LLM/BSC Watershed Protection Plan

—

Steering Committee Meeting

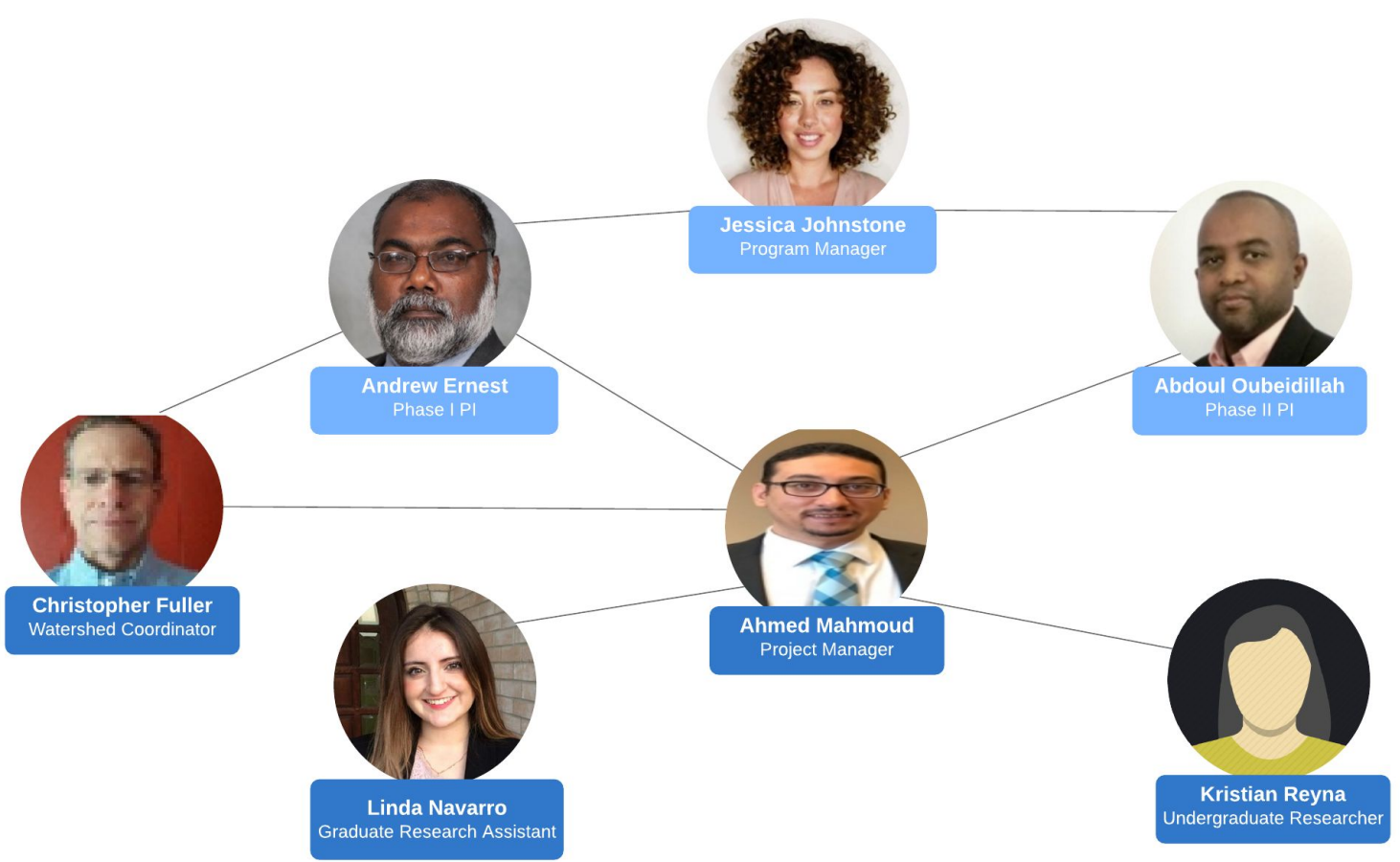
June 17th, 2020

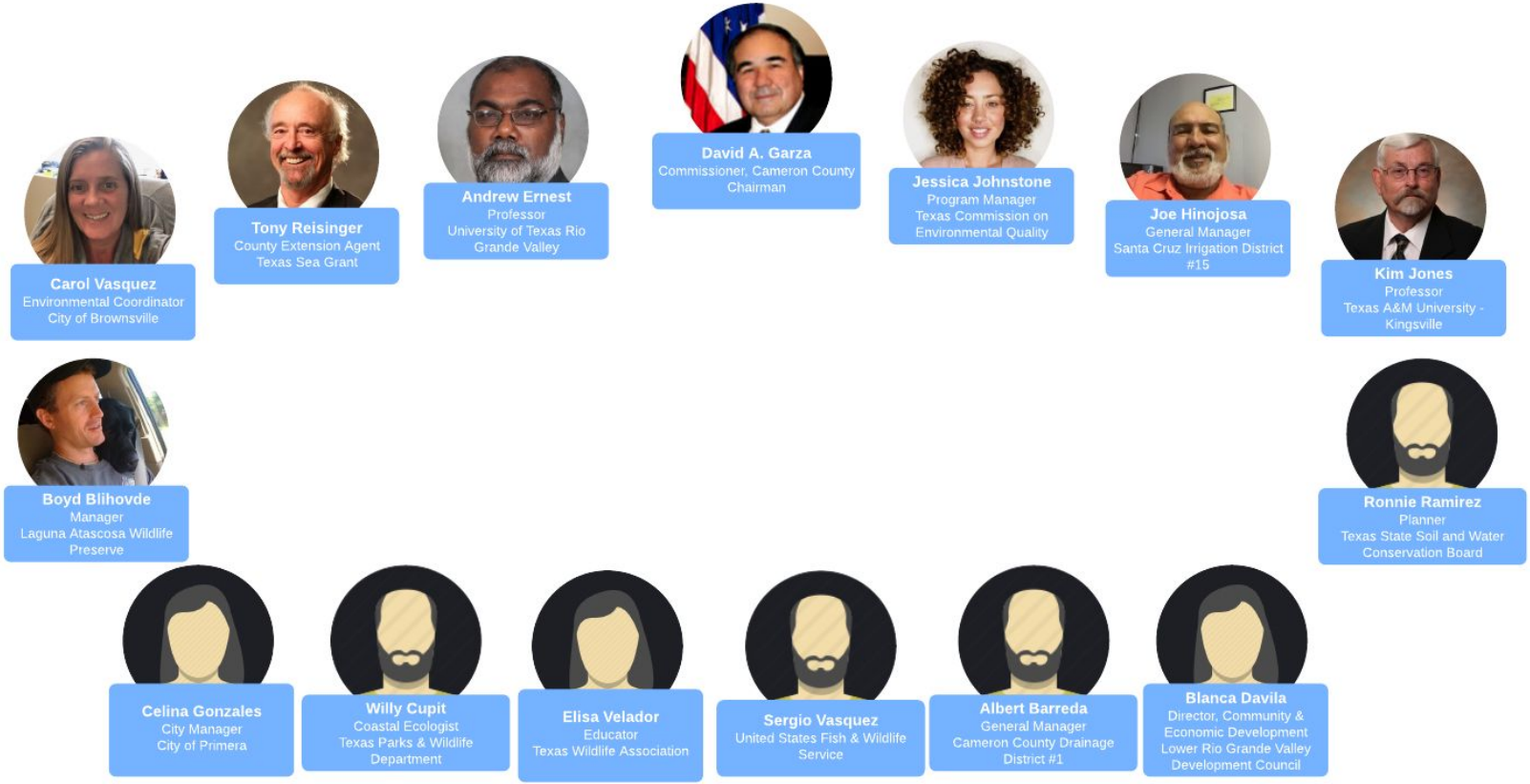
Agenda

1. Welcome and Introductions
2. Status of Data Collection
3. Modeling Efforts
4. Stakeholder Input for Model Assumptions
5. Data Gaps
6. Adjourn

Welcome & Introductions

Project Team





Steering Committee

Technical Advisory Committee

a. LRGVSWTF

b. TCEQ

c. EPA

d. TSSWCB

e. Hydrologic Modeling (UTRGV, TAMUK)

f. Water Quality Modeling (UTRGV, TAMUK)

g. Nueces River Authority

Urban and Infrastructure Workgroup

a. MS4 Operators

b. TCEQ

c. Port of Brownsville

d. Brownsville PUB

e. Drainage Districts

f. WWTP Operators

g. TxDOT

h. OSSFs

Habitat and Coastal Workgroup

a. USFWS

b. TPWD

c. Texas GLO

d. Audubon Society

e. TNC

f. VPEC

Agricultural Workgroup

a. Irrigation Districts

b. Growers

c. TSSWCB

d. TDA

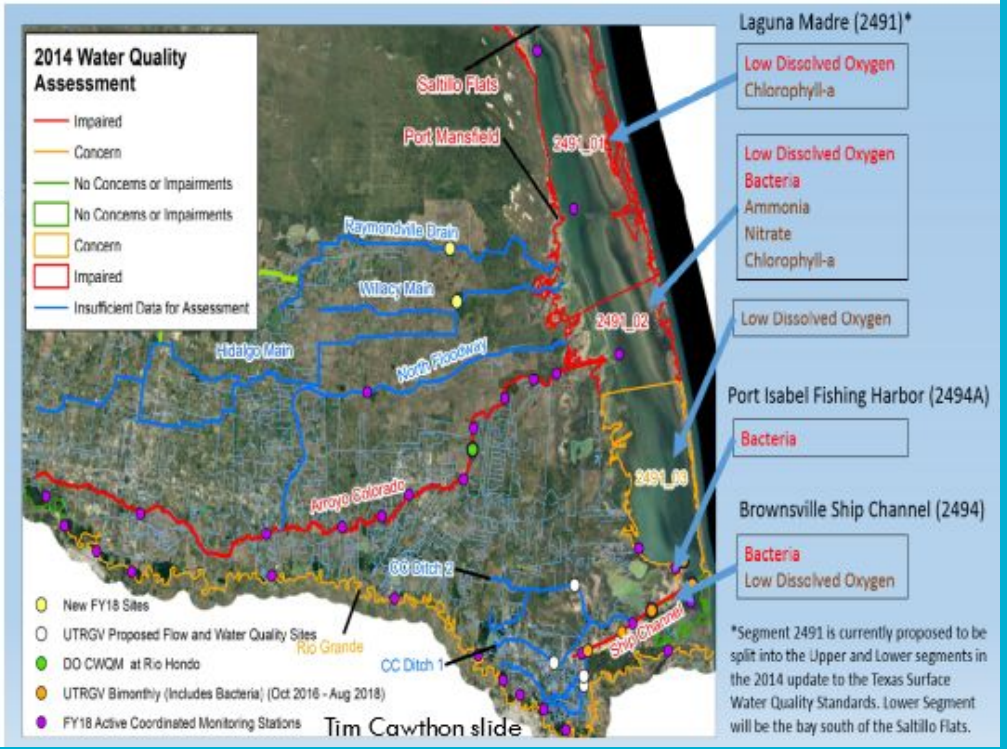
e. USDA

Status of Data Collection

OBJECTIVES

DEVELOP A WPP TO IMPROVE AND PROTECT WATER QUALITY WITHIN THE LOWER LAGUNA MADRE/BROWNSVILLE SHIP CHANNEL WATERSHED.

- MEET EPA'S NINE-ELEMENTS FOR WATERSHED-BASED PLANS (WBPS)

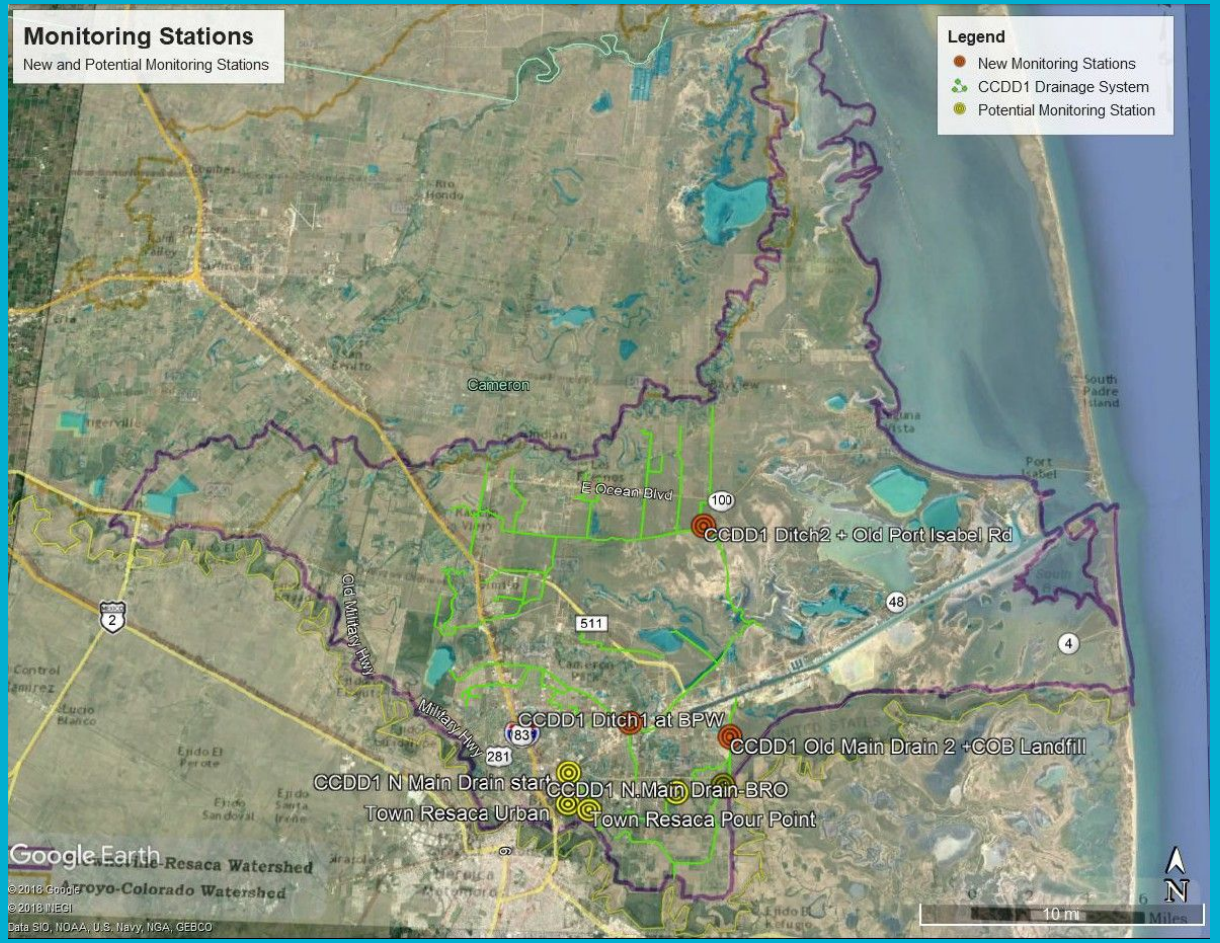


EPA's 9-Elements

A. Identify causes and sources of pollution
B. Estimate pollutant loading into the watershed and the expected load reductions
C. Describe management measures that will achieve load reductions and targeted critical areas
D. Estimate amounts of technical and financial assistance and the relevant authorities needed to implement the plan
E. Develop an information/education component
F. Develop a project schedule
G. Describe the interim, measurable milestones
H. Identify indicators to measure progress
I. Develop a monitoring component

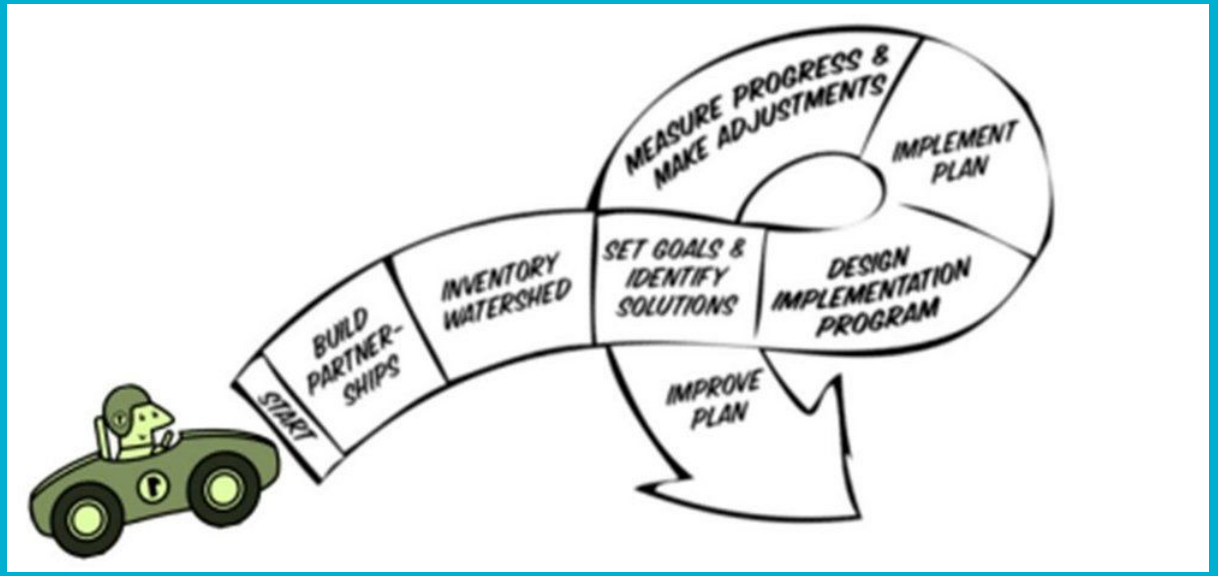
Twin Projects

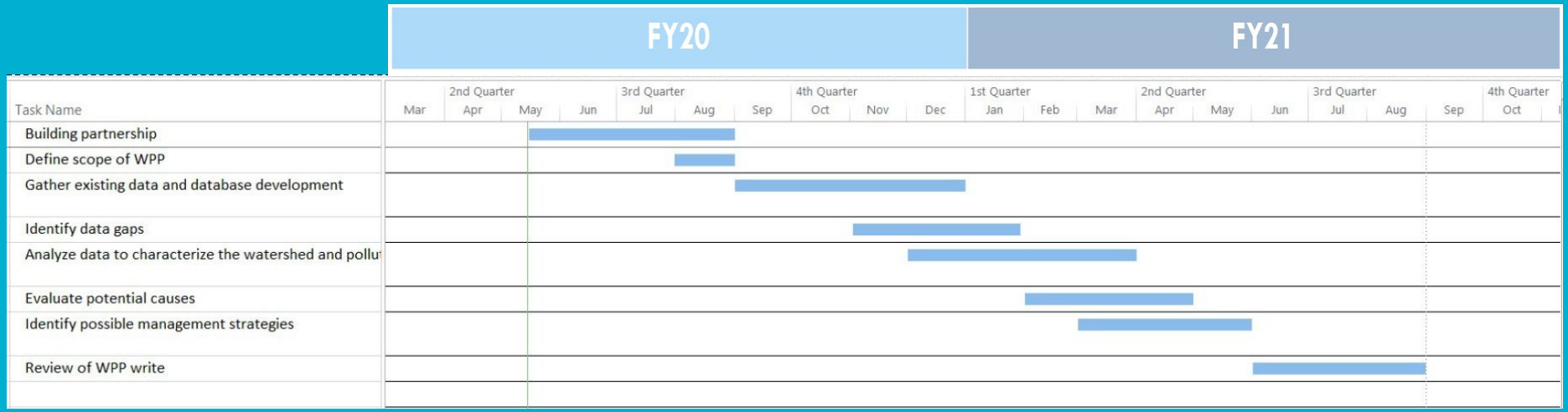
- Build on previous 319 projects
  - Sampling stations
  - Same locations but frequent
  - Additional san martin lake flow measurements
- Modeling
  - Model data from phase 1
- Watershed Protection Plan (wpp)
  - Timeline



WPP Timeline

1. Building partnership
2. Define scope of wpp
3. Develop structure of wpp
4. Gather existing data and database development
5. Analyze data
6. Identify possible management strategies
7. Write/review wpp





WPP Timeline

Grant Status

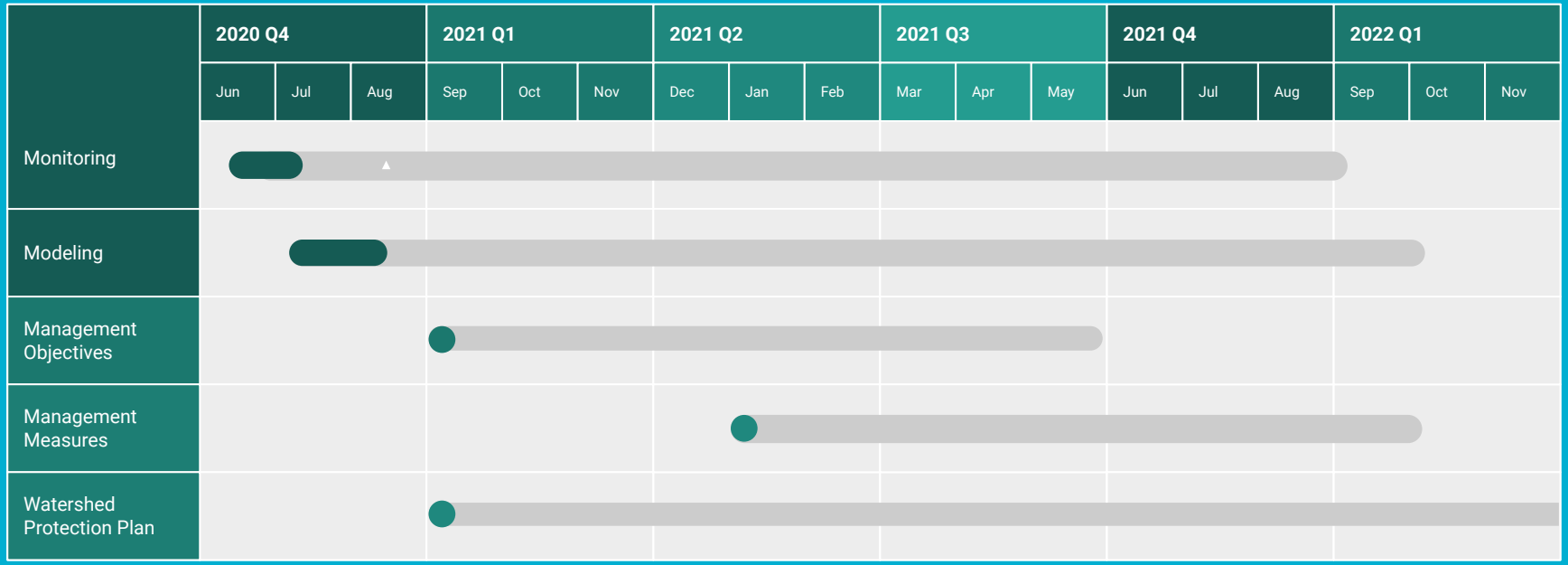
- Monitoring QAPP (Approved July 2019)
- RTHS (Real-Time Hydrological System) (Installed August 2019)
- Watershed Characterization Report (Approved September 19)
- 1st Sampling Event (February 2020)
- Data Uploaded SWQMIS (April 2020)
- Modeling and Geospatial QAPP (In progress)

Grant Status

- Monitoring Timeline:
  - 2nd Monitoring Event (July 2020)

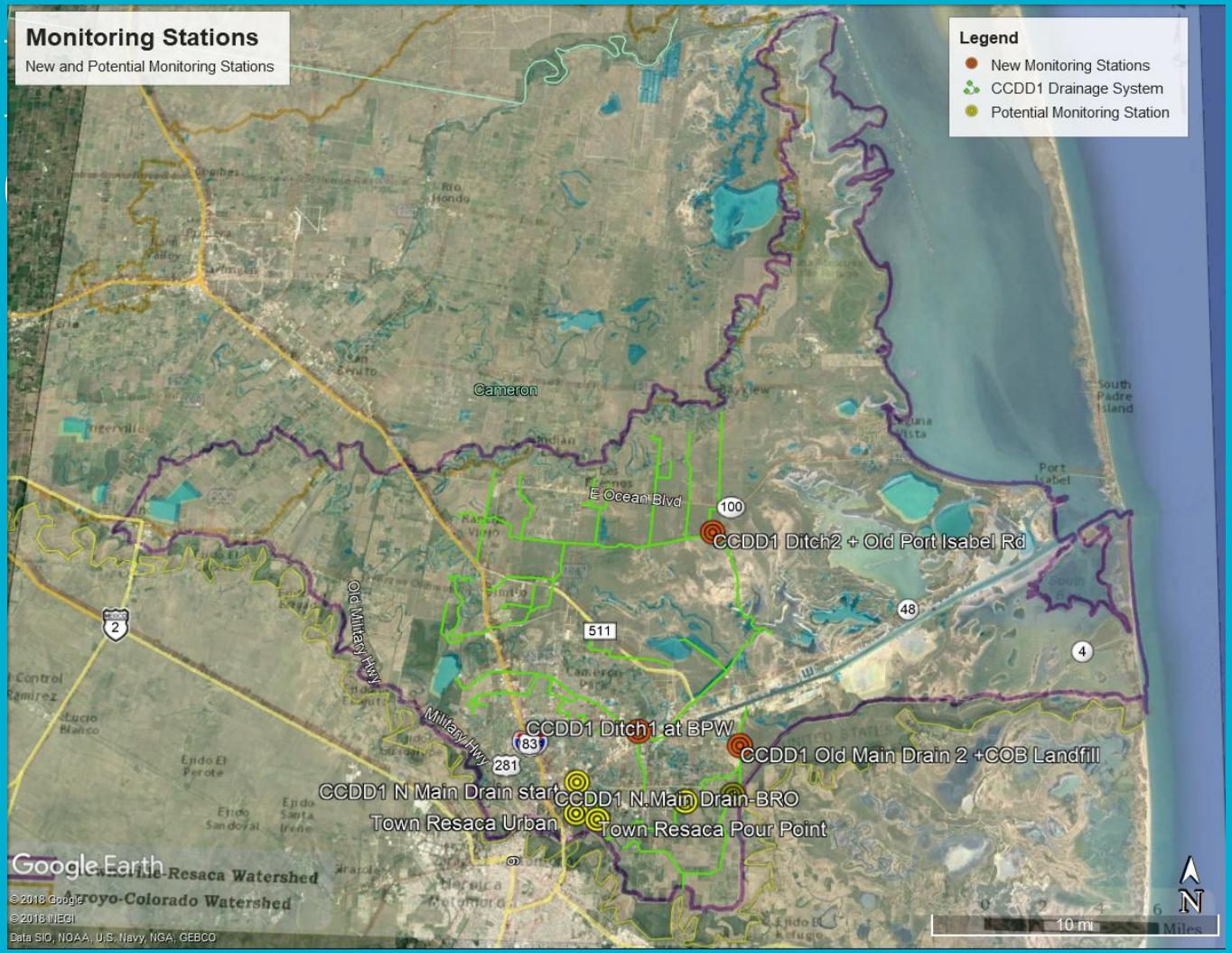
- Outreach Events
  - Postponed due to COVID-19
  - LRGV Stormwater Conference (Postponed to 2021)

Project Timeline



Water Quality and Flow Data

Site	Predominant Land Use	Status
CCDD1 Ditch No. 2 at the intersection with Old Port Isabel Rd. downstream of Bayview East lateral	Agriculture	Data Collection started summer 2019.
Ditch No. 1 at the Brownsville Public Works offices	Urban medium density	Data Collection started summer 2019
Old Main Drain 2 at the Brownsville Landfill	Agriculture and Urban	Data Collection started summer 2019


Monitoring Stations
New and Potential Monitoring Stations
Legend
New Monitoring Stations
CCDD1 Drainage System
Potential Monitoring Station
Cameron
E Ocean Blvd
100
CCDD1 Ditch2 + Old Port Isabel Rd
Old Military Hwy
511
48
4
2
Military Hwy
83
281
CCDD1 Ditch1 at BPW
CCDD1 Old Main Drain 2 +COB Landfill
CCDD1 N Main Drain start
CCDD1 N.Main Drain-BRO
Town Resaca Urban
Town Resaca Pour Point
Google Earth
© 2018 Google
© 2018 INEGI
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
10 mi
N

Phase I- Sampling Events

- 1st Quarterly (unbiased sampling event)-February 11-12, 2020
- 2nd Quarterly - Postponed due COVID-19
  - Originally scheduled to occur May-June 2020
  - Tentatively expected to occur July-August 2020
- Annual Biased Flow- tentatively scheduled for wet season Sept. 2020

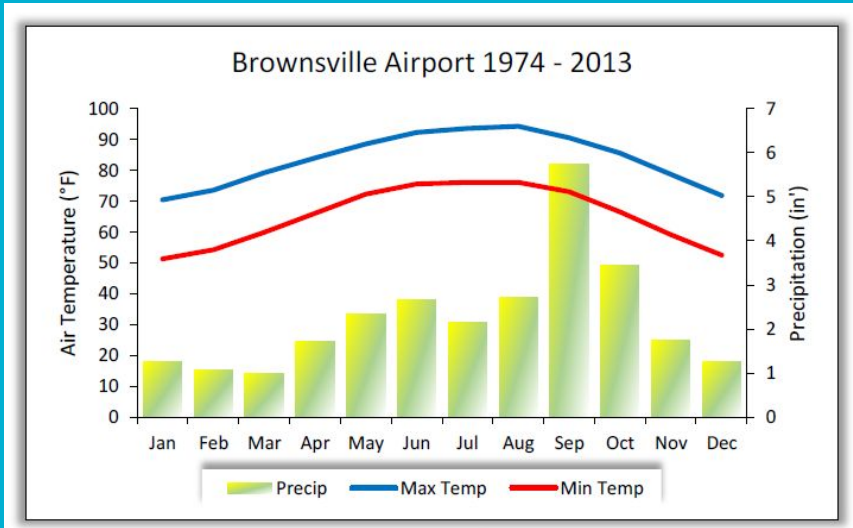


Figure 1-4. Average monthly air temperature and precipitation at Brownsville Airport, Texas, 1974–2013. Source: NCDC (2015).

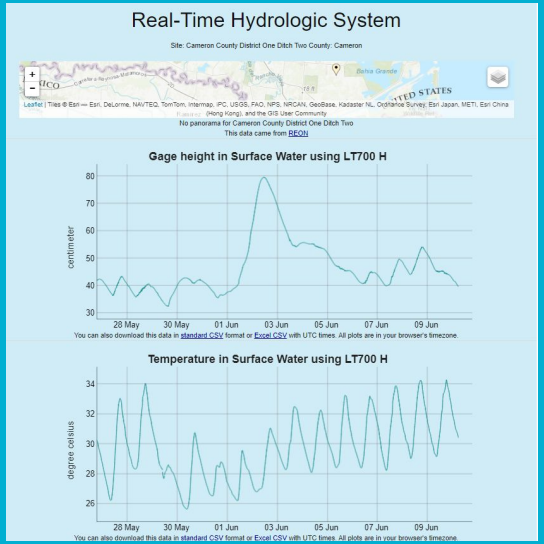
LLM/BSC Watershed Characterization 2018

Data Collection Scope

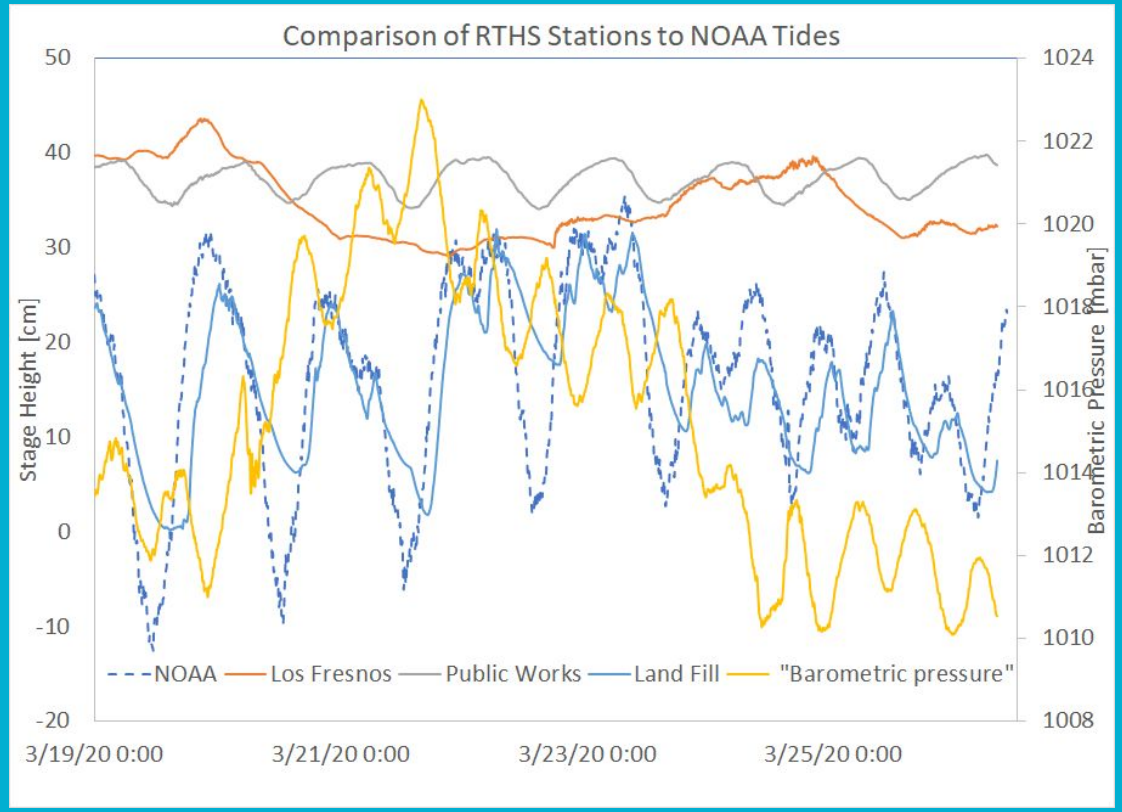
1. Three Monitoring Stations
    - Brownsville Public Works- (SWQM ID 22120
    - Cameron County Drainage District 1- Ditch #2 (SWQM ID 22118)
    - City of Brownsville Landfill (SWQM ID 22121)
2. Continuous- stage height and water temperature
3. Unbiased Sampling Events- Quarterly
    - Instantaneous flow (ADCP)
    - In-situ water quality (pH, specific conductance, D.O., water temp.)
    - Grab Samples (*E. coli*, TKN, Nitrate-Nitrite, Total-Phosphorus)
4. Biased flows- 1/year
    - Immediately following a rain event
    - Same parameters as unbiased events

Continuous RTHS Measurements

1. River and Estuary Observatory Network (REON)-http://rths.us
2. Real Time Hydrologic Station
   a. Stations online in Feb (Prior to Q1 sampling event)
   b. Continuous data at 5 minute resolution



Tidal effects



Brownsville Public Works (22120)

Date: Feb. 11, 2020

Flow: 0.25 m^3/s

Gage Height: 1.2 ft

Water Temp: 25.5℃

SpC: 6,808 uS/cm

D.O.: 5.68 mg/L

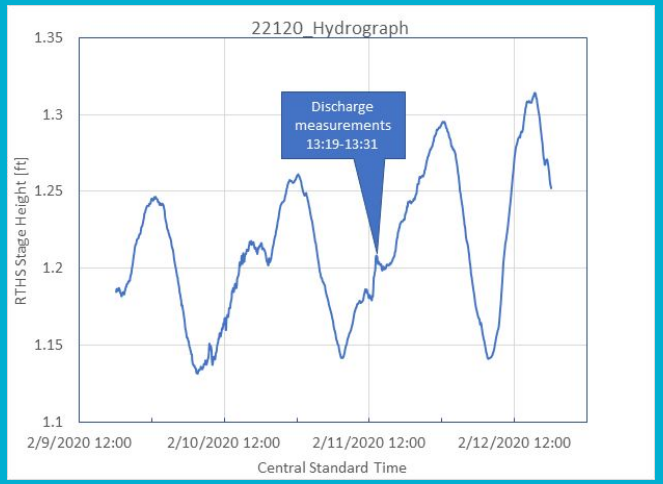
pH: 7.5

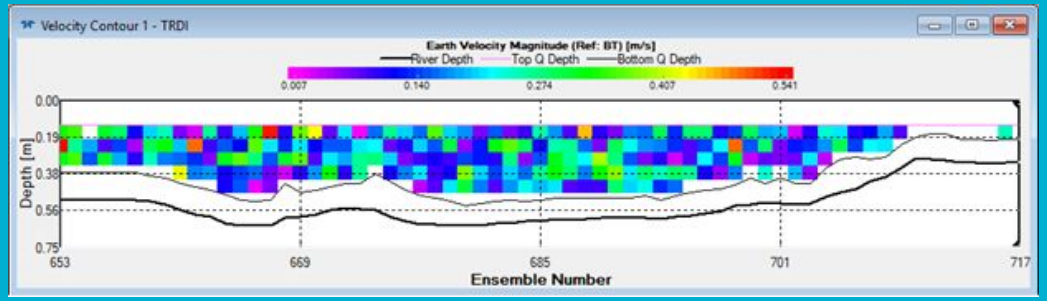
E. coli- 1120 CFU/100ml

TKN: 0.67 mg/L

NO_2+NO_3: 12 mg/L

Total-P: 2.9 mg/L





Cameron County DD 1- Ditch #2 (22118)

Date: Feb. 12, 2020

Flow: 0.9 m^3/s

Gage Height: 0.84 ft

Water Temp: 17℃

SpC: 12,128 uS/cm

D.O.: 7.72 mg/L

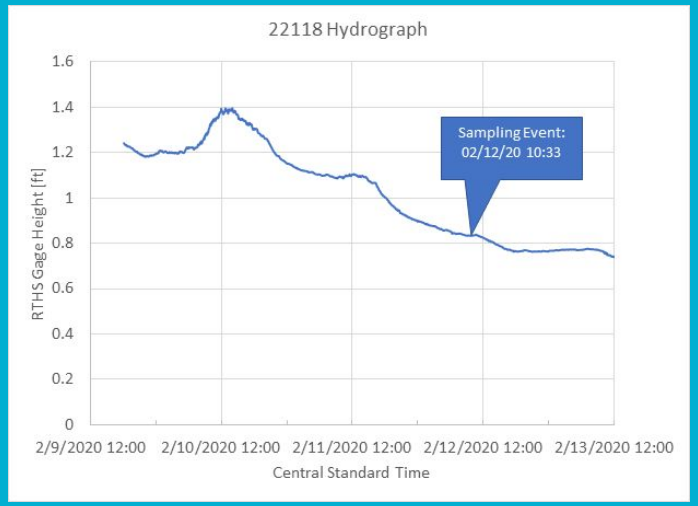
pH: 8.2

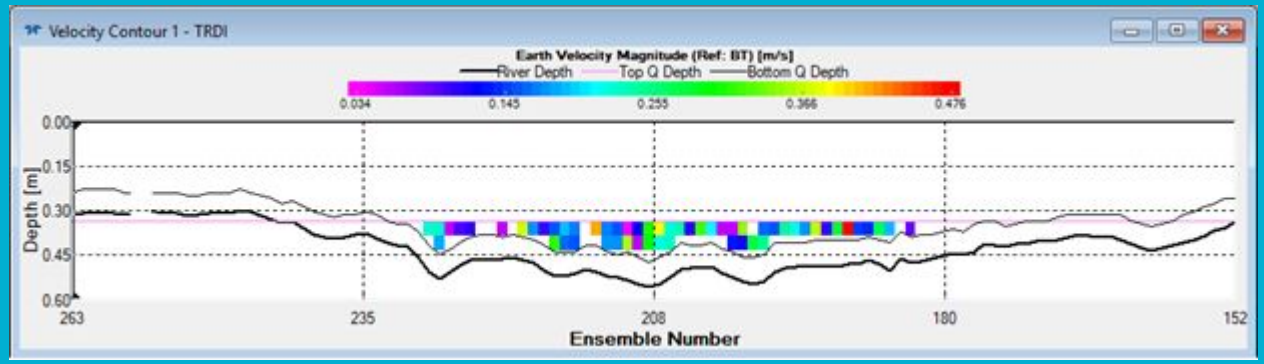
E. coli- 648 CFU/100ml

TKN: 2.2 mg/L

NO_2+NO_3: 5.8 mg/L

Total-P: 1.8 mg/L





City of Brownsville Landfill (22121)

Date: Feb. 12, 2020

Flow: 0.2 m^3/s

Gage Height: 0.28 ft

Water Temp: 18.2℃

SpC: 6,026 uS/cm

D.O.: 8.22 mg/L

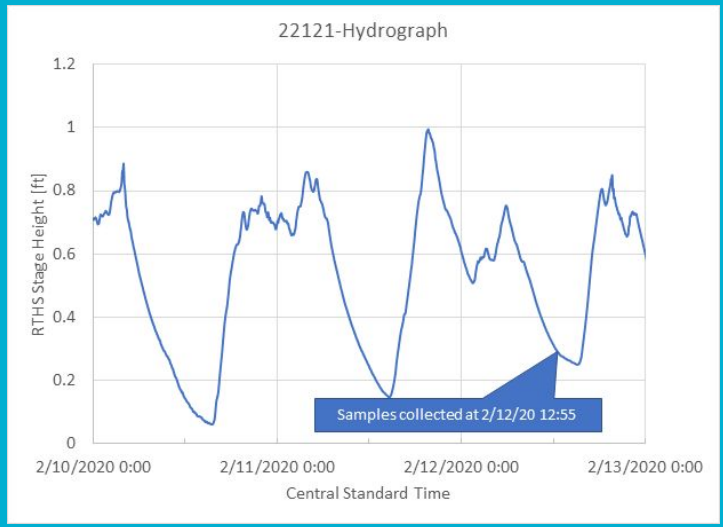
pH: 8.0

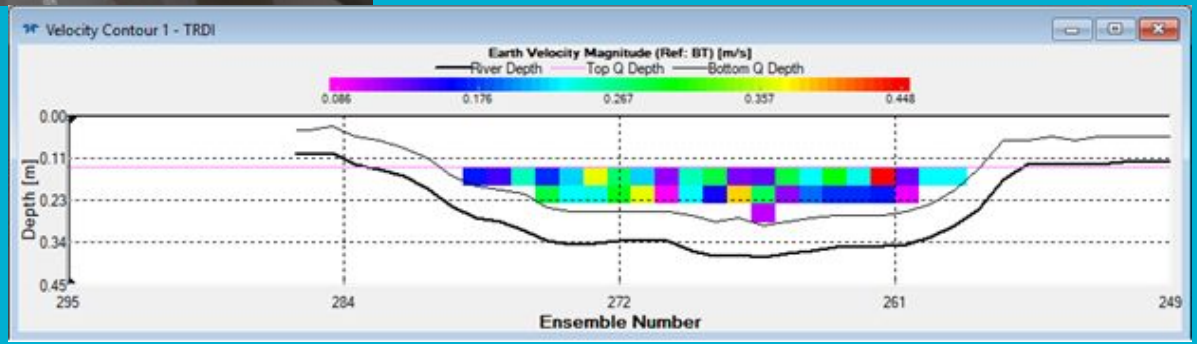
E. coli-980 CFU/100ml

TKN: 64 mg/L

NO_2+NO_3: .1.1 mg/L

Total-P: 0.12 mg/L





2nd Quarterly Sampling Event

- Postponed due to COVID-19
  - Summer 2020
- Special Precautions
  - Pre-mobilization health screenings (personnel must be fit for duty)
  - Provision of PPE
  - Limit personnel traveling in same personnel
  - Dedicate equipment
  - Provide supplies for personal hygiene (e.g. hand sanitizers) and proper disposal of contaminated supplies.
  - Other applicable measures

San Martin Lake Monitoring

- It receives freshwater flow from 2 of the main 3 ditches in the LLM/BSC watershed and is connected to the Ship Channel and saltwater flows into the Lake daily.
- 6 domestic permitted wastewater outfalls and 1 groundwater desalination wastewater outfall with TPDES/NPDES permits that discharge 20.85 MGD into the lake.
- Lack of detailed water quality information on San Martin Lake and the various drainage networks.
- Second phase of funding from the CWA 319(h) program focuses on characterizing flows in/out of the Lake into the Ship Channel

River and Estuary Observation Network Data Maps About Search Register Sign in

Welcome

The River and Estuary Observation Network (REON) is a community network of real-time data providers and users committed to the philosophy of enabling local and regional water resource management through sharing of water data and open exchange of water information.

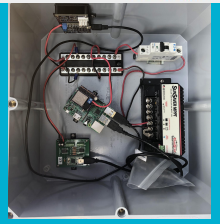
Get Started »

Search for Data.

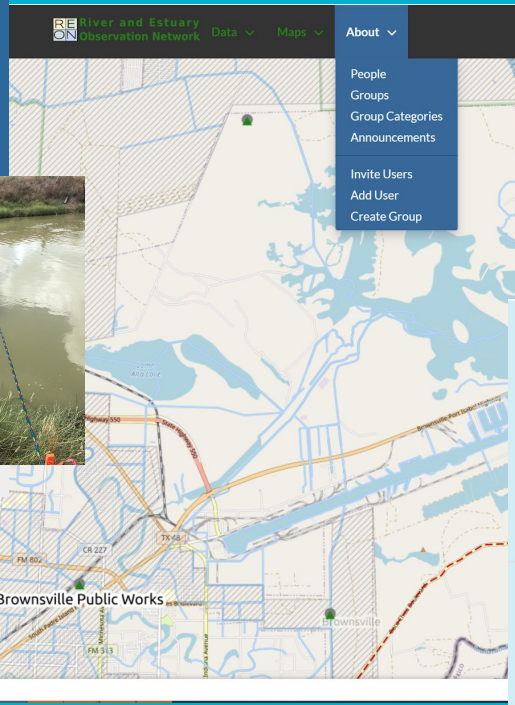
Search

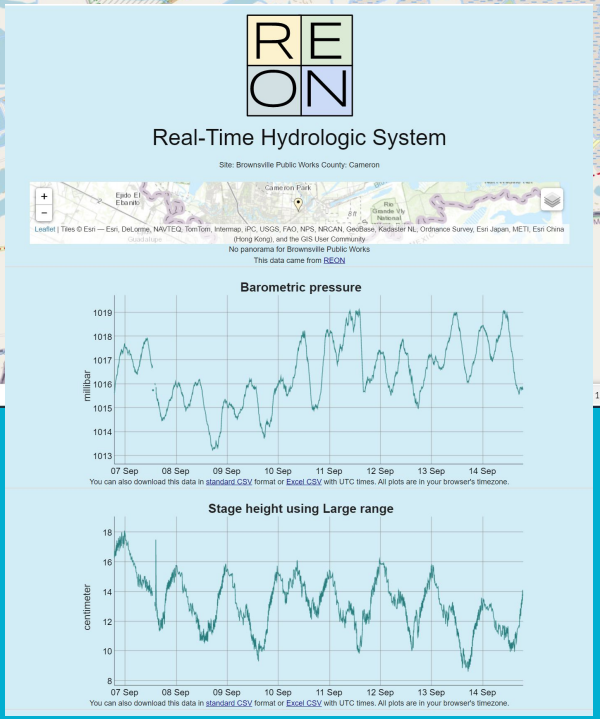
Advanced Search

322 Layers



Maps





River & Estuary Observation Network Cybercollaboratory

Modeling Efforts

Water Quality Modeling

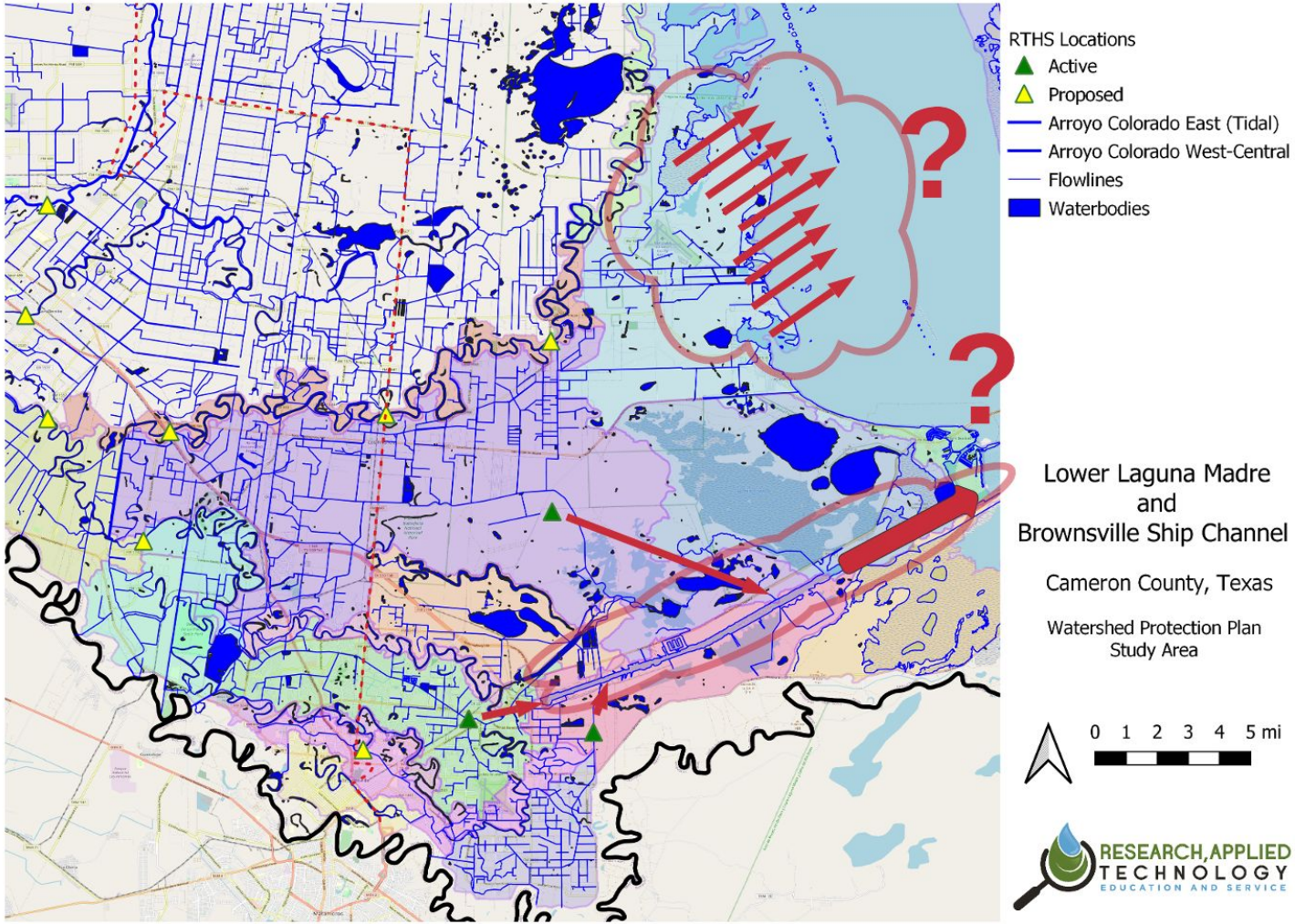
- **SELECT** calculates and allocates potential bacteria loadings from various sources via an ArcGIS environment at a sub-watershed level. Delineating the watershed into smaller sub-watersheds aids in targeting specific areas that may be “hot spots” for potential bacteria loadings.

Spatially Explicit Load Enrichment Calculation Tool (SELECT)

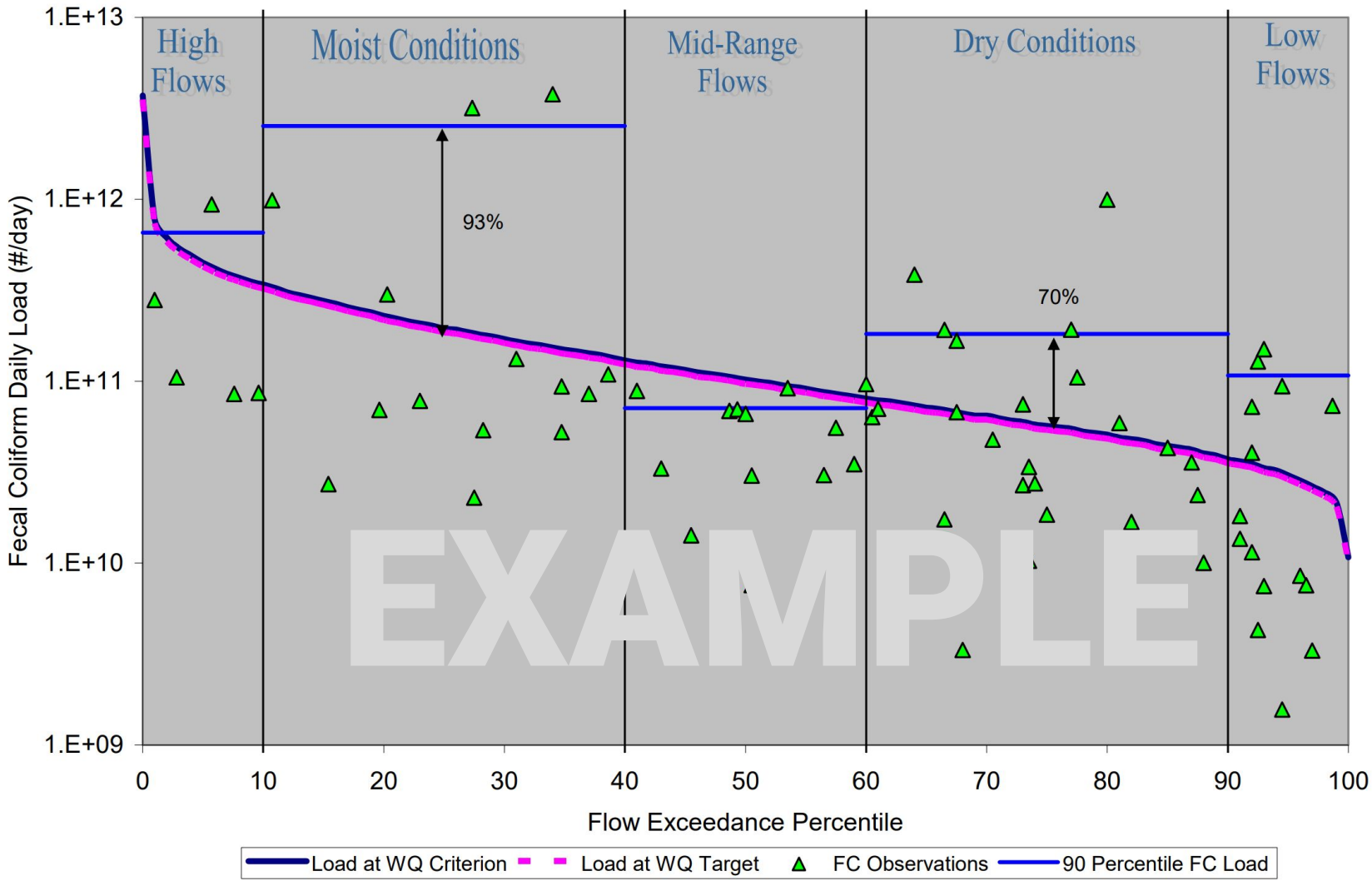
- Identify Potential Bacteria Loadings by Watershed

Load Duration Curves (LDCs)

- Flow Conditions where Loads are Exceeded
- Define Potential Load Reductions

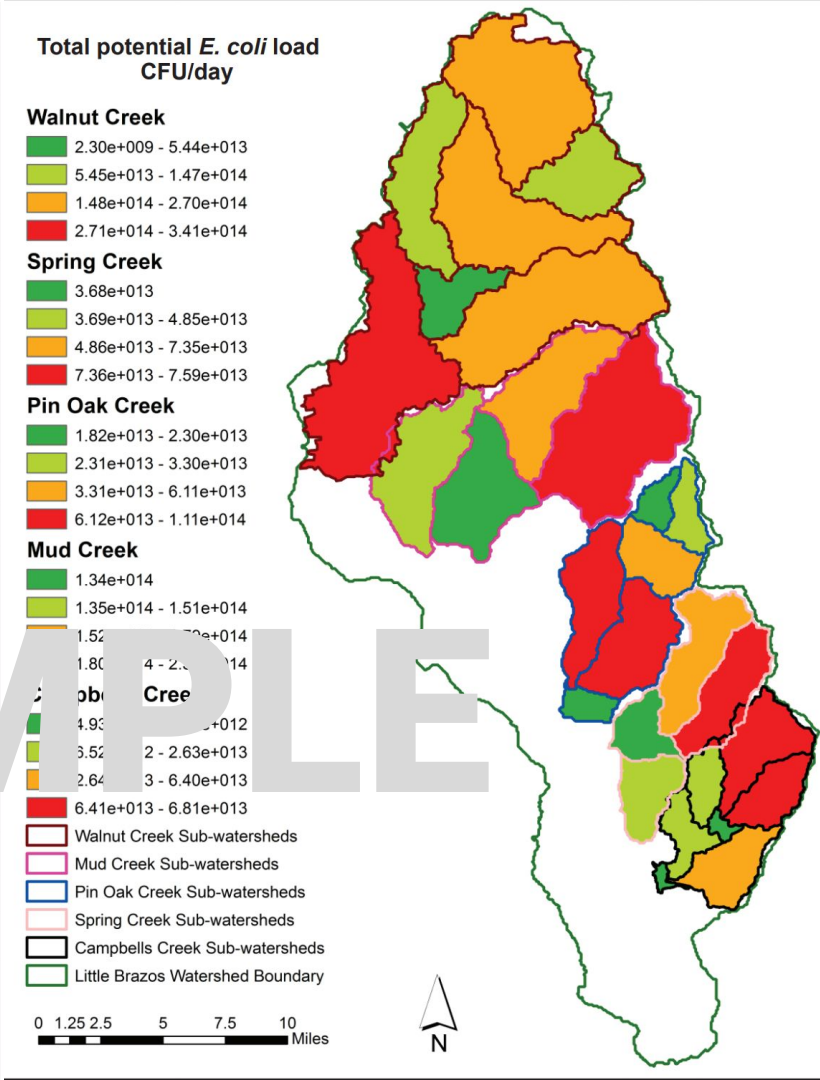


Load Duration Curves



SELECT

Watershed	Potential *E. coli* sources	Daily potential *E. coli* load (CFU/day)	
		Minimum	Maximum
Walnut Creek	Cattle	2.30e+9	3.36e+14
	Deer	1.05e+6	8.97e+10
	Feral hogs	0	5.78e+12
	Poultry operations	0	6.37e+13
	OWTSs	9.69e+6	5.41e+11
	WWTFs	0	1.05e+9
Mud Creek	Cattle	1.30e+14	2.55e+14
	Deer	3.68e+10	7.37e+10
	Feral hogs	2.22e+12	3.98e+12
	Poultry operations	0	9.37e+12
	OWTSs	6.15e+6	2.53e+12
	WWTFs	0	1.43e+9
Pin Oak Creek	Cattle	1.73e+13	1.09e+14
	Deer	[illegible]	[illegible]3e+10
	Feral hogs	7.[illegible]	[illegible]e+12
	OWTSs	2[illegible]	[illegible]-11
Spring Creek	Cattle	[illegible]8e+[illegible]	7.40[illegible]3
	Deer	1.37e+10	2.99e+10
	Feral hogs	9.70e+11	1.79e+12
	OWTSs	6.07e+10	2.67e+11
Campbells Creek	Cattle	4.80e+12	6.64e+13
	Deer	1.81e+9	2.70e+10
	Feral hogs	1.31e+11	2.05e+12
	OWTSs	4.25e+9	1.72e+12



Stakeholder Input for Model Assumptions

Technical Advisory Committee

- Elevation Data
- Watershed Boundary
- Land Use or Land Cover
- Flow Data (Add rows as needed)
- Water Quality Data
- Seasonal Variations
- Buffer Weighting
- Septic Systems

Urban and Infrastructure Workgroup

Urban Stormwater

Will be included in Model? Yes ☐No ☐

Source: <_____>	Notes: <_____>
Pollutant Concentration: <_____>	Source: <_____>

Are the pollutants of concern in the urban stormwater in the watershed? <_____>
Do any of the Municipal Separate storm sewer systems collect water quality samples of their systems? Yes ☐No ☐ If so, please describe data collected. <_____>

Industrial Activity

Will be included in Model? Yes ☐No ☐
Is there any significant industrial activity in the watershed that may contribute the pollutants of concern? Yes ☐No ☐ Maybe ☐ If so, please describe. <_____>
Are you able to obtain information on these sources and there contribution? Yes ☐No ☐ Maybe ☐ If so, please describe. <_____>

Illegal Dumping

Will be included in Model? Yes ☐No ☐

Source: <_____>	Notes: <_____>
Land Uses applied to: <_____>	
Method for calculating number in watershed: <_____>	

Where are the specific areas of concern in the watershed? <_____>
Do the illegal dump sites usually contain trash that would contribute to pollutant of concern? <_____>
Are their many dump sites near streams? <_____>

Septic Systems

Will be included in Model? Yes ☐No ☐

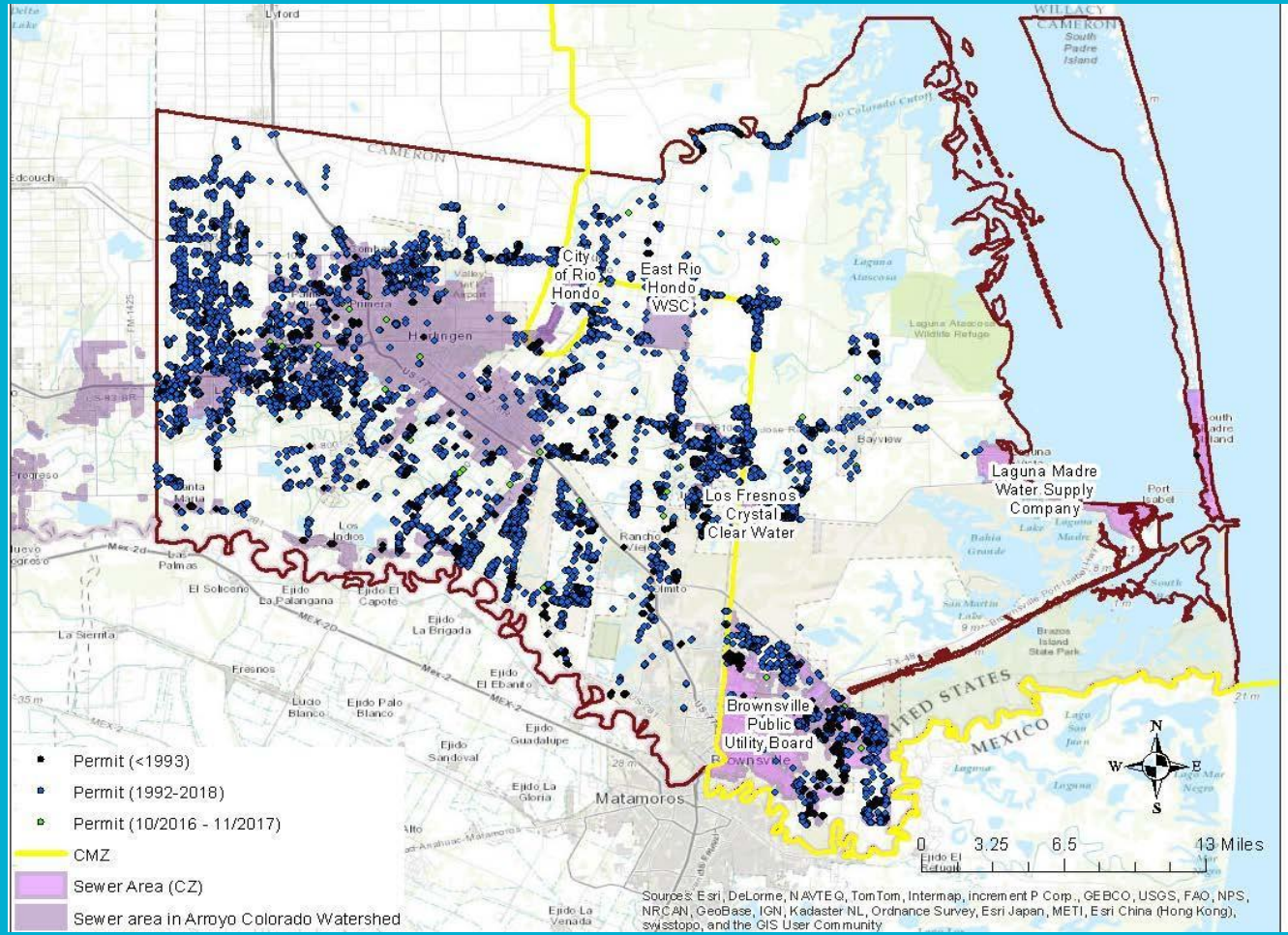
Source: <_____>	Notes: <_____>
Failure Rate % and Source*: <_____>	
Pollutant Concentration and Source: <_____>	
Land Uses applied to: <_____>	

Method for calculating number in watershed: <_____>
Example Sources: 1) EPA national study in 2002 found failure rates averaged between 10-20% across U.S. (Onsite Wastewater Treatment Systems Manual 2002) 2) Texas average was found to be 12% according to Texas On-Site Council Study

*Local input from local designated representative and stakeholders is required; or provide justification for why it cannot be obtained.
Are locations of septic systems known? Yes ☐ No ☐
If yes, briefly explain how locations of septic systems were identified. <_____>
If no septic system locations available are you planning to collect this information? Yes ☐ No ☐
If not what will be your methodology for including septic systems in the model? <_____>
Please justify the failure rate chosen. <_____>

OSSF Database

- Quantification of potential OSSF contribution to water quality issues will be completed using the SELECT Model.
- TWRI is completing OSSF mapping in the watershed and will provide this GIS layer to the UTRGV Modeler for inclusion in the SELECT model.



Habitat and Coastal Workgroup

Deer

Will be included in Model? Yes ☐No ☐

Source: <_____>	Notes: <_____>
Number and Density: <_____>	Source: <_____>
Pollutant Concentration: <_____>	Source: <_____>
Land Uses applied to: <_____>	
Method for calculating number in watershed: <_____>	
Example Sources:	

Feral Hogs

Will be included in Model? Yes ☐No ☐

Source: <_____>	Notes: <_____>
Number and Density: <_____>	Source: <_____>
Pollutant Concentration: <_____>	Source: <_____>
Land Uses applied to: <_____>	
Method for calculating number in watershed: <_____>	

Example Sources:

1) Texas AgriLife. A 2011 report by Texas A&M Institute of Renewable Natural Resources found Feral Hog Density in Texas from reported studies ranged from 1.33 hogs/square mile to 2.45 hogs/square mile. Had a 95% confidence interval.
2) Local knowledge

Other Significant Wildlife (Repeat Table as needed)

Will be included in Model? Yes ☐No ☐

Species: <_____>	
Source(s): <_____>	Notes: <_____>
Number and Density: <_____>	Source: <_____>
Pollutant Concentration: <_____>	Source: <_____>
Land Uses applied to: <_____>	
Method for calculating number in watershed: <_____>	

Are there other significant wildlife sources in the watershed that aren't listed in this checklist?
Yes ☐ No ☐ (E.g. Arroyo Colorado watershed has Javelina and Nilgai.)
Please list other significant wildlife sources and whether you plan to include in model. <_____>

Wildlife Unknown

Will be included in Model? Yes ☐No ☐

Source(s):	Notes:
Pollutant Concentration: <_____>	Source: <_____>
Land Uses applied to: <_____>	
Method for calculating number in watershed: <_____>	

Agricultural Workgroup

Fertilizer Application

Will be included in Model? Yes ☐No ☐

Source: <_____>	Notes: <_____>
Pollutant Concentration: <_____>	Source: <_____>
Land Uses applied to: <_____>	

Please briefly describe how this will be incorporated into the model. <_____>

Will seasonal fluctuations be taken into account? <_____>

Existing Ag Land Water Quality Management Plans

Will be included in Model? Yes ☐No ☐

Source: <_____>	Notes: <_____>

Source:
This information can be obtained from the Texas State Soil and Water Conservation Board and the United States Department of Agriculture

Is there a significant number of acres in the watershed under a WQMP plan? Yes ☐No ☐

Please describe how this will be incorporated into the model. <_____>

Livestock (Repeat Table as needed)

Will be included in Model? Yes ☐No ☐

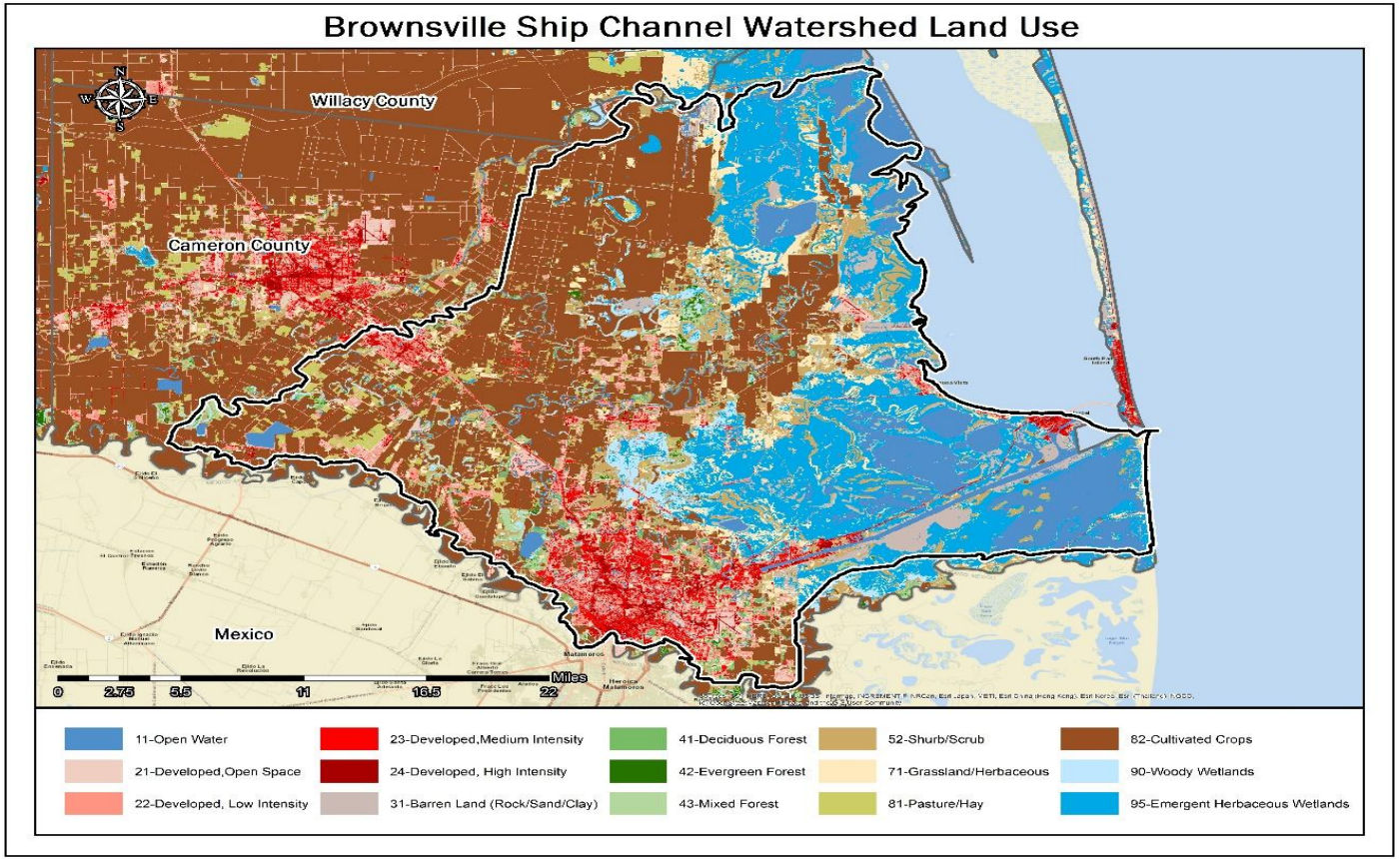
Species: <_____>	
Source: <_____>	Notes: <_____>
Number and Density: <_____>	Source: <_____>
Pollutant Concentration: <_____>	Source: <_____>
Land Uses applied to: <_____>	
Method for calculating number in watershed: <_____>	

Example Sources:

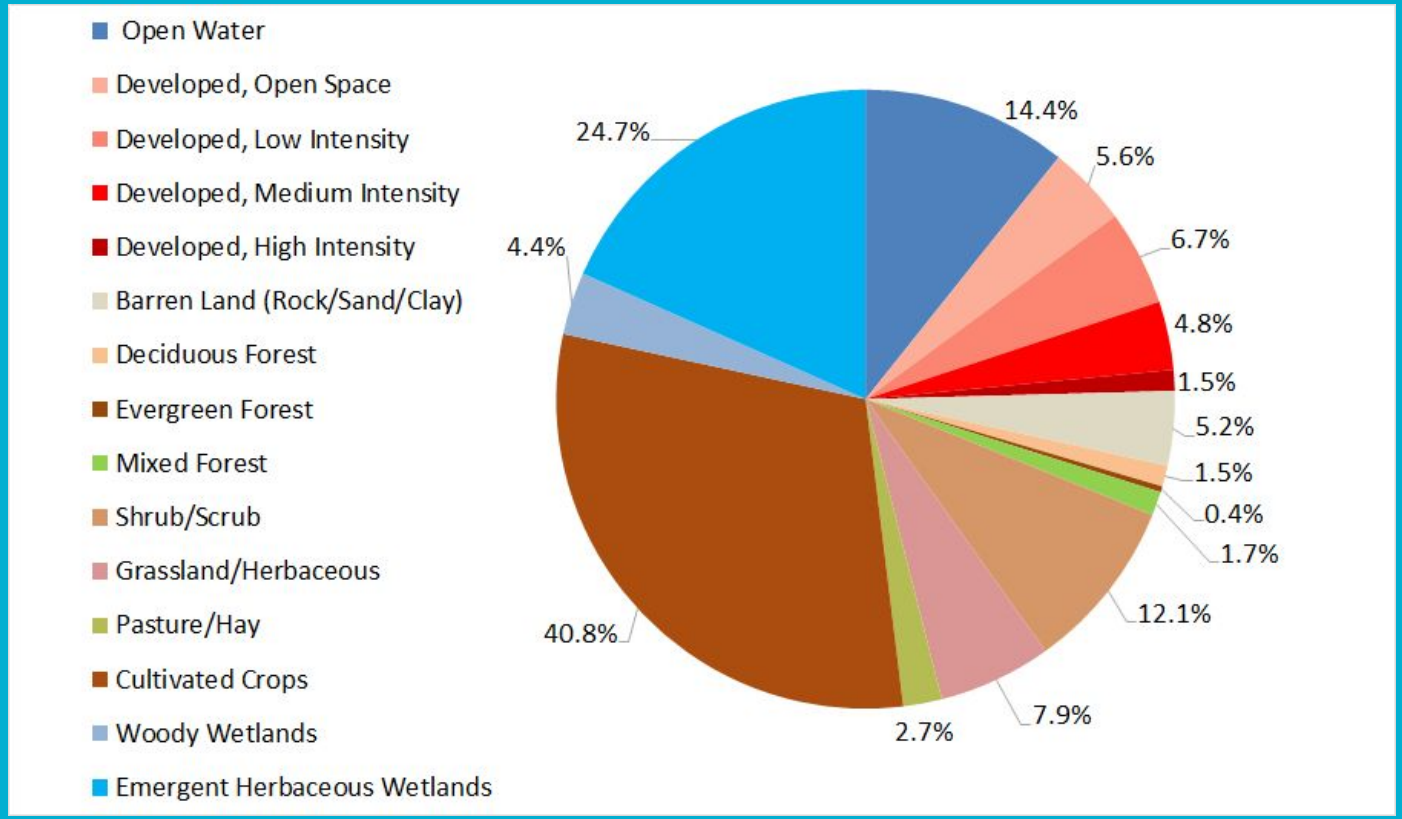
1) USDA National Agriculture Statistics Service County-level agricultural census data
2) Local knowledge

Data Gaps

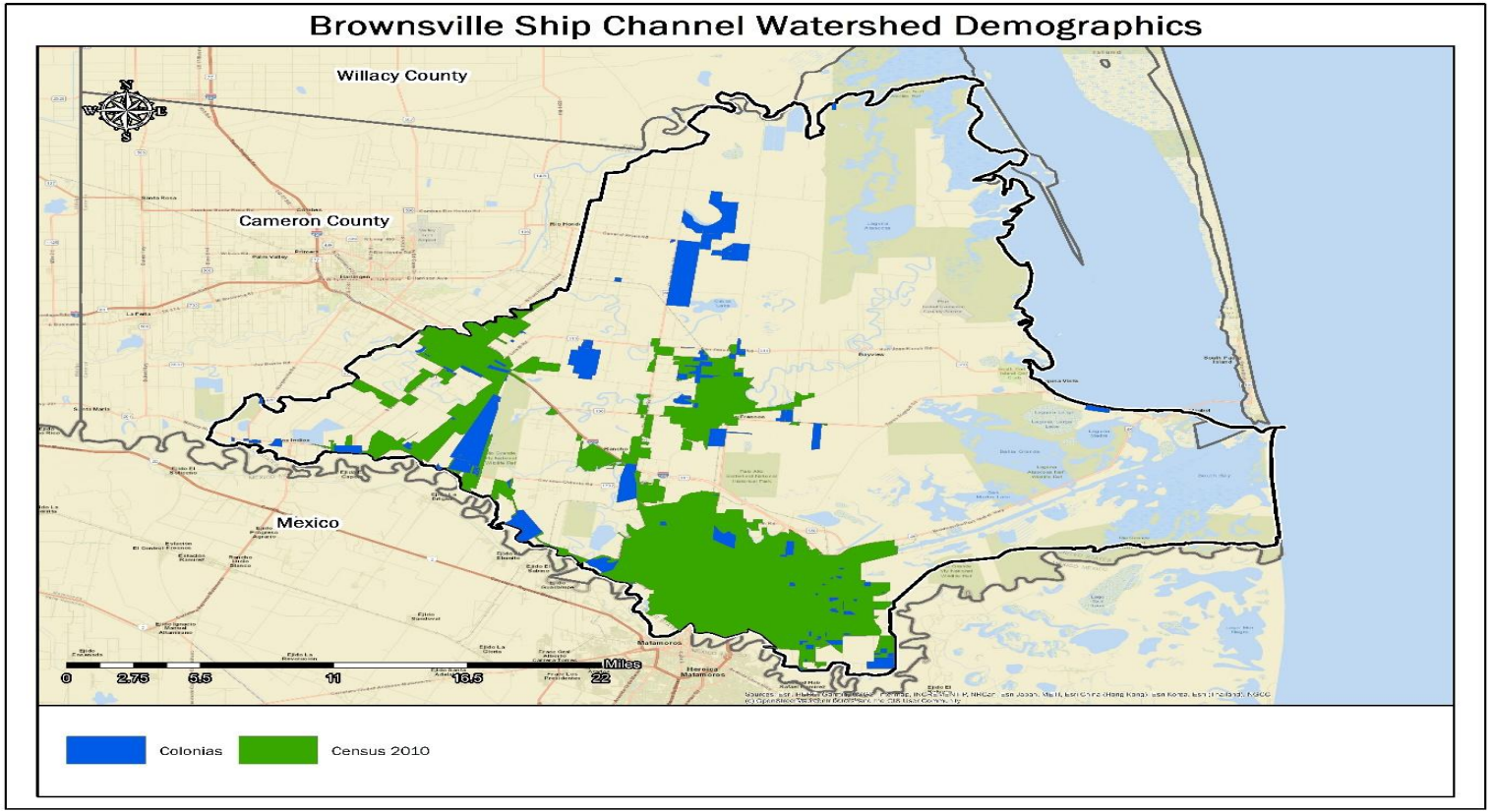
Land Use


Brownsville Ship Channel Watershed Land Use
Willacy County
Cameron County
Mexico
Matamoros
0
2.75
5.5
11
16.5
22
Miles
11-Open Water
21-Developed,Open Space
22-Developed, Low Intensity
23-Developed,Medium Intensity
24-Developed, High Intensity
31-Barren Land (Rock/Sand/Clay)
41-Deciduous Forest
42-Evergreen Forest
43-Mixed Forest
52-Shurb/Scrub
71-Grassland/Herbaceous
81-Pasture/Hay
82-Cultivated Crops
90-Woody Wetlands
95-Emergent Herbaceous Wetlands

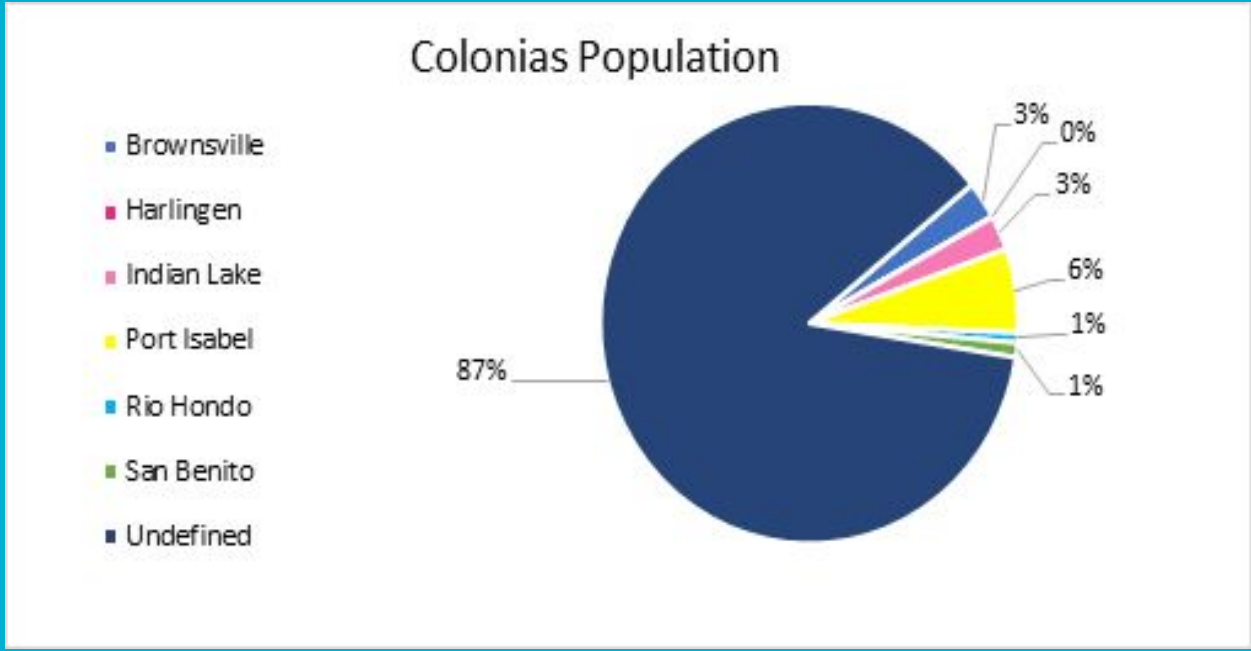
Land Use


Open Water
Developed, Open Space
Developed, Low Intensity
Developed, Medium Intensity
Developed, High Intensity
Barren Land (Rock/Sand/Clay)
Deciduous Forest
Evergreen Forest
Mixed Forest
Shrub/Scrub
Grassland/Herbaceous
Pasture/Hay
Cultivated Crops
Woody Wetlands
Emergent Herbaceous Wetlands
14.4%
5.6%
6.7%
4.8%
1.5%
5.2%
1.5%
0.4%
1.7%
12.1%
7.9%
2.7%
40.8%
4.4%
24.7%

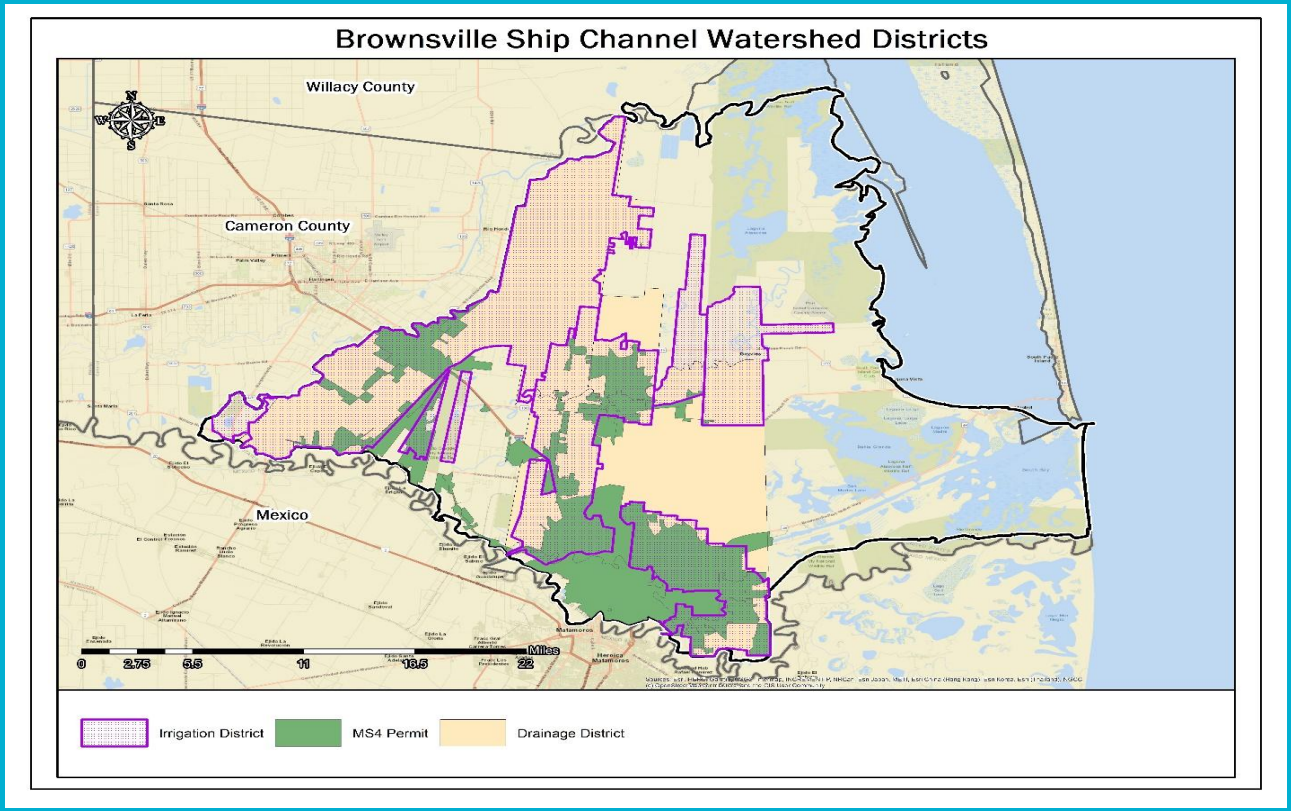
Colonias


Brownsville Ship Channel Watershed Demographics
Willacy County
Cameron County
Mexico
Matamoros
0
2.75
5.5
11
16.5
22
Miles
Colonias
Census 2010

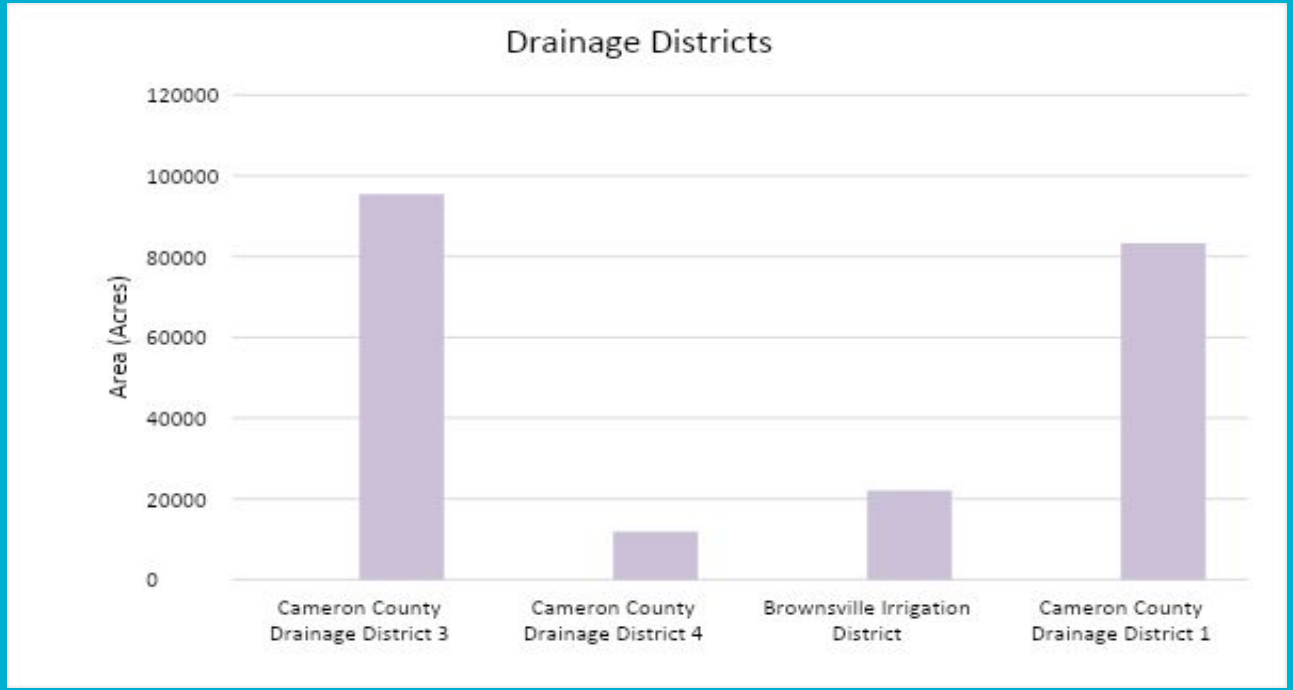
Colonias


Colonias Population
Brownsville
Harlingen
Indian Lake
Port Isabel
Rio Hondo
San Benito
Undefined
3%
0%
3%
6%
1%
1%
87%

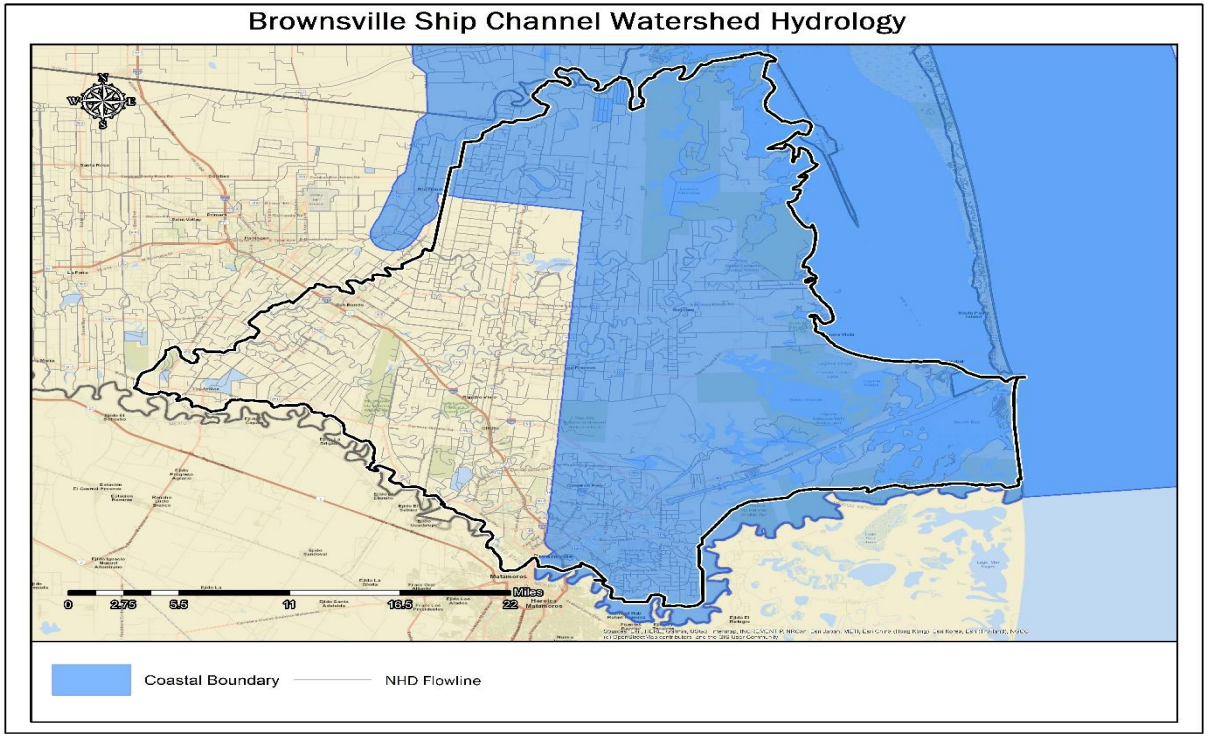
Watershed Districts



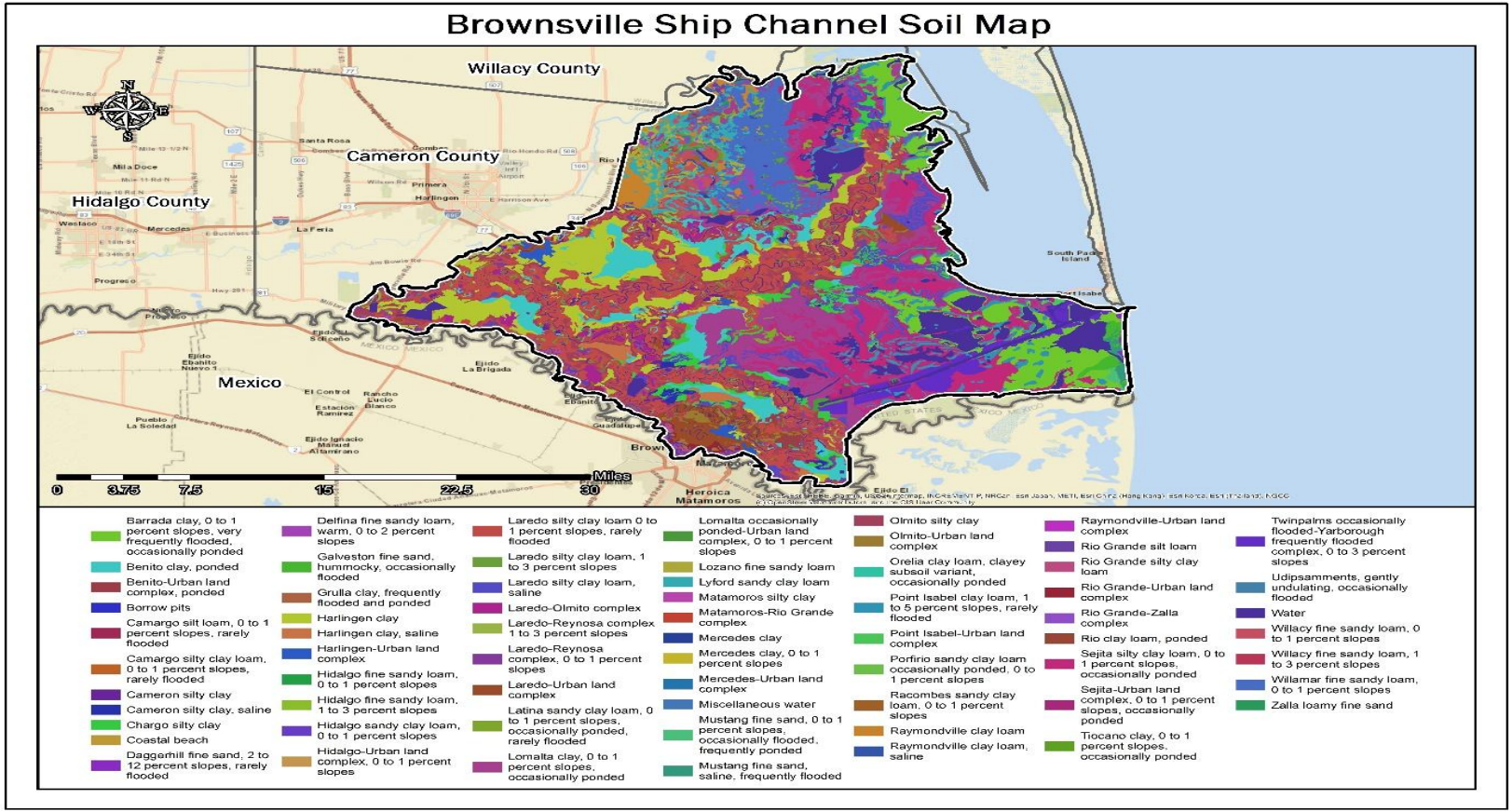
Watershed Districts



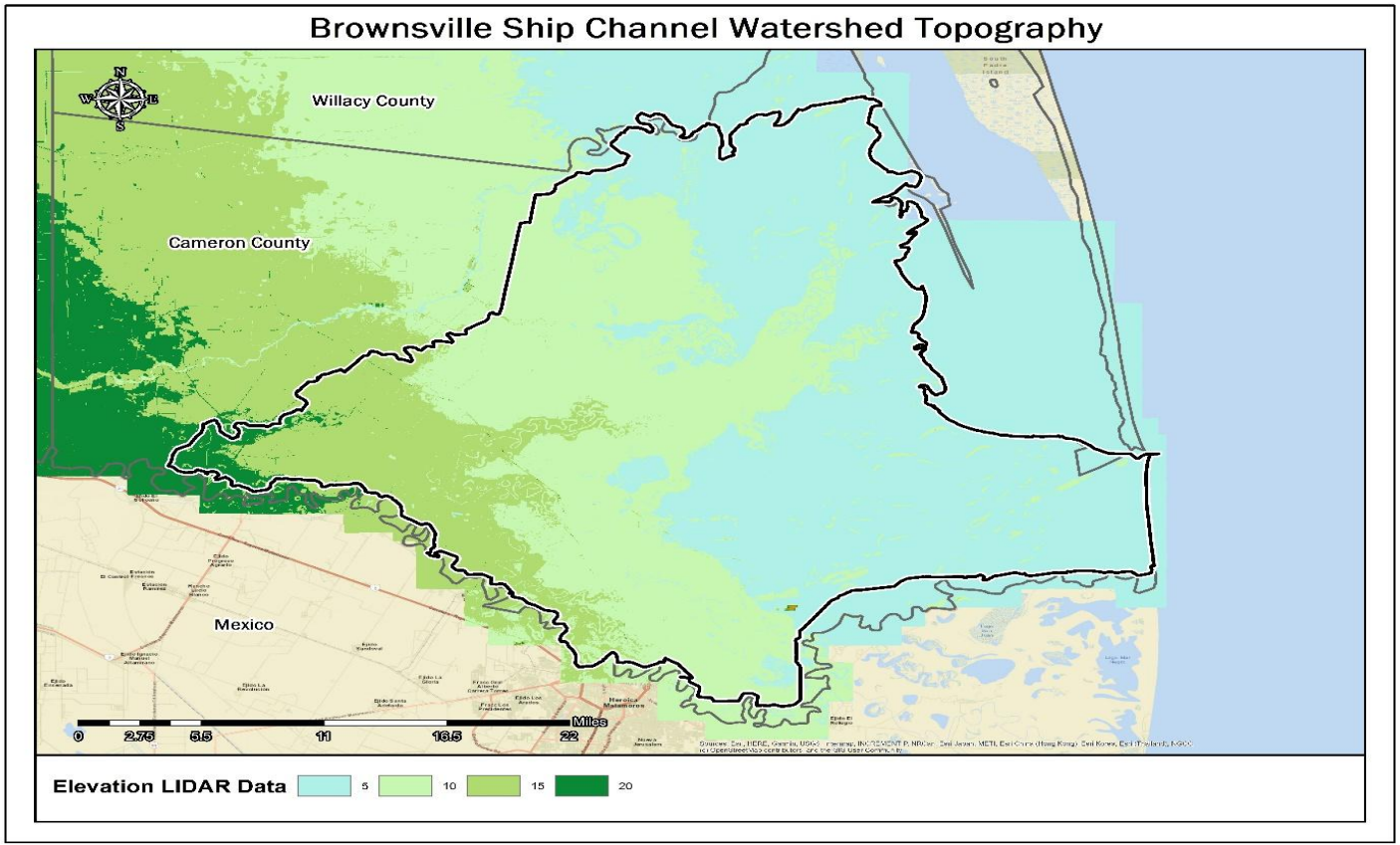
Coastal Boundary



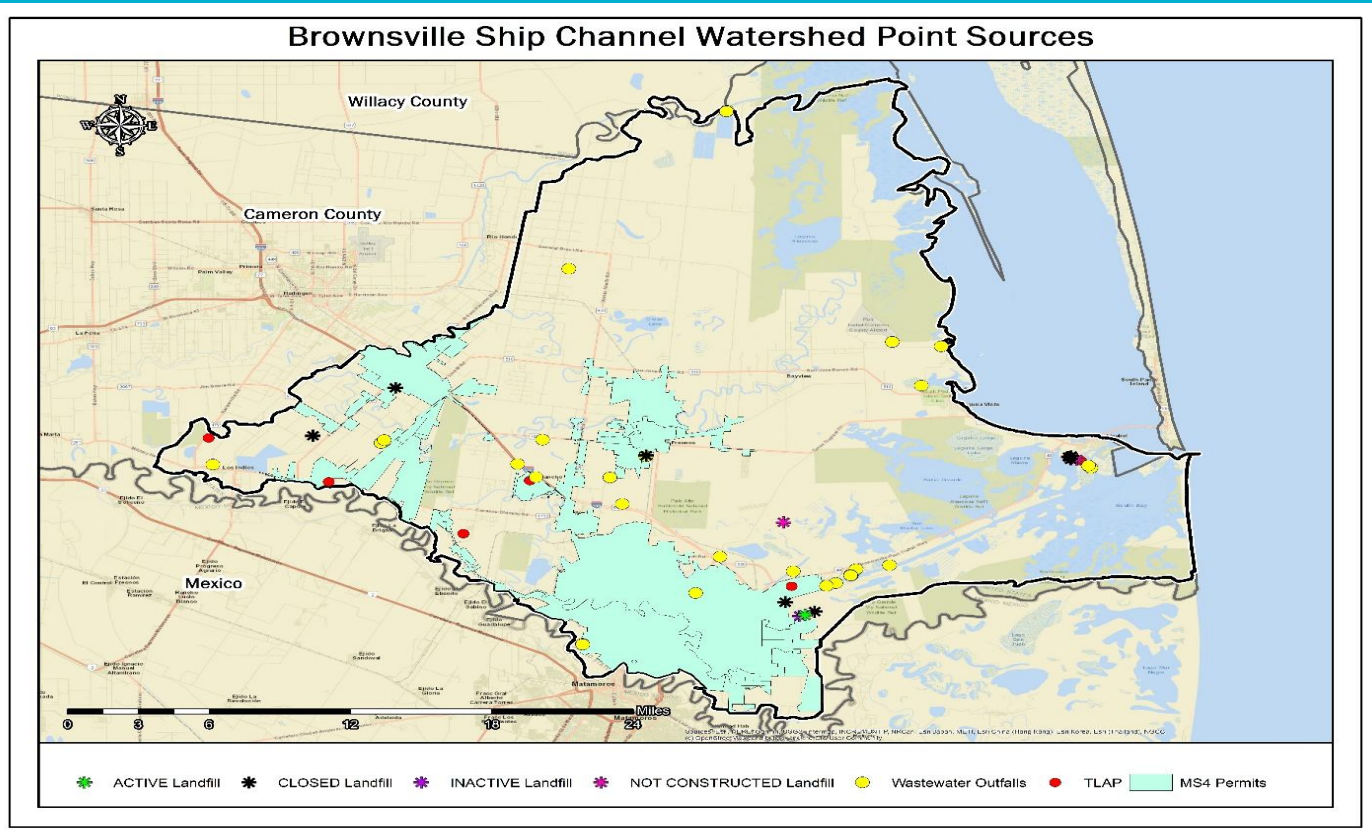
Soil Map


Brownsville Ship Channel Soil Map
Willacy County
Cameron County
Hidalgo County
Mexico
Miles
0
3.75
7.5
15
22.5
30
Barrada clay, 0 to 1 percent slopes, very frequently flooded, occasionally ponded
Benito clay, ponded
Benito-Urban land complex, ponded
Borrow pits
Camargo silt loam, 0 to 1 percent slopes, rarely flooded
Camargo silty clay loam, 0 to 1 percent slopes, rarely flooded
Cameron silty clay
Cameron silty clay, saline
Chargo silty clay
Coastal beach
Daggerhill fine sand, 2 to 12 percent slopes, rarely flooded
Delfina fine sandy loam, warm, 0 to 2 percent slopes
Galveston fine sand, hummocky, occasionally flooded
Grulla clay, frequently flooded and ponded
Harlingen clay
Harlingen clay, saline
Harlingen-Urban land complex
Hidalgo fine sandy loam, 0 to 1 percent slopes
Hidalgo fine sandy loam, 1 to 3 percent slopes
Hidalgo sandy clay loam, 0 to 1 percent slopes
Hidalgo-Urban land complex, 0 to 1 percent slopes
Laredo silty clay loam 0 to 1 percent slopes, rarely flooded
Laredo silty clay loam, 1 to 3 percent slopes
Laredo silty clay loam, saline
Laredo-Olmito complex
Laredo-Reynosa complex 1 to 3 percent slopes
Laredo-Reynosa complex, 0 to 1 percent slopes
Laredo-Urban land complex
Latina sandy clay loam, 0 to 1 percent slopes, occasionally ponded, rarely flooded
Lomalta clay, 0 to 1 percent slopes, occasionally ponded
Lomalta occasionally ponded-Urban land complex, 0 to 1 percent slopes
Lozano fine sandy loam
Lyford sandy clay loam
Matamoros silty clay
Matamoros-Rio Grande complex
Mercedes clay
Mercedes clay, 0 to 1 percent slopes
Mercedes-Urban land complex
Miscellaneous water
Mustang fine sand, 0 to 1 percent slopes, occasionally flooded, frequently ponded
Mustang fine sand, saline, frequently flooded
Olmito silty clay
Olmito-Urban land complex
Orelia clay loam, clayey subsoil variant, occasionally ponded
Point Isabel clay loam, 1 to 5 percent slopes, rarely flooded
Point Isabel-Urban land complex
Porfirio sandy clay loam occasionally ponded, 0 to 1 percent slopes
Racombes sandy clay loam, 0 to 1 percent slopes
Raymondville clay loam
Raymondville clay loam, saline
Raymondville-Urban land complex
Rio Grande silt loam
Rio Grande silty clay loam
Rio Grande-Urban land complex
Rio Grande-Zalla complex
Rio clay loam, ponded
Sejita silty clay loam, 0 to 1 percent slopes, occasionally ponded
Sejita-Urban land complex, 0 to 1 percent slopes, occasionally ponded
Tiocano clay, 0 to 1 percent slopes, occasionally ponded
Twinpalms occasionally flooded-Yarborough frequently flooded complex, 0 to 3 percent slopes
Udipsamments, gently undulating, occasionally flooded
Water
Willacy fine sandy loam, 0 to 1 percent slopes
Willacy fine sandy loam, 1 to 3 percent slopes
Willamar fine sandy loam, 0 to 1 percent slopes
Zalla loamy fine sand

Topography


Brownsville Ship Channel Watershed Topography
Willacy County
Cameron County
Mexico
0
2.75
5.5
11
16.5
22
Miles
Elevation LIDAR Data
5
10
15
20

Point Source



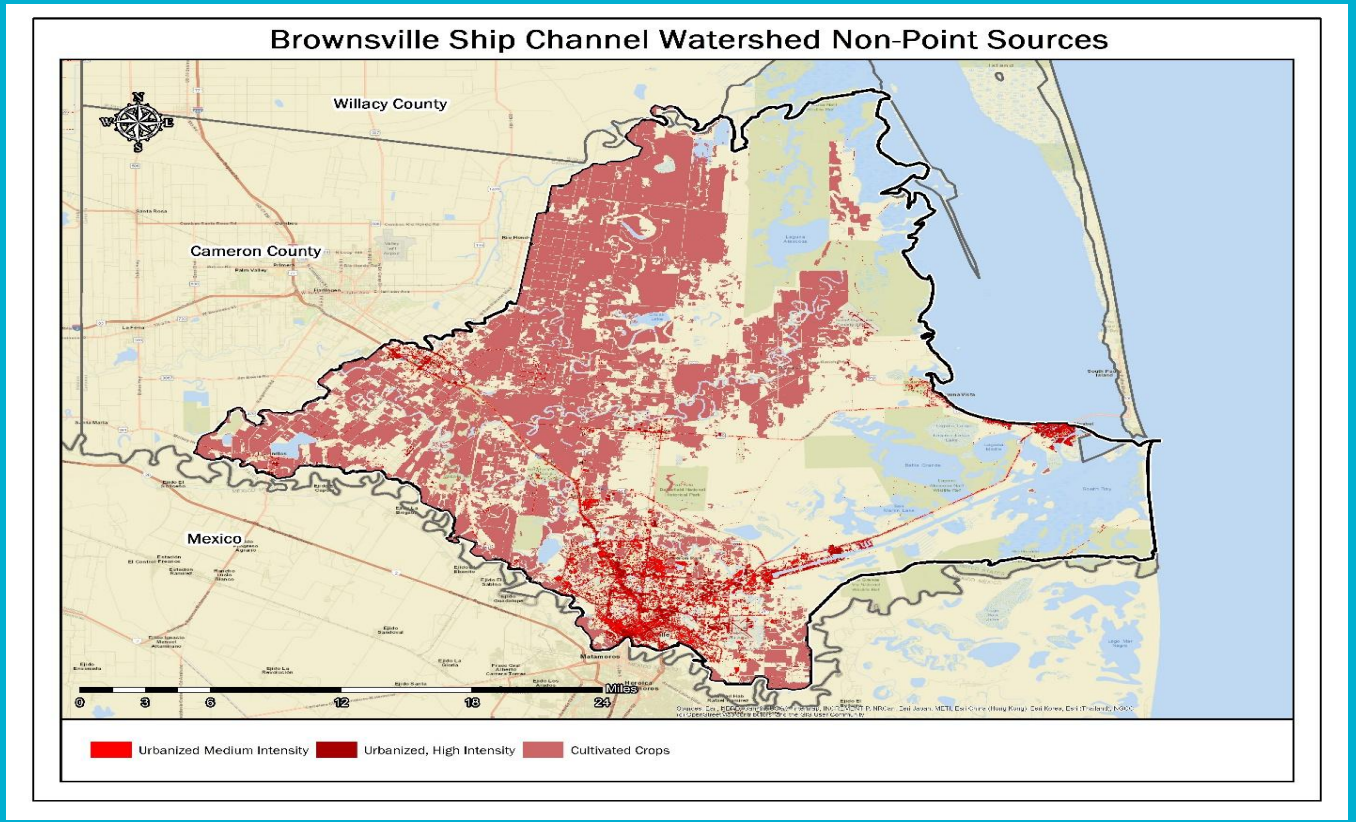
LandFills

LANDFILLS		
1	CITY OF BROWNSVILLE COMPOSTING FACILITY	ACTIVE
2	CITY OF LOS FRESNOS LANDFILL	CLOSED
3	CITY OF BROWNSVILLE LANDFILL	CLOSED
4	CITY OF PORT ISABEL LANDFILL	NOT CONSTRUCTED
5	SANITARY LANDFILL CORP	CLOSED
6	APPLIED RECOVERY TECHNOLOGY LANDFILL	NOT CONSTRUCTED
7	CITY OF BROWNSVILLE COMPOSTING FACILITY	INACTIVE
8	CITY OF BROWNSVILLE LANDFILL	ACTIVE
9	CITY OF SAN BENITO	CLOSED
10	CAMERON COUNTY FRESH WATER SUPPLY DISTRICT	CLOSED
11	CAMERON COUNTY LANDFILL	CLOSED
12	CITY OF PORT ISABEL LANDFILL	CLOSED
13	CAMERON COUNTY FRESH WATER SUPPLY DISTRICT TRANSFER STATION FACILITY	CLOSED

Wastewater Outfalls

- 32 Wastewater Outfalls permits
- Majority are located within Brownsville city
- City of Brownsville and Harlingen having MS4 permits

Non-Point Source



Adjourn

Water Quality Modeling

- The **Geospatial Load Assessment Methodology (GLAM)** was developed by Houston-Galveston Area Council (H-GAC) to provide a simple means of estimating nutrient loading, assumed to be a primary constituent of low DO issues. Because GLAM is a new methodology without previous implementation, robust stakeholder review will be requested prior to its use.

Water Quality Modeling

- **Tidal Prism Model** is a steady-state model capable of simulating up to 10 water quality variables, including dissolved oxygen and fecal coliform bacteria. Tidal Prism Model is applicable only to marinas where tidal forces are predominant with oscillating flow (e.g., an estuary or a tidal river). Therefore, the Tidal Prism Model can’t be applied to marinas located on a sound, an open sea, or a lake or reservoir.

Water Quality Modeling

- **Tidal Prism Model** is a steady-state model capable of simulating up to 10 water quality variables, including dissolved oxygen and fecal coliform bacteria. Tidal Prism Model is applicable only to marinas where tidal forces are predominant with oscillating flow (e.g., an estuary or a tidal river). Therefore, the Tidal Prism Model can’t be applied to marinas located on a sound, an open sea, or a lake or reservoir.