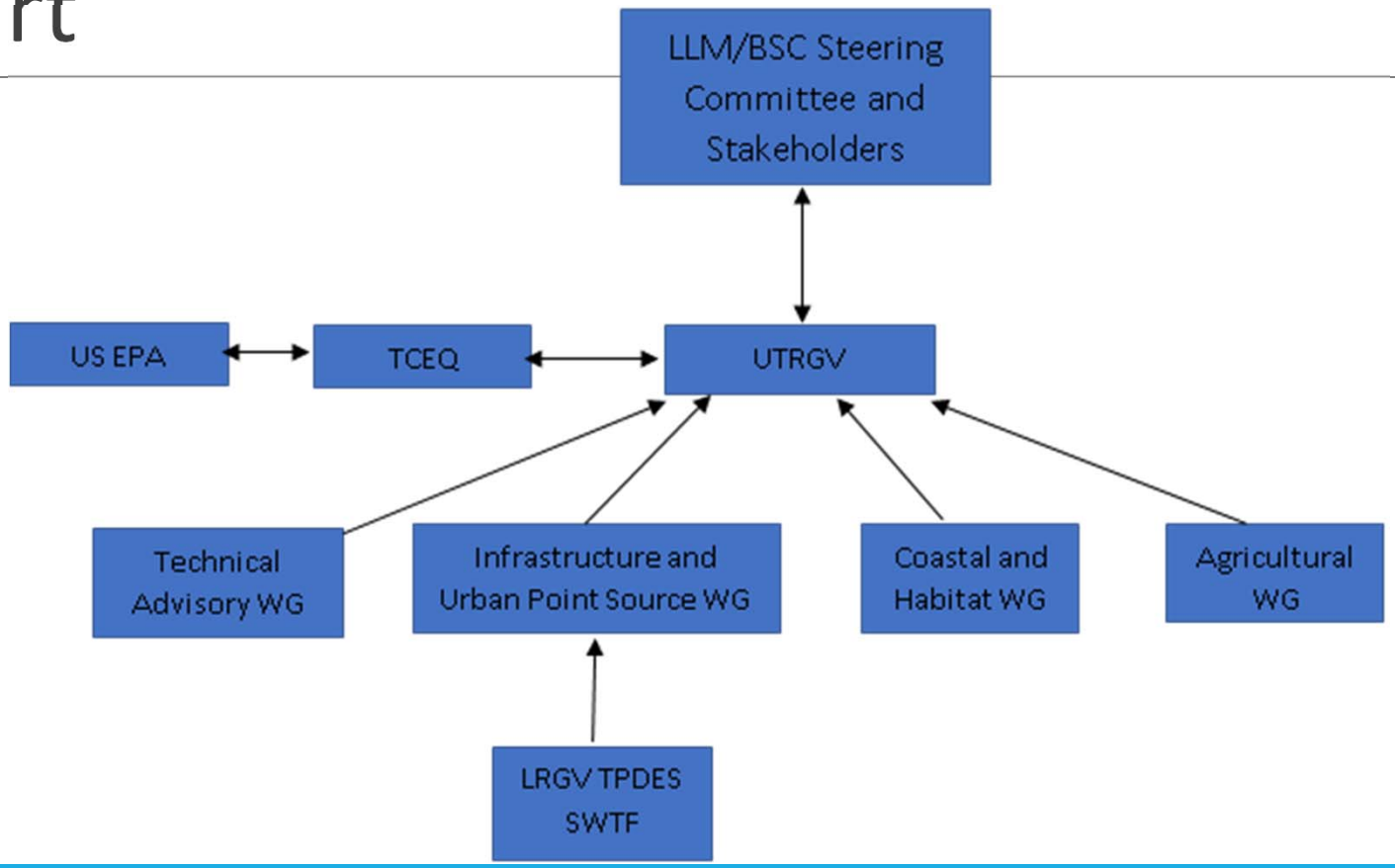
LLM/BSC Watershed Protection Plan

WESLACO, TX. JULY 1OTH, 2019

Watershed Partnership Organization Chart



Watershed Characterization Report

2. Subwatershed Delineation

Techniques used:

- high-resolution light detection and ranging (LiDAR) topographic data,

- the National Hydrography Dataset Plus Version 2 flowlines (NHD Plus v2),

- satellite and aerial imagery,

- previous delineations from existing flood studies,

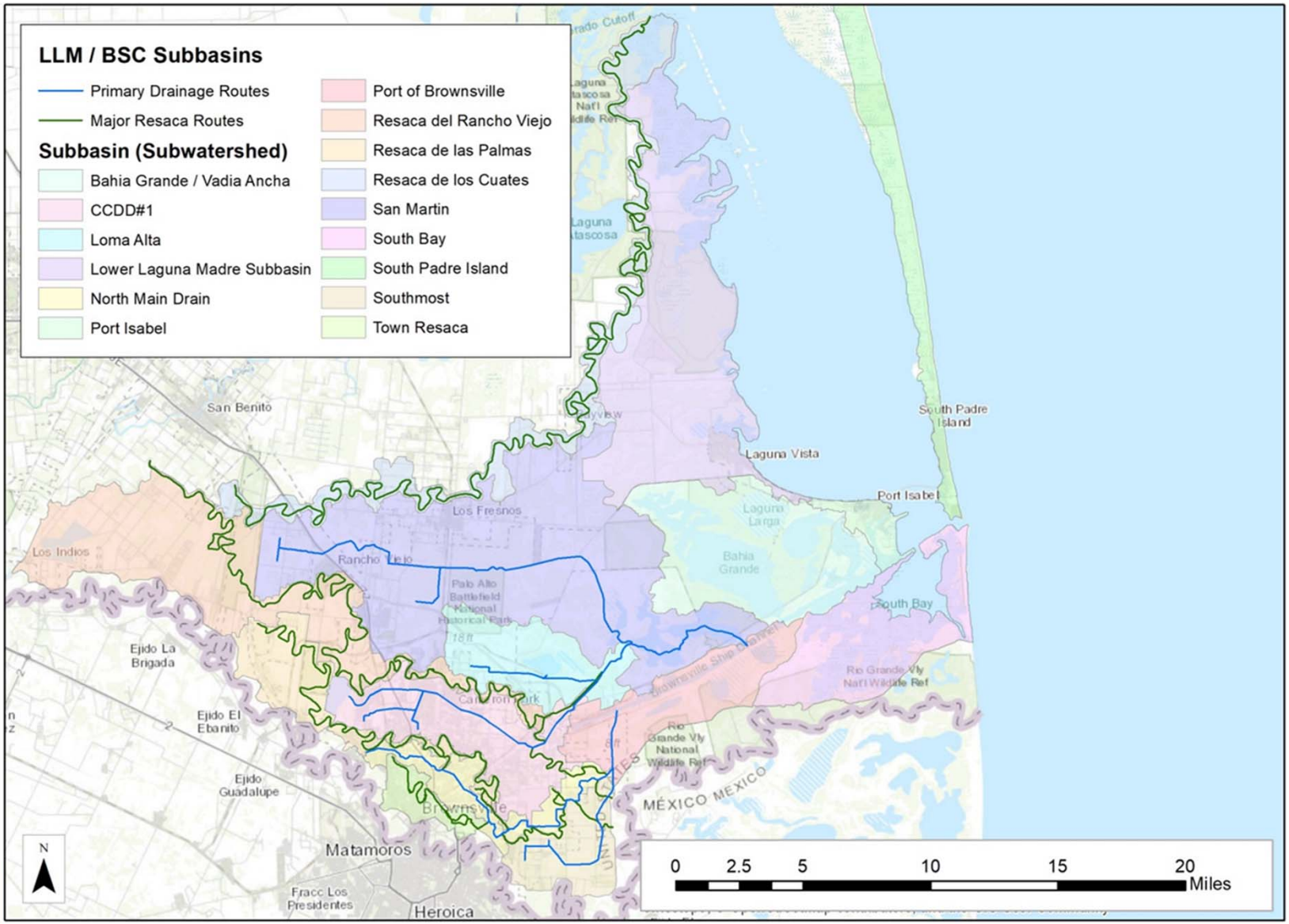
- local knowledge from utility, irrigation, and drainage districts,

- and limited ground-truthing of some of the more topographically complex areas (typically coinciding with areas of confluence and / or divergence of subwatershed topographic boundaries, irrigation canals, drainage ditches and resacas.

2.1 Subwatersheds overview

Factors included

- drainage pattern,
- drainage density,
- outfall location,
- landuse patterns,
- population density,
- location (coastal vs. inland),
- conveyance mechanism (resaca / drainage ditch / overland flow),
- and most importantly, whether delineating that particular subwatershed would simplify water quality monitoring and source location identification.


LLM / BSC Subbasins
Primary Drainage Routes
Major Resaca Routes
Subbasin (Subwatershed)
Bahia Grande / Vadia Ancha
CCDD#1
Loma Alta
Lower Laguna Madre Subbasin
North Main Drain
Port Isabel
Port of Brownsville
Resaca del Rancho Viejo
Resaca de las Palmas
Resaca de los Cuates
San Martin
South Bay
South Padre Island
Southmost
Town Resaca
San Benito
Los Fresnos
Laguna Vista
South Padre Island
Port Isabel
Laguna Larga
Bahia Grande
South Bay
Los Indios
Rancho Viejo
Palo Alto Battlefield National Historical Park
Ejido La Brigada
Ejido El Ebanito
Ejido Guadalupe
Brownsville
Matamoros
Fracc Los Presidentes
Heroica
MÉXICO MEXICO
Rio Grande Vly National Wildlife Ref
N
0 2.5 5 10 15 20
Miles

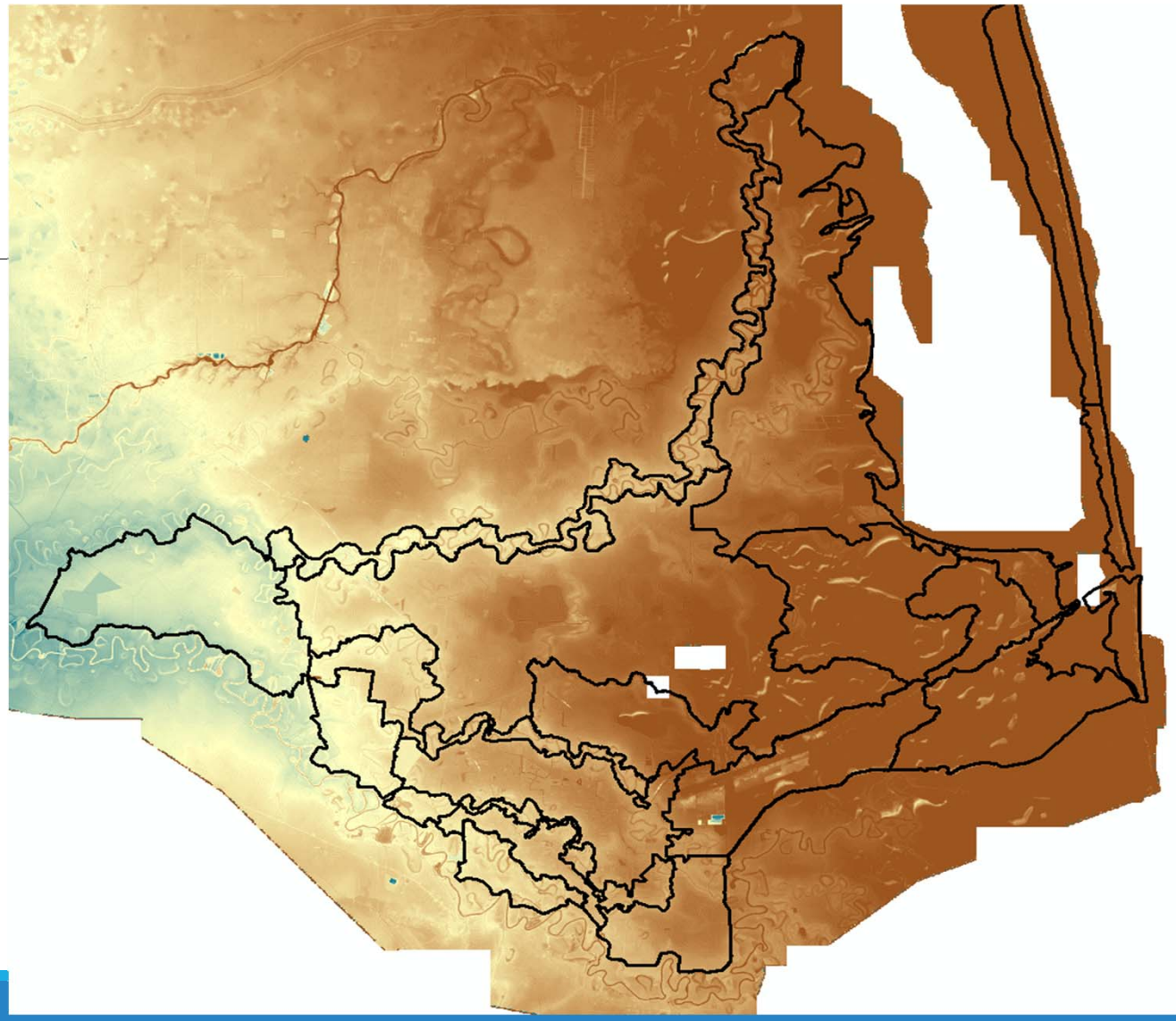
2.1 Subwatersheds overview

Subwatershed	Area	Population	Population Density	Majority Land Cover and %	Type
Town Resaca	5.6 (%)	29,000	5,145	Developed (93%)	Stormwater Dominated Resaca
North Main Drain	11.1	43,000	3,900	Developed (78%)	Primary / Secondary Drainage
Resaca de la Palma / Guerra (Both)	16	17,300	1,079	Agriculture (38%)	Resaca System
RDLG – U/S	11.9	3,000	256	Agriculture (50%)	Resaca System – Sink
RDLG – D/S	4.1	14,300	3,440	Developed (75%)	Resaca System – Augmented Flow
CCDD#1	25.8	76,155	2,955	Developed (70%)	Primary / Secondary Drainage
Resaca del Rancho Viejo (All)	51.2	22,900	447	Agriculture (54%)	Resaca System
RRV – U/S	36.4	12,700	348	Agriculture (60%)	Resaca System - Sink
RRV – M/S	9.3	2,700	289	Agriculture (51%)	Resaca System – Augmented Level
RRV – D/S	5.5	7,500	1,360	Developed (39%)	Resaca System – Augmented Level
San Martin (CCDD#2 and #3)	93	20,300	213	Wetlands (38%)	Primary / Secondary Drainage
Resaca de los Cuates (Both)	30	3,850	127	Agriculture (34%)	Resaca System
RDLC – U/S	16.5	3,600	216	Agriculture (47%)	Resaca System – Augmented Flow
RDLC – D/S	13.5	250	19	Wetland (39%)	Resaca System – Coastal / Sink
Southmost Drain	13.1	12,000	915	Agriculture (46%)	Primary / Secondary Drainage – Tile Drain
Loma Alta	18	2,000	107	Wetland (40%)	Primary / Secondary Drainage
Port of Brownsville	30.8	600	28	Barren Land (32%)	Coastal – Ship Channel Proper
Bahia Grande / Vadia Ancha	39	0	0	Barren Land (36%)	Coastal – Ship Channel
Lower Laguna Madre	62	6,800	106	Wetlands (37%)	Coastal
South Bay	26	16	0.6	Wetlands (51%)	Coastal
Port Isabel	4.4	6,300	1,400	Developed (43%)	Coastal
South Padre Island (Both)	17.8	2,900	157	Barren Land (67%)	Coastal
SPI – Upper	14.5	0	0	Barren Land (78%)	Coastal
SPI – Lower	3.3	2,900	850	Developed (61%)	Coastal

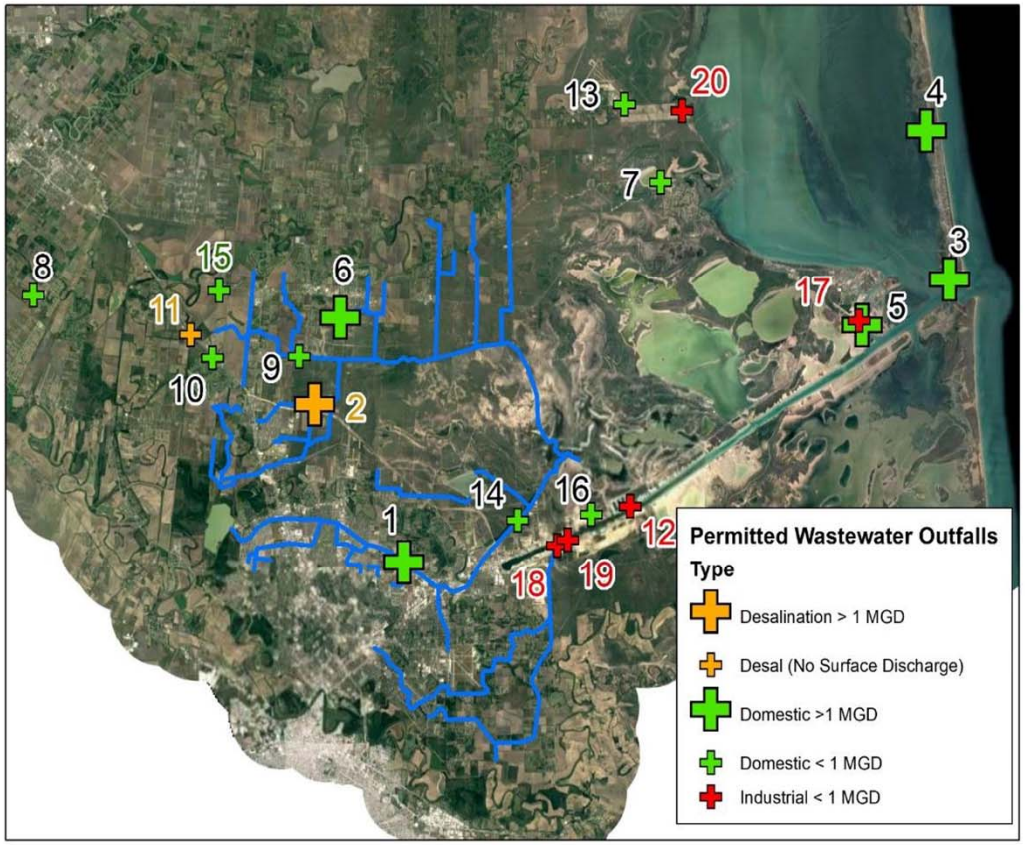
2.1 Subwatersheds overview

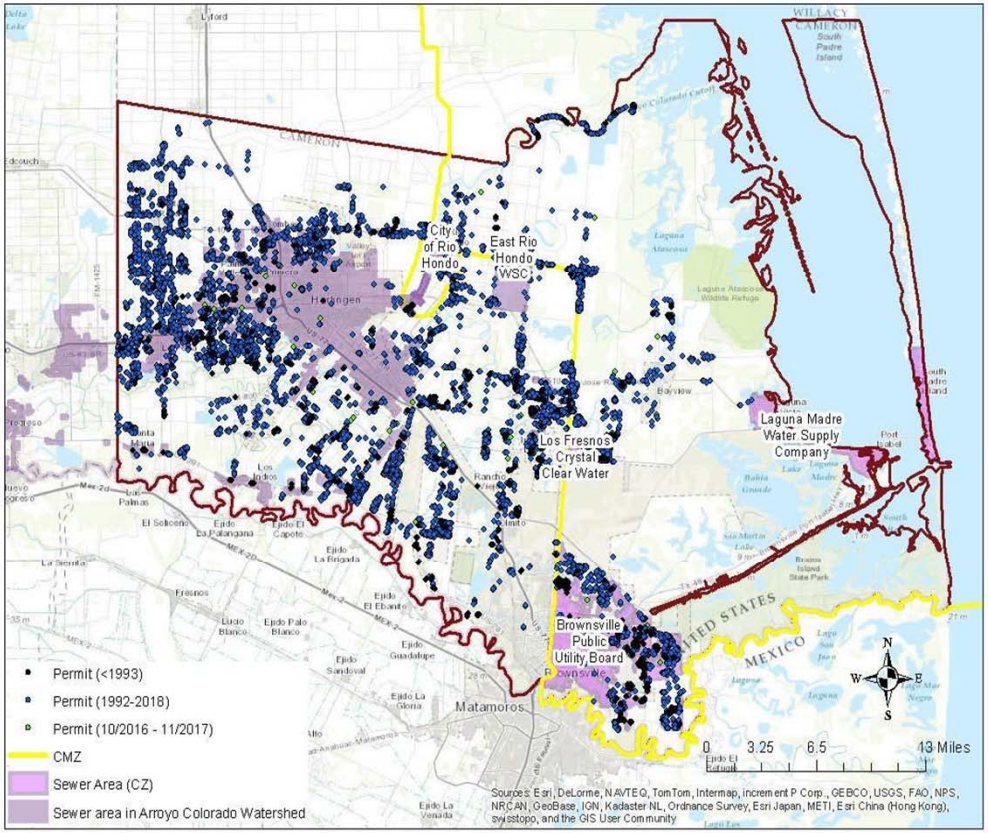
Three subwatershed types

- Primary Drainage,
  - County Cameron Drainage Ditch #2 (San Martin Lake Drain).
  - Cameron County Drainage Ditch #1;
  - Loma Alta Subwatershed;
  - North Main Drain;
  - Southmost Drain;
- Coastal Basins
  - Port of Brownsville Subwatershed;
  - Bahia Grande / Vadia Ancha Subwatershed;
  - South Bay Subwatershed;
  - Lower Laguna Madre Subwatershed;
  - Port Isabel Subwatershed;
  - South Padre Island Subwatershed (north and south subsections)
- Resaca Basins

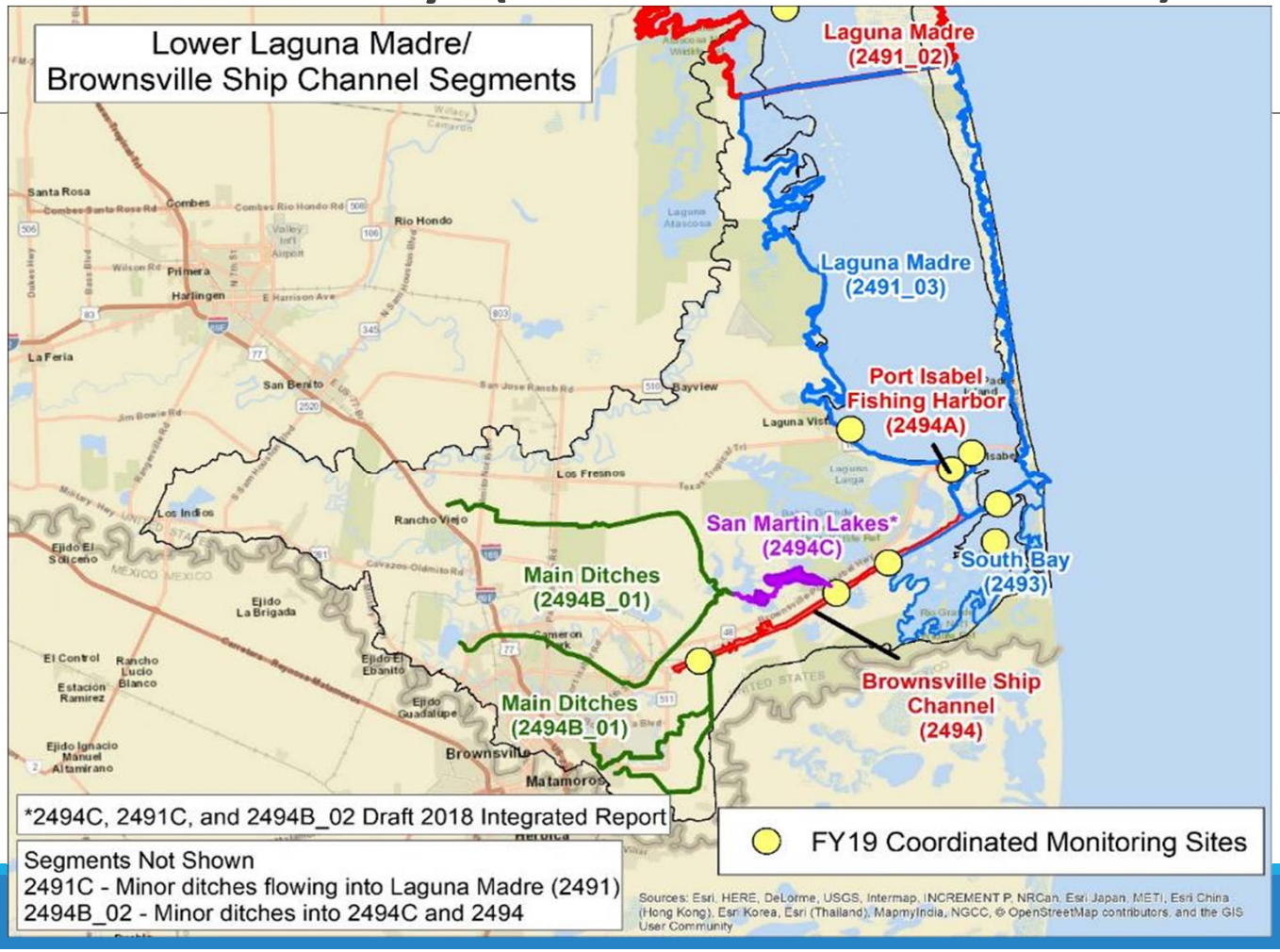


3 Point sources and OSSF

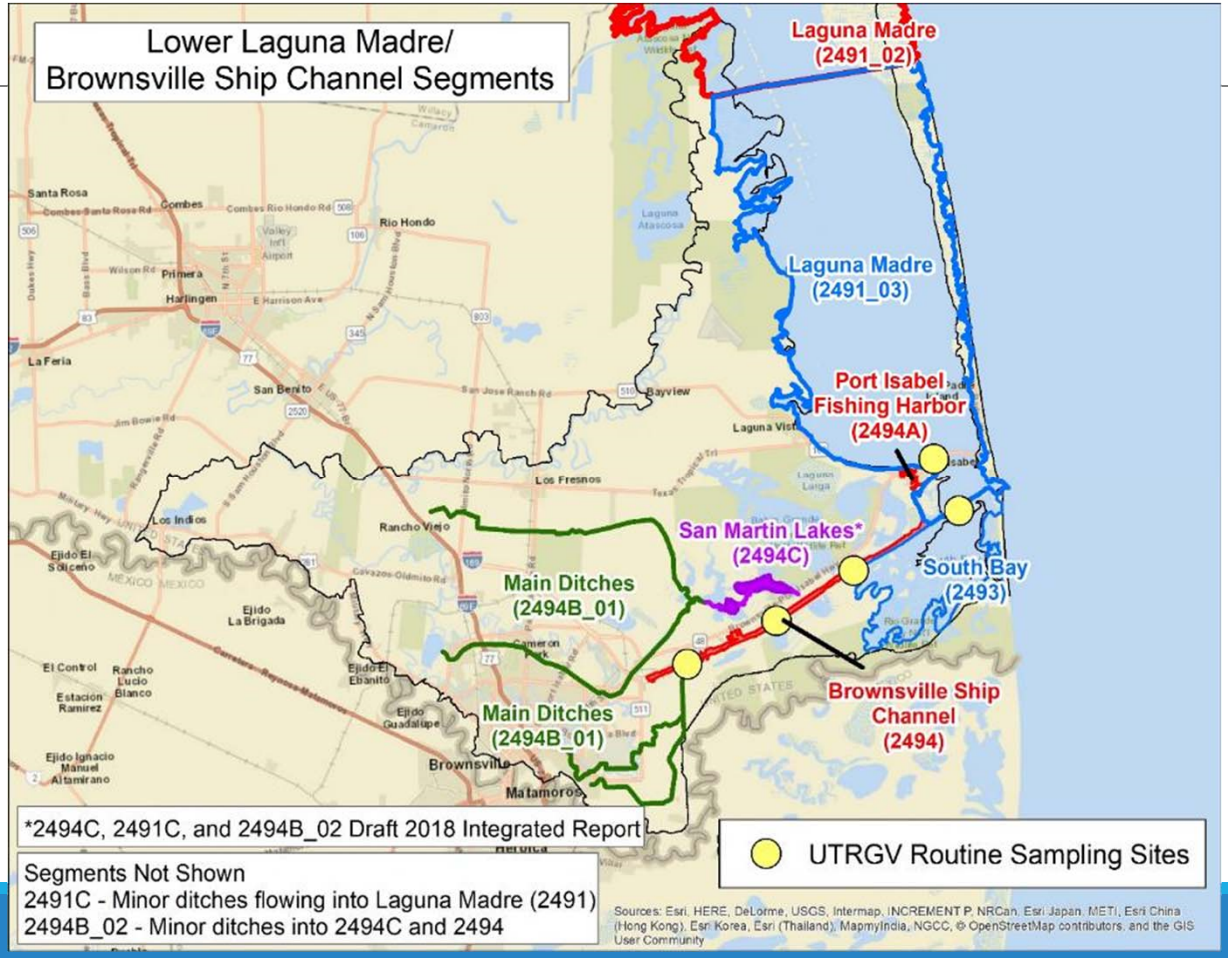




4 Water Quality (SWQM and CRP)



4 Water Quality (UTRGV)



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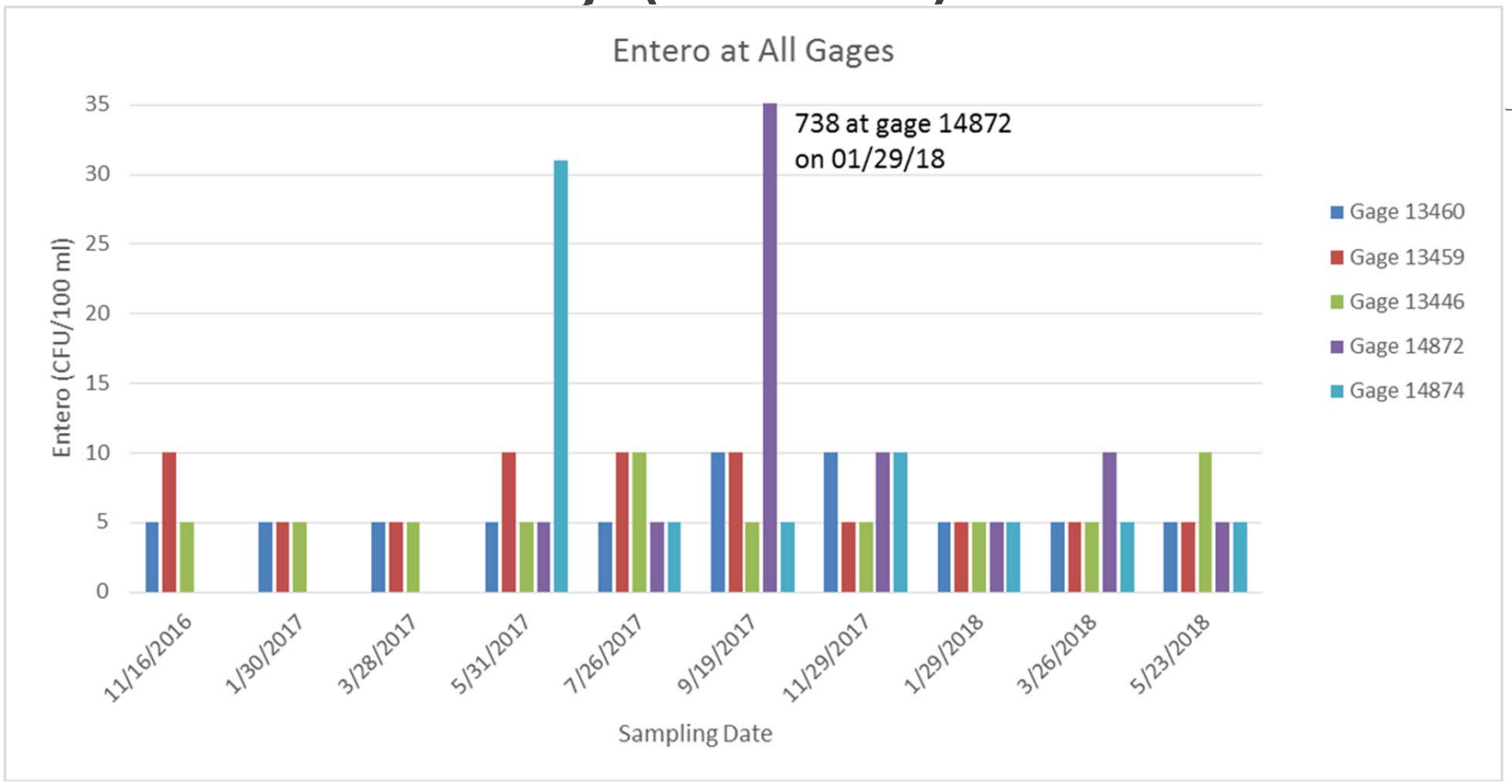

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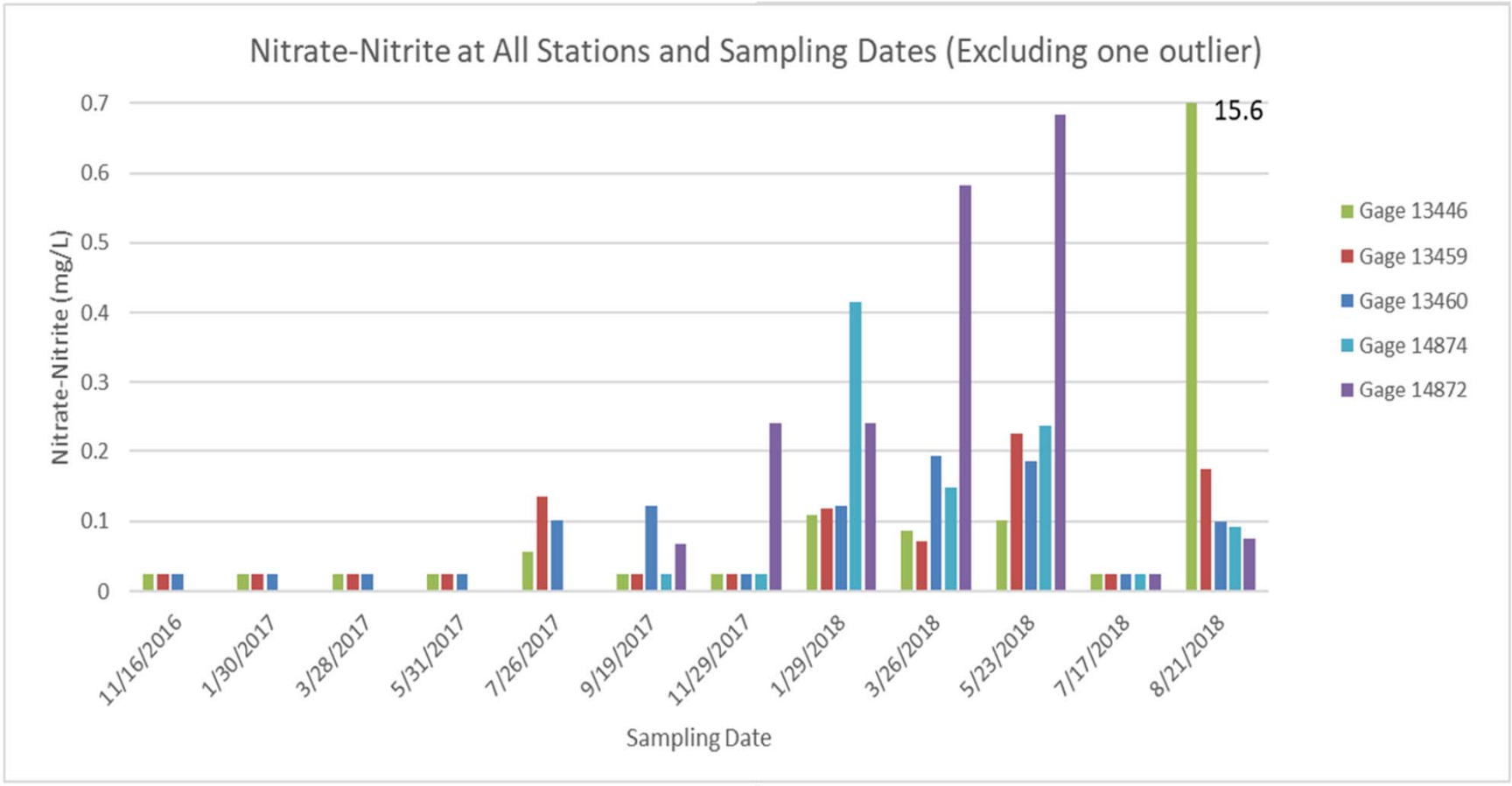

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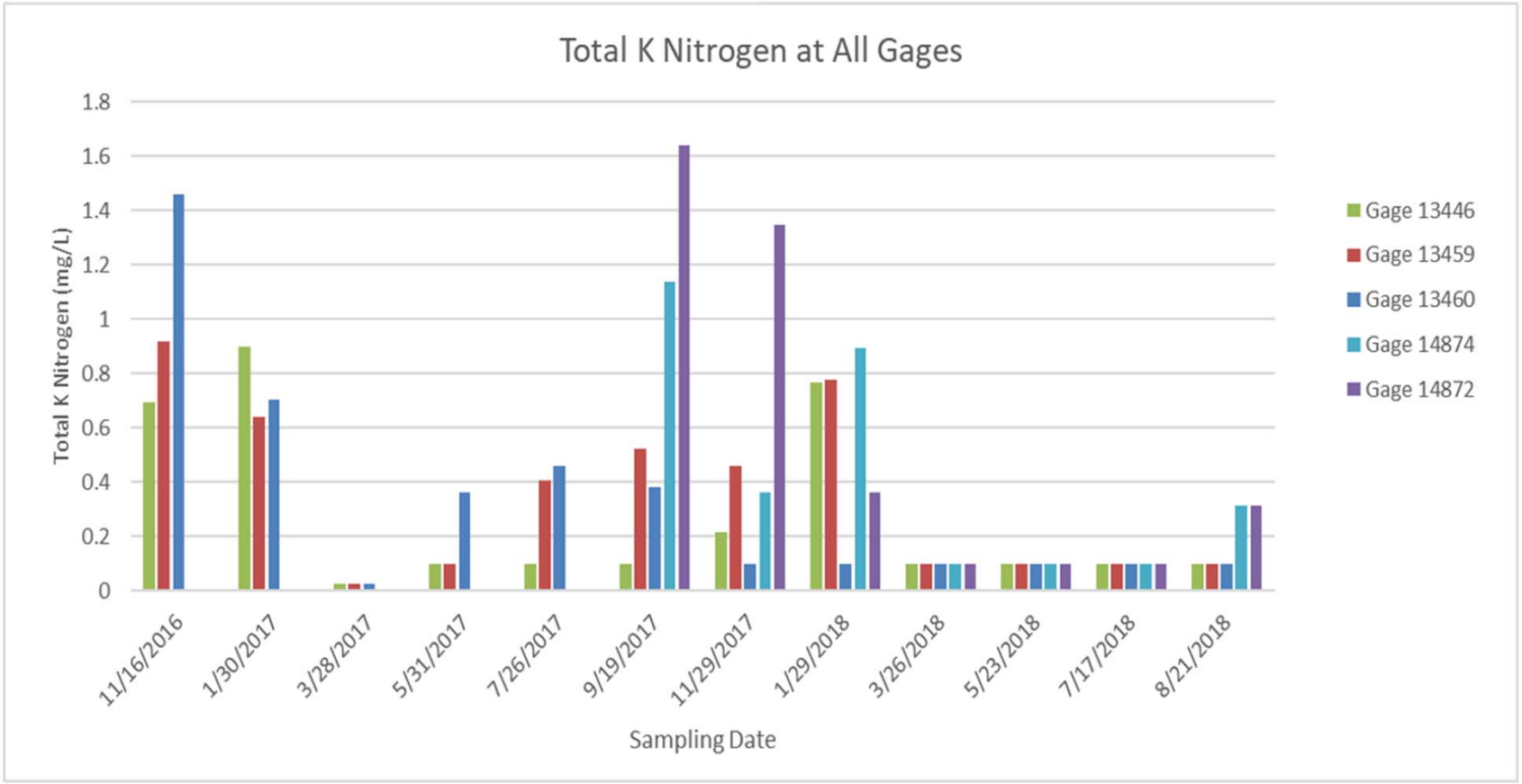

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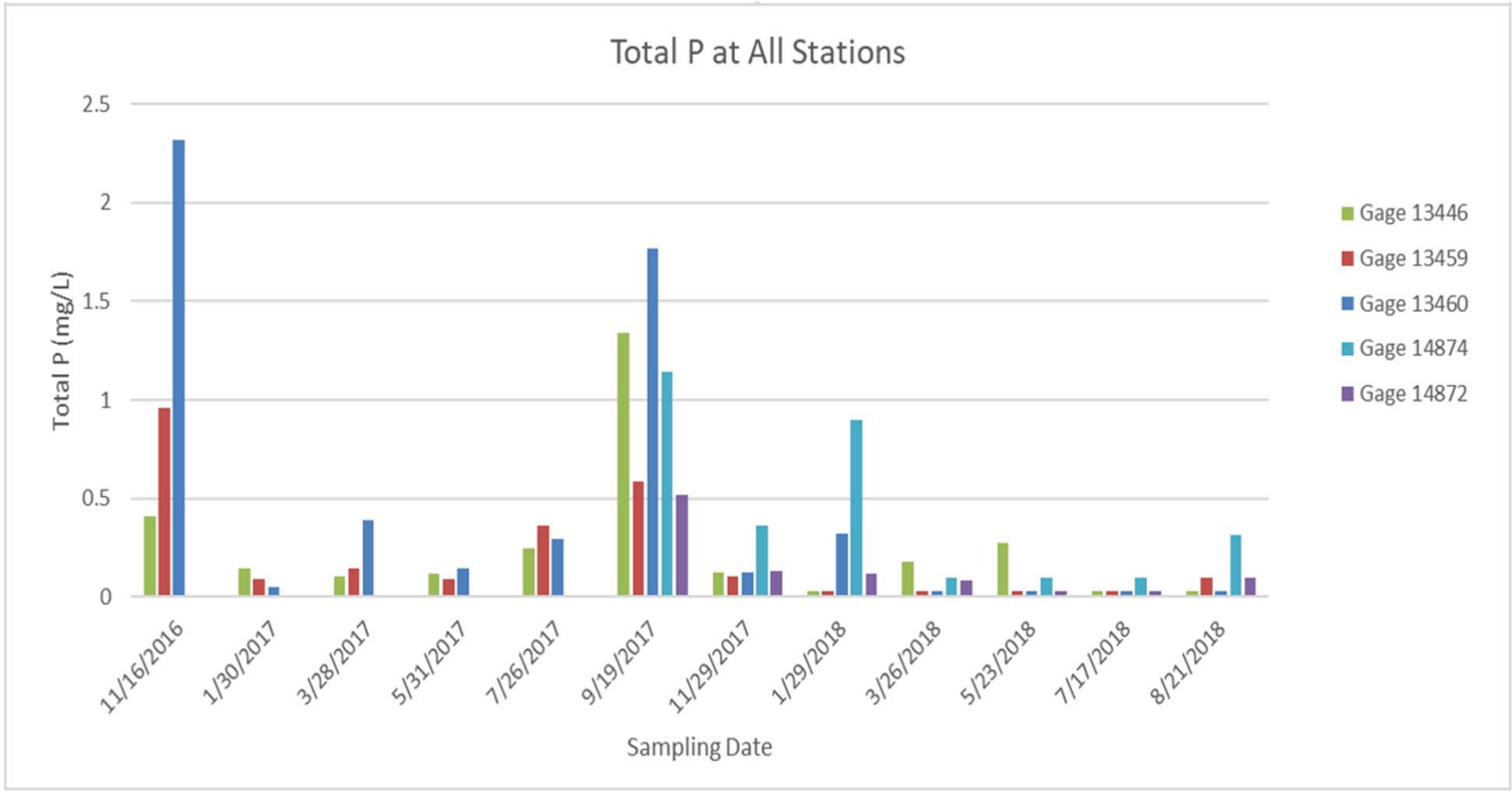

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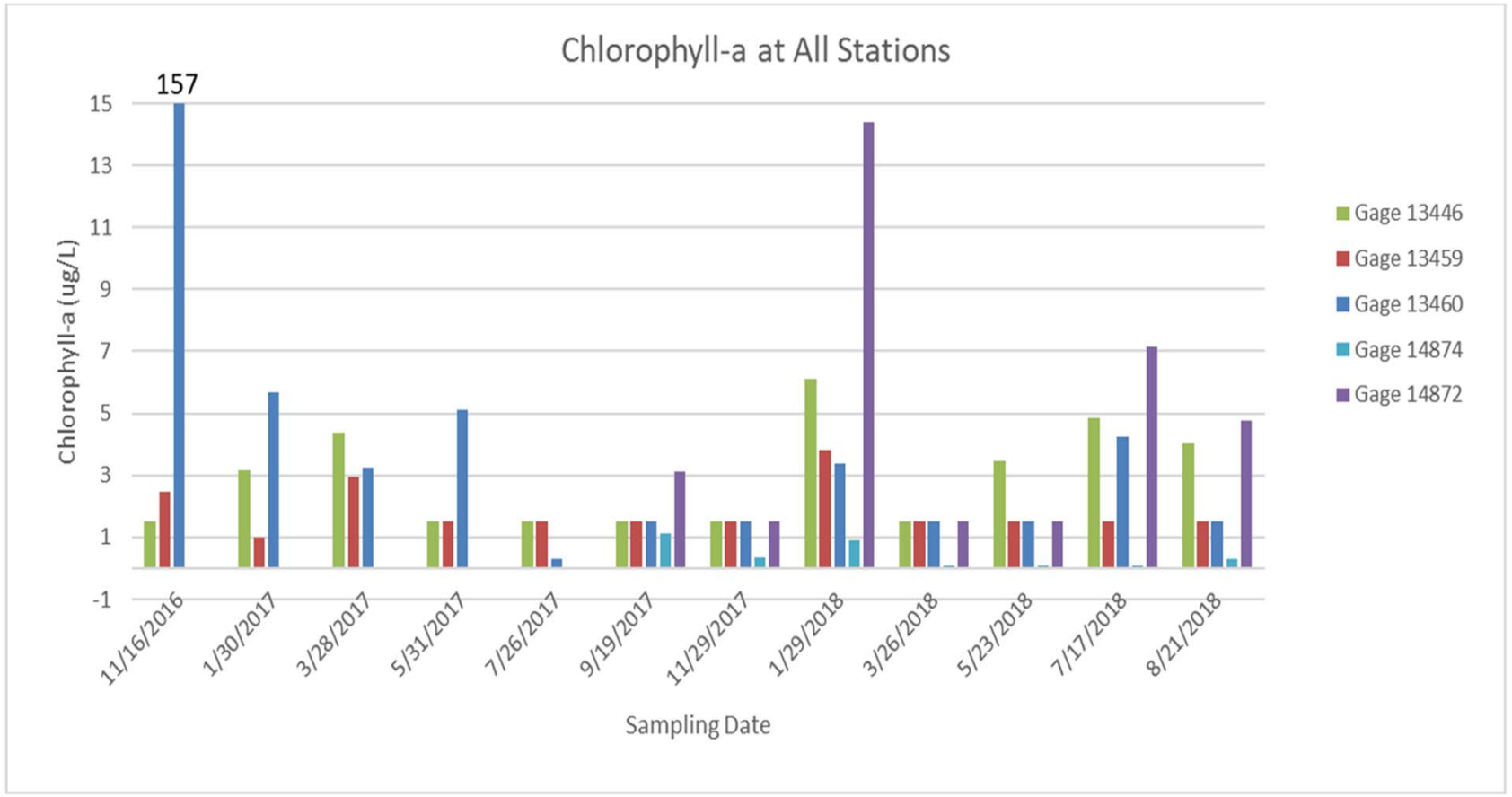


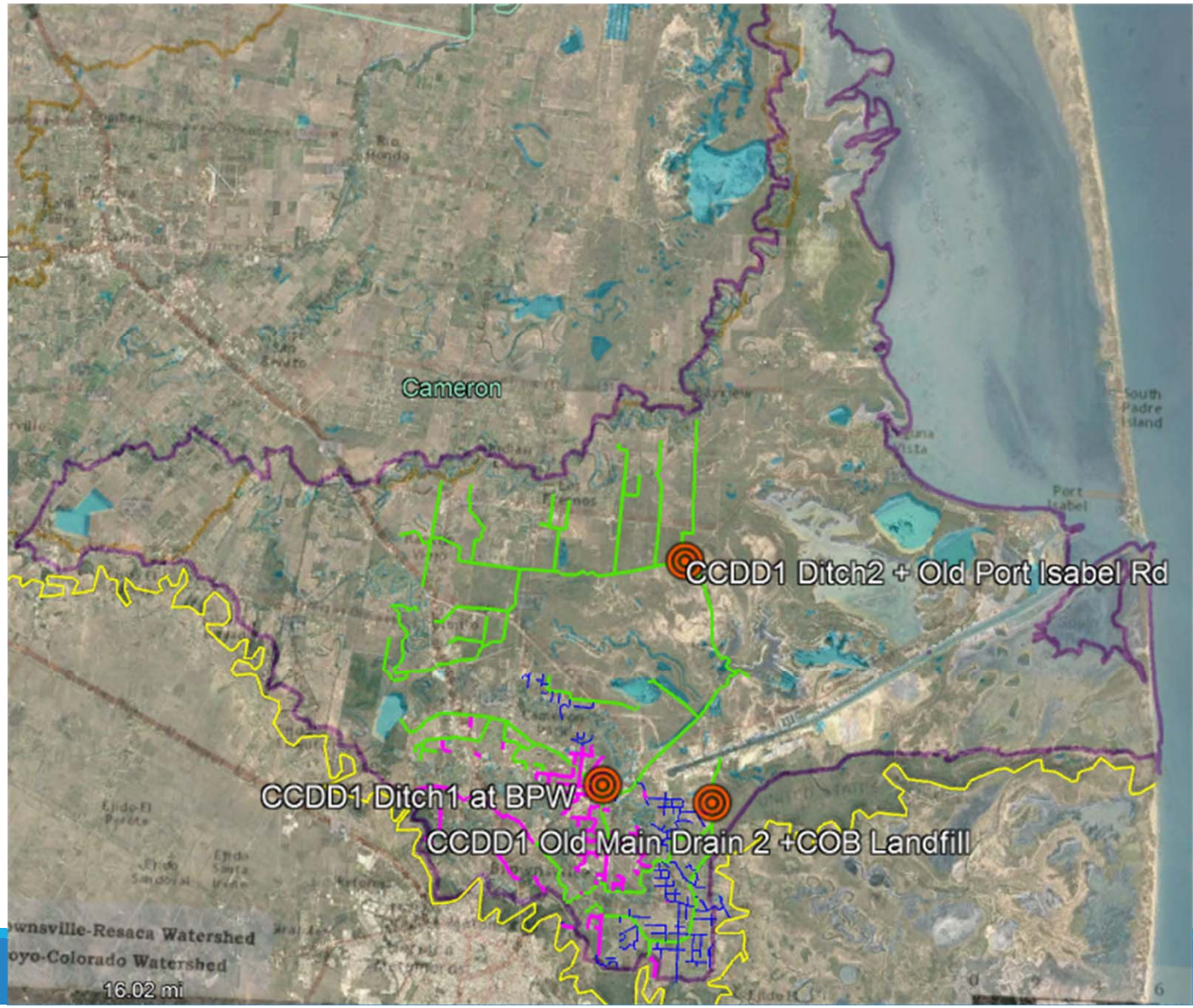
Grant Status

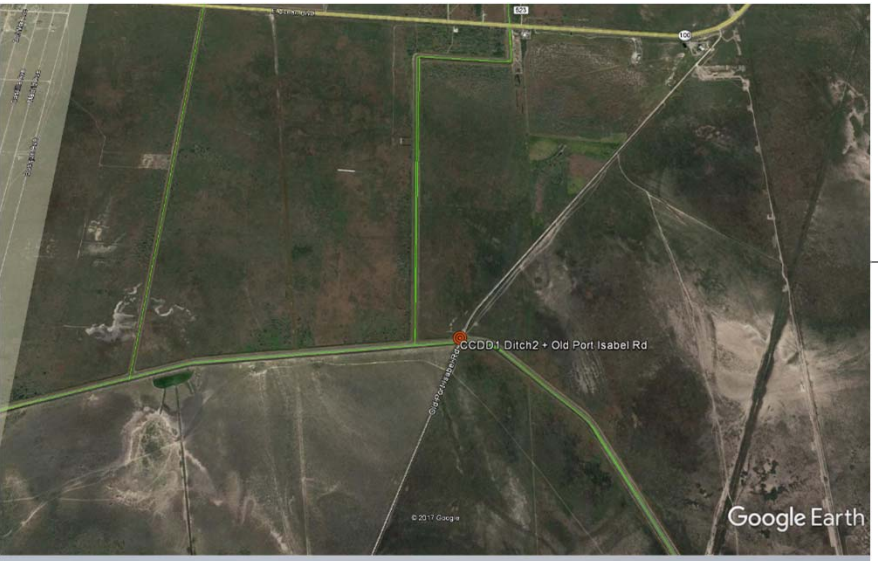
- Monitoring QAPP:
  - *E. Coli* holding time was extended from 8hrs to 24 hrs
  - Sampling and flow measurements will take place independently but on the same day.
  - All comments have been addressed; Ready for Signatures

Grant Status

- Monitoring Timeline:
  - Equipment delivery:
    - ADCP: April 2019
    - RTHS: August 2019
  - Installation, testing and trial runs:
    - August 2019
    - RTHS: Late August 2019
  - TCEQ pre-monitoring audit and 1st sampling event: Late August 2019
    - Readiness Review (TCEQ NPS and QA) **pending

Monitoring sites





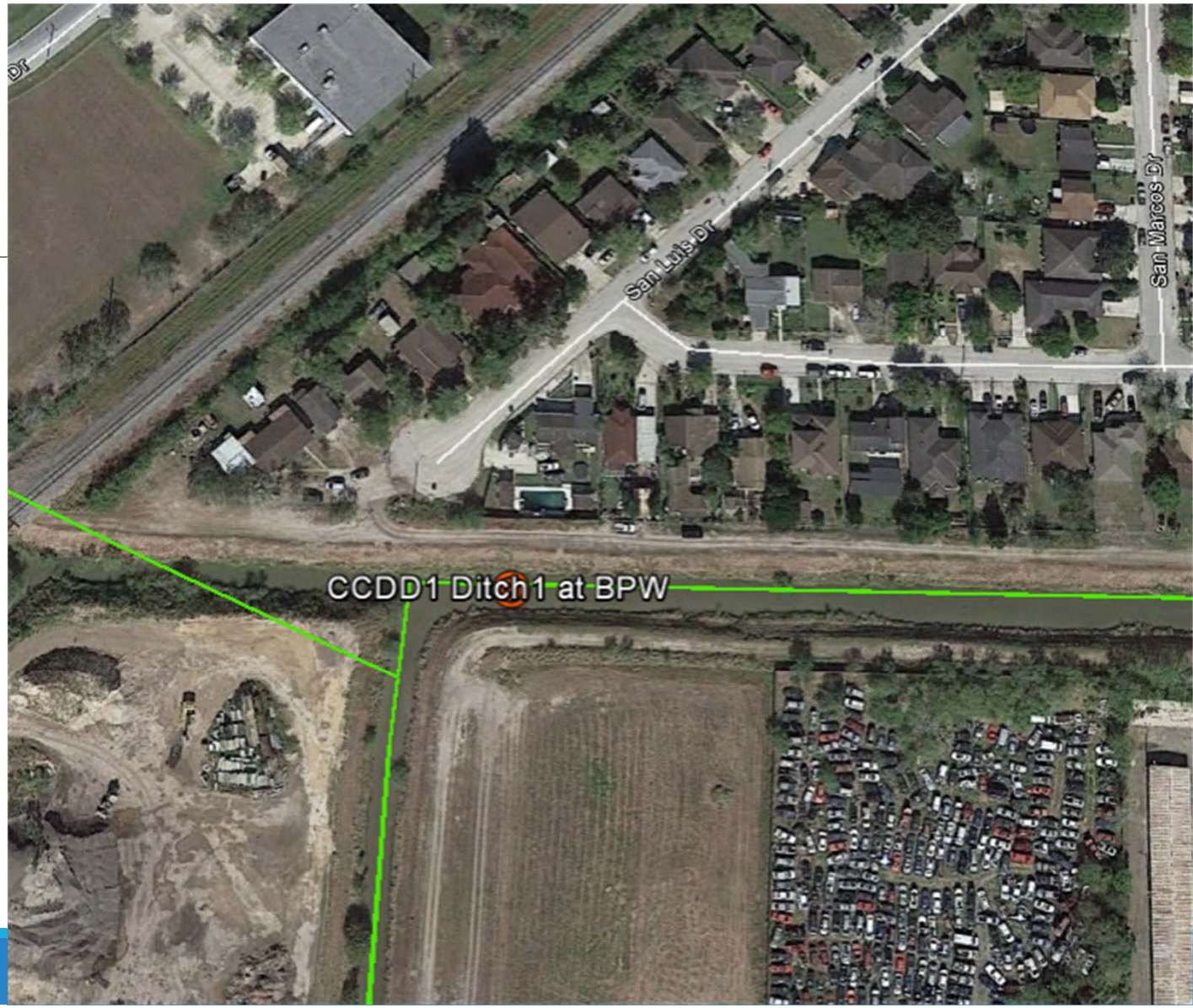
Monitoring sites

Monitoring will occur at 3 sites within the CCDD1 drainage network:

1. CCDD1 Ditch No. 2 at the intersection with Old Port Isabel Rd. downstream of Bayview East lateral. Conveys water from mostly agricultural land in the northern part of the watershed.

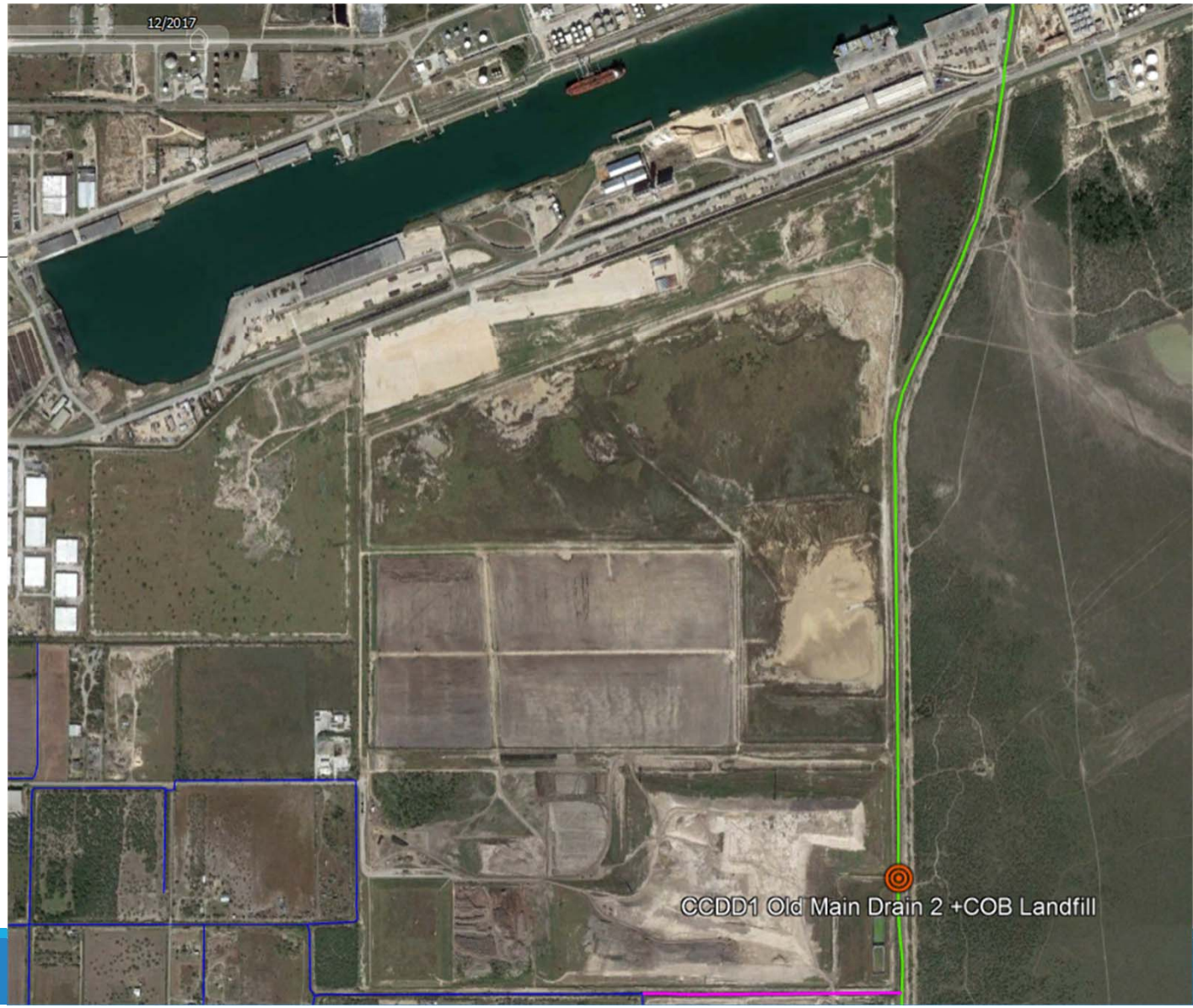
Monitoring sites

2. Ditch No. 1 at the Brownsville Public Works offices. conveys water from mostly urbanized areas of northern Brownsville.



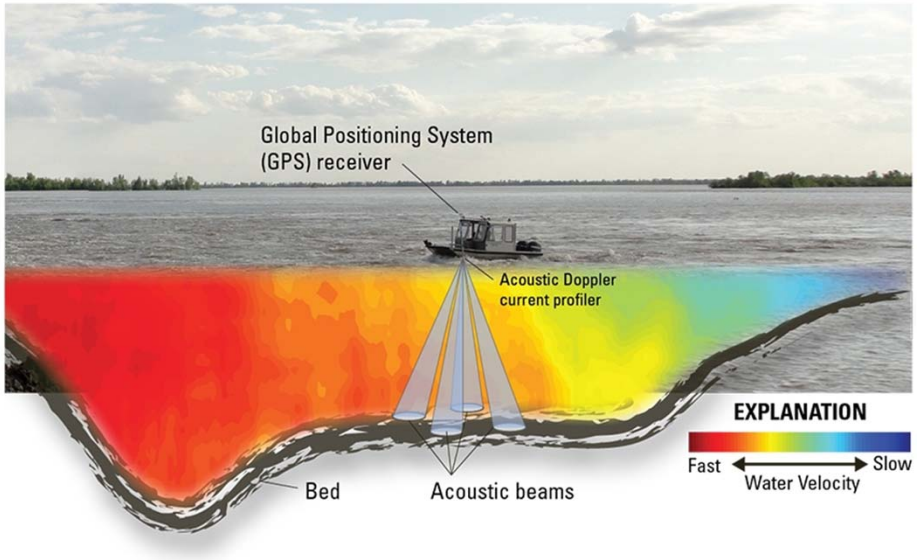
Monitoring sites

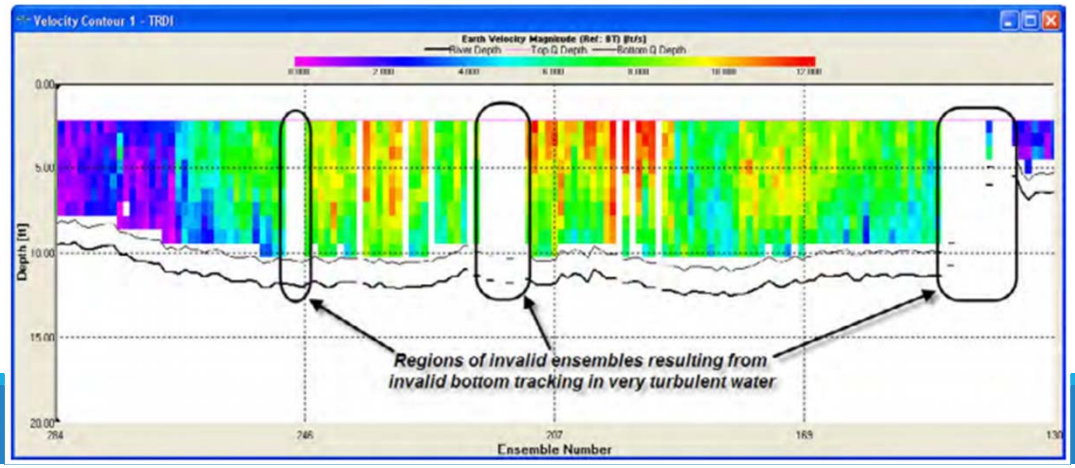
3. Old Main Drain 2 at the Brownsville Landfill. This drainage ditch conveys water from mostly urbanized areas of central and southern Brownsville and agricultural land in the south most region of the watershed



Flow and Water Quality measurements

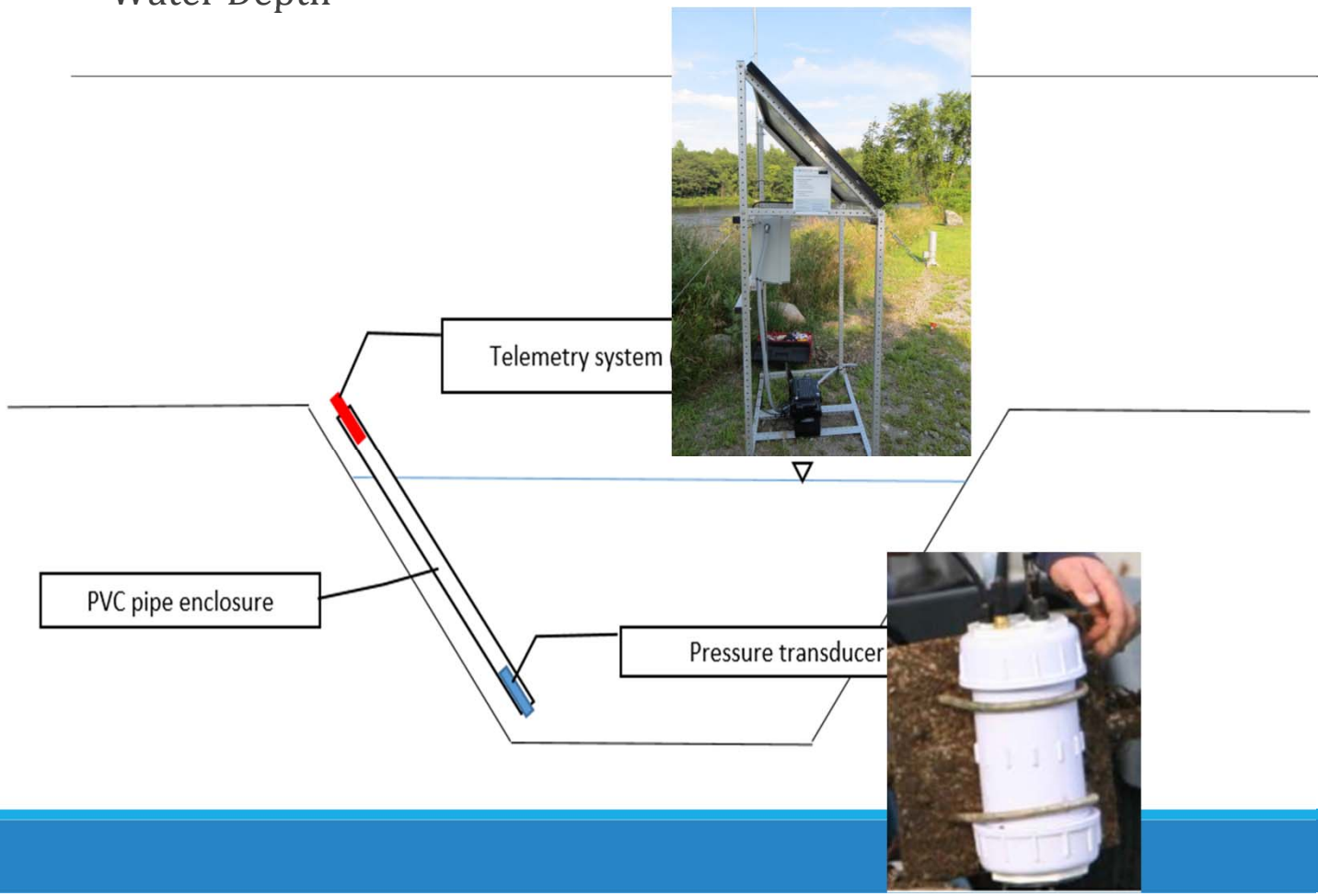
ADCP





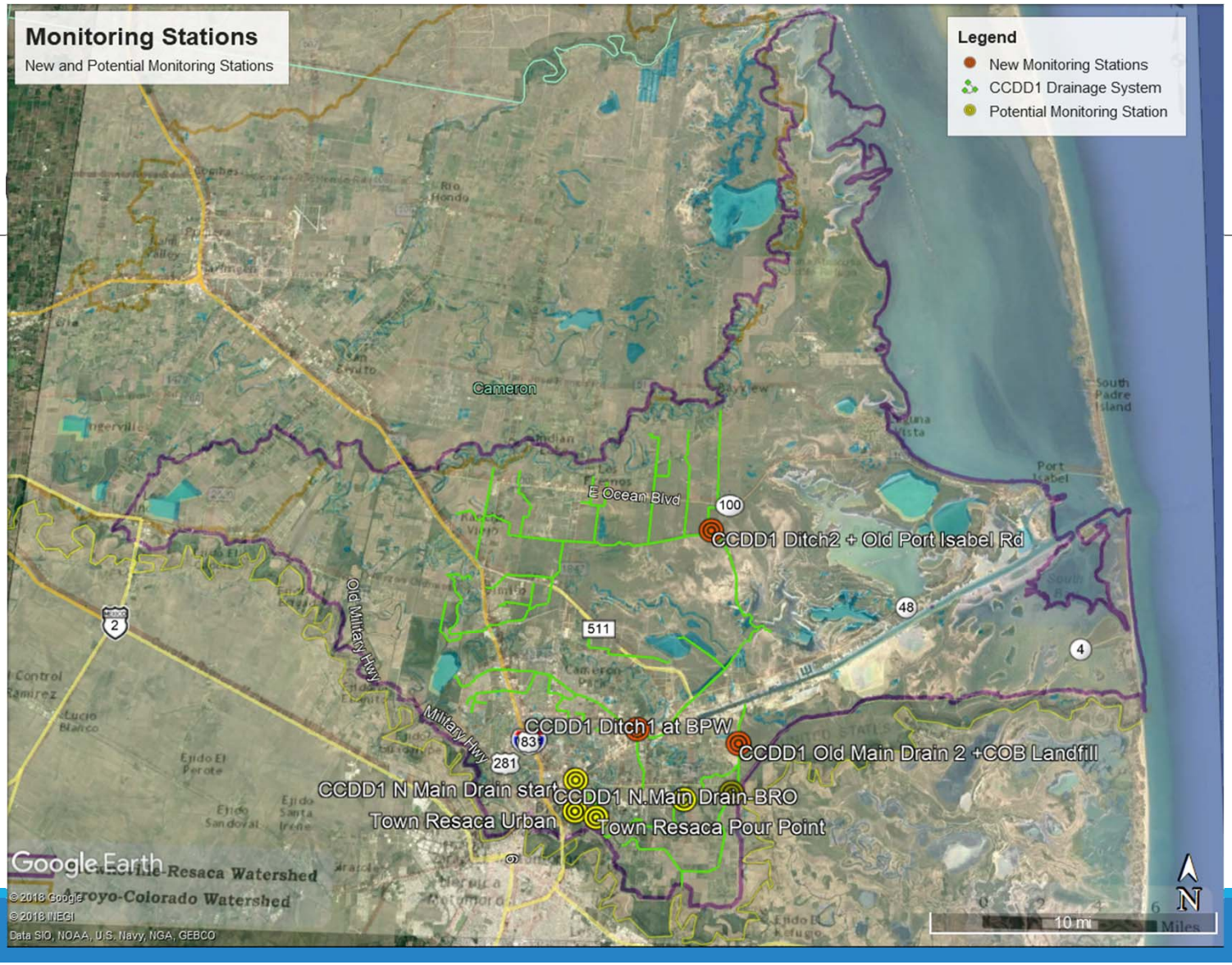
Flow and Water Quality measurements

Water Depth



Additional Water Quality and Flow Data (Phase II)

Site	Predominant Land Use	Status
Town Resaca upstream of PUB WWTP	Urban High Density	Potential
Headwaters of CCDD1 North Main Drain	Urban medium density and Industrial/Commercial	Potential
CCDD1 North Main Drain downstream of Brownsville Airport	Urban high density and Industrial/Commercial	Potential
San Martin Lages Outfall to Brownsville Ship Channel	Urban/Ag	Potential


Monitoring Stations
New and Potential Monitoring Stations
Legend
New Monitoring Stations
CCDD1 Drainage System
Potential Monitoring Station
Cameron
E Ocean Blvd
CCDD1 Ditch2 + Old Port Isabel Rd
Old Military Hwy
Military Hwy
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
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N

San Martin Lakes 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.
- In FY20 a second phase of funding from the CWA 319(h) program will be available to expand the monitoring network.

San Martin Lakes Monitoring

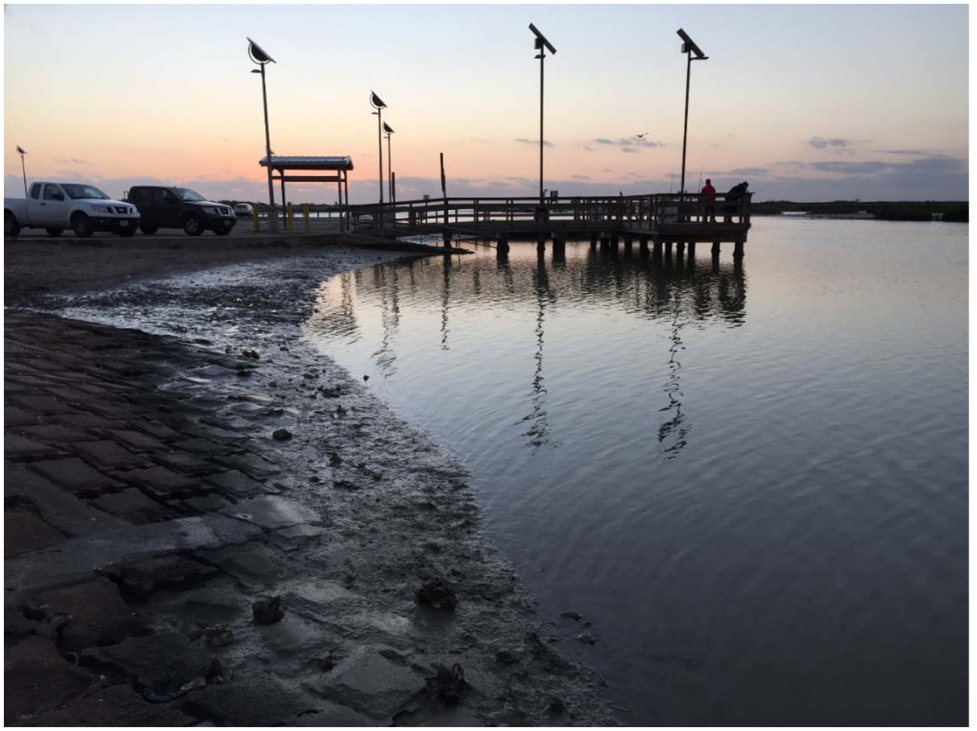
Modeled Inflow Validation & Nutrient Loading Estimation in Two Subwatersheds of the Lower Laguna Madre

Prepared by
Hudson DeYoe, University of Texas Rio Grande Valley
Warren Pulich, Texas State University
Nelun Fernando, Texas Water Development Board

A REPORT FUNDED BY A TEXAS COASTAL MANAGEMENT PROGRAM GRANT APPROVED BY THE TEXAS LAND COMMISSIONER PURSUANT TO NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION AWARD NO. NA13NOS4190113.

CMP Contract Number: 14-085-000-7953

San Martin Lakes Monitoring



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.

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.

Model Inputs and Assumptions
Technical Advisory Committee

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

Model Inputs and Assumptions 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. <_____>

Model Inputs and Assumptions Habitat and Coastal

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: <_____>	

Model Inputs and Assumptions Ag 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	