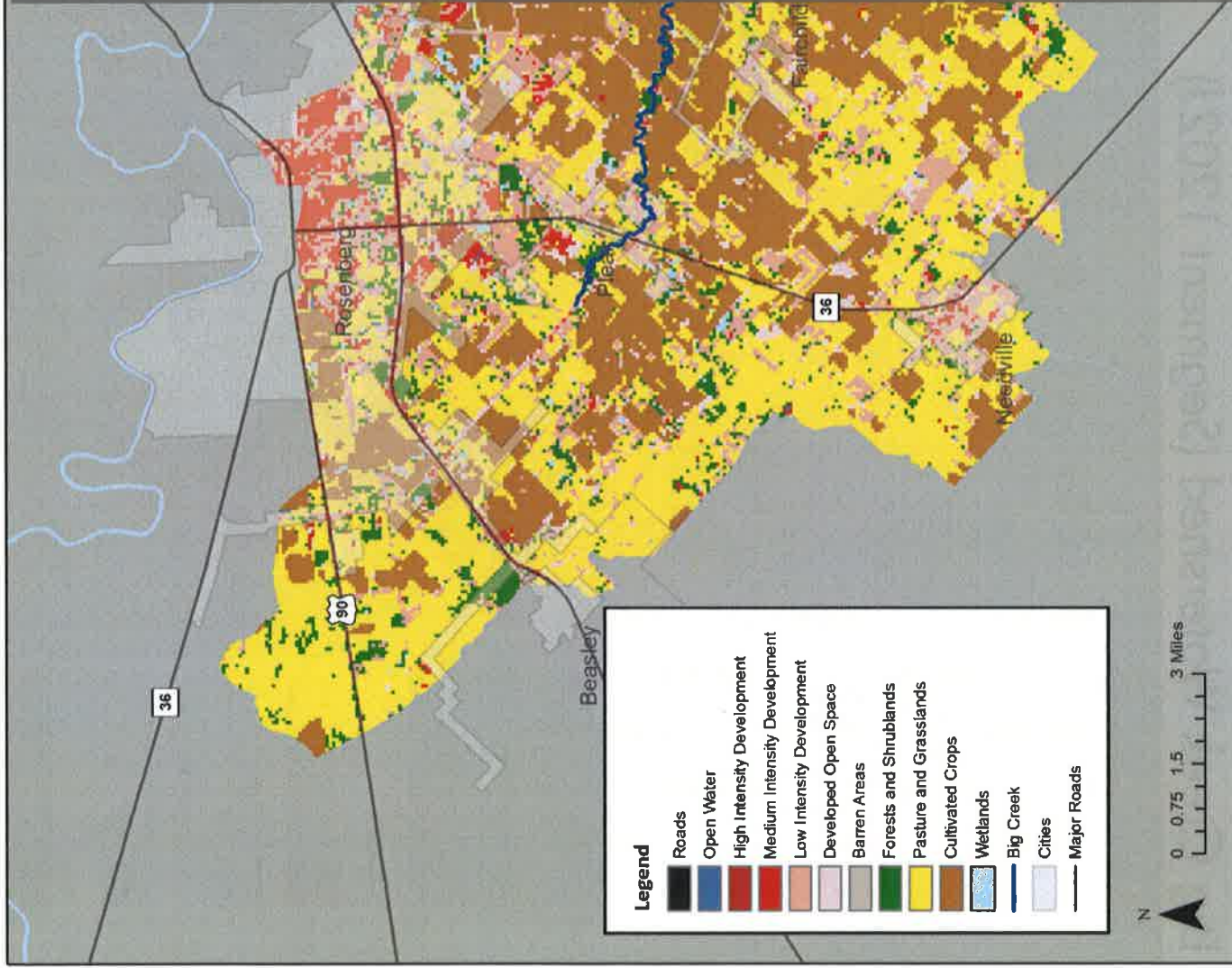
Beasley



# Big Creek Watershed (Segment 1202J)



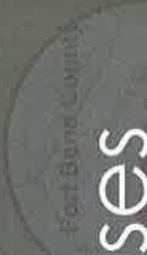
# Land Cover in the Big Creek Watershed



- Mix of uses

- Majority (65%) agricultural or (15%) “natural”

- Rapid growth / urbanization



Brazos River



# Water Quality Challenges



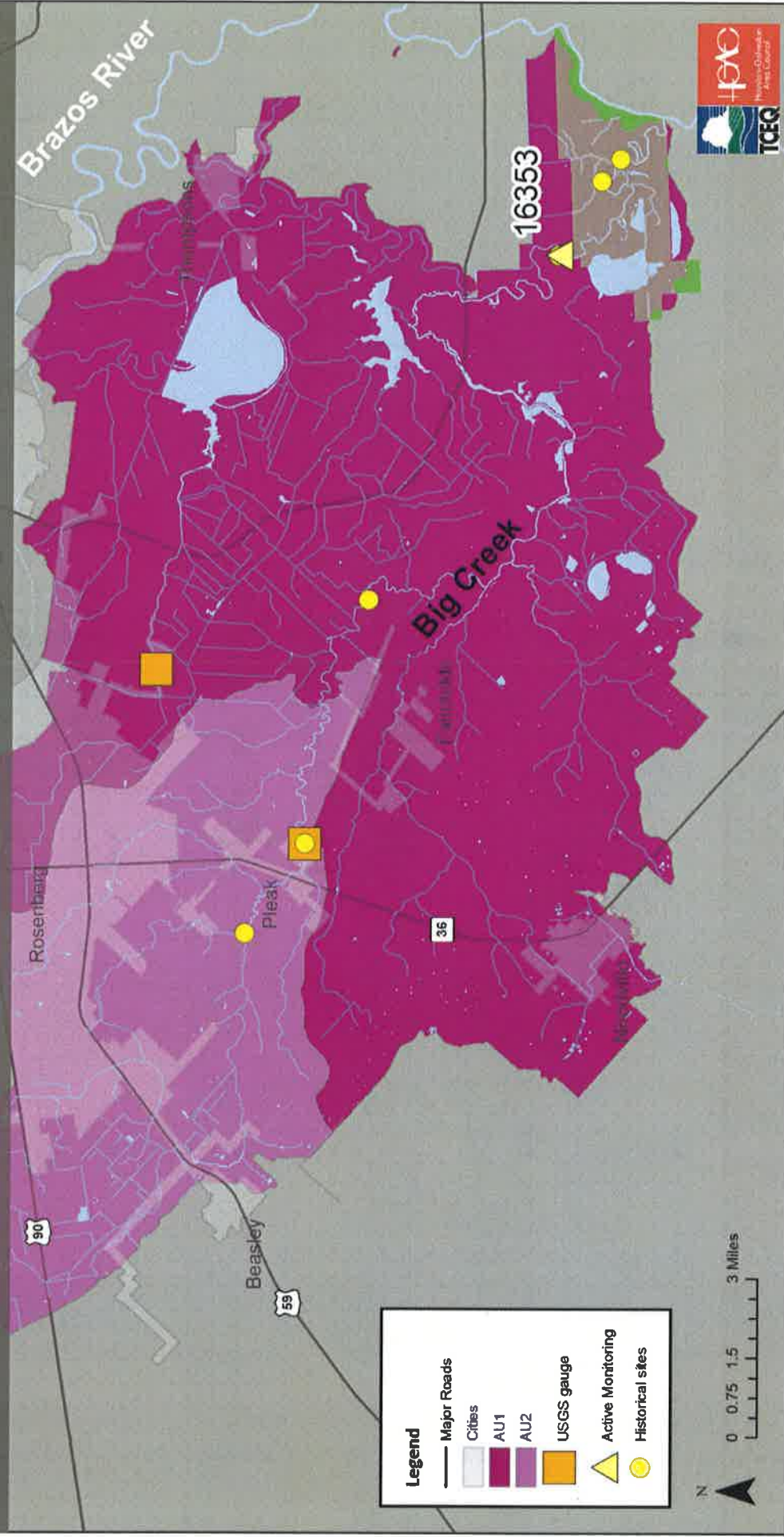
# Water Quality Background



- Waterbodies in Texas evaluated every two years against water quality standards using monitoring data.
- Standards reflect uses of waterways (recreation, water supply, aquatic life, etc.)
- Waterways not meeting one or more standards are **Impaired.**

## Monitoring Stations in the Big Creek Watershed

- Two assessment units
- 1 active monitoring station at Sawmill Road; quarterly samples
- Several historical sites



# Big Creek Status

2018 Status (data from 2009-2016)

- **Impaired** for contact recreation (fecal bacteria, since 2002)
- **Concerns** for
  - Aquatic life (low dissolved oxygen, issues with fish communities and habitat in lower)
  - General use (nutrients)



## Current Data (2016-2018)

- **Fecal Bacteria** – continued issue; 62% exceeded; geomean double the standard.
- **Dissolved Oxygen** – Continuing. 32% don't meet screening level; 7% don't meet minimum.
- **Nutrients** – Phosphorus exceeds 11%, no data for upper.

# Other Challenges



- **Sediment** – erosion and sediment transport can impact aquatic life, flooding, other pollutants; changing hydrology.
- **Trash/Dumping**– No widescale dumping or trash accumulation reported, some known sites.
- **Invasives** – Some areas of invasive water plants identified.
- **Growth** – Increasing sources, decreasing open space.



# Quantifying Improvement

Before water quality can be addressed, we need to understand:

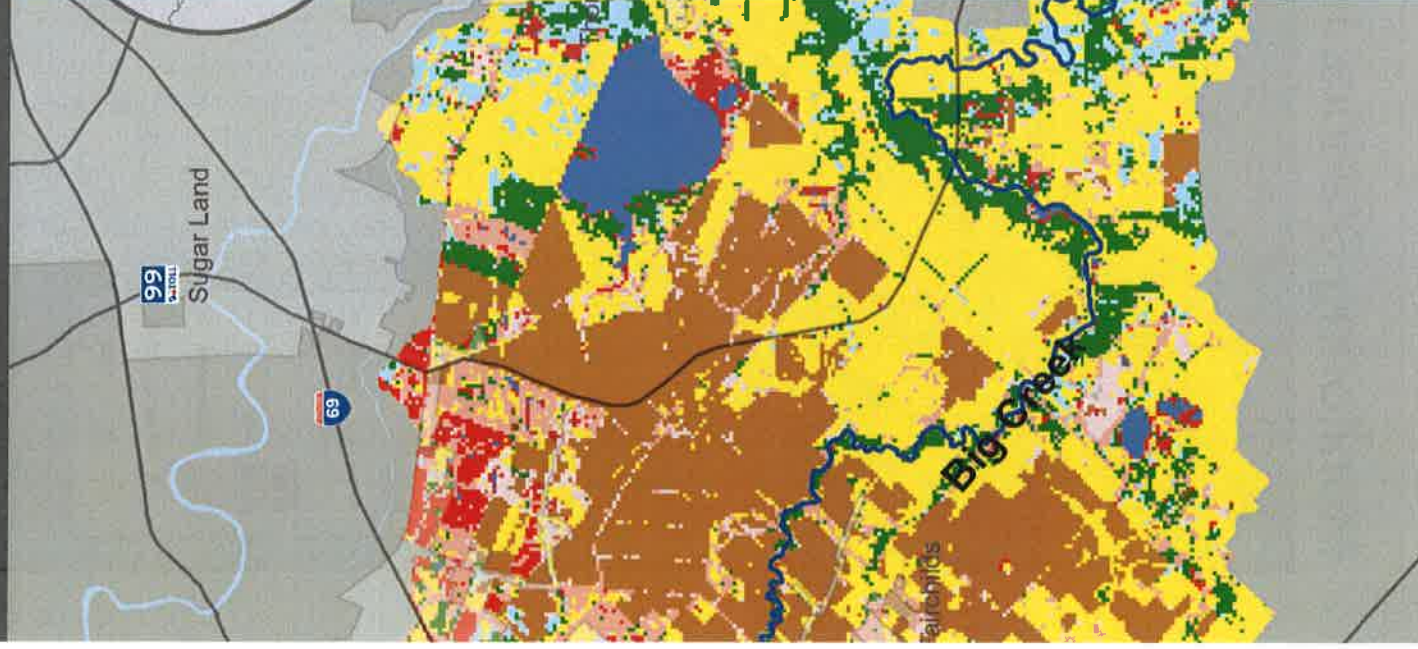
- **Extent of the issue** - How much improvement is needed.
- **Potential sources** - What needs improvement
- **Expected changes** - How will sources, conditions change in the future



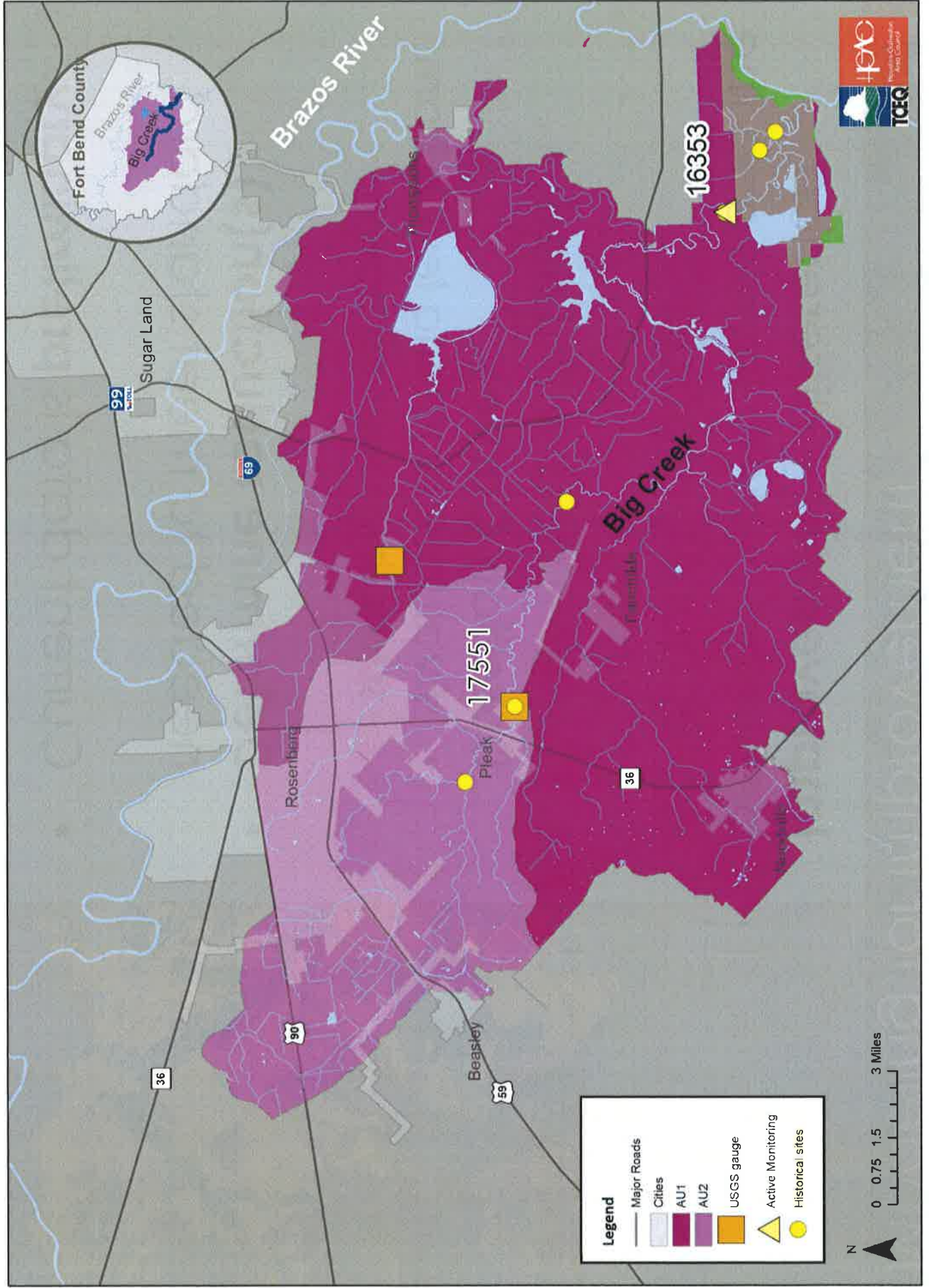
# Modeling for Improvement

**Improvement** – difference between current levels and the water quality standard.

- Determined with **Load Duration Curves**
  - Evaluate bacteria levels from sampling over all flows
- **Determine reduction(s)** needed to meet standard
- Current data is **preliminary**.

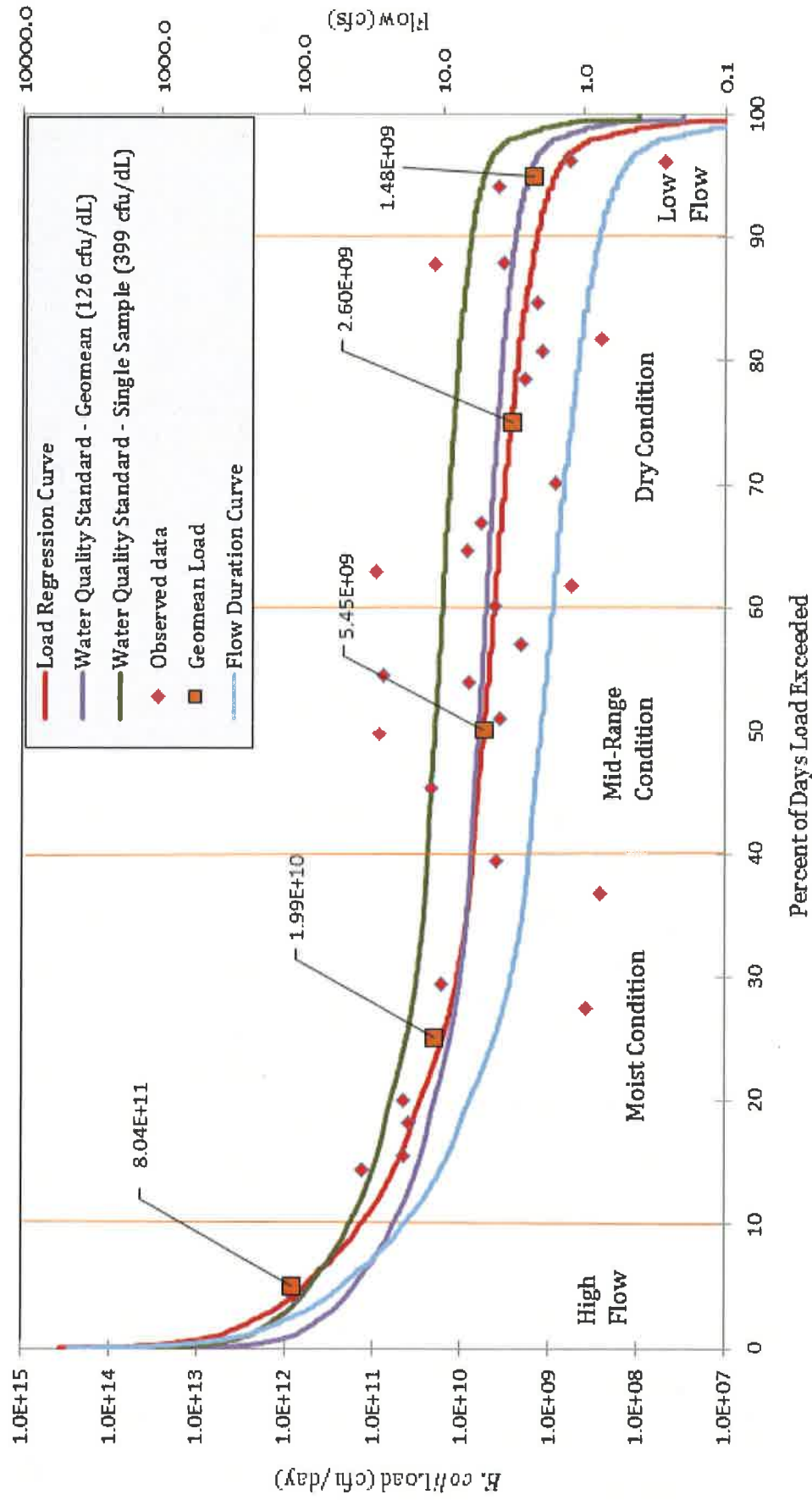


# Monitoring Stations in the Big Creek Watershed



# Load Duration Curves – Upstream (AU2)

17551



# Load Duration Curves – Upstream (AU2)

## Flow Category

## Percent Reduction Needed

**High Flows** (highest 10% of flows)

73%

**Moist Conditions** (Highest 40% of flows, excepting highest 10%)

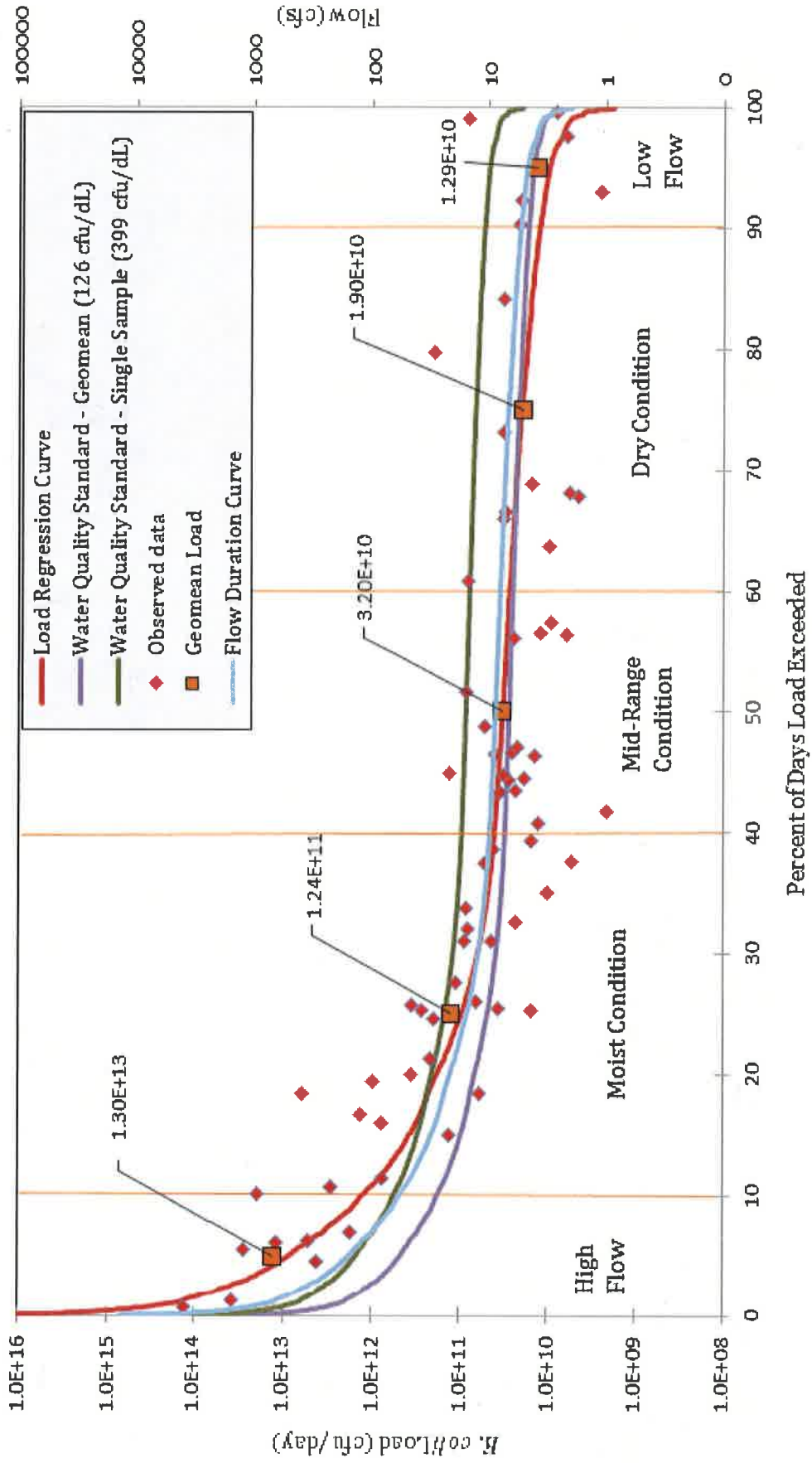
21%

**Weighted Average** (top 40% of flows)

34%

# Load Duration Curves - Downstream (AU1)

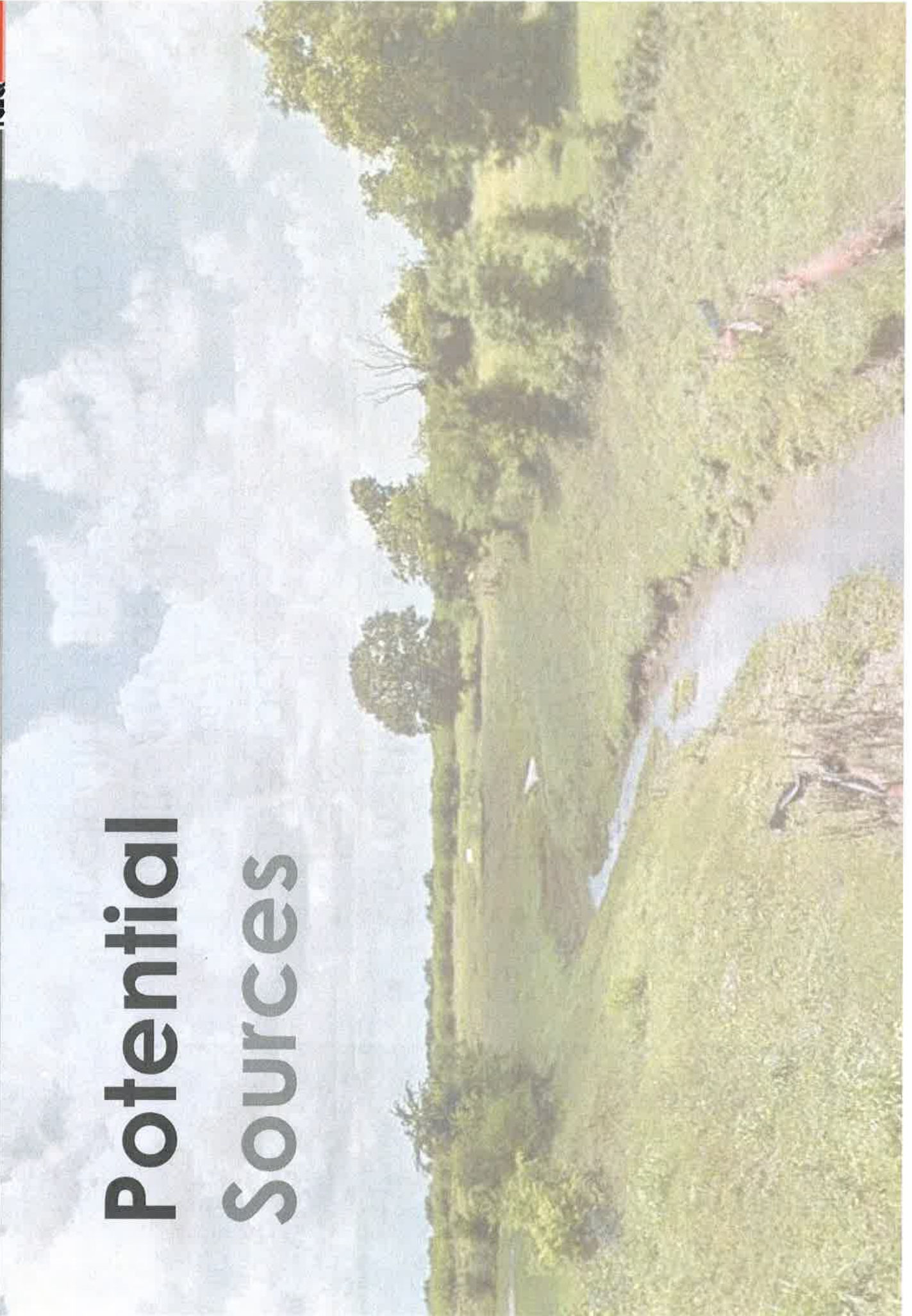
16353



# Load Duration Curves – Downstream (AU1)

Flow Category	Percent Reduction Needed
<b>High Flows</b> (highest 10% of flows)	94%
<b>Moist Conditions</b> (Highest 40% of flows, excepting highest 10%)	52%
<b>Midrange Conditions</b> (highest 60% of flows, to highest 40% of flows)	16%
<b>Weighted Average (top 60% of flows)</b>	47%

# Potential Sources



# Potential Sources of Fecal Waste

Fecal waste can come from:

- **Humans**
  - Wastewater plants/systems
  - Septic/Aerobic systems
  - Illicit sewage/dumping
- **Domestic Animals**
  - Pets
  - Livestock
- **Wildlife/Invasives-** mammals  
(including feral hogs), birds

**Source Survey** establishes potentials.



# Source Survey – Sewer Systems



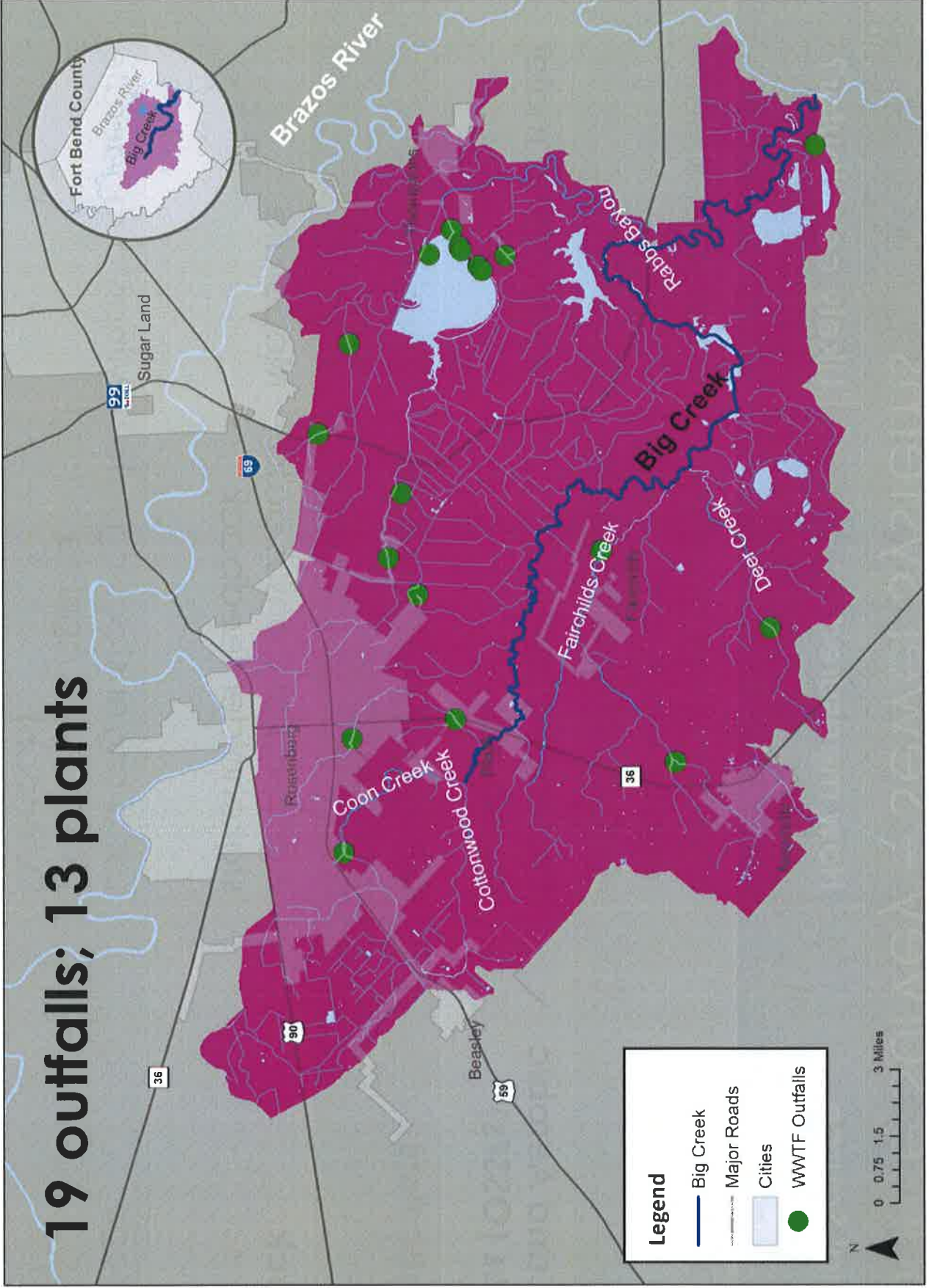
Potential Source	How measured	Likely contributor?
<b>Sewer systems</b>	Sanitary sewer overflow reports; discharge reports; land application	Minor to moderate
<b>Septic and Aerobic Systems (OSSFs)</b>	Presence (OSSF database)	Moderate to major
<b>Domestic Pets</b>	0.8 dogs/per Household (AVMA, 2012)	Moderate
<b>Livestock</b>	Agricultural Census data, stakeholder feedback	Moderate
<b>Feral Hogs</b>	Land cover stocking rate (Texas A&M AgriLife Extension)	Minor to moderate
<b>Other Wildlife</b>	Anecdotal (Deer measured through TPWD RMU data)	Moderate

# Source Survey – Sewer Systems



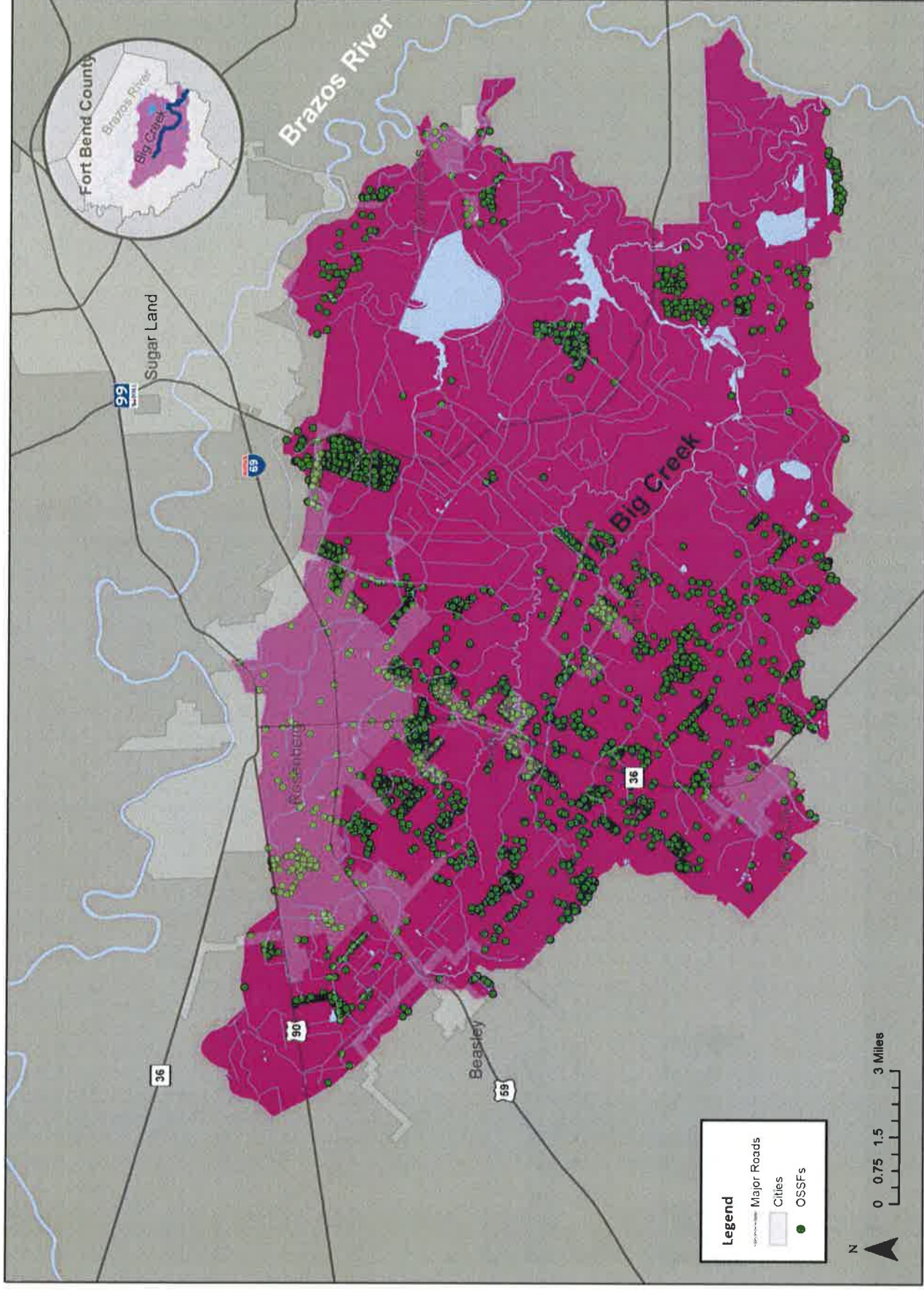
Wastewater Outfalls in the Big Creek Watershed

## 19 outfalls; 13 plants



# Source Survey – OSSFs (Septic/Aerobic)

## Permitted OSSFs in the Big Creek Watershed



# Next Steps



# Next Steps – This Project



## 1. Your Feedback

- Include local concerns, knowledge
- Feedback on sources
- Map Exercise

## 2. Final Report

- Includes your feedback
- Review before next meeting

## 3. Second Meeting

1. August TBD
2. Receive feedback

# Next Steps for Big Creek



TCEQ will move forward with an effort to address water quality.

- A **Total Maximum Daily Load** will be developed as a target for improvement.
- Local stakeholders will collaborate on an **Implementation Plan** of measures to meet the target
- Process to begin FY2020



Questions?



Any Questions?

For more information,  
contact:

**Justin Bower**  
**713-499-6653**  
**[justin.bower@h-gac.com](mailto:justin.bower@h-gac.com)**

3555 Timmons Lane, Suite  
120, Houston, TX 77077





Fort Bend Star  
Fort Bend County  
Stafford, TX  
Circulation: 95  
Frequency: Weekly  
July 17, 2019

## Efforts now underway to reduce E. coli in Big Creek

By Landan Kuhlmann  
LKUHLMANN@FORTBENDSTAR.COM

Big Creek in Fort Bend County has long been a popular spot for recreation, with its 222 square miles servicing 414 miles of waterways.

State and local officials are responding to a threat to its public safety – elevated levels of fecal matter – with a large-scale water-quality project that could begin within a year.

Representatives from the Texas Commission on Environmental Quality (TCEQ) and Houston-Galveston Area Council (H-GAC) gathered July 11 with Fort Bend County stakeholders and a few residents to discuss water-quality issues impacting the Big Creek watershed and provide an opportunity to give feedback on potential paths forward.

“Some of these issues have risen to the point of triggering a need to address those issues,” H-GAC senior planner Justin Bow-

er said. "Everything that is happening in a drainage area eventually makes its way down to the water, for better or worse."

Bower said Big Creek, based on a 2018 study that considered data from 2009-16, has been identified by the TCEQ as failing to meet the state water-quality standard for recreational contact, which applies to places where there is a significant risk of water ingestion because of activities such as wading and swimming. Big Creek's primary water-quality challenge is elevated levels of fecal bacteria, which can be harmful to health, the economy and the environment. There also are concerns about suitability for aquatic life.

The standard against which Big Creek is measured is 126 colony-forming units of *E. coli* per 100 milliliters of water. According to data gathered by TCEQ and H-GAC surveyors, 62 percent of the samples collected for the ongoing study contained *E. coli* levels that were higher than that standard, posing a noticeable – but not irreparable – risk.

Bower said he wasn't aware of any illnesses or deaths related to the contamination.

"How much *E. coli* we see helps us gauge how much waste and how much

risk there is to the public," Bower said.

According to project manager Earlene Lambeth with the TCEQ's Office of Water, work on Big Creek started in 2002 when it made the 303-D list – the state's list of impaired and threatened waters such as stream and river segments or lakes. States are required to submit their list for Environmental Protection Agency approval every two years, after which H-GAC and the EPA study seven years of trends to gauge potential risks.

Though the fecal matter levels are elevated and some residents at the meeting were surprised by that, Bower said it is not cause for alarm as long as the improvement project comes together. There will be no Big Creek waterways closed to the public.

"We're just taking the information and working with the stakeholders to find a solution. We're not restricting public access in any way," Bower said. "This is a waterway that has had some issues since 2002, so there's nothing overly concerning on the water-quality side that would make the county shut it down."

The main sources of contamination in largely rural areas such as those Big Creek serves, according to Bower, can come from humans – such as wastewater plants/systems, septic/aerobic systems or illicit sewage and dumping – or

animals/wildlife such as pets and livestock.

How the area urbanizes in the coming years could also have an impact on the study and methods by which the H-GAC attempts to remedy the situation.

"We are a watershed in transition, and that's going to impact how sediment is traveling through the system," Bower said.

H-GAC and the TCEQ are planning another public meeting in August to present an initial report based on stakeholder feedback. Following the August meeting, the two organizations and residents will collaborate on a potential implementation plan, a process officials hope to begin in fiscal year 2020.

"This was not a problem that happened overnight, and the solution itself will not happen overnight," Bower said. "What the sources are now are not necessarily what they will be 10-20 years from now. We have to consider that.

"A lot of (this study) will be based on your knowledge of what's feasible for your communities, what will or won't fly and what you believe is a priority. Nobody is going to have as good a handle on it as someone who works and lives here on a daily basis."

For more information or to give feedback on the project, contact Bower at 713-499-6653 or [justin.bower@h-gac.com](mailto:justin.bower@h-gac.com).

Media Monitoring Network

Fort Bend Herald  
Fort Bend County  
Rosenberg, TX  
Circulation: 4939  
Frequency: Daily  
July 16, 2019

# Big Creek has elevated levels of fecal bacteria

BY ALEX WUKMAN  
awukman@fbherald.com

Like many of Texas' waterways, Big Creek isn't safe for swimming. For the last seven or eight years the waterway — which starts where Hartledge Road crosses Cottonwood Creek, just north of Pleak — has been suffering.

"There's too much fecal bacteria in Big Creek," said Justin Bower, a senior planner with the Houston-Galveston Area Council. "What we've found is elevated levels of *E. coli* in the watershed."

Naturally occurring *e-coli* is present in almost all waterways, Bower added. The bacteria can find its way into a stream in a dozen different ways.

"*E. coli* could come from agricultur-

al runoff, wild animals or wastewater treatment plants," Bower said. For Big Creek the problem is getting the amount of *e-coli* down to acceptable levels.

The EPA and Texas Commission on Environmental Quality have set a limit of 126 colony forming units of *E. coli* per 100 milliliters, a colony forming unit is a way to estimate the number of viable cells in a sample.

Since 2012, Big Creek's annual average of *E. coli* bacteria has surpassed the EPA's limit, Bower said.

"During that time there have been some major flooding events which raised the CFU count and there have been some droughts which lowered it," he added.

"But on average the CFUs have ex-

ceeded the limit."

Big Creek's elevated levels of fecal bacteria led the Houston-Galveston Area Council and TCEQ to have a stakeholders' meeting at George Memorial Library on July 11.

Officials from Fort Bend County, Brazos Bend State Park and some of the local municipalities got together to identify the problem, Bower said.

"Right now we are in the preliminary stages of the process," he added.

"We're trying to determine the sources of the bacteria."

Determining the source of a particular strain of *e-coli* in a body of water that meanders through 25% of the county, before reaching the Brazos River at the southeastern tip of Brazos

Bend State Park, can be an expensive, and time-consuming, process.

"We can do DNA testing to find the point of origin, but that costs thousands of dollars per sample," Bower said.

The easier way is to come up with a rough estimate of the possible sources.

"We try to estimate how many cows, horses, dogs and septic systems are on a stretch of water," he said.

Once the possible sources are identified the TCEQ will move forward in creating a response.

It will take one to two years before TCEQ develops a plan for the Big Creek watershed.

"It didn't get to this point overnight and it won't get solved overnight," Bower said.



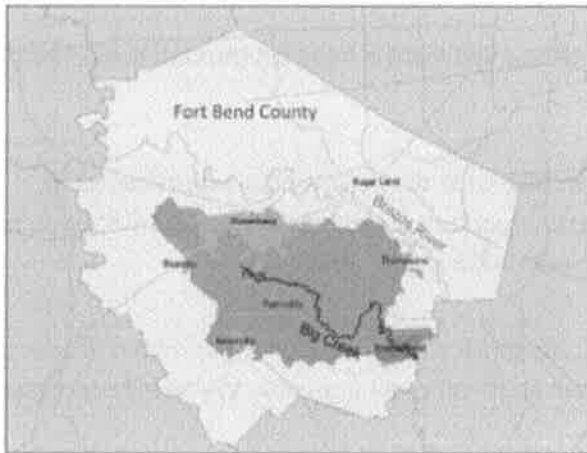
fortbendstar.com  
Fort Bend County  
Stafford, TX  
Circulation: 301  
Frequency: Daily  
July 16, 2019

**Link:**

<http://www.fortbendstar.com/efforts-now-underway-to-reduce-e-...>

## Efforts now underway to reduce E. coli in Big Creek

July 16, 2019 by Landan Kuhlmann — Leave a Comment



**Big Creek spans more than 200 square miles in Fort Bend County, servicing 414 miles of waterways. (Map from H-GAC)**

Big Creek in Fort Bend County has long been a popular spot for recreation, with its 222 square miles servicing 414 miles of waterways.

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**Houston-Galveston Area Council**

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September 14, 2019

Earlene Lambeth (MC 203)  
TMDL Project Manager  
Water Quality Division  
Texas Commission on Environmental Quality  
12100 Park 35 Circle, Bldg. F  
Austin, Texas 78753

RE: September 2019 Progress Report for Contract 582-18-81222, Work Order 2.

Dear Ms. Lambeth:

Enclosed is one (1) copy of the FY 2019 6<sup>th</sup> Progress Report for Contract No. 582-18-81222-02. It covers all deliverable/task activities for the project period August 1, 2019 through August 31, 2019. Financial Statements, HUB report and Voucher will be submitted separately.

Included in this Report are:

1. One copy of the quarterly progress report for August 1, 2019 thru August 31, 2019.
2. Copies of meeting summaries and other pertinent materials from project related meetings.

We hope you find the quarterly report satisfactory. Any comments you have will be appreciated. If you have any questions, please contact me by phone (713-993-4549) or E-mail (todd.running@h-gac.com).

Sincerely,

Todd Running  
Water Resources Program Manager  
Community & Environmental Planning Dept.

CC Jason Leifester  
Chris Loft  
Justin Bower

TR/srj  
Enclosures



**TMDL Program**  
**FY 2019 Progress Report #6**  
**Time Period Covered: 8/01/2019 – 8/31/2019**  
**Name of Project: Watershed Characterization for Big Creek**  
**Contract No./Work Order 582-18-81222-02**

**Date: September 14, 2019**

**TASK #1. PROJECT ADMINISTRATION**

<b>Deliverable(s)</b>	<b>Due Date</b>	<b>Status</b>
List all deliverables under the task described above	List the due dates for each deliverable	If the deliverable has been completed, enter the date submitted to the TCEQ. If the deliverable has not been completed, briefly describe the status of each deliverable.
Monthly Progress Report	September 15, 2019	Monthly report for Work Order submitted an electronic copy on September 14, 2019
Invoice	September 15, 2019	Invoices will be submitted under another cover.
Weekly Reports	Weekly	Provided as an attachment.

**Work Performed This Period – detail all activities for this task and briefly describe the progress on each deliverable:**

Work performed for this task during this period included writing and assembling the monthly report. Copies of weekly emails are attached.

**TASK #2. PUBLIC EDUCATION AND OUTREACH**

<b>Deliverable(s)</b>	<b>Due Date</b>	<b>Status</b>
List all deliverables under the task described above	List the due dates for each deliverable	If the deliverable has been completed, enter the date submitted to the TCEQ. If the deliverable has not been completed, briefly describe the status of each deliverable.
Development of meeting materials (Task 2.1)	Draft meeting materials will be sent to the TCEQ Project Manager at least two weeks prior to distribution for each meeting	The first BIG Creek stakeholder meeting was held on July 11, 2019. Meeting materials were sent to TCEQ PM for review on July 9, 2019.  The second Big Creek stakeholder meeting was held on Aug. 28, 2019. Meeting materials submitted on Aug. 22, 2019. The meeting was discussed with TCEQ on Aug. 26, 2019.
Host two, and up to four total, watershed stakeholder meetings (Task 2.2)	As needed	<ul style="list-style-type: none"> <li>• July 11, 2019 – first stakeholder meeting held.</li> <li>• August 28, 2019 – second stakeholder meeting was held.</li> </ul>
Summary of meetings (Task 2.3)	Within 2 weeks after meetings	A summary was provided with the weekly reports. A full meeting summary will be provided to the TCEQ PM with the Sept. PR.
List of general stakeholders (Task 2.4)	With PRs	No updates at this time.
Facilitate delivery of education programs (Task 2.5)	As needed	No updates at this time.
Public participation/outreach summaries (Task 2)	With PRs	No updates at this time.

Work Performed This Period – detail all activities for this task and briefly describe the progress on each deliverable:

The meeting summary for July 11, 2019 is attached to this report. Staff prepared for the second stakeholder meeting scheduled for Aug. 28, 2019. H-GAC contacted the BIG Creek stakeholders via email in August to announce the second stakeholder meeting set for Aug. 28, 2019. H-GAC provided an agenda and presentation for the TCEQ PM to review. Final meeting reminders were sent out in August prior to the meeting. The meeting summary has been attached to this report, however a brief review follows:

August 28, 2019 – Stakeholder meeting was held at the George Memoria Library in Richmond. Eight stakeholders were in attendance. H-GAC reviewed the contents of the Big Creek TSD. This review included water quality data and potential fecal bacteria sources with the attendees. Watershed planning and next steps were discussed.

### TASK #3 EXISTING DATA QAPP

<b>Deliverable(s)</b>	<b>Due Date</b>	<b>Status</b>
List all deliverables under the task described above	List the due dates for each deliverable	If the deliverable has been completed, enter the date submitted to the TCEQ. If the deliverable has not been completed, briefly describe the status of each deliverable.
Draft Acquired Data QAPP (3.1)	45 days after issuance of notice to proceed.	Provided October 31, 2018.
Final QAPP (3.2)	Two weeks after receipt of TCEQ comments	Final QAPP approved November 30, 2018.
QAPP amendments (Task 3.3)	As needed	No update needed.
QAPP Annual Update	Annually, as needed.	No update needed.
QAPP CARs (Task 3.5)	As needed	No CARs required.
Quality assurance audits (Task 3.6)	Will participate as needed	No audits performed.

#### Work Performed This Period

QAPP was approved on November 30, 2018. Staff began to work on the revised QAPP for FY20.

### TASK #4 WATERSHED CHARACTERIZATION REPORT

<b>Deliverable(s)</b>	<b>Due Date</b>	<b>Status</b>
List all deliverables under the task described above	List the due dates for each deliverable	If the deliverable has been completed, enter the date submitted to the TCEQ. If the deliverable has not been completed, briefly describe the status of each deliverable.
Draft Report (Task 4.1)	July 15, 2019	Draft report finished and under review. Expect to deliver in August.
Final TSD (Task 4.2)	Two weeks after receipt of TCEQ comments	

#### Work Performed This Period – detail all activities for this task and briefly describe the progress on each deliverable:

The draft characterization report was finished and submitted to TCEQ PM on August 22, 2019. Staff received comments and revised the document as needed. The report was resubmitted and then share with stakeholders prior to the August 28, 2019 meeting.

### PROJECT RELATED MEETINGS, WORKSHOPS, TRAINING OR EVENTS

- 1) Presentations:
  - a. No presentations, outside of the 2<sup>nd</sup> stakeholder meeting, were given during this report period.
- 2) Meetings, Events and Conferences:

- a. No associated meetings were attended during this report period.
- 3) Associated Implementation Projects and Programs
  - a. No associated implementation has been carried out in the project area.

**BRIEF DESCRIPTION OF OVERALL FINDINGS:**

H-GAC submitted the draft characterization report to TCEQ in August. Staff received comments and revised the document accordingly. The document was resubmitted. Additionally, staff prepared for and then hosted the second Big Creek stakeholder meeting on August 28, 2019. The characterization report was the main topic for the meeting.

**Significant Problems (describe any scheduling shortfalls, detail significant problems and how these problems were resolved, etc.):**

No problems were encountered this quarter.



## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Tuesday, August 13, 2019 5:37 PM  
**To:** 'Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)'  
**Cc:** 'Jason Leifester (Jason.leifester@tceq.texas.gov)'; Bower, Justin; 'Chris Loft'  
**Subject:** FY 19 WO #2 Weekly Report (July 29 - Aug. 2)

Good Afternoon, Earlene – Below you will find the weekly report for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

### July 29<sup>th</sup> – Aug. 2<sup>nd</sup>:

#### **Task 1** Project Administration

- ***Anticipate Spend Down August 2019?:*** Yes.
- ***Is spending by categories going as expected?:*** Yes at this time.
- ***Last Invoice:*** N/A.
- ***Original Budget Amount:*** \$85,000
- ***Total Spent to Date: (May 31, 2019)*** \$49,959.24 ***Remaining Budget Amount:*** \$35,040.76

#### **Task 2** Public Education and Outreach Activities

- Working to schedule a stakeholder meeting for late August.

#### **Task 3** Quality Assurance

- QAPP approved and executed.

#### **Task 4** Characterization Report

- Finalizing first draft in preparation to send to TCEQ PM.

Thanks,

Steve

Steven Johnston  
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## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Thursday, August 15, 2019 4:39 PM  
**To:** 'Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)'  
**Cc:** 'Jason Leifester (Jason.leifester@tceq.texas.gov)'; Bower, Justin; 'Chris Loft'  
**Subject:** FY 19 WO #2 Weekly Report (Aug 5 - Aug 9)  
**Attachments:** PR5\_15Aug2019.pdf

Good Afternoon, Earlene – Below you will find the weekly report for Work Order #2 under 582-18-81222. I have also attached PR5 for your review. Please let me know if you have any questions.

### Aug. 5<sup>th</sup> – Aug. 9<sup>th</sup>:

#### **Task 1** Project Administration

- ***Anticipate Spend Down August 2019?:*** Yes.
- ***Is spending by categories going as expected?:*** Yes at this time.
- ***Last Invoice:*** N/A.
- ***Original Budget Amount:*** \$85,000
- ***Total Spent to Date: (July 31, 2019)*** \$73,611.07 ***Remaining Budget Amount:*** \$11,388.93

#### **Task 2** Public Education and Outreach Activities

- 2<sup>nd</sup> stakeholder meeting scheduled for August 28, 2019 in Richmond from 1:30 – 3:30 PM.

#### **Task 3** Quality Assurance

- QAPP approved and executed.

#### **Task 4** Characterization Report

- Finalizing first draft in preparation to send to TCEQ PM.

Thanks,

Steve

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## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Wednesday, September 11, 2019 6:56 PM  
**To:** 'Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)'  
**Subject:** FY 19 WO #2 Weekly Report (Aug 19 - Aug 23)

Hi, Earlene – Sending this to correct the record. The report below incorrectly used the August 12<sup>th</sup> – 16<sup>th</sup> instead of August 19<sup>th</sup> – 23<sup>rd</sup>. I will send the next weekly report shortly.

Steve

---

**From:** Johnston, Steven  
**Sent:** Friday, August 23, 2019 3:16 PM  
**To:** 'Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)' <Earlene.lambeth@tceq.texas.gov>  
**Cc:** 'Jason Leifester (Jason.leifester@tceq.texas.gov)' <Jason.leifester@tceq.texas.gov>; Bower, Justin <Justin.Bower@h-gac.com>; 'Chris Loft' <Chris.Loft@tceq.texas.gov>  
**Subject:** RE: FY 19 WO #2 Weekly Report (Aug 12 - Aug 16)

Good Afternoon, Earlene – Below you will find the weekly report for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

Aug. 19<sup>th</sup> – Aug. 23<sup>rd</sup>:

**Task 1** Project Administration — Received executed 2020 WO, started work on Work Plan and budget.

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (July 31, 2019)** \$73,611.07 **Remaining Budget Amount:** \$11,388.93

**Task 2** Public Education and Outreach Activities

- 2<sup>nd</sup> stakeholder meeting scheduled for August 28, 2019 in Richmond from 1:30 – 3:30 PM.

**Task 3** Quality Assurance

- QAPP approved and executed.

**Task 4** Characterization Report

- First draft of the Characterization Report was submitted to TCEQ PM.

Thanks,

Steve

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## Johnston, Steven

---

**From:** Johnston, Steven  
**Sent:** Wednesday, September 11, 2019 7:00 PM  
**To:** 'Earlene Lambeth (Earlene.lambeth@tceq.texas.gov)'; 'Nicole Reed'  
**Cc:** Jason Leifester (Jason.leifester@tceq.texas.gov); Chris Loft; Bower, Justin  
**Subject:** FY 19 WO #2 Weekly Report (Aug 26 - Aug 30)

Good Evening, Earlene and Nicole – Below you will find the weekly report for Work Order #2 under 582-18-81222. Please let me know if you have any questions.

Aug. 26<sup>th</sup> – Aug. 30<sup>th</sup>:

**Task 1** Project Administration — Received executed 2020 WO. Submitted Work Plan and budget.

- **Anticipate Spend Down August 2019?:** Yes.
- **Is spending by categories going as expected?:** Yes at this time.
- **Last Invoice:** N/A.
- **Original Budget Amount:** \$85,000
- **Total Spent to Date: (July 31, 2019)** \$73,611.07 **Remaining Budget Amount:** \$11,388.93

**Task 2** Public Education and Outreach Activities

- 2<sup>nd</sup> stakeholder meeting was held on August 28, 2019 in Richmond from 1:30 – 3:30 PM. The stakeholders were presented with copies of the draft Big Creek Characterization Report. H-GAC reviewed the content of the report.

**Task 3** Quality Assurance

- QAPP approved and executed.

**Task 4** Characterization Report

- First draft of the Characterization Report was submitted to TCEQ PM.

Thanks,

Steve

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# Big Creek Watershed Characterization

## Public Meeting Summary

July 11, 2019

### Attendance

There were approximately 20 people in attendance in addition to H-GAC and TCEQ project staff.

### The meeting commenced at approximately 1:35

- I) **Welcome** – Justin Bower, Houston-Galveston Area Council, welcomed the attendees and asked for a round of introductions.
- II) **Watershed Overview** – Project staff discussed the water quality issues for Big Creek, with specific focus on fecal indicator bacteria and contact recreation state water quality standard.
  - a. Water quality status - The Creek is listed as impaired for contact recreation by the Texas Commission on Environmental Quality and has other water quality concerns.
  - b. Potential sources – Sources of fecal waste in the watershed include a variety of both human and animal (domestic and wild) sources.
  - c. Scale of reductions - Preliminary water quality modeling showed appreciable reductions were needed in the highest flow conditions.
  - d. Future growth - Demographic projections suggest that the watershed is rapidly transitioning away from rural land uses, but that there will be a mix of uses through the foreseeable future.
  - e. Stakeholder concerns - Stakeholders expressed concerns over additional contaminants like pesticides, petroleum products, or other toxics vulnerable to flooding.
- III) **Overview of Water Quality in the Cypress Creek Watershed** – Project staff discussed the geographic, political, land cover characteristics of the watershed, water quality status, and potential sources of pollution within the watershed. Cypress Creek is not able to meet state water quality standard for contact recreation and has concerns for other constituents that impact aquatic life uses and other uses. Multiple sources of fecal waste are present in the watershed and contribute to the problem.
- IV) **Addressing Water Quality Issues** – Project staff discussed the current characterization project, and the likely trajectory forward. H-GAC and TCEQ will work to refine existing technical data towards the purpose of developing a total maximum daily load (TMDL) for fecal indicator bacteria, and eventually, an implementation plan to address sources.
  - a. Characterization Report – H-GAC indicated they would be developing a formal characterization report for stakeholder review prior to an additional public meeting in August, and would be seeking feedback.

- V) **Open Discussion** – Stakeholders indicated areas of development in the watershed, and provided feedback on potential contamination (as per II-e above). The potential impact of oil fields in the watershed, while not the focus of this project, was noted as a concern for future water quality.
- VI) **Adjournment** - The meetings adjourned at approximately 3:30.



## Johnston, Steven

---

**From:** Bower, Justin  
**Sent:** Tuesday, August 27, 2019 5:01 PM  
**To:** 'Adam.Wright@fortbendcountytexas.gov'; 'bkoch@tsswcb.texas.gov';  
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'vmoreno@lcsid.org'; 'Karissa.Graves@tx.usda.gov'; 'Linda.Freund@tx.nacdn.net'  
**Cc:** 'Earlene Lambeth'; Running, Todd; Johnston, Steven  
**Subject:** Final Reminder - Tomorrow, August 28 Public Informational Meeting on Big Creek Watershed  
**Attachments:** Draft Big Creek Watershed Characterization - 8 27 19.pdf; Public Meeting 8 22 19.pdf

Good Afternoon,

This is the final reminder that the Texas Commission on Environmental Quality and the Houston-Galveston Area Council invite you to attend **the second public informational meeting on an effort to assess and improve water quality in the Big Creek Watershed** (see attached map). The meeting is open to the public, and will be held:

Tomorrow, Wednesday, August 28, 2019  
1:30 PM – 3:30 PM  
George Memorial Library, Room 2A  
[1001 Golfview Drive, Richmond, TX 77469](#)

At the meeting, the project team will discuss and seek feedback on a preliminary report on water quality issues impacting Big Creek (attached), and discuss the next steps for the project going forward. Big Creek is currently unable to meet state water quality standards for contact recreation and has degraded ability to support aquatic life. The current project is assessing the extent and potential causes for water quality issues in support of future efforts to improve water quality. Input and guidance from local stakeholders is a key part of developing future solutions.

Please contact me with any questions you have about the meeting, this specific project, or general water quality issues in Big Creek. We hope you'll consider participating in the meeting on August 28th. Light refreshments will be served. An agenda and draft Big Creek Watershed Characterization report are attached. Please forward this invitation to anyone else you think may be interested.

Respectfully,

Justin Bower  
Senior Planner, Community and Environmental Planning

Houston-Galveston Area Council  
3555 Timmons Lane, Suite 120  
Houston, TX 77277  
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*You are receiving this email because you or your organization has a political boundary, a permitted wastewater facility/outfall, utility district, other infrastructure pertinent to water quality, other local interest in the watershed, or have previously expressed an interest in the project. Please contact us if you no longer wish to receive emails for this project, or if you have an alternate email address/contact we should be using.*

# Big Creek Watershed Characterization Public Meeting Summary

August 28, 2019

## Attendance

There were 8 people in attendance, in addition to H-GAC and TCEQ project staff.

## The meeting commenced at approximately 1:35

- I) **Welcome** – Justin Bower, Houston-Galveston Area Council, welcomed the attendees and asked for a round of introductions.
- II) **Big Creek Watershed Overview** – Project staff gave a brief recap on the water quality issues for Big Creek, with specific focus on fecal indicator bacteria and contact recreation state water quality standard, including water quality status, potential sources of pollution, scale of reductions, future growth impacts, and other stakeholder concerns.
- III) **Project Progress Review** – Project staff gave a summary of progress since the last meeting, which primarily consisted of additional stakeholder meetings and the finalization of the characterization report.
- IV) **Draft Characterization Report** - Project staff introduced the draft Characterization Report and ran through its findings briefly. Stakeholders gave feedback on the watershed boundary and other minor textual clarifications. Staff requested that stakeholders review the report and provide additional feedback after the meeting at their discretion.
- V) **Next Steps** – Project staff indicated that the effort would be ongoing in fiscal year 2020, where more in-depth technical analysis and outreach would be conducted.
- VI) **Open Discussion** – Staff took public feedback, and informally discussed any upcoming opportunities or events with several partners.





# Characterization Report for Indicator Bacteria in the Big Creek Watershed

Segment: 1202J      Big Creek



*Big Creek at Whaley-Long Point Road*

August 2019

# Characterization Report for Indicator Bacteria in the Big Creek Watershed

Segment

1202J, Big Creek

Prepared for

Total Maximum Daily Load Program  
Texas Commission on Environmental Quality

MC-203

P.O. Box 13087

Austin, Texas 78711-3087

Prepared by

Justin Bower

William Hoffman

Thushara Ranatunga

Houston-Galveston Area Council

Houston, TX 77027

August 2019

## Acknowledgements

Financial support for this study was provided by the U.S. Environmental Protection Agency and the Texas Commission on Environmental Quality. The lead agency for this study was the Texas Commission on Environmental Quality.

Technical advice, feedback, and historical information was graciously provided by local stakeholders as part of preliminary outreach. Special thanks to the Fort Bend County Drainage District, Brazos Bend State Park, and the J.B. Harrison Foundation for their support and staff time in coordinating field activities for this project.

DRAFT

## Contents

### Contents

Acknowledgements.....	3
Contents .....	4
List of Figures .....	6
List of Tables .....	7
List of Acronyms and Abbreviations.....	8
Section 1.....	9
Introduction.....	9
1.1 Background .....	9
1.2 Water Quality Standards .....	11
1.3 Contact Recreation and Bacteria.....	12
1.4 Total Maximum Daily Load Program.....	13
1.5 Characterization Report Purpose and Organization.....	14
Section 2.....	15
Watershed Description.....	15
2.1 Description of the Big Creek System.....	15
Segment Description .....	15
Stream Network .....	19
Drainage Area/Watershed Delineation .....	22
2.2 Watershed Climate and Environmental Characteristics .....	24
Precipitation and Temperature .....	24
Elevation .....	24
Water Usage.....	25
Soils.....	25
Ecoregions.....	26
Local Political Geography .....	27
2.3 Watershed Population and Population Projections.....	28
2.4 Land Cover and Land Use .....	29
Land Cover.....	30

Section 3.....	35
Review of Historical Data.....	35
3.1 Historical Data Sources Overview.....	35
3.2 Ambient Monitoring Data.....	35
Data Acquisition .....	35
Analysis of <i>E. coli</i> Data .....	37
Analysis of Other Parameters .....	39
3.3 Wastewater Treatment Facility Discharge Monitoring Reports .....	40
Data Acquisition .....	40
DMR Data Review – <i>E. coli</i> .....	40
DMR Data Review – <i>Other Parameters</i> .....	40
3.4 Sanitary Sewer Overflow Reports .....	40
Data Acquisition .....	40
Section 4.....	42
Preliminary Flow Assessment.....	42
4.1 Evaluating Flow and <i>E. coli</i> Loading .....	42
Data Acquisition .....	42
LDCs for Big Creek.....	43
Section 5.....	46
Potential Sources of Contamination.....	46
5.1 Identifying Potential Sources .....	46
5.2 Regulated Sources.....	48
Domestic and Industrial Wastewater Treatment Facilities .....	48
Sanitary Sewer Overflows .....	48
Dry Weather Discharges/Illicit Discharges .....	48
TPDES General Wastewater Permits.....	49
TPDES General Stormwater Permits.....	49
Other Permitted Facilities and Operations.....	50
5.3 Unregulated Sources .....	52
On-site Sewage Facilities.....	52
Agriculture .....	54

Wildlife and Invasive Animals .....	55
Section 6.....	57
Findings and Recommendations .....	57
6.1 Summary .....	57
6.1 Findings and Recommendations .....	57

## List of Figures

Figure 1 - The Big Creek Watershed .....	10
Figure 2 - Big Creek at Boothline Road .....	13
Figure 3 - Big Creek at Hartledge Road .....	14
Figure 4 - Big Creek and the Brazos River Watershed .....	16
Figure 5 - Big Creek Assessment Unit 1202J_01 (Downstream) .....	17
Figure 6 - Big Creek Assessment Unit 1202J_02 (Upstream) .....	18
Figure 7 - Stream Network Diagram of Big Creek .....	19
Figure 8 - Drain Bypass Structure at the Confluence of Rabbs Bayou and Big Creek .....	22
Figure 9 - Big Creek Watershed Delineation .....	23
Figure 10 - Elevation Change in the Big Creek Watershed .....	25
Figure 11 - Soils of the Big Creek Watershed .....	26
Figure 12 - Level IV Ecoregions of the Big Creek Watershed .....	27
Figure 13 - Political Geography of the Big Creek Watershed .....	28
Figure 14 - Stormwater Management Structure near Seabourne Creek Park .....	29
Figure 15 - Land Cover in the Big Creek Watershed .....	31
Figure 16 - Land Use in the Big Creek Watershed (2018) .....	33
Figure 17 - Land Use in the Big Creek Watershed (2045) .....	34
Figure 18 - Monitoring Stations in the Big Creek Watershed .....	36
Figure 19 - E. coli Results by Station .....	38
Figure 20 - Big Creek at FM 762, near Paw Paw Ranch .....	39
Figure 21 - Wastewater Outfalls in the Big Creek Watershed .....	41
Figure 22 - LDC for AU2, Station 17551 .....	44
Figure 23 - LDC for AU1, Station 16353 .....	45
Figure 24 - Horses in the Big Creek Watershed .....	46
Figure 25 - Oil Fields (Orchard Dome, Oil Creek, Thompsons) .....	51
Figure 26 - OSSFs in the Big Creek Watershed .....	53
Figure 27 - Great Blue Heron at Brazos Bend State Park .....	56
Figure 28 - Maintained Channel in Big Creek .....	58

## List of Tables

Table 1 - Population Change in the Big Creek Watershed	29
Table 2 - Land Cover by Category	30
Table 3 - Land Use in the Big Creek Watershed, 2018 and 2045	32
Table 4 - Years of Available Monitoring Data by Station	37
Table 5 - E. coli Results by Monitoring Station	37
Table 6 - Other Water Quality Parameter Analyses	39
Table 7 - Potential Fecal Indicator Bacteria Reductions, by Station	43
Table 8 - Potential Source Survey	47
Table 9 - General Wastewater Permits - Concrete Operations	49
Table 10 - MS4 Phase II Permits in the Big Creek Watershed	50
Table 11 - Agricultural Animal Populations in the Big Creek Watershed	54
Table 12 - Dog Populations, Current and Future	55
Table 13 - Feral Hog Populations in the Big Creek Watershed	56

## List of Acronyms and Abbreviations

AU	Assessment Unit
CAFO	Concentrated Animal Feeding Operation
CRP	Clean Rivers Program
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DO	Dissolved Oxygen
<i>E. coli</i>	<i>Escherichia coli</i>
EPA	(U.S.) Environmental Protection Agency
H-GAC	Houston-Galveston Area Council
IR	Texas Integrated Report of Surface Water Quality
LDC	Load Duration Curve
mL	Milliliter
MPN	Most Probable Number
MS4	Municipal Separate Storm Sewer System
MUD	Municipal Utility District
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OSSF	On-site Sewage Facility
SSO	Sanitary Sewer Overflow
SWQMIS	Surface Water Quality Monitoring Information System
SWQS	State Water Quality Standard
TCEQ	Texas Commission on Environmental Quality
TMDL	Total Maximum Daily Load
TPDES	Texas Pollutant Discharge Elimination System
TPWD	Texas Parks and Wildlife Department
WPP	Watershed Protection Plan
WWTF	Wastewater Treatment Facility

## Section 1 Introduction

### 1.1 Background

Big Creek and its tributaries drain an area of over 200 square miles of central Fort Bend County, Texas (Figure 1). The watershed for this tributary to the Brazos River contains a variety of land uses but is primarily rural and agricultural in character, with several large industrial users and small population centers. These existing land uses, the impacts of increased residential development pushing into the watershed from the north, and natural sources of pollution have led to a variety of water quality challenges for Big Creek. Elevated levels of fecal waste pose risks for recreation in the waterway, and levels of oxygen and habitat conditions in the waterway are sometimes insufficient to support its aquatic life.

Because of these water quality issues, the Houston-Galveston Area Council (H-GAC) was tasked by the Texas Commission on Environmental Quality (TCEQ) to prepare the Big Creek Watershed Characterization Report to assess the status and potential means to address water quality challenges in the creek. This approach sought to quantify and describe water quality trends, identify potential sources of pollution (particularly fecal bacteria) and develop information on which to base decisions about future approaches to improving water quality.

Additionally, this project supported and facilitated an initial public outreach effort designed to inform local stakeholders and seek feedback on subsequent steps of addressing water quality in the creek. Likely next steps are the development of a Total Maximum Daily Load (TMDL) study and subsequent Implementation Plan, with the potential for developing a locally-led watershed protection plan (WPP) to address additional stakeholder and TCEQ-identified water quality concerns.

# Big Creek Watershed (Segment 1202J)

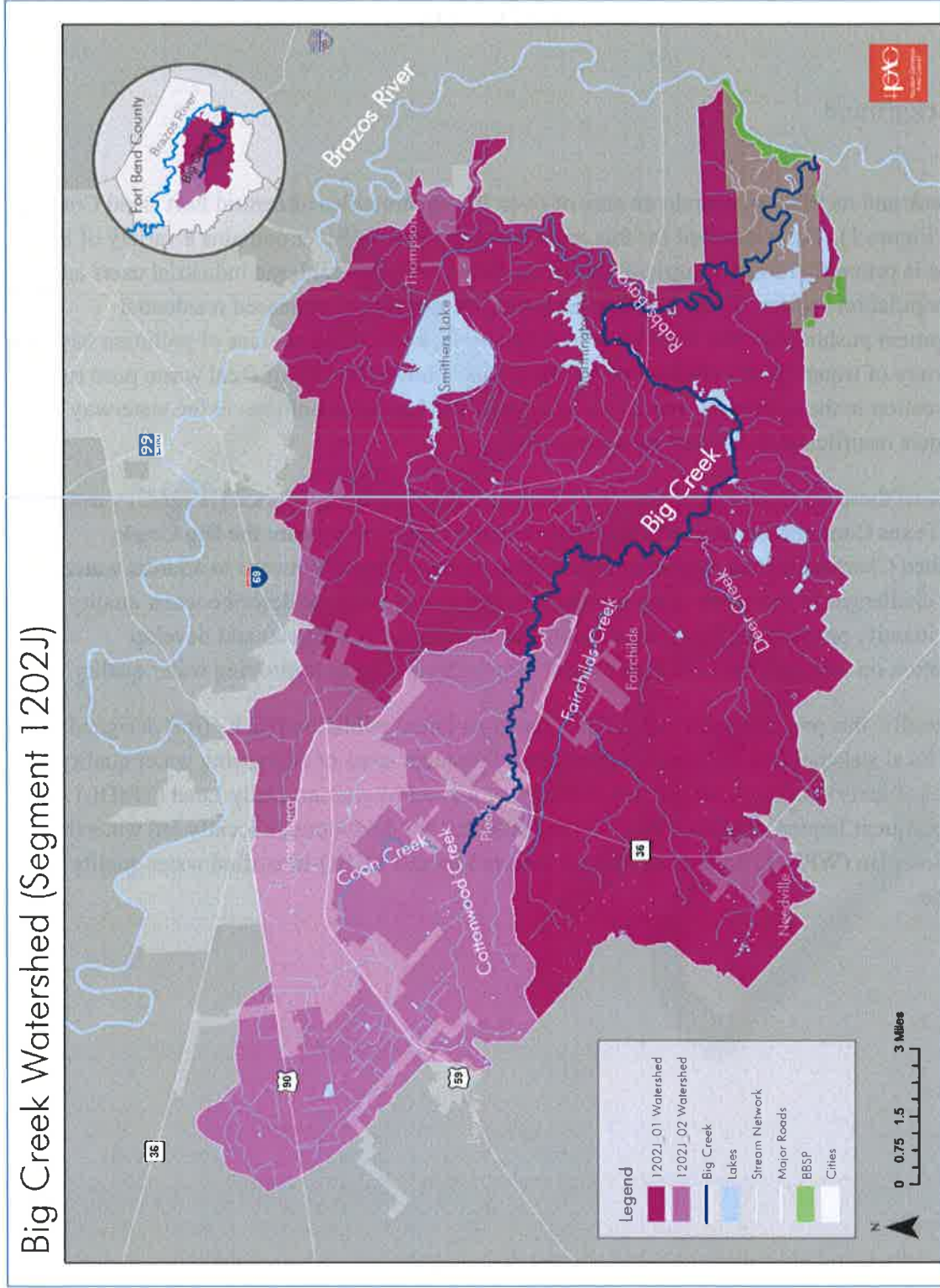


Figure 1 - The Big Creek Watershed

## 1.2 Water Quality Standards

Section 303(d) of the federal Clean Water Act (CWA) requires all states to identify waters that do not meet, or are not expected to meet, applicable water quality standards. State Water Quality Standards (SWQS) are developed based on the uses designated for each waterway.

These state standards are codified as state rules under Title 30, Chapter 307 of the Texas Administrative Code. The standards are written by the TCEQ under the authority of the Clean Water Act and the Texas Water Code. The U.S. Environmental Protection Agency (EPA) approves the Texas SWQS, which are designed to:

- designate the uses, or purposes, for which the state's water bodies should be suitable;
- establish numerical and narrative goals for water quality throughout the state; and
- provide a basis on which TCEQ regulatory programs can establish reasonable methods to implement and attain the state's goals for water quality.

The standards set explicit goals for the quality of streams, lakes, rivers, and bays throughout the region to protect the public's health and water supply, support aquatic life, and prevent degradation of water quality. Criteria for pollutants or conditions relevant to the standards (e.g., appropriate levels of dissolved oxygen, temperature, pH, dissolved minerals, toxic substances, and bacteria) are established to evaluate the ability of the waterways to support these uses.

The TCEQ meets the requirements of the CWA<sup>1</sup> by collecting and assessing water quality samples in its waterways. The assessments derived from this data are completed every two years<sup>2</sup> and are summarized in the Texas Integrated Report of Surface Water Quality (IR). Those water bodies that do not support one or more of the designated uses of the waterway, as measured by compliance with the SQWS, are included in the report's 303(d) list of impaired waterways.

The primary focus of this watershed characterization report are the elevated levels of fecal waste that affect Big Creek's ability to support the SWQS for contact recreation.

---

<sup>1</sup> Specifically, sections 350(b) and 303(d)

<sup>2</sup> Although this report references the approved 2014 Integrated Report of Surface Water Quality, Draft 2016 and 2018 versions are currently in the review and approval process.

### 1.3 Contact Recreation and Bacteria

Pathogens in human and animal waste can cause gastrointestinal and other illnesses and represent a public health risk during contact recreation<sup>3</sup> in contaminated waterways. The presence of fecal waste is measured using indicator bacteria or other indicators common to all warm-blooded animals. The presence of fecal indicator bacteria (FIB) suggests that human and animal wastes are reaching a waterway from a variety of potential sources, including inadequately treated human wastewater, agricultural animals, domestic pets, and wildlife.

The SWQS for contact recreation in freshwater systems uses the bacterium species *Escherichia coli* (*E. coli*) as the indicator for criteria<sup>4</sup> to assess whether a waterway can meet its contact recreation use designation. *E. coli* bacteria are found in human and animal intestines and feces and are easily assessed and predictive of human health risk in freshwater systems. Elevated FIB concentrations represent the most common water quality impairment in Texas, and this issue is widespread in the greater Houston region.

On February 12, 2014, the TCEQ adopted revisions to the Texas SWQS including the categorical levels of recreational use and their associated criteria. Recreational use consists of five categories for freshwater. Big Creek is classified as having a Primary Contact Recreation 1<sup>5</sup> use designation. Therefore, its evaluation for compliance with the SWQS for contact recreation is based upon the criteria for that use designation<sup>6</sup>, which are 126 MPN/100ml (for the geometric mean of the sampling data) and 399 MPN/100ml (for a single sample). Big Creek was first identified as being unable to support the contact recreation standard criteria in 2002 and has maintained an impairment for this standard ever since.

---

<sup>3</sup> Contact recreation includes activities that pose a significant risk of ingestion of water (e.g., swimming, wading by children, water skiing, diving, tubing, surfing, and the following whitewater activities: kayaking, canoeing, and rafting).

<sup>4</sup> Criteria are expressed as the number of bacteria per 100 milliliters (mL) of water [in terms of colony-forming units, most probable number (MPN), or other applicable reporting measures].

<sup>5</sup> Waterbodies are designated for primary contact recreation 1 unless sufficient site-specific information demonstrates that elevated concentrations of FIB frequently occur due to sources of pollution that cannot be reasonably controlled by existing regulations; wildlife sources of bacteria are unavoidably high; there is limited aquatic recreational potential; or primary or secondary contact recreation is considered unsafe for other reasons such as ship and barge traffic.

<sup>6</sup> While this characterization report focuses on contact recreation impairment and fecal indicator bacteria, it is also worth noting that aquatic life use standard for Big Creek is Minimal for AU2 (upstream) but becomes High in AU1 after flow appreciably increases after the confluence of several tributaries. Other concerns noted in the 2014 Integrated Report of Surface Water Quality Impact, or may impact, the aquatic life use.



*Figure 2 - Big Creek at Boothline Road*

#### 1.4 Total Maximum Daily Load Program

As part of the CWA requirements, States must develop a TMDL for each pollutant that contributes to the impairment of a listed water body. The TCEQ is the lead agency responsible for developing TMDLs for impaired surface waters in Texas.

A TMDL is like a budget – it determines the amount of a pollutant that a water body can receive and still meet its applicable water quality standard. A TMDL is commonly expressed as a load with units of mass per unit of time but may be expressed in other ways. When a TMDL is established, an Implementation Plan is developed to identify the regulatory and voluntary management measures necessary to improve water quality and restore full use of the water body.

The TMDL Program is a major component of Texas’s overall process for managing the quality of its surface waters. The program addresses impaired or threatened streams, reservoirs, lakes, bays, and estuaries (water bodies) in, or bordering on, the state of Texas. The primary objective of the TMDL Program is to restore and maintain the beneficial uses – such as drinking water supply, recreation, support of aquatic life, or fishing – of impaired or threatened water bodies. H-GAC is one of the partners that supports the TCEQ in the development of TMDLs and Implementation Plans within its 13-county region.

### 1.5 Characterization Report Purpose and Organization

This document will consider the extent and contributing factors related to the contact recreation impairment in Big Creek (Segment 1202J). The primary purpose of this report is to provide background information on watershed characteristics (geography, hydrology, land use, potential sources of contamination, and extent and character of the contact recreation impairment) to inform subsequent TMDL and Implementation Plan development processes. Other water quality issues and concerns raised by local stakeholders in the preliminary review and feedback phase of this project are included for context and reference.

The primary elements of this report are:

- introduction (Section 1);
- watershed description (Section 2);
- historical data review (Section 3);
- preliminary flow assessment (Section 4);
- identification of potential sources of contamination (Section 5); and
- summary of findings (Section 6).



*Figure 3 - Big Creek at Hartledge Road*

## Section 2

### Watershed Description

#### 2.1 Description of the Big Creek System

##### Segment Description

Big Creek (Segment 1202J) is an unclassified<sup>7</sup> stream segment located in the central Fort Bend County portion of the Brazos River Watershed<sup>8</sup> (Figure 4). The main stem of this freshwater stream is approximately 34 miles long and follows an old channel of the meandering Brazos River<sup>9</sup>. The headwaters of the waterway lie in ephemeral drainage and minor streams of the primarily rural areas south and west of Rosenberg. Additional headwaters areas south of the Sugar Land area feed tributaries (e.g. Rabbs Bayou) that enter the main channel lower in the system. The officially-designated segment itself starts at the confluence of Cottonwood and Coon Creeks and receives flow from a variety of other smaller tributaries in other parts of the system. For much of its length, the segment is a small to medium sized stream that has been heavily modified in many areas to act as a drainage conveyance or as part of agricultural improvements (e.g., berms in riparian edges of fields). The creek's terminal end is at its confluence with the Brazos River at the eastern edge of Brazos Bend State Park. Unlike the channel upstream, the waterway within the confines of the park is relatively unmodified and has more natural riparian areas.

TCEQ evaluates two separate portions of the waterway, called assessment units (AUs). These AUs (Figure 5) from downstream to upstream are:

- 1) 1202J\_01 – the portion of Big Creek from its confluence with the Brazos River immediately east of Brazos Bend State Park upstream to a point just east of FM 2977 south of the City of Rosenberg; and
- 2) 1202J\_02 – the portion of Big Creek upstream of 1202J\_01 to its headwaters at the confluence of Cottonwood Creek and Coon Creek just west of Highway 36 and the City of Pleak.

The primary difference between the AUs are that 1202J\_02 (upstream) is intermittent with pools, and has an intermediate aquatic life use designation, while 1202J\_01 (downstream) is a perennial stream with high aquatic life use designation. However, in consideration of the primary focus of this characterization effort, the AUs have the same contact recreation designation.

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<sup>7</sup> "Unclassified" is a designation given to stream segments that are tributaries to a primary, classified segment.

<sup>8</sup> Specifically, Big Creek falls within the watershed of Segment 1202, Brazos River Below Navasota River.

<sup>9</sup> As referenced from [en-5/17/19](#) on

[https://tpwd.texas.gov/publications/pwdpubs/pwd\\_rp\\_t3200\\_1059c/big\\_creek.phtml](https://tpwd.texas.gov/publications/pwdpubs/pwd_rp_t3200_1059c/big_creek.phtml)

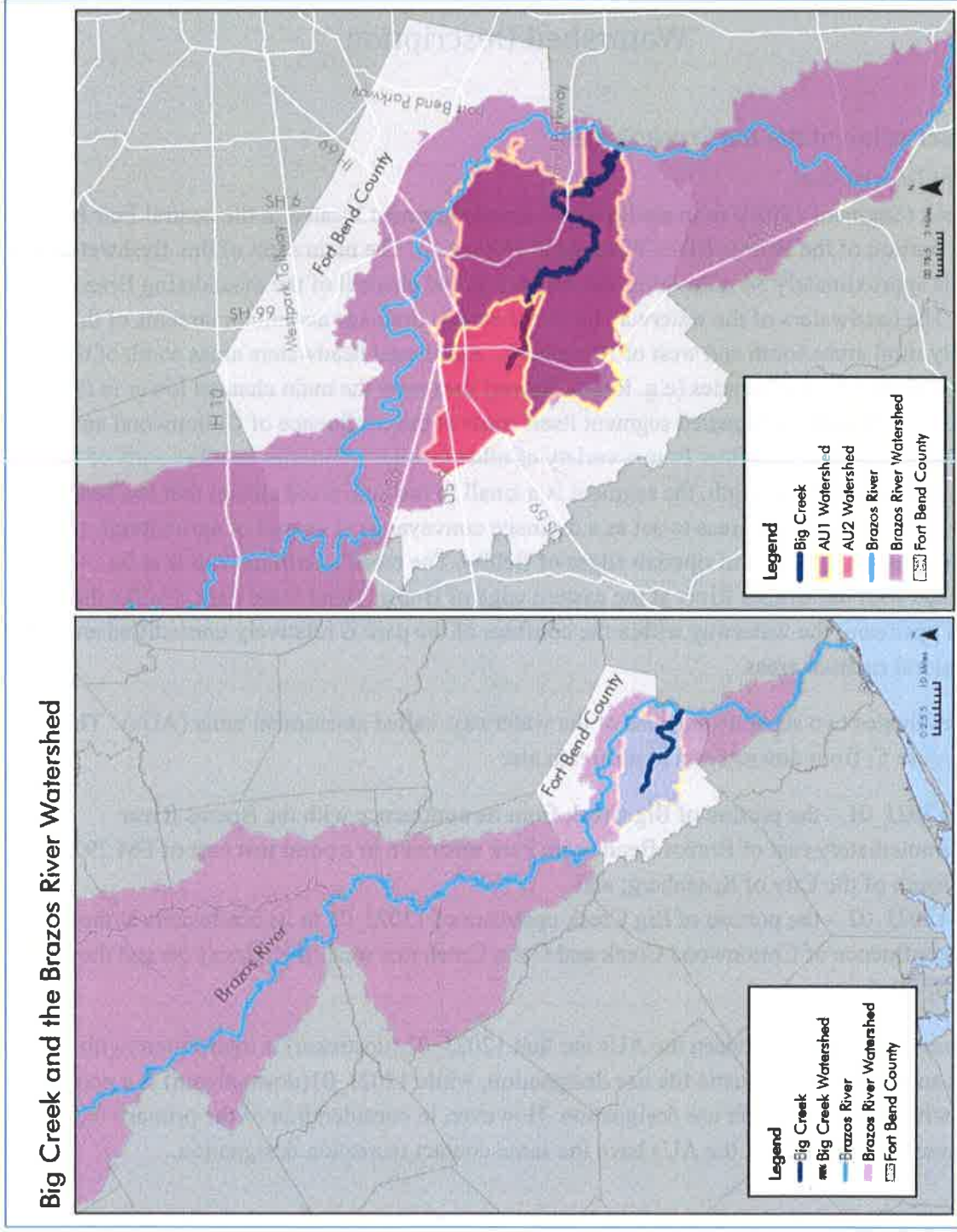


Figure 4 - Big Creek and the Brazos River Watershed

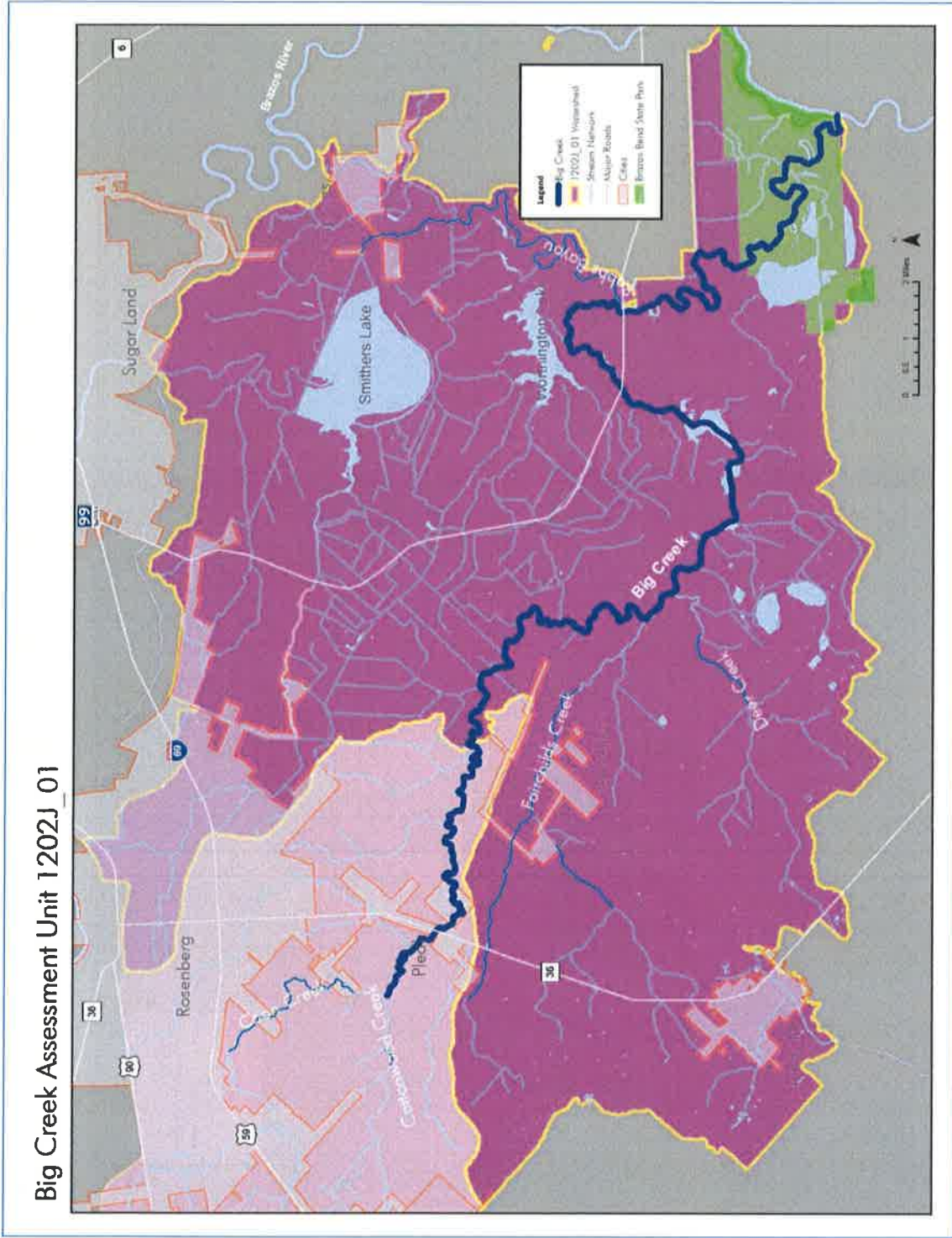


Figure 5 - Big Creek Assessment Unit 1202J\_01 (Downstream)

Characterization Report for Indicator Bacteria in the Big Creek Watershed

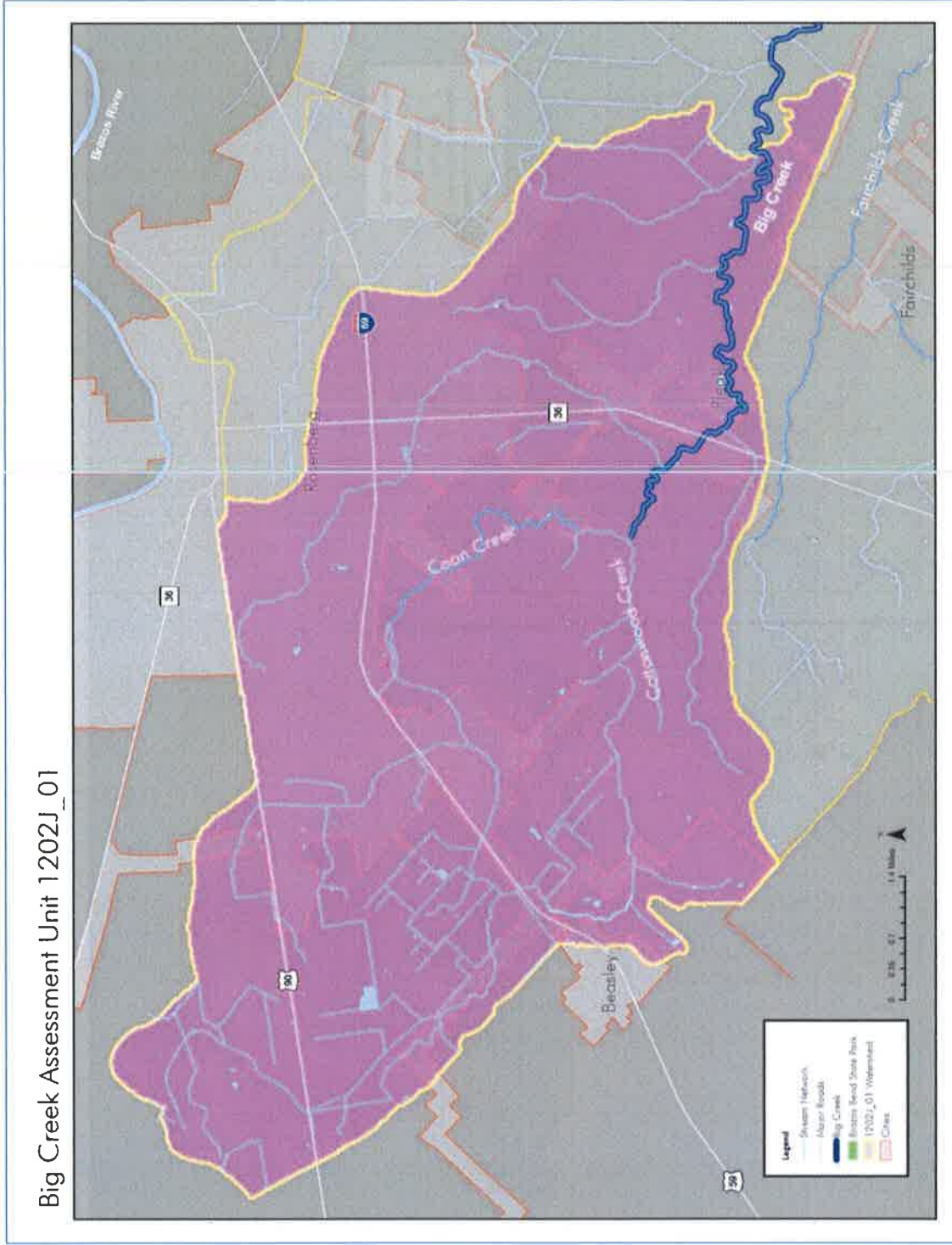


Figure 6 - Big Creek Assessment Unit 1202J\_02 (Upstream)

Stream Network

In addition to the 34 stream miles of Big Creek itself, its drainage network consists of an additional 414 miles of tributaries, impoundments, and drainage conveyances. There are six primary tributaries to the main channel: Coon Creek, Cottonwood Creek, Seabourne Creek, Fairchilds Creek, and Deer Creek in AU2, and Rabbs Bayou in AU1. In addition, AU1 receives conditional flows from the outlets of Smithers and Worthington Lakes. Close to the end of AU1, a large drainage bypass channel diverts flow from the main channel directly to the Brazos River during certain flow conditions. Figure 7 is a network diagram (not to scale) of the progression of tributaries and components of the system from upstream (left and top) to downstream (right), emphasizing the dual headwater areas of the system.

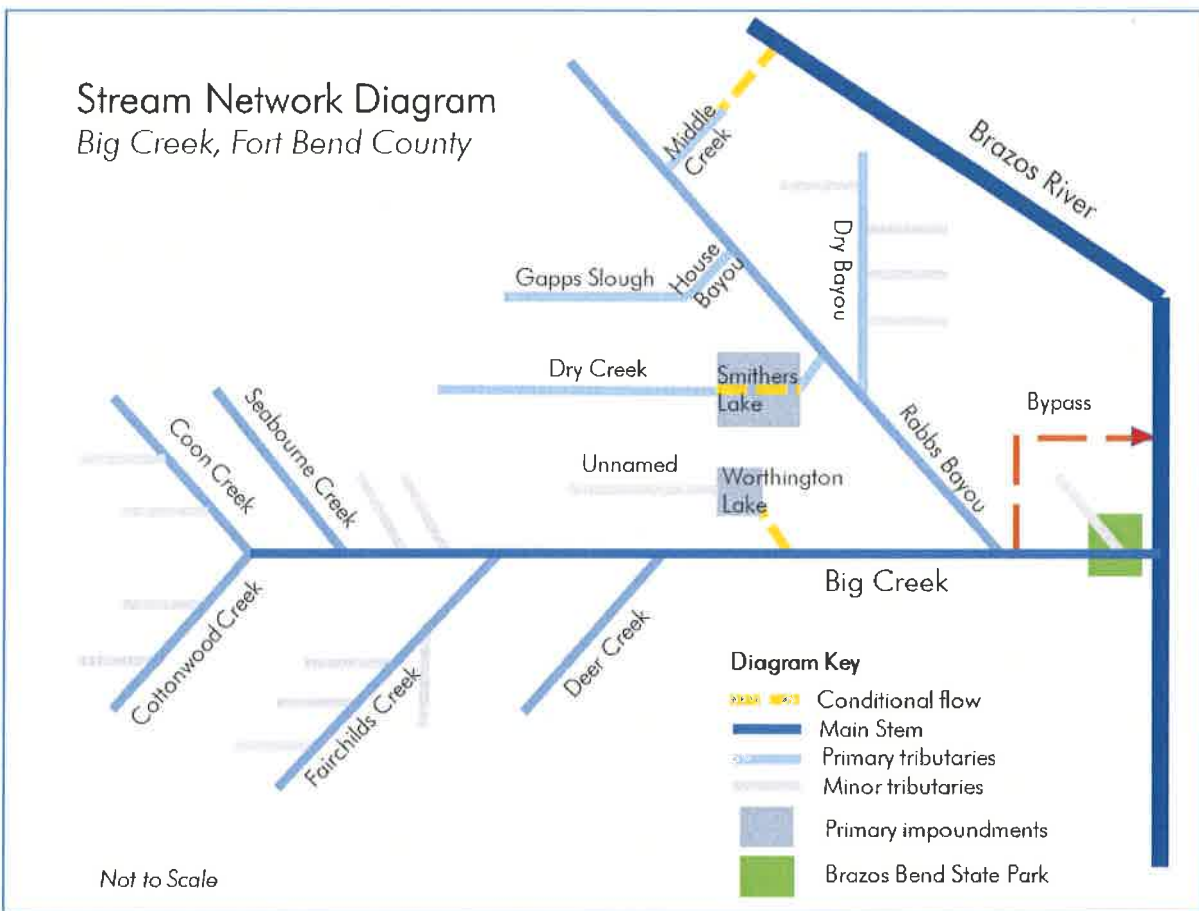


Figure 7 - Stream Network Diagram of Big Creek

## **Primary Tributaries**

*Coon Creek* – Coon Creek is a small, intermittent tributary draining an area of transitional mixed land use along the southwestern border of the City of Rosenberg. It is one of the two primary headwaters tributaries of AU2.

*Cottonwood Creek* – Along with Coon Creek, Cottonwood Creek is the second primary headwaters tributary for Big Creek, whose official segment begins at their confluence. Most of the drainage area for this tributary is a mix of agricultural areas and light rural development. Its headwaters include several areas of historic or active oil production west of Rosenberg.

*Seabourne Creek* – Seabourne Creek originates immediately west of Rosenberg in agricultural field drainage. However, much of its length passes areas of suburban and exurban development before its confluence with Big Creek immediately downstream of the confluence of Cottonwood and Coon Creeks. Its most notable feature is the dense riparian buffer that is maintained around an appreciable portion of its middle sections.

*Fairchilds Creek* – Fairchilds Creek's headwaters are in the developed area of Needville, as well as agricultural and rural surrounding areas. Its immediate environs along its length are rural and agricultural uses typical of the watershed. As it approaches its confluence with Big Creek immediately west of FM 1994, its riparian forest cover and relatively natural floodplain broadens, although it remains a heavily modified and maintained drainage channel. Several natural and constructed impoundments intercept sheet flow in this area, providing potential treatment.

*Deer Creek* – Deer Creek is similar to the other tributaries described in this west/southwest area of the watershed. Its immediate riparian areas are a mix of rural and agricultural uses other than the very start of its flow in the area near Highway 36, east of Needville. It joins the Big Creek system immediately downstream of the Fairchilds Creek confluence (west of FM 1994 on the JB Harrison Foundation property, benefitting from the same natural and constructed wetland impoundments of this area).

*Rabbs Bayou* – The Rabbs Bayou system drains most of the watershed area east of Rosenberg and north and east of Smithers Lake. It includes flow from a variety of smaller tributaries, drainage from street systems and conveyances from the developing areas east of Rosenberg, and outflow from Smithers Lake (see below). Its channels upstream of the confluence with the outflow from Smithers Lake is highly modified, while the stretch below this point is relatively more natural (though still historically modified and maintained as a drainage conveyance). The confluence of Rabbs Bayou and Big Creek is located directly upstream of the drainage bypass (see below).

### **Conditional Flow Contributions**

*Smithers Lake* – Smithers Lake is created by the impoundment of drainage from the center of the watershed to form an impoundment used by the W.A. Parish Generating Station, a large electric generating facility serving the region. Water levels on Smithers Lake are maintained by a control structure on its eastern end, supplemented from time to time by water supply canal flows. Flow through the Smithers Lake system is dependent on the lake level and operating needs of the plant. In discussions with stakeholders and county drainage district staff, flow from this system is not typically appreciable enough to greatly impact downstream hydrology.

*Worthington Lake* – Worthington Lake is another artificial impoundment but is not actively maintained. It intercepts a small amount of drainage, and outflow is dependent solely on lake level exceeding the impounding structure. Flow from this system is not appreciable even in overflow conditions.

### **Other System Features**

*Drainage Bypass* – A large drainage bypass structure intercepts flow exceeding a static elevation at the confluence of Rabbs Bayou and Big Creek. It also intercepts flow coming south from the area east of Rabbs Bayou and west of the Brazos River (including Waters Lake Bayou), effectively removing this area from the Big Creek Watershed. At its eastern terminus, a flap gate control structure helps prevent backflow from the Brazos. However, at high enough elevation, Brazos water floods this low-lying area, and may move backward into the system at this point.

*WCA Fort Bend Landfill* – A series of small lakes and active landfill cells make up a large tract of land directly downstream of the confluence of Big Creek, Deer Creek and Fairchilds Creek, just east of FM 1994. Stormwater reaching the active face of the landfill is required to be handled separately and segregated from flows reaching Big Creek, but flow from the external areas continues through the non-active site to reach Big Creek. Many of the impoundments and features in this small area are remnants of previous activities on this property, including extensive sulfur mining in the area.



*Figure 8 - Drain Bypass Structure at the Confluence of Rabbs Bayou and Big Creek*

### Drainage Area/Watershed Delineation

Big Creek and its associated tributaries drain an area of 221 square miles in total. The watershed for the system was delineated using multiple geospatial datasets, aerial image evaluation, stakeholder feedback, and limited windshield survey reconnaissance. The starting point for delineating the watershed was USGS's National Hydrography Dataset Plus, which provides granular catchment level delineation. Adjustments were made to this dataset to account for hydrologic barriers, change in flow on the ground due to new development, and the large drainage bypass along the southeastern portion of the watershed. The watershed was further delineated to represent the respective drainage areas of the two AUs (Figure 9).

### Big Creek Watershed Delineation

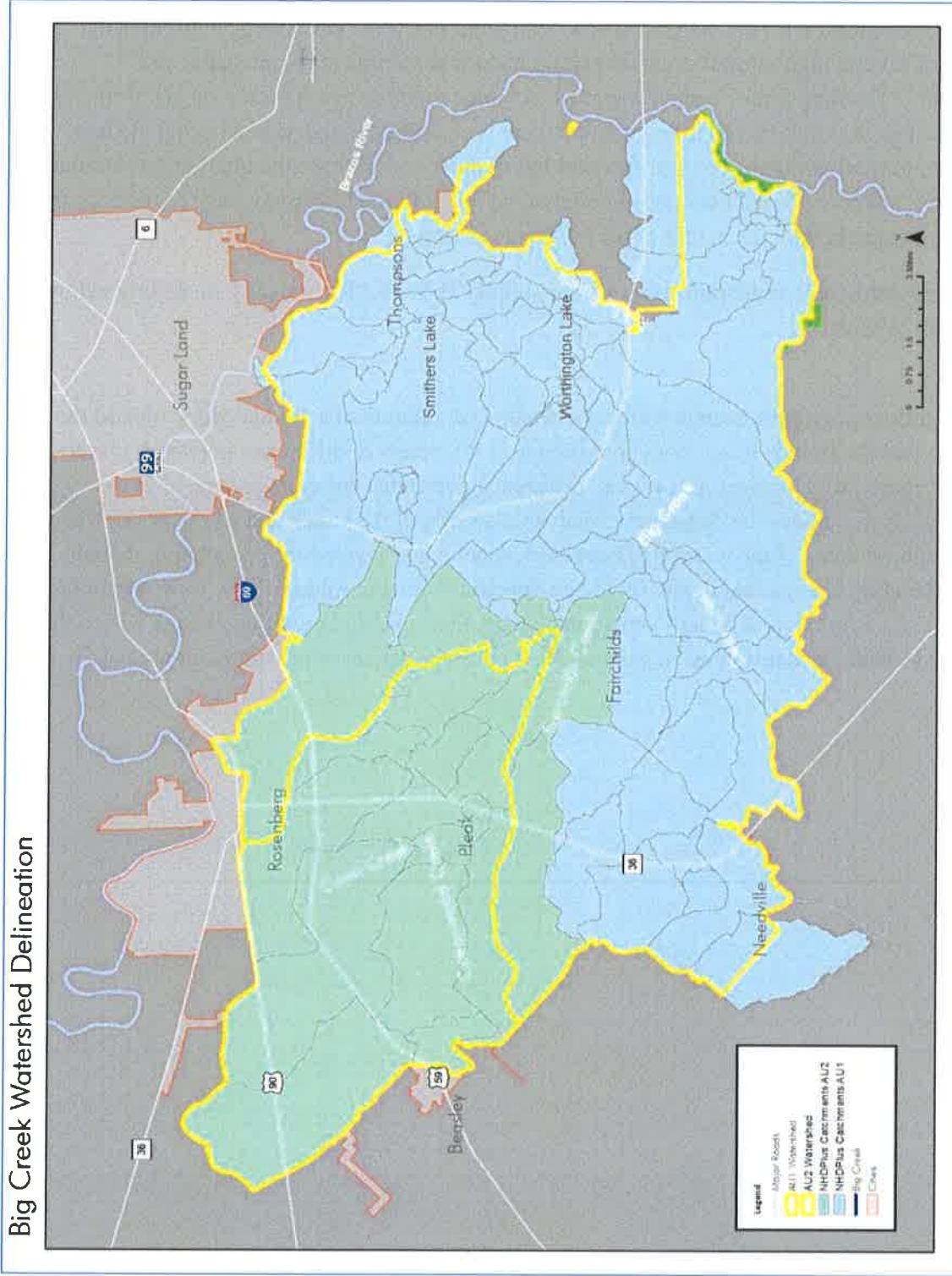


Figure 9 - Big Creek Watershed Delineation

## 2.2 Watershed Climate and Environmental Characteristics

### Precipitation and Temperature<sup>10</sup>

Average precipitation for the watershed is 47.78 inches per year. This average obscures the impacts of several high rainfall events breaking historical records in recent years, and exacerbating flooding issues in the watershed. Average monthly precipitation ranges from 2.80 to 5.00 inches. Rainfall occurs throughout the year with February and March seeing the least amount of rainfall while the late summer and fall months typically see the greatest rainfall due to tropical disturbances. September and October stand out with the highest average rainfall, as those months correspond with the height of the hurricane season.

Average monthly air temperature ranges from slightly above 52°F in January to slightly below 84°F in the August.

### Elevation

There is little topographic change within the watershed, other than a gradual slope toward the southeast and the Brazos River, with approximately 40 meters of difference in overall elevation change (Figure 10). However, this overall difference overstates the average change in the watershed, as it includes the deepened conveyance profile of the Creek and its channels. Many of the agricultural areas of the watershed have been specifically leveled for production, making overall elevation change less impactful to site-specific drainage. Additionally, flow within the system is less a function of overall elevation change, than specific, modified change within the waterways/channels themselves. In general, flow rates are typical of coastal plain waterways of this size.

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<sup>10</sup> Based on National Oceanic and Atmospheric Administration (NOAA) weather station data for station GHCND:USC00418996, Thompsons 3 WSW, TX US. Data accessed on July 14, 2019 and 8/15/2019 at <https://www.ncdc.noaa.gov/cdo-web/>.

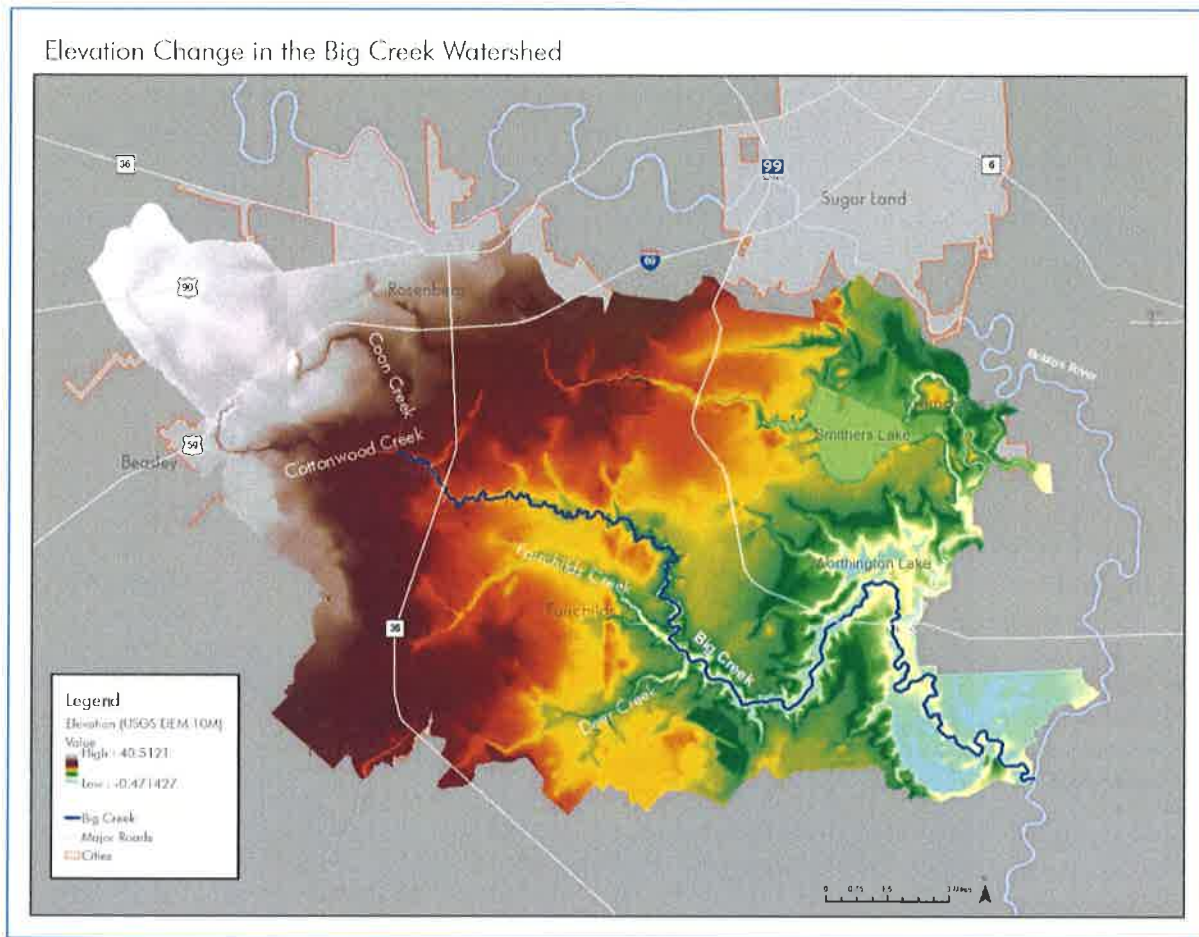


Figure 10 - Elevation Change in the Big Creek Watershed

### Water Usage

There are several adjudicated water rights within the Big Creek system. However, the only water right of appreciable volume is the impoundment and use of Smithers Lake water in electrical generation by the W.A. Parish Plant. Based on discussions with plant staff and Fort Bend County Drainage District staff, withdrawals from the impoundment do not have an appreciable impact on flows, or likely water quality impacts, downstream. For portions of the upper AU, the waterway is dominated by wastewater effluent. The transition from groundwater to surface water in Fort Bend County may eventually impact water resources in the watershed but is not currently a factor in water usage patterns.

### Soils

Fine-textured soils dominate the county in general (Figure 11), with shallow, chalky, calcareous soils being common, limiting vegetative growth in some managed riparian areas and slopes.

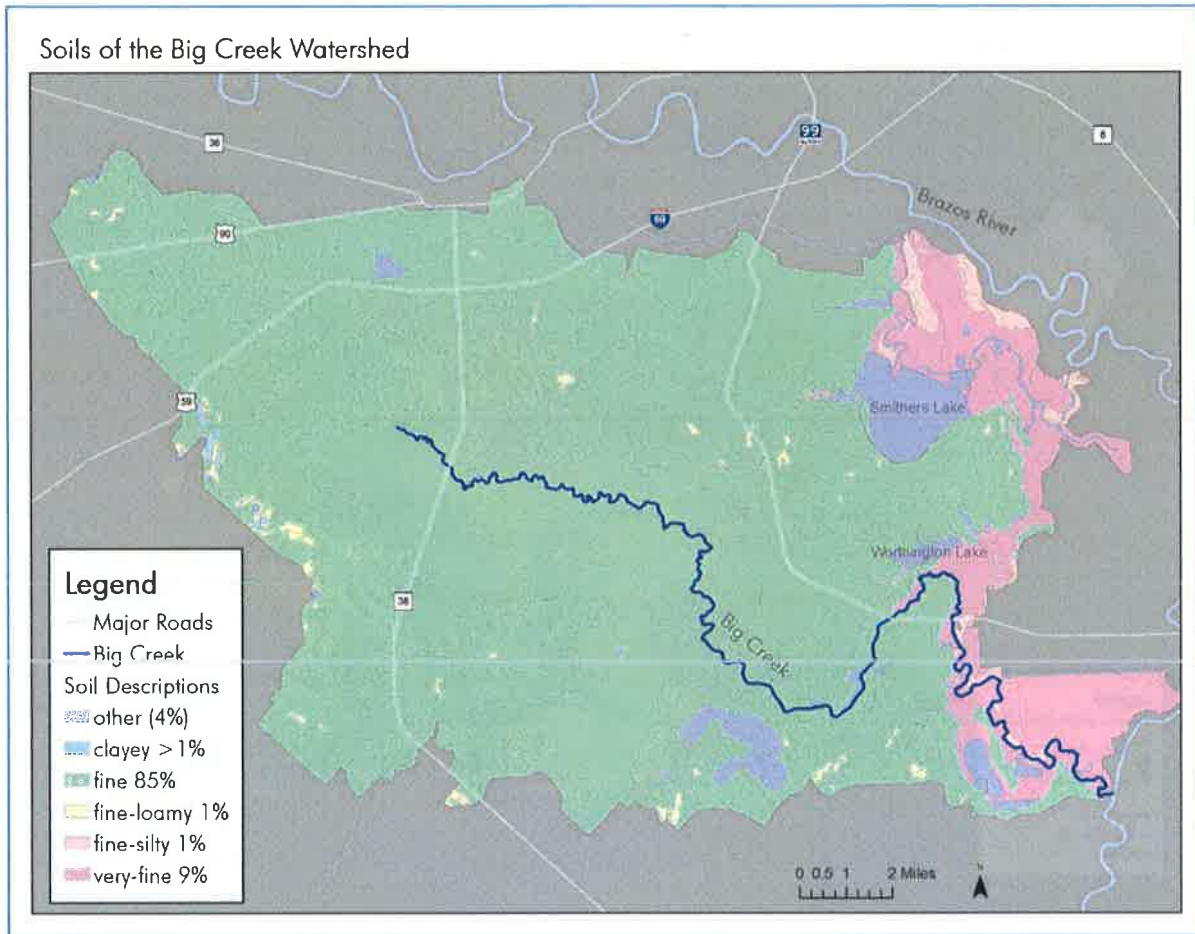


Figure 11 - Soils of the Big Creek Watershed

### Ecoregions

Big Creek falls primarily within the Northern Humid Gulf Coast Prairies area of the Western Gulf Coastal Plan, as defined by EPA’s Level III and IV Ecoregion classifications<sup>11</sup>. In its native state, these areas were characterized by extensive tallgrass prairie with small forested areas, often adjacent to riparian zones. A small portion of the eastern extent of the watershed falls within the Floodplains and Low Terraces region represented by the Brazos River floodplain. Typical native vegetation includes Little Bluestem, Switchgrass, and other dominant grasses, along with a variety of oak species, including native Live Oak. Centuries of development have altered much of the native species and habitat, with developed and agricultural areas being dominant over natural plant and animal communities in the areas outside relatively natural areas like Brazos Bend State Park. Even in its altered state, the area has a diverse array of animal life, with close to 300 bird species noted at Brazos Bend State Park. Areas in the watershed have had consistent

<sup>11</sup> Accessed from <https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-state> on 6/23/19.

issues with invasive species like feral hogs (a specific concern for the focus of this effort) and various invasive plants (alligator weed, Chinese tallow, etc.).

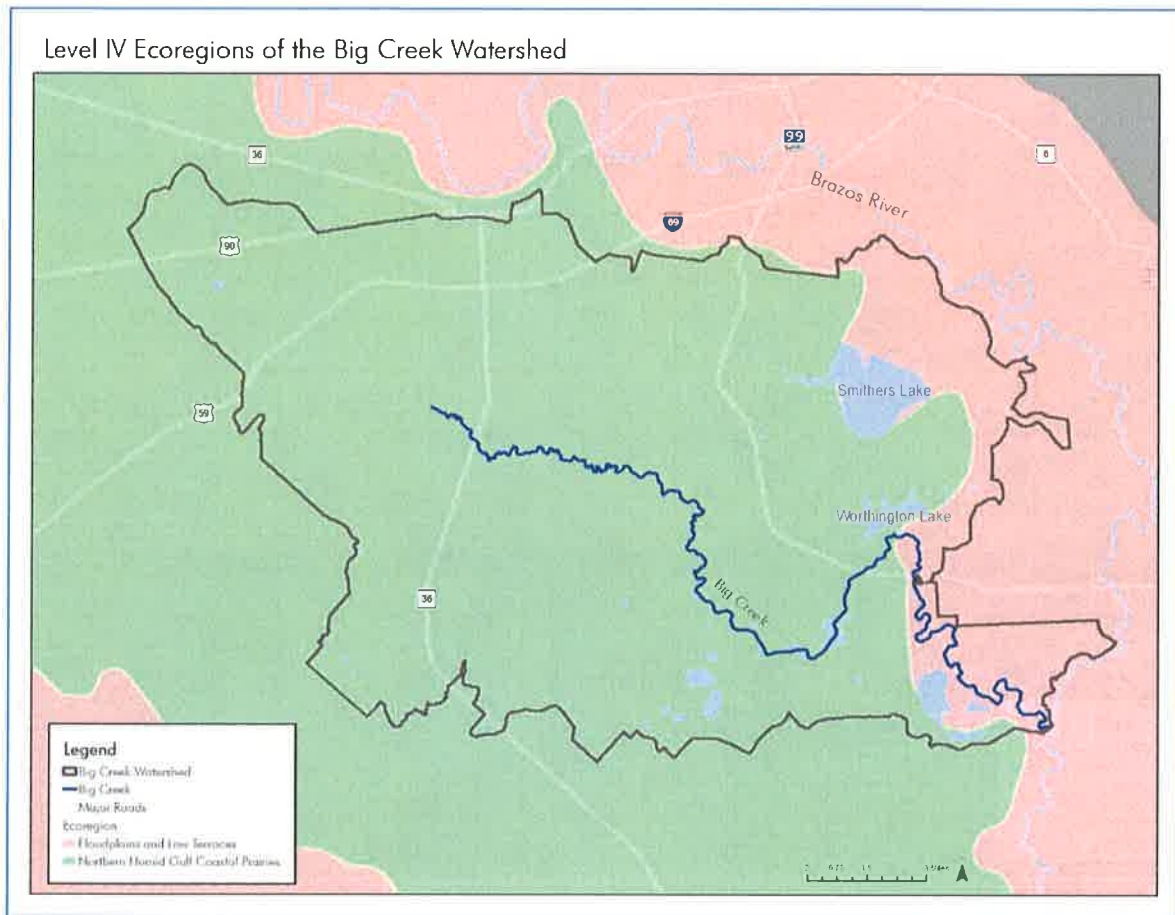


Figure 12 - Level IV Ecoregions of the Big Creek Watershed

### Local Political Geography

Big Creek falls wholly within Fort Bend County, and within the jurisdiction of the Fort Bend County Drainage District. It contains all or a portion of six cities or census designated places, including a small portion of the City of Sugar Land, a substantial part of the City of Rosenberg, part of the City of Needville, part of the Town of Thompsons, part of the City of Beasley, and all the villages of Pleak and Fairchilds. Additional small communities without formal governmental structure exist in the area, although development outside of the suburban expansion of the Rosenberg area is generally closer to traditional small-town development patterns. There are 22 municipal utility districts (MUDs) in or partially in the watershed, all of which are clustered in areas directly adjacent to the City of Rosenberg. The other notable political jurisdictions in the watershed are Brazos Bend State Park, a portion of the West Fort Bend Management District, Lamar and Needville Independent School Districts) and part of the service area of the Brazos River Authority.

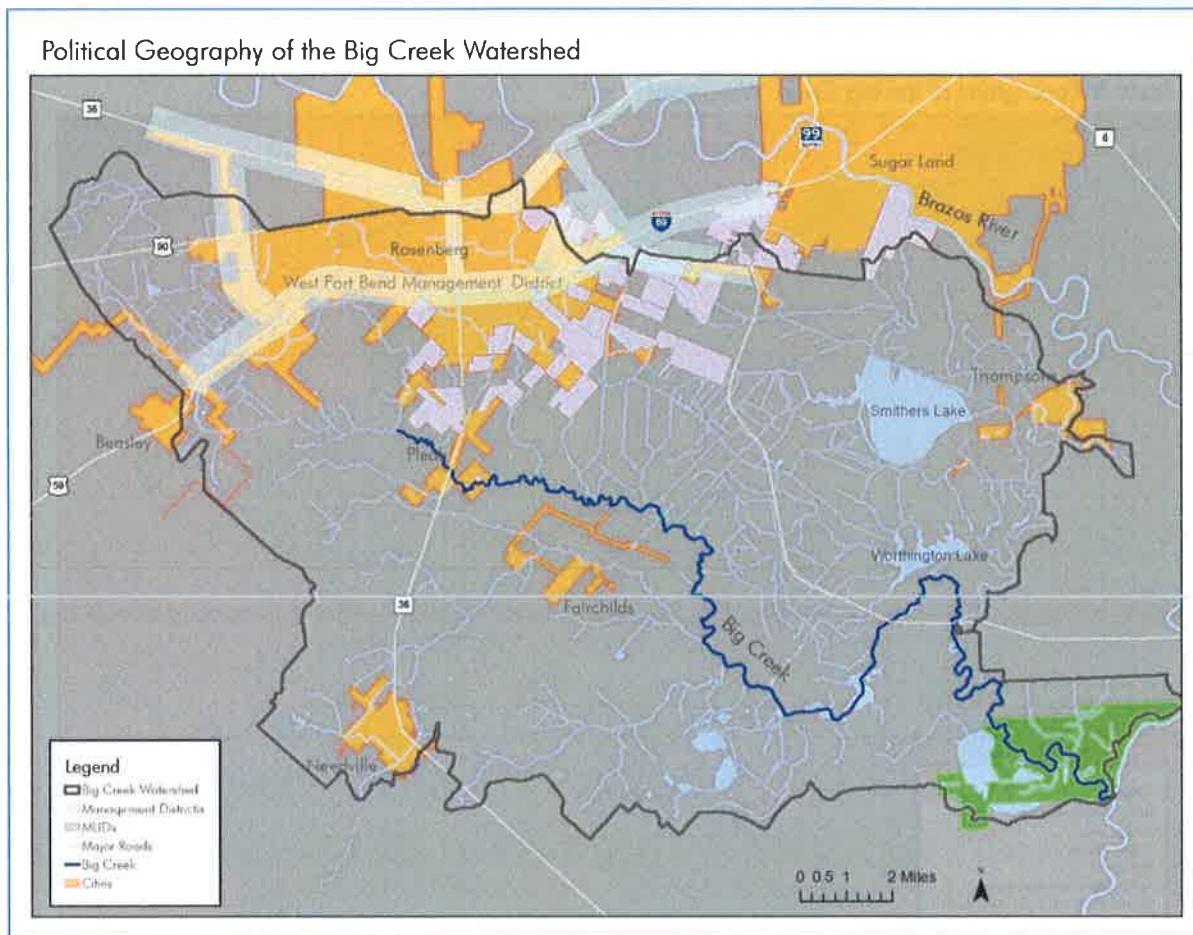


Figure 13 - Political Geography of the Big Creek Watershed

### 2.3 Watershed Population and Population Projections

The Big Creek Watershed contained a population of 58,442, representing 24,080 households, in 2018 (Table 1). Based on the H-GAC Regional Growth Forecast<sup>12</sup> demographic projections, the population of the watershed is expected to increase dramatically by 2040, at which point it will be 392,396, representing 150,879 households. This represents a net gain of 333,954 additional residents, a 571% increase. For comparison, the entire population of Fort Bend County was less (52,314) than the current population of the Big Creek Watershed.

<sup>12</sup> More information on the Regional Growth Forecast can be found at <http://www.h-gac.com/regional-growth-forecast/default.aspx>.

Table 1 - Population Change in the Big Creek Watershed

Year	2018	2020	2030	2040
Population	58,442	65,108	163,556	275,650
Change, year to year	-	6,666	98,448	112,094
Percent change, year to year	-	11%	151%	68%

Like other areas in the county and region, growth is generally pushing out from urban centers and along transportation corridors. However, the availability of MUDs and other districts as funding mechanisms for new development means development will not necessarily continue to expand in a contiguous manner.



Figure 14 - Stormwater Management Structure near Seabourne Creek Park

## 2.4 Land Cover and Land Use

Land cover describes the physical land type of an area, such as forest or open water, while land use describes how people are using the land<sup>13</sup>. Change in either the physical surface of the land or the way in which it is used can impact water quality. Both land cover and land use have gone through iterations of change across the history of the watershed but are currently changing most rapidly in portions of its northern and western areas around Rosenberg and major transportation corridors.

<sup>13</sup> From “What is the Difference between Land Cover and Land Use?” Available online at: <https://oceanservice.noaa.gov/facts/lclu.html>. Accessed on May 13, 2019.

**Land Cover**

The project area was historically a mix of tallgrass prairies, oak mottes, and low-lying wetlands. After several hundred years of successive waves of human occupation, much of the native landscape has been converted to other uses. Since the early settlement of the area, widespread agricultural production has been the dominant land cover (and land use) type. Recent decades have seen a more rapid transition to denser urban and suburban development.

Land cover data<sup>14</sup> in the watershed indicates that the most predominant land cover type is still agricultural lands, with the combination of cultivated crops and pastureland comprising 53.3% of the area in both segments (Table 2). However, developed areas of varying intensity are common in the watershed (35.6%), especially in the aforementioned high growth areas, and an appreciable acreage of “natural”<sup>15</sup> areas still exist (13.1%). Figure 15 shows the distribution of land cover in the watershed. The balance of land cover types in the watershed is expected to continue to shift toward developed uses in the future, in line with the population and household projections in section 2.3.

*Table 2 - Land Cover by Category*

<b>Land Cover Category</b>	<b>% of Total Land Cover</b>	<b>Acres</b>
Open Water	1.6%	2,235
High Intensity Developed	0.8%	1,091
Medium Intensity Developed	24.4%	34,576
Low Intensity Developed	7.8%	10,983
Developed Open Space	2.6%	3,710
Barren Areas	0.0%	14
Forests and Shrublands	7.5%	10,670
Pasture and Grasslands	32.6%	46,148
Cultivated Crops	18.8%	26,604
Wetlands	3.8%	5,410

<sup>14</sup> Land cover data was derived from NOAA National Land Cover Dataset (NLCD) data for historic datasets, and H-GAC 10-class land cover converted from LANDSAT imagery for 2018 (“current”) data.

<sup>15</sup> For the purposes of this description, “natural” means areas not in active production or developed uses. This includes open water, second growth forests, barren areas, etc. It does not indicate undisturbed wilderness.

## Land Cover in the Big Creek Watershed

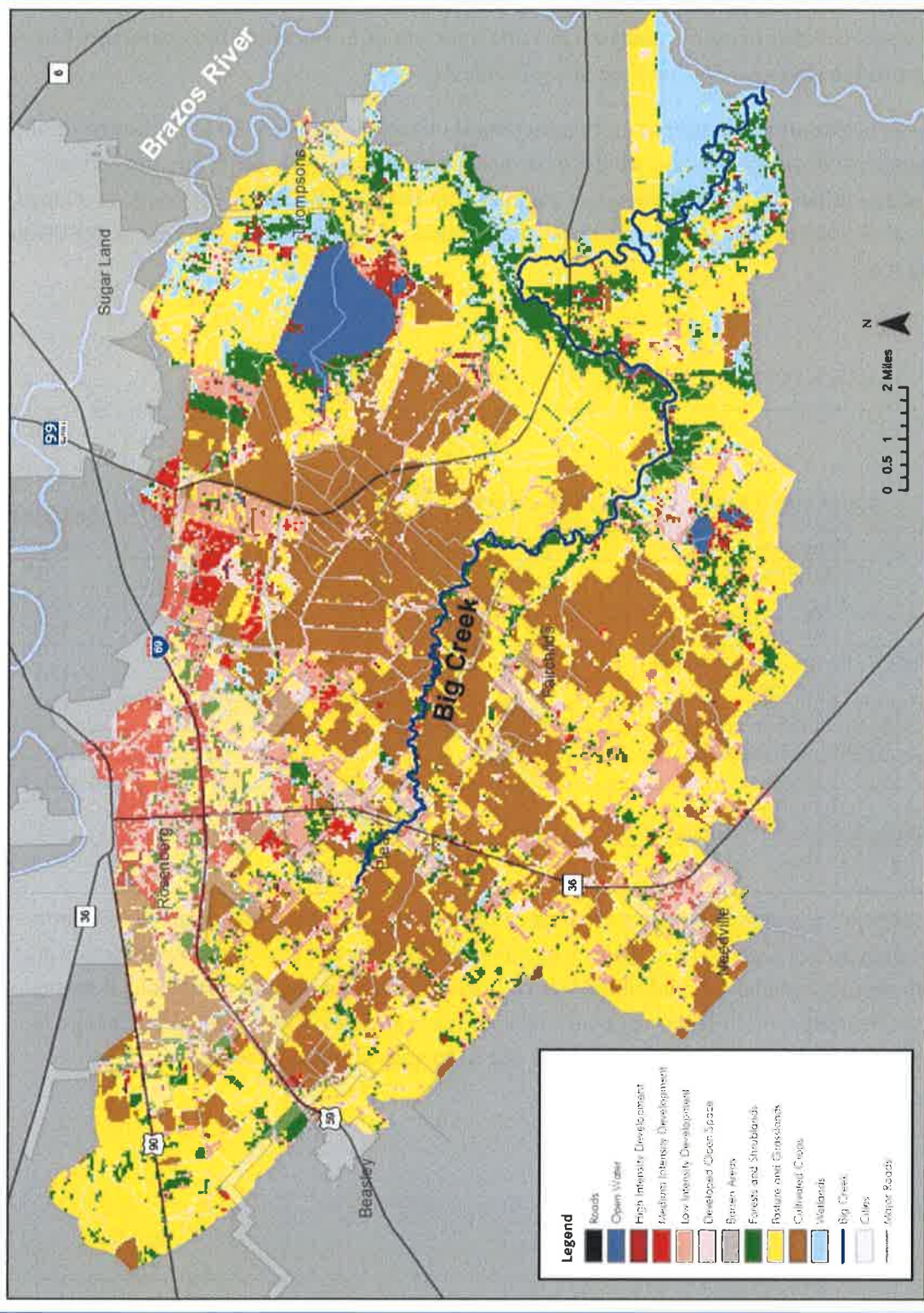


Figure 15 - Land Cover in the Big Creek Watershed

Land Use

To analyze land use patterns, change between current and future (2045) land use data from H-GAC’s regional demographic analyses provide a picture of a watershed in transition, while still highly rural in character for the time being (Table 3).

Land use in this area is predominantly agricultural or not currently in use with the potential for development. Residential areas are the next most common land use, reflecting the current presence of urban centers and suburban expansion in the area. By 2045, however, developed uses (residential, commercial, and multiple use areas) have increased to over 40% of the watershed area in total.

Table 3 - Land Use in the Big Creek Watershed, 2018 and 2045

<b>Land Use Type</b>	<b>2018 - Acres</b>	<b>2018 - % of Total Area</b>	<b>2045 - Acres</b>	<b>2045 - % of Total Area</b>
Unknown	826	0.6%	826	0.6%
Undevelopable	5,266	3.9%	5,266	3.9%
Residential	15,972	11.8%	34,172	25.3%
Commercial	828	0.6%	1,089	0.8%
Vacant Developable (includes Farming)	100,243	74.3%	58,072	43.1%
Multiple	4,800	3.6%	27,383	20.3%
Parks/Open Spaces	5,697	4.2%	5,697	4.2%
Other	55	0.0%	1,772	1.3%
Industrial	966	0.7%	55	0.0%
Governmental/Medical/Educational	175	0.1%	496	0.4%

Land uses in the watershed reflect the land cover, but also point to projections for the future of developing areas (Figures 16 and 17, respectively). Consideration of future impacts to water quality should consider the additional source load from human and domestic animal waste sources, the reduction in legacy agricultural sources, and especially the potential change in hydrological character of the drainage area due to increased impervious cover.

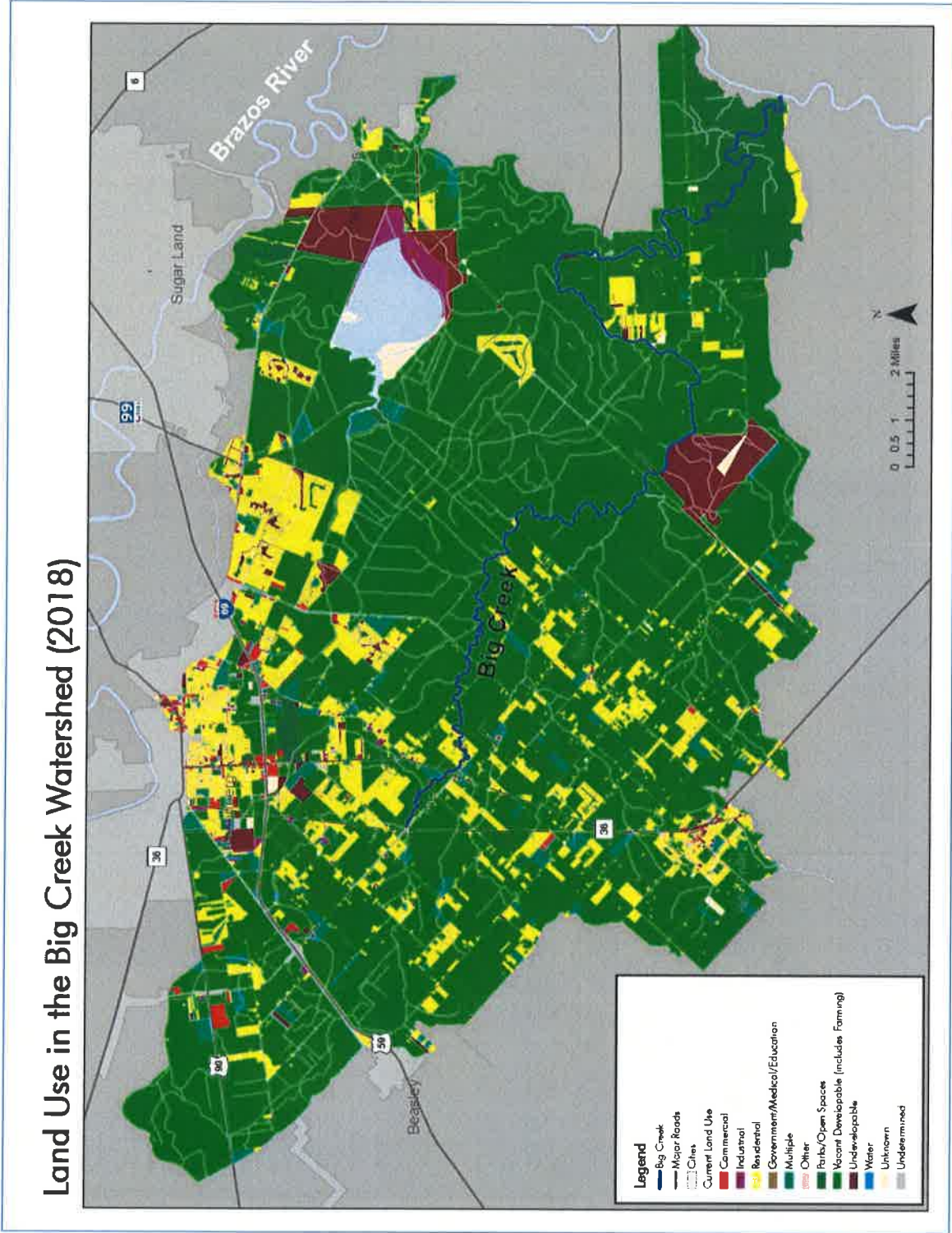


Figure 16 - Land Use in the Big Creek Watershed (2018)

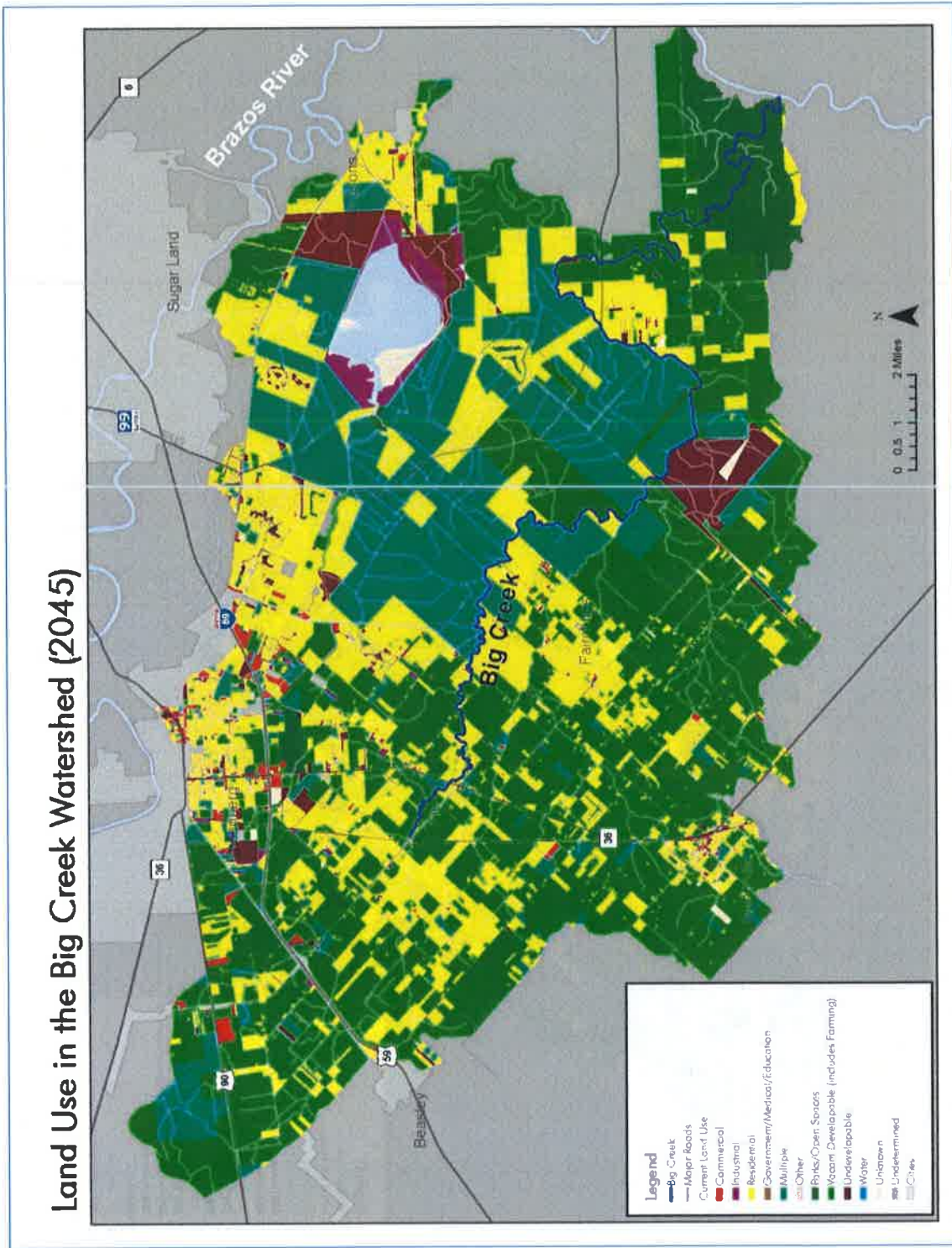


Figure 17 - Land Use in the Big Creek Watershed (2045)

## Section 3

### Review of Historical Data

#### 3.1 Historical Data Sources Overview

Contact recreation impairments in a waterway can represent a variety of conditions and arise from a number of different sources. Combined with an evaluation of the relationship between pollutant loads and flow (Section 4), potential sources of pollution (Section 5), and stakeholder feedback, historical water quality data sources helps provide a more precise understanding of the extent and conditions under which fecal pollution may be occurring. The data reviewed in this characterization include ambient monitoring data collected under the Clean Rivers Program (CRP), discharge monitoring reports (DMRs) from wastewater treatment facilities in the watershed, and sanitary sewer overflow (SSOs) reports from wastewater collection systems. The parameters reviewed for each data source is based on the current status of Big Creek on the TCEQ's 2014 IR<sup>16</sup>, including the contact recreation impairment for fecal bacteria (*E. coli*) and concerns<sup>17</sup> for depressed dissolved oxygen (DO), nitrate nitrogen, and total phosphorus.

#### 3.2 Ambient Monitoring Data

##### Data Acquisition

Up to 13 years of data for bacteria, nitrogen compounds, total phosphorus, DO, and total suspended solids were obtained from the TCEQ Surface Water Quality Monitoring Information System (SWQMIS). The data represented the routine ambient bacteria and other water quality data collected for the project area by the TCEQ's CRP for the study area. The data are currently collected at one station in AU1 (station 16353) but have been collected historically at several stations in the watershed (Figure 18). For the purpose of this review, three stations (two historical, and one current) were evaluated. These stations were selected based on sufficiency of existing data, currency of data, and representativeness of their AU or portion of the watershed. Each station was evaluated for bacteria (*E. coli*), nitrate nitrogen, total phosphorus, and DO (grab samples) parameters. Table 4 indicates the extent of data available for each station and parameter.

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<sup>16</sup> Although the 2014 IR is used as the basis, the parameters of concern remain an issue in the Draft 2018 IR.

<sup>17</sup> These parameters are included as supplemental indicators of waterway health. They are not the primary focus of this report.

### Monitoring Stations in the Big Creek Watershed

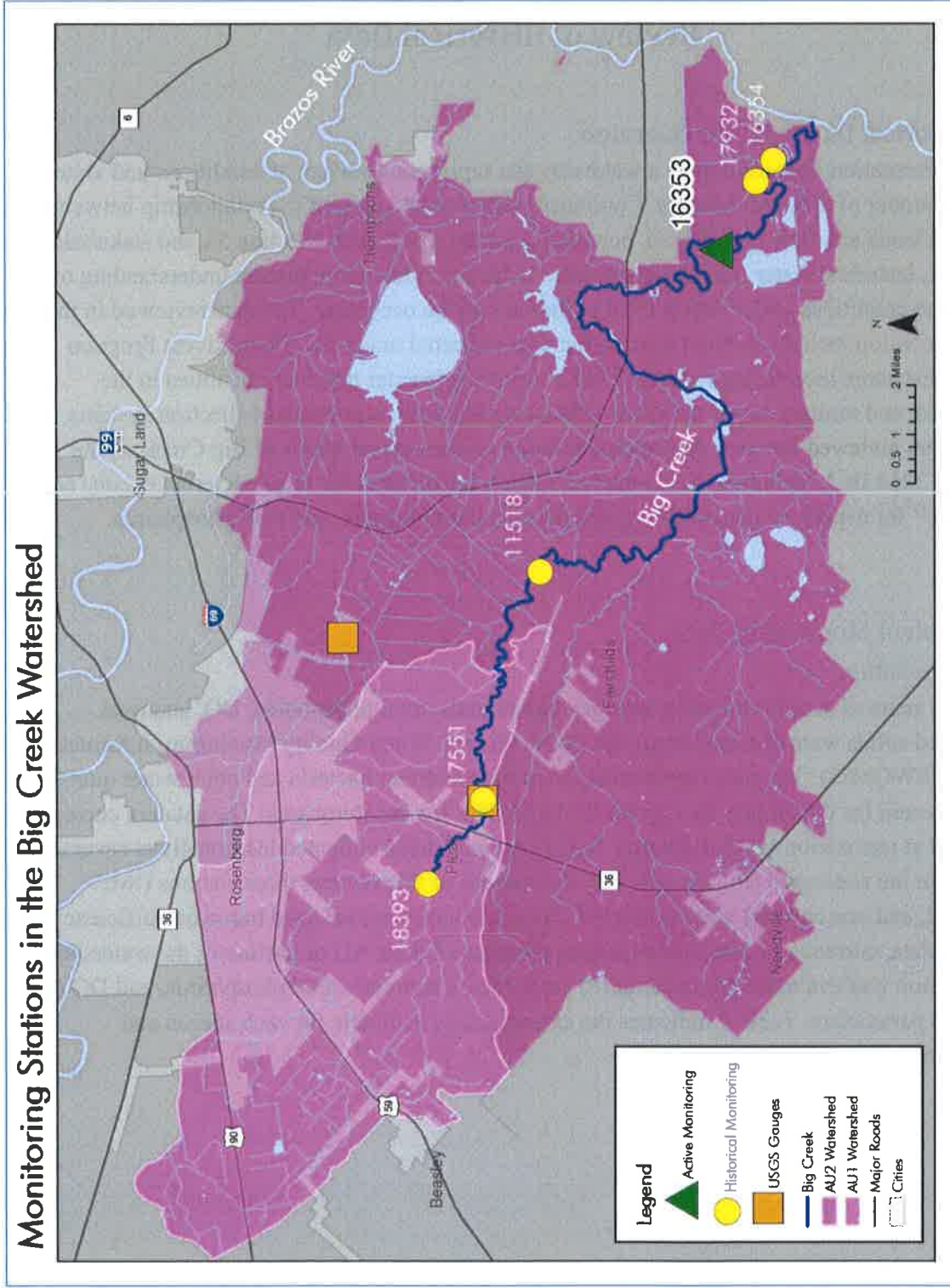


Figure 18 - Monitoring Stations in the Big Creek Watershed

Table 4 - Years of Available Monitoring Data by Station

Parameter	Years of available Data		
	Station 16353	Station 17551	Station 17932
<i>E. coli</i>	10 (2009-2018)	9 (2004-2012)	5 (2004-2008)
Total Phosphorus	10 (2009-2018)	9 (2004-2012)	5 (2004-2008)
DO (grab)	10 (2009-2018)	9 (2004-2012)	5 (2004-2008)
Nitrate Nitrogen	4 (2015-2018)	9 (2004-2012)	1 (2004)

#### Analysis of *E. coli* Data

The 2014 IR lists Big Creek as impaired for contact recreational use due to elevated levels of fecal waste, based on the FIB species *E. coli*. This segment was first listed as impaired in 2002. The 2014 IR shows the geomean for *E. coli* in AU1 to be 155.03 MPN/100ml, and within AU2 to be 109.56 MPN/100mL<sup>18</sup>. The data indicated that, at that time, AU1 was not supportive of the standard while AU2 was. Data review for this project included monitoring results between 2009 and 2018, which incorporates a later set of data than the current IR. The results of the review are displayed in Table 5, by station. Review of the data indicated that AU1 was likely still not supporting the SWQS. Data for years 2013-2018 was not available for AU2, so it does not support an evaluation of current trends. A pattern of high variability is present in both AUs, as represented by the maximum values which greatly exceed the geomean. Figure 19 shows the relationship of sample results by station for the whole time period of the sampling dataset.

Table 5 - *E. coli* Results by Monitoring Station

Station	Number of <i>E. coli</i> samples	Maximum value	Geomean	% in Violation
16353	70	14,000	241.14	61.4%
17551	30	2,419	105.69	53.3%
17932	16	3,448	97.19	37.5%

The lack of current data in both AUs is problematic for comparing current trends, or relative health of the different portions of the watershed. Using Station 16353 as a sole indicator for all Big Creek indicates that water quality near the end of the system is roughly twice the SWQS criteria but has high variability and times in which levels are an order of magnitude higher than the standard or more. These data indicate that the water quality issues leading to the contact recreation impairment are still present in the watershed.

<sup>18</sup> While this report references the most current approved IR (2014), it should be noted that subsequent draft IRs, including the 2018 draft, show geomeans with higher values for both AUs (e.g., the 2018 Draft IR indicates a geomean of 246.16 for AU1 and 178.05 for AU2).

Characterization Report for Indicator Bacteria in the Big Creek Watershed

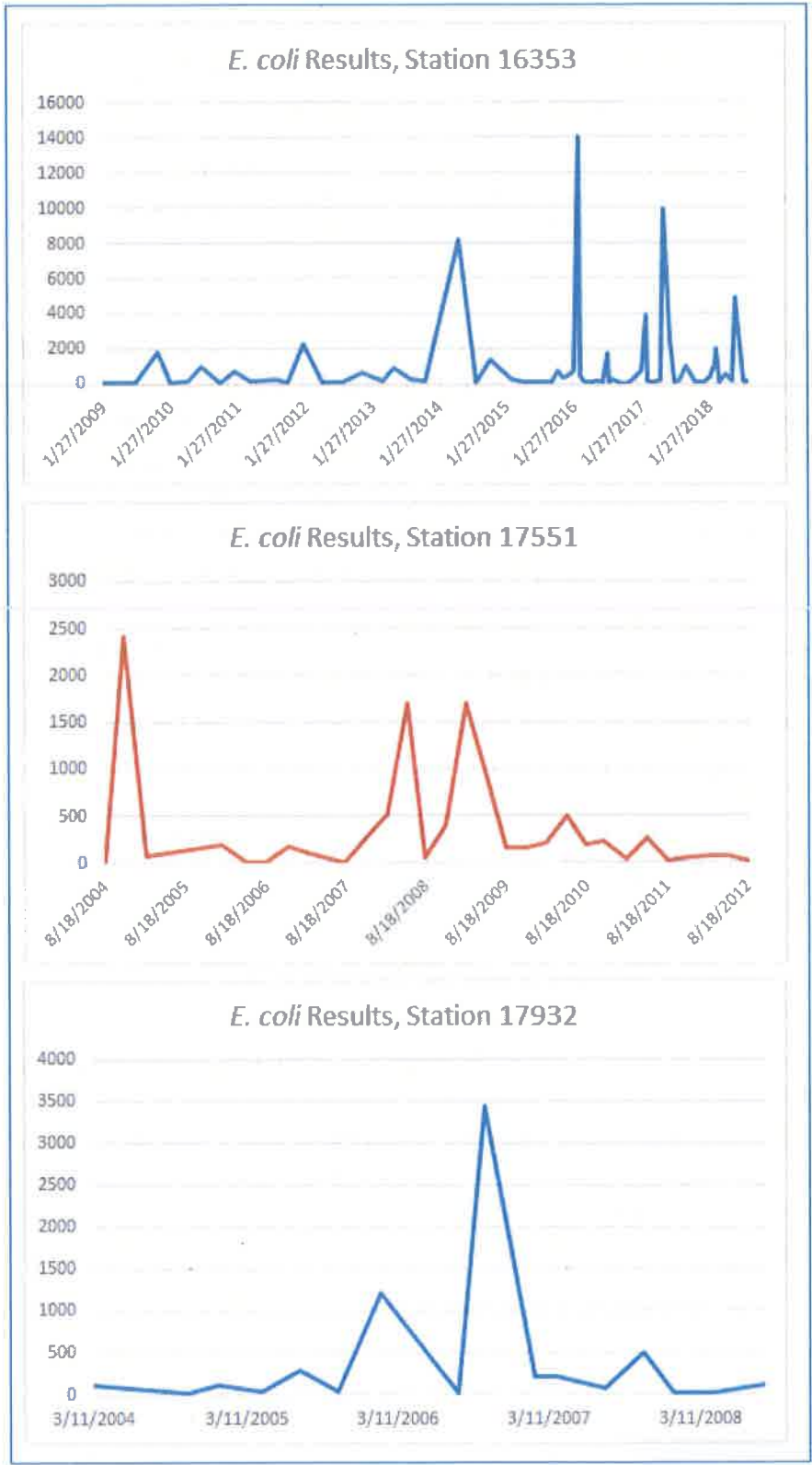


Figure 19 - *E. coli* Results by Station

Analysis of Other Parameters

This characterization focuses on FIB, but also evaluated other parameters for which a concern exists on the IR. The data in the ambient sampling, including data more current than the approved 2014 IR, indicated that these concerns still exist in the watershed. Table 6 includes the results for DO (grab), nitrate nitrogen, and total phosphorus.

Table 6 - Other Water Quality Parameter Analyses

Station	Violations of Criteria/Screening Levels by Parameter ( <i>number and percent of total samples</i> )			
	Nitrate Nitrogen	Total Phosphorus	DO (grab, minimum)	DO (grab, screening level)
16353	2 (5%)	6 (8%)	5 (6%)	24 (30%)
17551	32 (75%)	23 (72%)	1 (3%)	5 (14%)
17932	0 (0%)	0 (0%)	1 (5%)	3 (14%)

Spatially, the data indicates that nutrient issues are most pronounced in AU1. Under 10% of samples for all stations were unable to support the DO minimum, but larger percentages were unable to meet the screening levels. While the exceedances were most pronounced in AU1, downstream, it should be noted that AU1 has a less strict standard than AU2. The relative preponderance of nutrient exceedances in AU2 was not proportional to DO exceedances.



Figure 20 - Big Creek at FM 762, near Paw Paw Ranch

### 3.3 Wastewater Treatment Facility Discharge Monitoring Reports

#### Data Acquisition

There are a variety of wastewater treatment facilities (WWTFs), including both public and private sewage from outfall data developed by TCEQ in partnership with H-GAC. Data from 10 years (2008-2018) of DMRs<sup>19</sup> from facilities in the watershed (Figure 20) assisted in characterizing the long-term water quality in their discharges. There are 18 active outfalls that discharge to Big Creek, representing 12 facilities. Nine of the facilities had *E. coli* data available for evaluation under this project.

#### DMR Data Review – *E. coli*

There were no WWTFs with DMR data that had chronic issues meeting either their permit limit for *E. coli*. Of the 717 results (based on the daily average limits) in the 10-year period, only five (0.7%) were in excess of the facility's standard. While portions of AU2 are effluent dominated, the ability of plants in the AU to meet their standard on the average indicates that WWTFs do not appear to be a chronic source of load, even if they may be acute loading sources in certain conditions.

#### DMR Data Review – *Other Parameters*

In addition to the fecal bacteria results, the DMRs also contained results for DO, biochemical oxygen demand, ammonia nitrogen, and total suspended solids that were pertinent to water quality issues in Big Creek. In a review of the results for these tests, no widespread or facility-specific pattern of exceedance were found. No DO violations were found, while less than 1% (0.14%, 0.33%, and 0.81%, respectively) of all other parameters exceeded the facility's limits.

### 3.4 Sanitary Sewer Overflow Reports

#### Data Acquisition

Overflows, leaks, and unpermitted discharges from the collection systems of WWTFs can be an acute source of untreated fecal waste. Project staff evaluated seven years of SSO reports (2011-2018<sup>20</sup>) from TCEQ for the watershed area. There were 19 SSOs during that timeframe representing five facilities. Total volume was estimated at 62,110 total gallons. The reported causes for the SSOs were, in order of prominence: rainwater inflow and infiltration (58%); human error (16%); other blockages (10%); WWTF equipment or operation error (6%); and blockages due to debris, unknown causes, lift station failure, and collection system failures (less than 5% each).

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<sup>19</sup> DMR data was provided by TCEQ, as last accessed on 4/9/2019.

<sup>20</sup> 2018 data was not available during the development of this report.

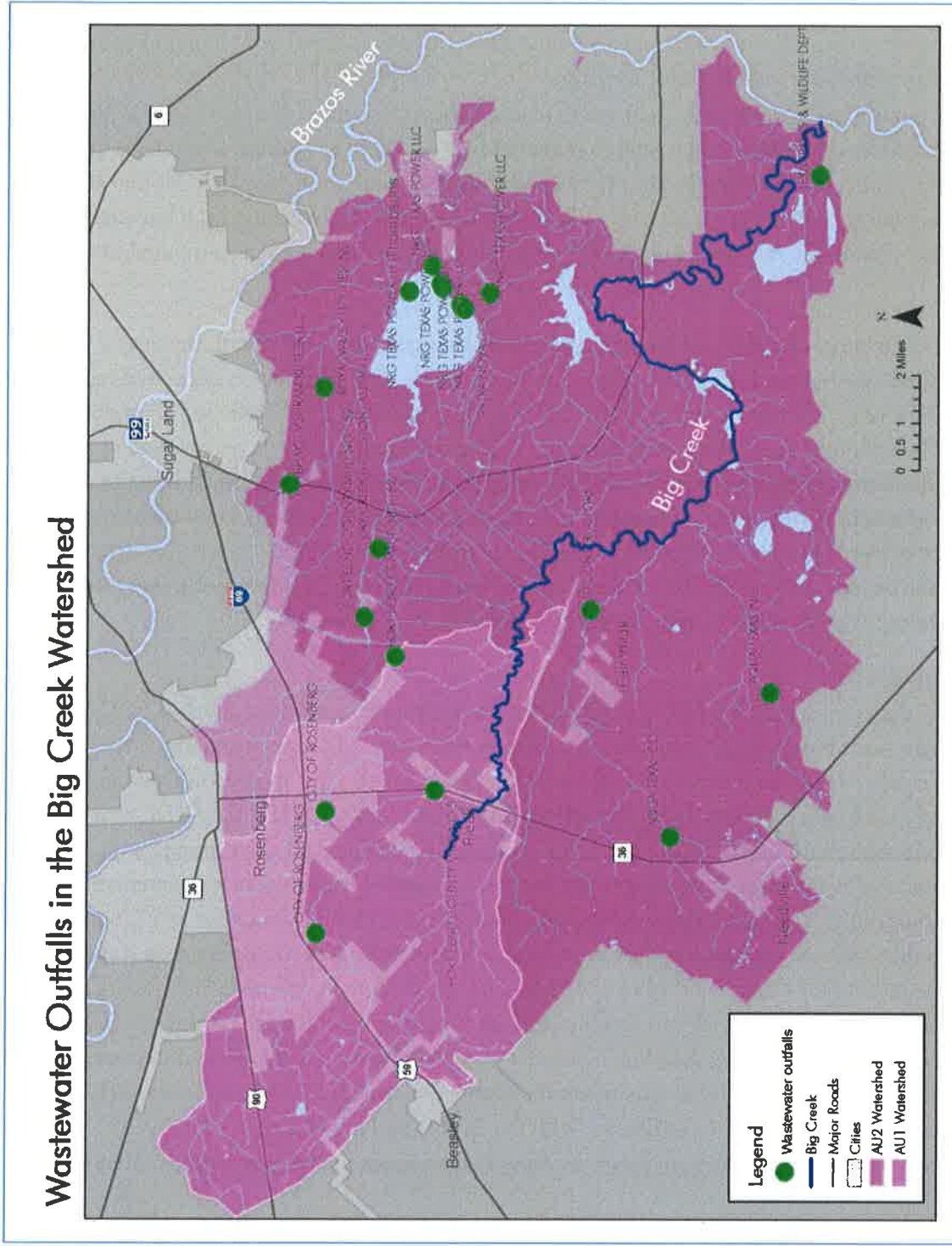


Figure 21 - Wastewater Outfalls in the Big Creek Watershed

## Section 4

### Preliminary Flow Assessment

#### 4.1 Evaluating Flow and *E. coli* Loading

The flow conditions under which fecal waste reaches waterways provide clues to the origins of potential sources of contamination, and to potential best practices to address them. High fecal bacteria levels in correspondingly high flow conditions may indicate primarily nonpoint sources of contamination reaching the waterways via stormwater flows. Conversely, high bacteria levels in low flow conditions may indicate steady contributions from point sources unrelated to storm flows.

Load duration curves (LDCs) are an evaluation tool that assess the flow conditions under which bacteria loads are reported. LDCs use flow duration curves, showing the percent of time each level of flow (e.g., high flows) are present in the bayou, combined with observed or modeled FIB results. The resulting curve shows where and to what extent bacteria loads persist, and to what extent reduction is needed to meet the SWQS, in different flow conditions. In addition to identifying potential categories of sources, LDCs can provide reduction goals by assessing the difference between projected loads at the contact recreation standard criteria's concentration, and those in the observed FIB data. This characterization effort used LDCs as a preliminary tool for understanding fecal bacteria loading in the watershed<sup>21</sup>.

#### Data Acquisition

Both flow data (observed or modeled) and bacteria results are necessary to develop LDCs. USGS flow gauges are a typical source of flow data as they represent long-term, continuous flow data which is easily adapted to a curve. H-GAC evaluated data for all CRP monitoring stations in the watershed to determine the most representative sites for developing LDCs. One LDC was developed for each AU. In AU1, station 17551 (Figure 18, section 3.2) corresponds with a USGS flow gauge, and is the most downstream site in the AU, making it the most representative site with the most sufficient data. Observed bacteria data does not include data after 2012, but there were no other more representative sites in the AU. However, the lack of current data should be taken as a caveat in the applicability of 17551's LDC. In AU2, there are no USGS flow gauges that correlate in position to CRP monitoring stations. Based on breadth and currency of CRP data, station 16353 (Figure 18, Section 3.2) is the most representative station in the watershed. While there are stations further downstream, they have less available data, are more likely to be influenced by mixing from the confluence with the Brazos and are less representative of conditions upstream as they benefit from the more natural areas in and surrounding Brazos Bend

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<sup>21</sup> These LDCs should not be taken as formal planning efforts or regulatory processes by TCEQ. They are used in the context of this characterization report solely as a conceptual tool for improving knowledge of fecal contamination in the watershed. Future development of a TMDL(s) will entail a more in-depth modeling process whose results may differ from those presented here.

State Park. Because of the lack of continuous flow data from a USGS gauge, the LDC for station 16353 was developed using flow data extrapolated from observed data at the station, and modeled data based on the extent of the watershed drainage area upstream. These data sources are sufficient for the conceptual nature of this analysis and are based on the more stringent data requirements of other formal watershed-based planning efforts.

LDCs for Big Creek

The developed LDCs include five flow categories: high flows (present less than 10% of the time), moist conditions (present less than 40% of the time), mid-range conditions (present less than 60% of the time), dry conditions (present less than 90% of the time), and low flow conditions (minimum volumes present between 90-100% of the time). A flow curve is plotted showing flow volumes across each of these categories. The SWQS criterion for *E. coli* is then added as a curve, showing *E. coli* loads that correspond to the flow volume (i.e. the load produced by multiplying observed concentrations by the flow volume). While the geomean criteria is the focus of this characterization, the single sample criterion (399 MPN/100mL) was also plotted as a reference. Lastly, a curve based on *E. coli* data from CRP monitoring shows how observed bacteria levels relate to allowed levels across flow categories. Where the observed data (load regression curve) exceeds the criteria curve (water quality standard – geomean), reduction is needed.

The LDC for AU2 (station 17551) indicates that while there are exceedances throughout the various flow conditions, the area of greatest exceedance and needed reduction begins in the midrange conditions but is greatest in the moist and high flow conditions (Figure 22). This may indicate that nonpoint sources have the greatest impact on compliance with the SWQS. However, given that portions of AU2 are effluent dominated, point source contribution in high flow conditions are also potential factors.

The LDC for AU1 (Station 16353) shows a broader pattern of exceedance, with the load regression curve in excess of the criteria curve as early as dry conditions and persisting through the rest of the increasing flow categories. This suggests the potential contribution of a broader range of sources, but may also reflect the cumulative nature of loading, as it includes flow and loading from AU2 upstream.

Table 7 indicates the amount of potential reduction needed at each station in each flow category.

Table 7 - Potential Fecal Indicator Bacteria Reductions, by Station

<b>AU/Station</b>	<b>High Flow</b>	<b>Moist</b>	<b>Midrange</b>	<b>Dry</b>	<b>Low Flow</b>
AU2/17551	73%	21%	-	-	-
AU1/16353	94%	52%	16%	-	-

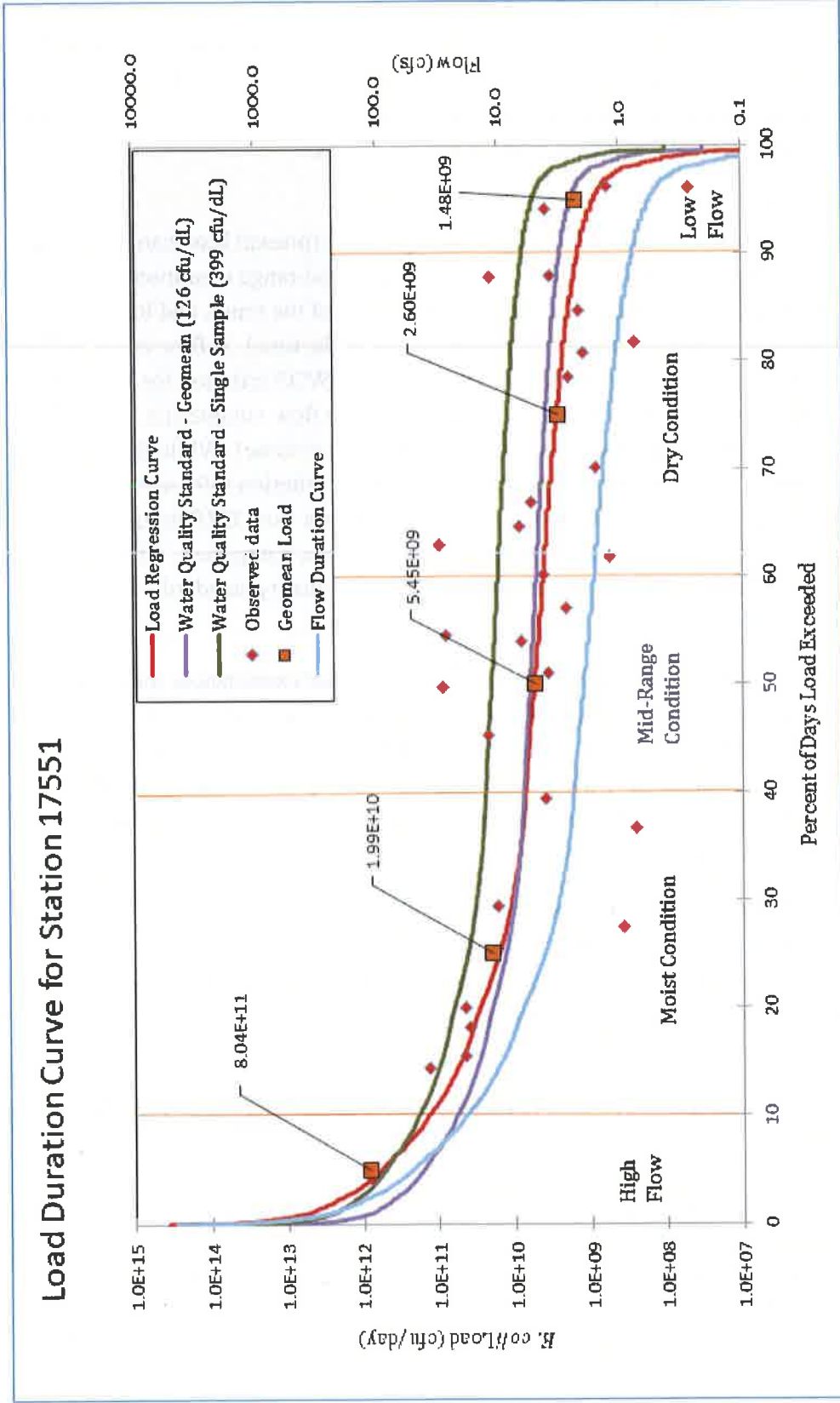


Figure 22 - LDC for AU2, Station 17551

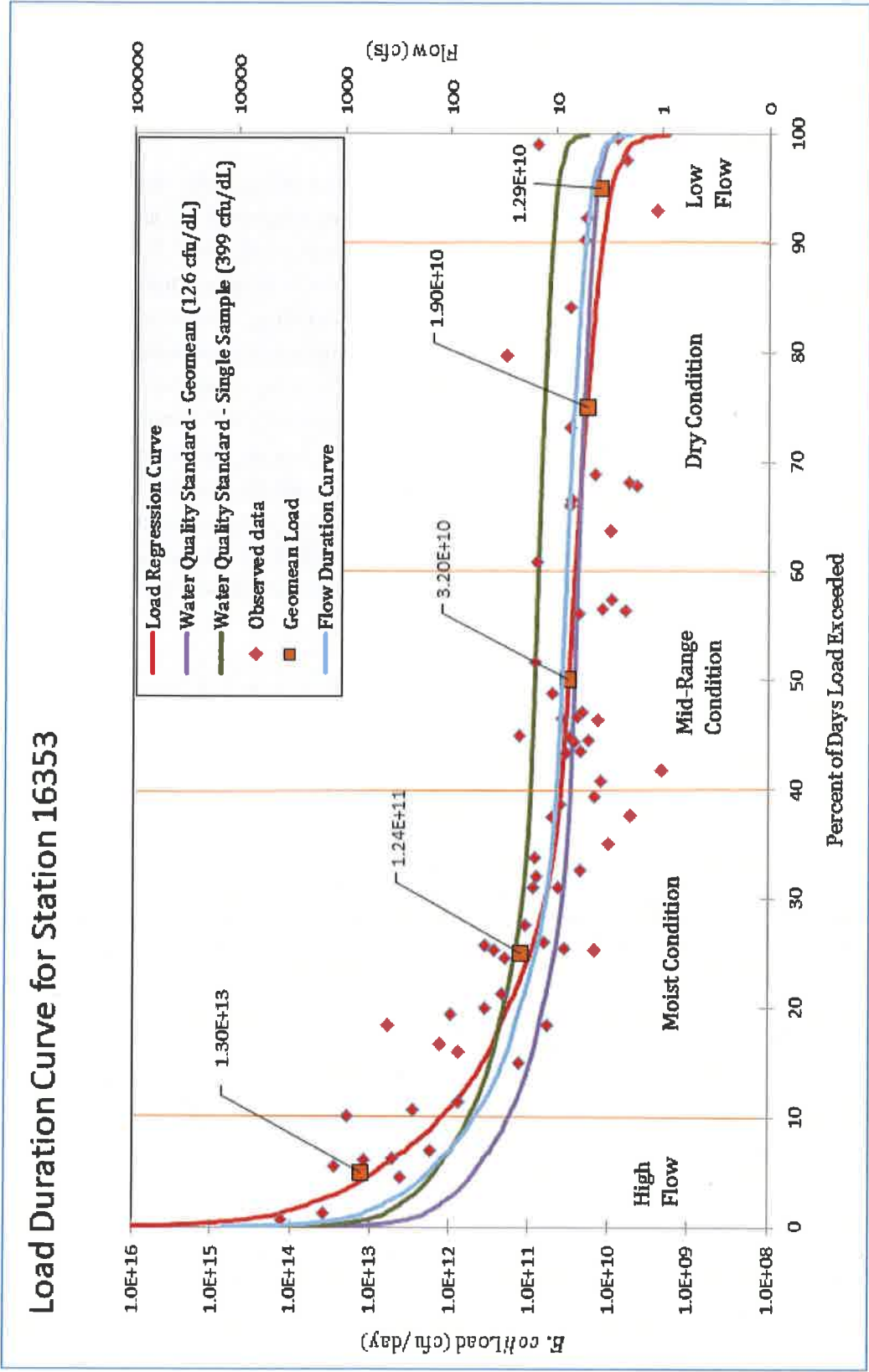


Figure 23 - LDC for AU1, Station 16353

## Section 5

### Potential Sources of Contamination

#### 5.1 Identifying Potential Sources

Water quality data and LDCs provide an overview of fecal bacteria loading in the waterway, and (in the case of LDCs) may hint at categories of sources (i.e. point or nonpoint) that are responsible. However, fecal waste comes from a variety of sources in a watershed. Addressing waste sources to improve water quality requires a more specific review of what sources exist in the watershed, to what extent, and what their likely prominence as loading sources are under given conditions. For the purpose of this characterization effort, preliminary source identification efforts included a general source survey of potential sources, and specific estimation of the extent of those sources<sup>22</sup>. General categories include four main waste sources: human, domestic animals, agricultural animals, and wildlife. These waste streams may enter waterways through multiple vectors (e.g. human waste may enter through SSOs, failing aerobic and septic systems (on-site sewage facilities, or OSSFs), or even direct deposition), so additional consideration and categorization is given to sources as either regulated or non-regulated. Table 8 shows the anticipated presence and potential extent of sources based on data investigations, ground reconnaissance, and feedback from local stakeholders.



*Figure 24 - Horses in the Big Creek Watershed*

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<sup>22</sup> All information in this section is based on potential sources. Any discussion of relative prominence or link to observed conditions is intended as conceptual in nature. No specific load modeling or fate and transport considerations for bacteria sources was conducted. Further consideration may be part of future efforts to develop TMDL(s) or other formal watershed planning efforts.

Table 8 - Potential Source Survey

Potential Source	Means of measurement	Potential Relative Contribution
Sanitary Sewer Systems	SSO reports; DMR data; land application projects.	Minor (discharge) to periodically moderate (overflows)
Septic and Aerobic Systems (OSSFs)	Presence in OSSF database (permitted); presence of houses outside sanitary service areas (recon., aerials, feedback).	Moderate to major.
Domestic Pets	Based on literature value (0.8 dogs per household <sup>23</sup> ) and actual households.	Moderate
Livestock	USDA Agricultural Census data <sup>24</sup> ; stakeholder feedback.	Moderate
Feral Hogs	Texas A&M Literature value based on land cover; local feedback.	Minor to Moderate.
Other Wildlife	TPWD RMU literature values (deer); anecdotal (other wildlife)	Minor to Moderate.
Landfills	Regulatory compliance; stakeholder feedback	Minor
Illegal Dumping	Anecdotal information	Minor

The relative distribution and contribution of sources is fairly even throughout the watershed, apart from more densely developed areas adjacent to the City of Rosenberg and other urban centers. However, the specific mix of land uses and land cover in any given area may result in a source profile that varies greatly from the overall mix of sources for the watershed.

These considerations reflect current sources, and do not project for future growth. The assessment is specific to fecal waste contamination and does not consider appreciable sources of nutrients (fertilizers for agricultural operations and domestic landscaping), sediment (erosion and development), or impacts to aquatic habitat and species profundity (hydrological changes, pesticides, etc.). Changes to flow conditions with increasing development (e.g., greater volumes of stormwater at higher velocities with decreased filtration) are an underlying factor influencing all bacteria sources and other water quality issues. Future consideration of best practices to

<sup>23</sup> Referenced at [www.avma.org/KB/Resources/Statistics/Pages/Market-Research-statistics-US-Pet-Ownership.aspx](http://www.avma.org/KB/Resources/Statistics/Pages/Market-Research-statistics-US-Pet-Ownership.aspx) on 5/15/19.

<sup>24</sup> Referenced at <https://www.nass.usda.gov/AgCensus/> on 5/20/19.

reduce sources may need to consider these elements to maximize efficiency in dealing with multiple water quality challenges.

## 5.2 Regulated Sources

WWTFs and stormwater discharges<sup>25</sup> from industries, construction, and municipal separate storm sewer systems (MS4s) are examples of regulated sources permitted under the Texas Pollutant Discharge Elimination System (TPDES) and National Pollutant Discharge Elimination System (NPDES) programs<sup>26</sup>.

### Domestic and Industrial Wastewater Treatment Facilities

There are 18 active, permitted outfalls in the watershed representing 12 permitted facilities. While acute overflows or exceptional events (e.g., Hurricane Harvey) may occur, their self-reported discharge monitoring data indicates that they are generally able to meet their permit limits for *E. coli*. However, because their permit limit for daily average corresponds to the SWQS, they are a source of load at times even when in compliance with their limits. More information on these facilities can be found in section 3.3. While WWTFs do not appear to represent an appreciable portion of the fecal waste local in the system, they are of specific concern because human waste sources have an elevated risk to human public health<sup>27</sup>.

### Sanitary Sewer Overflows

SSOs are relatively uncommon in the watershed (see section 3.4) and do not represent appreciable volumes. However, they may represent periodic acute loading on a localized basis and are likely to correspond to already elevated loading in high flow conditions.

### Dry Weather Discharges/Illicit Discharges

In addition to stormwater, regulated entities under TPDES and NPDES permits must identify and correct dry weather discharges/illicit discharges that contribute effluent to the MS4 but have not been approved via permit or resulted from emergency firefighting activities. Examples of illicit discharges to the storm sewer include home sanitary pipes connected directly to the storm sewer, cross connections between a municipal sanitary sewer and a storm sewer, a leaking sanitary sewer leaching into a storm sewer, and failing OSSFs leaking into a storm sewer. No known data was available for this watershed, but it is likely that these discharges exist to some degree in MS4 areas.

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<sup>25</sup> Stormwater discharges are considered as a vector, rather than a specific source, as they contain a conglomeration of nonpoint source domestic animal, human, and wildlife wastes in their discharge.

<sup>26</sup> While many OSSFs operate under a permit from a local authorized agent, they are treated as unregulated sources for the purpose of this effort.

<sup>27</sup> Based on research done by Texas A&M University staff on quantitative microbial risk assessment, as referenced at <https://oaktrust.library.tamu.edu/bitstream/handle/1969.1/158640/GITTER-THESIS-2016.pdf?sequence=1&isAllowed=y> on 6/10/19.

**TPDES General Wastewater Permits**

The TCEQ regulates certain types of facilities that process wastewater, some of which potentially contain fecal waste. General wastewater permit types include:

- TXG110000 – concrete production facilities;
- TXG130000 – aquaculture production facilities;
- TXG340000 – petroleum bulk stations and terminals;
- TXG670000 – hydrostatic test water discharges;
- TXG830000 – water contaminated by petroleum fuel or petroleum substances;
- TXG920000 – concentrated animal feeding operations; and
- WQG20000 – livestock manure compost operations.

A review of active general permit coverage (TCEQ Central Registry, August 15, 2019) in the Big Creek Watershed found five concrete production facilities and one aquaculture facility under general permit within the watershed (Table 9). No other active general wastewater permit facilities or operations were found.

*Table 9 - General Wastewater Permits - Concrete Operations*

<b>Authorization number</b>	<b>Permit Type</b>	<b>Permittee/Registrant</b>	<b>City</b>	<b>Site Location</b>
TXG111258	TXG110000 – concrete production facilities	L. Guerrero & Sons Ready-Mix Company	Rosenberg	770 Walsh Rd Rosenberg Tx 77471 9114
TXG111575	TXG110000 – concrete production facilities	Williams Brothers Construction Co., Inc.	Rosenberg	25825 Southwest Fwy Rosenberg Tx 77471 5681
TXG111756	TXG110000 – concrete production facilities	Cemex Construction Materials Houston, LLC	Richmond	3002 Fm 2977 Rd Richmond Tx 77469 8459
TXG111970	TXG110000 – concrete production facilities	Williams Brothers Construction Co., Inc.	Rosenberg	5900 Hwy 59 South Rosenberg Tx 77471
TXG111978	TXG110000 – concrete production facilities	Alleyton Resource Company, LLC	Rosenberg	6314 Reading Rd Rosenberg Tx 77471 5673
TXG130058	TXG130000 – aquaculture production facilities	Mackys Farm LLC	Needville	9988 Louis St Needville Tx 77461 9851

**TPDES General Stormwater Permits**

Regulated stormwater is permitted by the state under TPDES and is considered a point source by the state. Stormwater from unregulated areas is considered a nonpoint source and will be discussed under unregulated sources in a subsequent section. Discharges of stormwater from a Phase II urbanized area, industrial facility, construction site, or other facility involved in certain activities are required to be covered under the following TPDES general permits:

- TXR040000 – stormwater Phase II MS4 general permit for urbanized areas;
- TXR050000 – stormwater multi-sector general permit (MSGP) for industrial facilities;
- TXR150000 – stormwater from construction activities disturbing more than one acre;

There are several construction stormwater permits in the watershed<sup>28</sup>, but the primary focus of this characterization effort is stormwater that has a high likelihood of containing fecal waste. A review of active permits covering MS4s in the TCEQ Central Registry found that there are five active Phase II MS4 permits in the watershed (Table 10).

Table 10 - MS4 Phase II Permits in the Big Creek Watershed

Permit	Entity	City
TXR040272	City of Rosenberg	Rosenberg
TXR040383	Fort Bend County Drainage District	Sugar Land
TXR040480	Fort Bend County MUD 155	Richmond
TXR040481	Fort Bend County MUD 159	Rosenberg
TXR040551	Fort Bend County MUD 167	Rosenberg

#### Other Permitted Facilities and Operations

In addition to the permitted facilities discussed above, there are several other large-scale facilities or areas of operation worth noting in the watershed.

- The WCA Waste Corporation operates the Fort Bend Regional Landfill, located at 14115 Davis Estates Road. This Type I landfill accepts municipal and other wastes that may include fecal wastes. In discussions with landfill staff and review of aerials, tributaries and sheet flow can traverse the landfill property and flow into Big Creek. However, by their permit requirements, any stormwater reaching the active face of the landfill needs to be sequestered and removed.
- NRG Energy operates the W.A. Parish Generating Station, a dual-fired power plant occupying over 4,500 acres of the central watershed, and impounding drainage flows (and supplemental water supply) in Smithers Lake, before discharging from the Lake to the Rabbs Bayou system. Based on conversations with plant staff and Fort Bend County Drainage District staff, flow variation from the discharge does not have a notable impact on downstream volumes. Water quality impacts from fecal waste are not likely appreciable; most of the discharged volume from the plant is process/cooling water.
- There are several active and legacy oil fields in the watershed, due to the presence of several salt domes (Figure 25). While these are not sources of fecal waste, they are worth noting as areas of specific use in the watershed that may contribute to ancillary water quality issues. The Orchard Dome Oil Field is in the headwaters of Seabourne Creek in AU2, the Oil Creek

<sup>28</sup> As of 8/20/19, there are 316 records for Fort Bend County, including many in the Rosenberg area.

Oil Field north of the confluence of Fairchilds Creek and Big Creek, and Thompsons Oil Field north of the drainage diversion on the eastern side of the watershed.

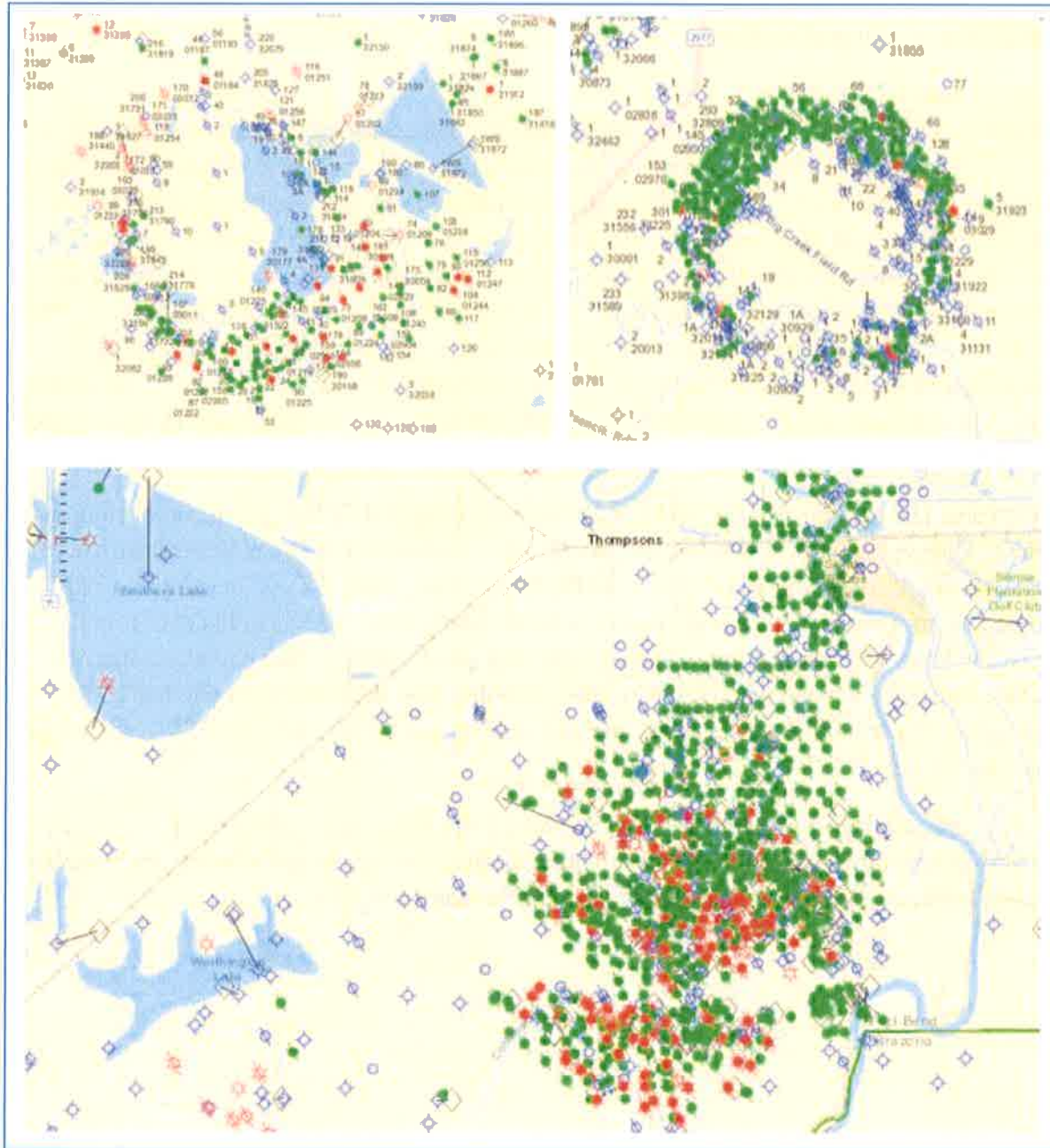


Figure 25 - Oil Fields (Orchard Dome, Oil Creek, Thompsons)

### 5.3 Unregulated Sources

Nonpoint sources of fecal waste are often unregulated because they come from diffuse accumulations rather than a single discrete source. OSSFs<sup>29</sup>, certain agricultural activities, land application fields, urban runoff not covered under a permit, pet wastes, and wildlife wastes are examples of unregulated sources.

#### On-site Sewage Facilities

Away from municipal centers where more centralized public wastewater treatment is common, rural and low-density suburban residences and stand-alone commercial and industrial businesses within the county or a city's extraterritorial jurisdiction are more likely to use owner-operated OSSFs, often referred to as septic systems, though also including modern aerobic systems and other on-site treatment technology. When not sited or functioning properly, OSSFs can be an appreciable source of fecal waste, especially when they are in areas adjacent to waterways. The likelihood of failure can be influenced by soil type, design, age, and maintenance. Literature values suggest failure rates for OSSFs in Texas are approximately 12% on average<sup>30</sup>. In similar areas, failure rates of 10-20% have been used, although some areas in the greater Houston region have reached failure rates in excess of 70%.

The number and location of permitted OSSFs has been compiled by H-GAC in coordination with authorized agents in H-GAC's service region, which includes the Big Creek Watershed. There are 3,142 records of permitted OSSFs in the Big Creek Watershed. H-GAC developed an OSSF geographic information database to identify potential unpermitted OSSFs in H-GAC's service area using known OSSF locations, county parcel data, and WWTF service boundaries (used to exclude addresses on centralized service). Based on this data, there are likely another 2,372 unpermitted OSSFs in the watershed. Combined, there are an estimated 5,514 OSSFs within the watershed (Figure 27).

Based on a conservative estimate of a 10-15% failure rate range, there would be an expected 551-827 failing systems in the watershed. Failing OSSFs, like wastewater systems, are a specific concern because of the greater health risk posed by human fecal waste.

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<sup>29</sup> Some OSSFs in the watershed are operated under permit, while some are grandfathered. For the purpose of this characterization report, OSSFs are treated as unregulated due to the nature of their permit, the lack of regular reporting, and their generally diffuse nature.

<sup>30</sup> Reed, Stowe and Yanke, LLC. 2001. Study to Determine the Magnitude of, and Reasons for, Chronically Malfunctioning On-site Sewage Facility Systems in Texas. Texas Onsite Wastewater Treatment Council.

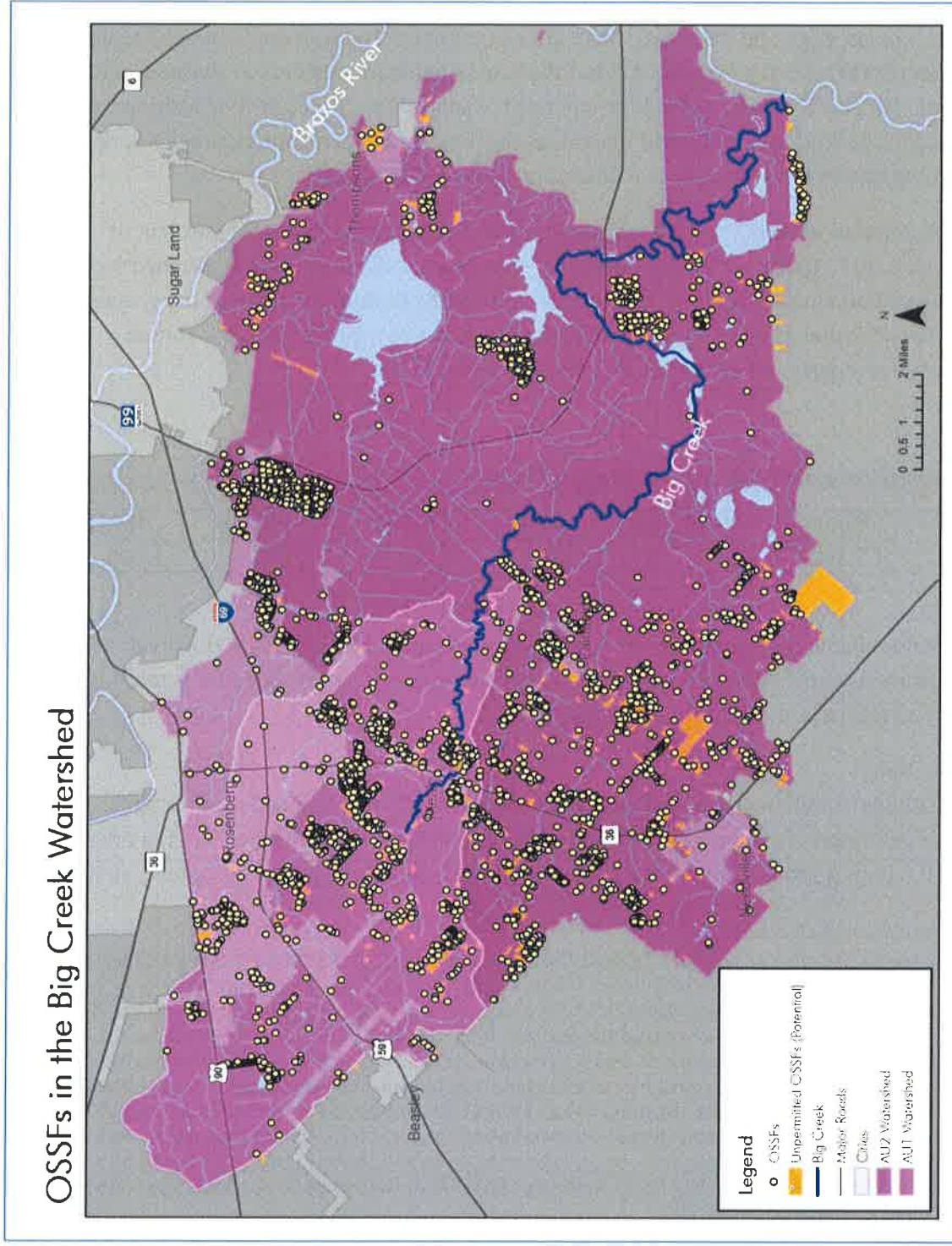


Figure 26 - OSSFs in the Big Creek Watershed

## Agriculture

Agriculture production remains a large economic base for much of the watershed. The primary source of fecal waste from agricultural activities is domestic livestock, including cows, sheep and goats, horses, pigs, and chickens. There are no permitted Concentrated Animal Feeding Operations (CAFOs) in the watershed<sup>31</sup>, but there are significant numbers of livestock still in production. Fecal waste from agriculture can reach water bodies from direct deposition by livestock and via land applications of manure as fertilizer during crop production. Description of areas of cropland in the watershed is included in Table 2 and Figure 15.

Livestock population numbers were estimated based on the United States Department of Agriculture’s 2017 Census of Agriculture data. Numbers for the Big Creek Watershed were derived from Fort Bend County data, reduced to reflect the proportional size of the watershed (i.e. Big Creek Watershed is 25% of Fort Bend County, so 25% of the county’s animal populations were assumed to be in Big Creek’s watershed<sup>32</sup>).

Table 11 - Agricultural Animal Populations in the Big Creek Watershed

Farms	Cattle	Pigs/Hogs	Sheep	Goats	Poultry	Horses <sup>33</sup>
288	7,892	13	103	143	698	506

There are no reliable data available for extent of manure spreading on fields. However, as much of that manure is expected to arise from the animals represented above, specific acreage is not necessary to estimate at this level of analysis.

## Domestic Pets

Pets are another commonly unregulated source of fecal waste in urban and rural settings. Literature values provide a general estimate of pet populations, with an expected dog ownership value of 0.8 dogs per household<sup>34</sup>. Dogs are the specific concern as potential sources, as waste

<sup>31</sup> Based on review of CAFO permits for Fort Bend County accessed on 6/23/19 at TCEQ’s Water Quality General Permits & Registration Search – Advanced Search portal, at [https://www2.tceq.texas.gov/wq\\_dpa/index.cfm](https://www2.tceq.texas.gov/wq_dpa/index.cfm).

<sup>32</sup> This estimate is based on the general ratio of respective areas of the county and watershed, but also based on review of land cover for the county as a whole and feedback from stakeholders. In reality, livestock are not equally distributed in the county, with some areas of denser production, and some of lighter production. While Big Creek is less rural than some areas of the south and west of the county, it is far more rural than much of the developed northeast. Based on the available data, the proportional area approach is expected to best reflect the available data. Further development of TMDLs or other formal watershed planning should revisit these estimates and seek specific guidance from agricultural agencies.

<sup>33</sup> Agricultural census data may not fully reflect horse populations in the watershed, as non-farm horses are not fully accounted for (e.g. equestrian horses, etc.)

<sup>34</sup> Referenced at [www.avma.org/KB/Resources/Statistics/Pages/Market-Research-statistics-US-Pet-Ownership.aspx](http://www.avma.org/KB/Resources/Statistics/Pages/Market-Research-statistics-US-Pet-Ownership.aspx), 5/15/19. American Veterinary Medicine Association produces pet ownership statistics that include a range of ownership averages for national and state contexts. The 0.8 dogs per household number reflects a higher end of the range, but one that coincided with stakeholder feedback and prior projects in the area.

from cats is typically deposited inside and sequestered. Both current and future dog population estimates are presented in Table 12. Feral dog and cat populations cannot be estimated from available data or anecdotal reports, but should be considered as a potential source, especially in urban areas with greater access to food sources.

The Big Creek Watershed contained a population of 58,442, representing 24,080 households, in 2018 (Table 1). Based on the H-GAC Regional Growth Forecast<sup>35</sup> demographic projections, the population of the watershed is expected to increase dramatically by 2040, at which point it will be 392,396, representing 150,879 households.

Table 12 - Dog Populations, Current and Future

<b>Statistic</b>	<b>2018</b>	<b>2045</b>
Households	24,080	150,879
Dogs	19,264	120,703

This estimate treats all households equivalently and does not reflect differences in fate and transport of fecal waste between urban areas with high impervious cover and rural areas.

#### Wildlife and Invasive Animals

The Big Creek Watershed supports a diverse population of wildlife species, along with non-domestic invasive animals like feral hogs. Deer, coyotes, rodents, migratory waterfowl and other bird species, amphibians and reptiles (including large numbers of American Alligator), and other animal species are found both in natural areas like Brazos Bend State Park and in developed areas. Warm blooded animals are the primary focus of this assessment. While the potential to impact human health varies by animal type, all warm-blooded animals produce FIB that can show up in monitoring data and may have fecal pathogens that can cause disease. Wildlife and invasive animal fecal waste can enter the waterway through direct deposition or in stormwater.

Literature values or specific data sources exist for deer and feral hogs, but estimating other wildlife is an uncertain process due to the lack of available literature values and standing data sources for many of the wildlife species present in the watershed (e.g. coyote, migratory birds, etc.). Based on bacteria/microbial source tracking efforts reviewed in other similarly rural watersheds, including the Upper Oyster Creek Watershed in Fort Bend County<sup>36</sup>, wildlife loads can be an appreciable, but highly variable, part of the fecal waste load entering a rural waterway.

<sup>35</sup> More information on the Regional Growth Forecast can be found at <http://www.h-gac.com/regional-growth-forecast/default.aspx>.

<sup>36</sup> technical data referenced at <https://www.tceq.texas.gov/waterquality/tmdl/25-oystercreek.html>, 5/22/19.

White-tailed deer populations are estimated by TPWD as part of their Resource Management Unit program data, using an estimate of 1 deer for every 40.2 acres, yielding 3,518 deer in the watershed.

Feral hogs, a nonnative, invasive species, are unique in their ability to adapt to a variety of habitats and have high reproductive rates. Feral hogs have been identified as a large contributor to fecal waste in riparian areas which provide transportation corridors and wallowing sites. Feral hog density rates suggest that there are roughly 1.3 to 2.45 hogs per square mile in areas with suitable habitat<sup>37</sup>. Based on best professional judgement and feedback from stakeholders, feral hog estimates were based on populating hogs at a density of 1.3 per square mile in low intensity developed; 2 per square mile in developed open space, bare land and cultivated land; 2.45 per square mile in pasture/grasslands, forests/shrubs, and wetlands; and no hogs in developed areas or open water (Table 13).

Table 13 - Feral Hog Populations in the Big Creek Watershed

Animal	Deer	Feral Hogs
Population	3,518	355

Fort Bend County, including areas in and around Brazos Bend State Park, are local hotspots for birds year-round, but have greatly increased numbers in migration. Seasonal visitors like migratory waterfowl and swallows also visit the watershed in substantial numbers. No specific data exists to estimate population numbers, but anecdotal reports from sources like Ebird, Audubon Christmas Bird Count results, and other data conglomeration efforts suggest that bird populations are significant<sup>38</sup>.



Figure 27 - Great Blue Heron at Brazos Bend State Park

<sup>37</sup> Referenced at <https://agrilibecdn.tamu.edu/feralhogs/files/2011/05/FeralHogFactSheet.pdf> on 5/21/19.

<sup>38</sup> Additional information can be referenced at [www.ebird.com](http://www.ebird.com), [www.audubon.com](http://www.audubon.com), or [www.inaturalist.org](http://www.inaturalist.org). The Audubon Brazos Bend Christmas Bird Count occurs within the bounds of the watershed ([www.brazosbendcbc.com](http://www.brazosbendcbc.com)).

## Section 6

### Findings and Recommendations

#### 6.1 Summary

The 221-square mile watershed of Big Creek includes a mix of land cover types, land uses, and potential sources of pollution. The water quality impairment and concerns present for the creek in the 2014 IR are likely to be exacerbated by continuing development, absent implementation of any measures to mitigate pollutant sources.

Fecal waste is the primary pollutant of concern for this characterization, and the source profile for the watershed is varied and in transition from traditional rural and natural sources to increased inputs from developed areas and human wastes.

#### 6.1 Findings and Recommendations

The analyses conducted under this report characterized the natural and human factors that influenced water flow and pollutant loading in the watershed. Key findings from the report include:

- Projected development and population growth will have an appreciable impact on land cover and land use in the watershed in the coming decades;
- Sources in the watershed are in a similar transitional period, with legacy agricultural sources being displaced by developed area sources.
  - Recommendation – additional source identification and modeling, with feedback from stakeholders, is necessary to provide more robust evaluation of relative contribution of fecal waste to instream loads.
- Water quality analyses indicate impairments and concerns noted in the 2014 IR (and subsequent Draft IRs) and still prevalent in the watershed, and not likely to decrease in the near future (absent intervention). Current data shows an increasing trend for *E. coli*.
  - Recommendation – additional data is needed in AU2 to support future assessments.
- Fecal waste sources are likely to remain varied, even through the developmental transition period. Wildlife population numbers are the least certain of current estimations.
  - Recommendation – additional source identification and modeling, with feedback from stakeholders, is necessary to provide more robust evaluation of relative contribution of fecal waste to instream loads.
  - Recommendation – estimates for overall loading from other wildlife should be developed based on prior source tracking work on local and other projects.

- High flow conditions relate strongly to high flow conditions in AU2. SWQS exceedances in AU2 are less specific to high flow conditions, but do also favor higher flows in general, with exceedances less prevalent in lower flow conditions.
  - Recommendation – formal LDCs or similar modeling should be conducted as part of formal TMDL or other watershed-based planning efforts.
- Flooding remains a major challenge for the watershed, with significant effort in developing and maintaining drainage conveyances likely to continue for the foreseeable future.
  - Recommendation – future planning efforts should consider both the challenges the watershed’s drainage situation represent, as well as opportunities for coordinating water quality best practices with flood mitigation efforts.



*Figure 28 - Maintained Channel in Big Creek*