

Inventory and Mapping of On-Site Sewage Facilities (OSSF) in the Coastal Areas of Texas: Methodologies and Challenges

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TEXAS A&M
AGRILIFE
EXTENSION



Outline

- 1) Why a Coastal Zone OSSF geodatabase
- 2) Coastal Zone OSSF Inventory (COSSI) method
- 3) Refinements for inventory continuous update
- 4) Applications in Texas

1) Goal: Protect Texas Rivers, Lakes, and Bays



Credit: TCEQ

Goal: Avoid Failing Systems



Coastal NPS Pollution Control Program

- Why?
 - Section 6217 of the Coastal Zone Act Reauthorization Amendments of the CZMA in 1990 requires states with federally approved Coastal Management Programs to develop and implement a Coastal NPS Pollution Control Program.
- Who approves?
 - NOAA and EPA
- What?
 - Develop & implement management measures/practices to control NPS
- When ?
 - June 2019

Federal Mandate

- *“To ascertain whether OSSFs in Coastal Zone are failing”*
- Timeframe = 15 years
- Good News - Many inspections are already being done under existing practices of local Authorized Agents and the Real Estate Community
 - Projected inspections over the next 15 years have been calculated based on these existing practices



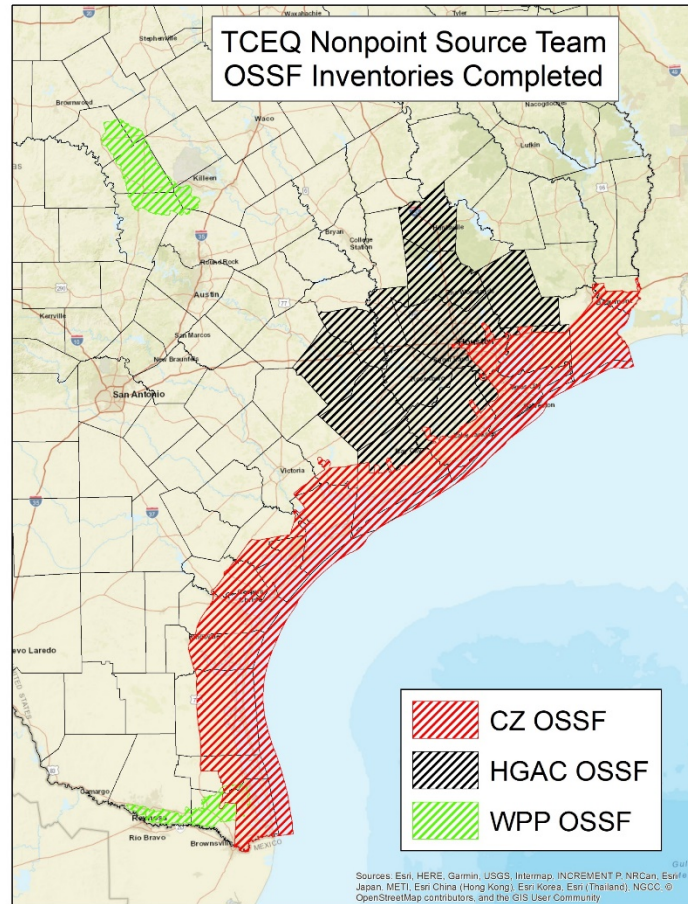
OSSF Inspections and Maintenance Tracking

- Texas AgriLife Extension is updating annually
- Much of this is already being done under existing practices of local Authorized Agents and the Real Estate Community

Strategy to obtain inspections	15-year Projection	Notes
Authorized Agent Inspections	6,240	Based on totals for previous years
Required Maintenance Inspections Reported to Authorized Agents	4,908	Based on totals for previous years
Watershed Based Plan (WBP) Inspections	17,288	
Point-of-Sale Real Estate Inspections	20,805	Based on totals for previous years
Direct Contracting for Inspections	1,200	
OSSF Education and Outreach	150	

Credit: TCEQ

Completed OSSF Inventories



Credit: TCEQ

2) Coastal Zone OSSF Inventory (COSSI)

- Challenging local conditions
- Other similar projects in Texas:
 - Houston-Galveston Area Council (H-GAC)
 - Buck Creek watershed (Gregory et al., 2013): “A combination approach is recommended”
 - Other counties and watersheds

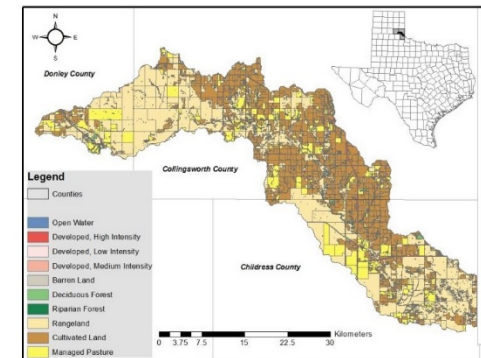
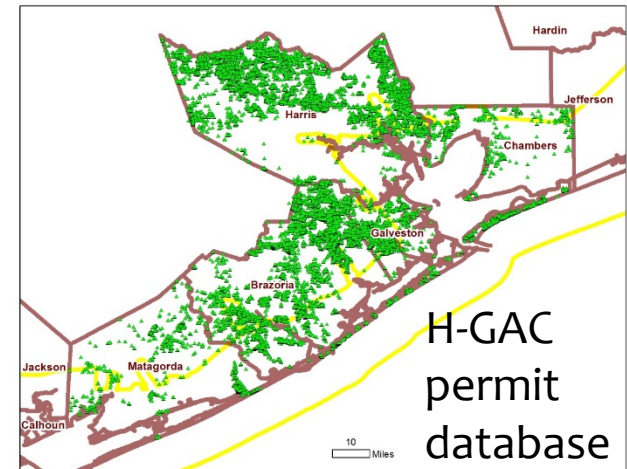
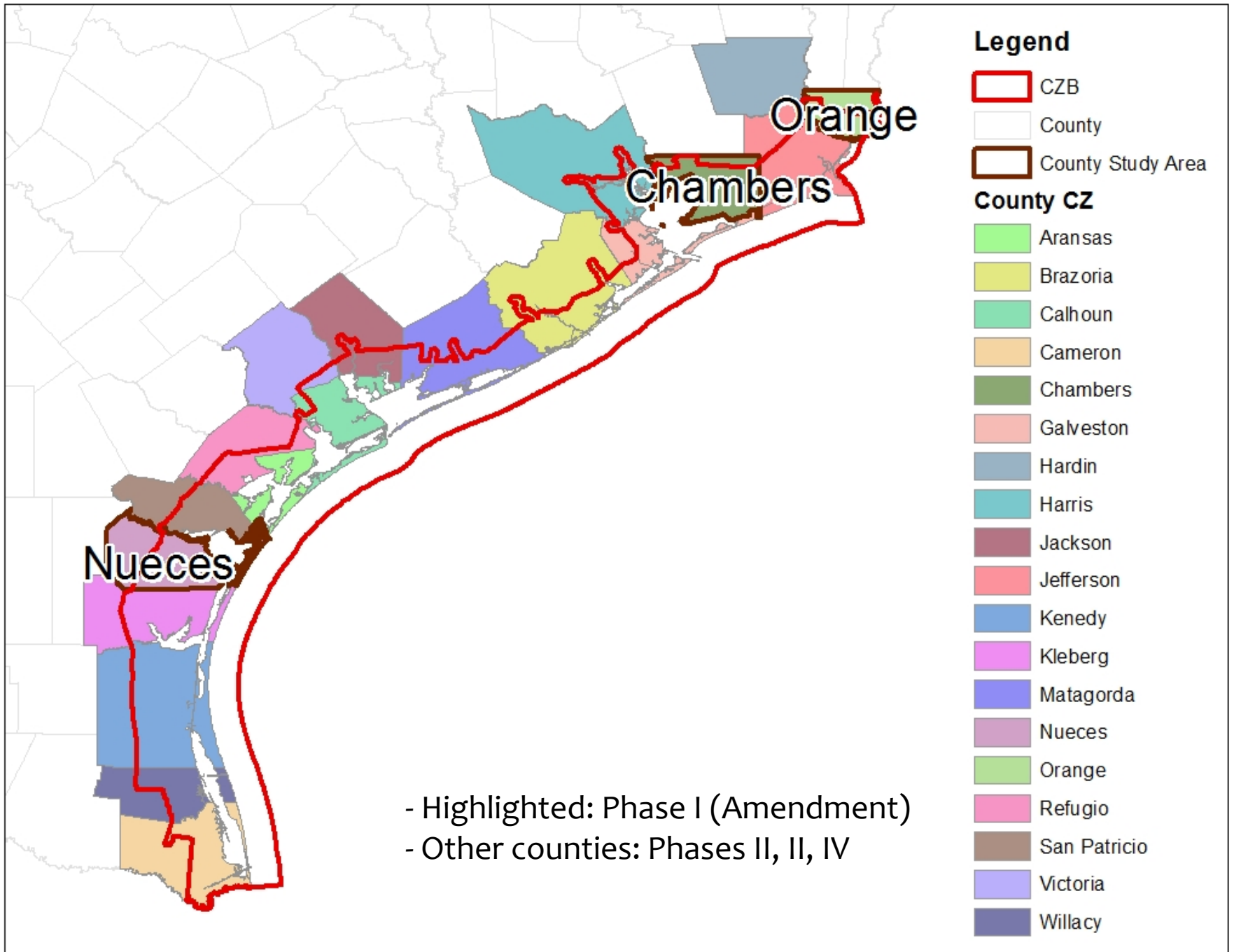


Figure 1 Study Area: Land use and land cover of the Buck Creek watershed in Texas

Funds

- ⊙ **Amendment No.2 to Contract No. 13-00000001-0001 Coastal Zone Act Reauthorization Amendment (CZARA) Sewage Facility (OSSF) Training, Reconnaissance, and Replacement Project: (FY16) **Develop and implement a method to produce an inventory of OSSF systems in selected counties of the Coastal Zone of TX****
- ⊙ **Contracts (FY17-19): “...Implement and maintain Inventory for the entire Coastal Zone...”**

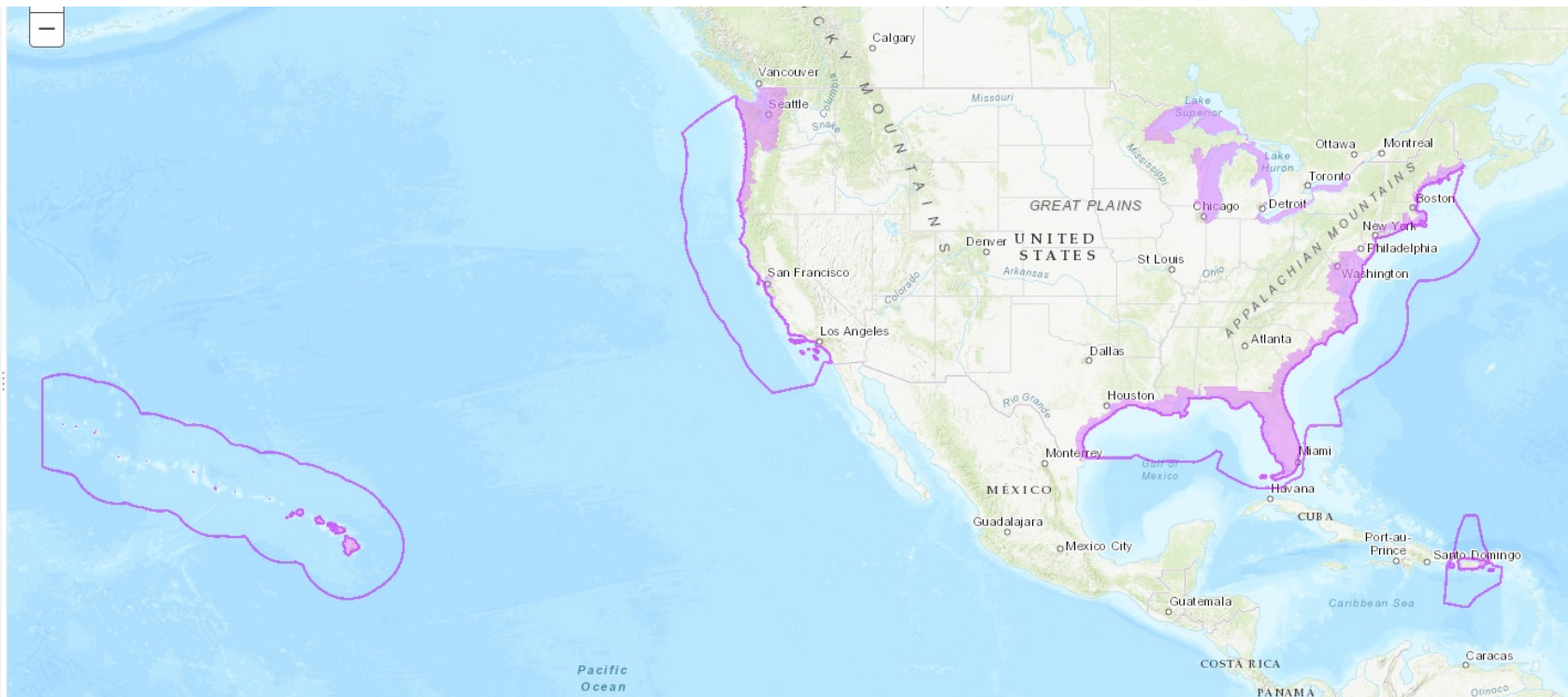
“Information is not easily available”



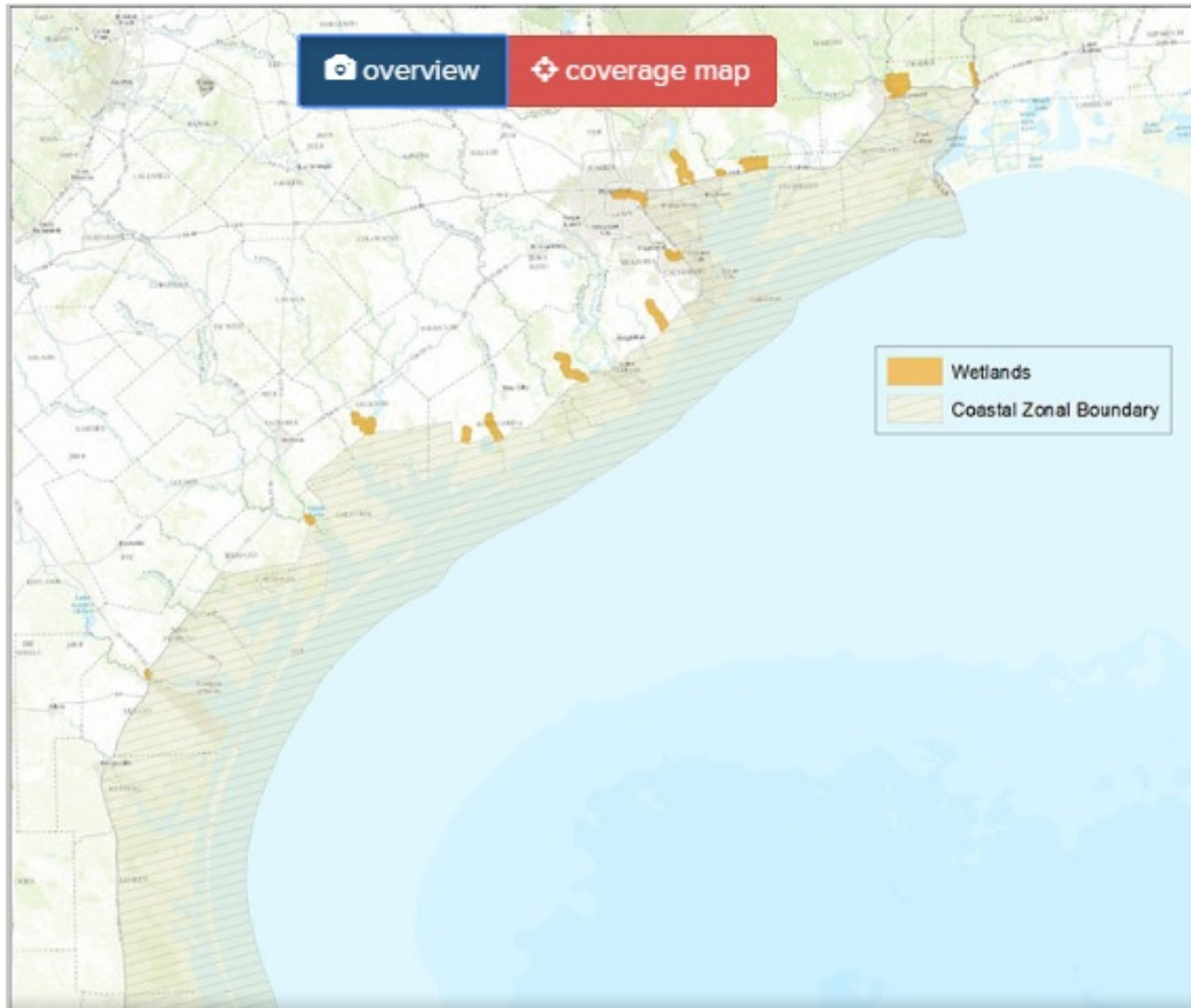
Coastal Zone Management Act (1972) Boundary

- ⦿ Defined by the **individual states and territories**
- ⦿ Direct and significant **impact** on coastal waters
- ⦿ **Texas** Coastal Management Program (CMP):
 - ⦿ “Coastal facility designation line”: Oil Spill Prevention and Response Act of 1991
 - + Wetlands landward (one mile)
 - ⦿ Roughly follows roads that are parallel to coastal waters and wetlands generally within one mile of tidal rivers

- BoundariesAndRegions**
- Coastal Zone Management Act Boundary
 - CZMA Boundary
 - Federal Consistency Boundary



GLO Coastal Zone Boundary



Date(s):

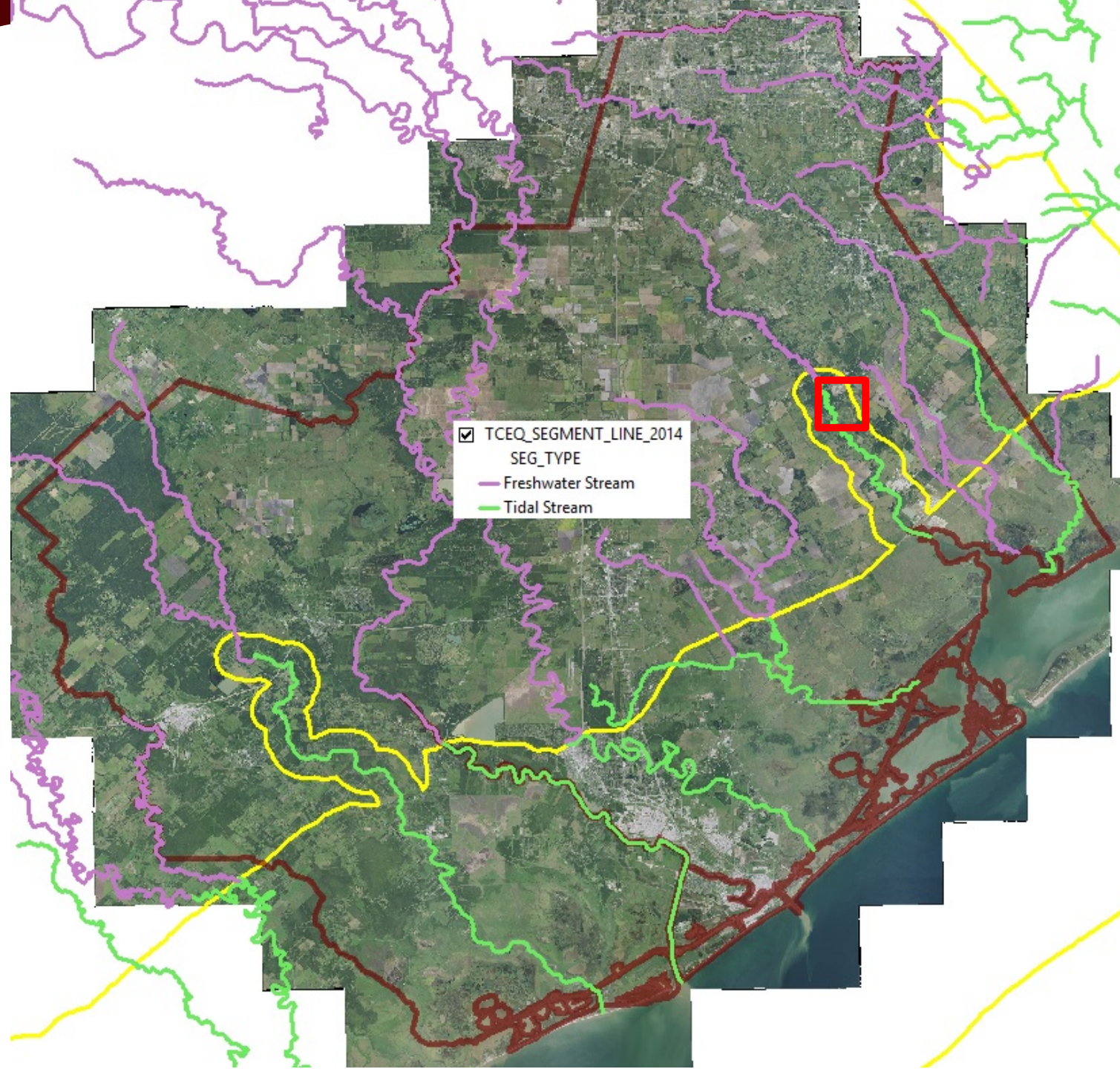
Creation date
varies

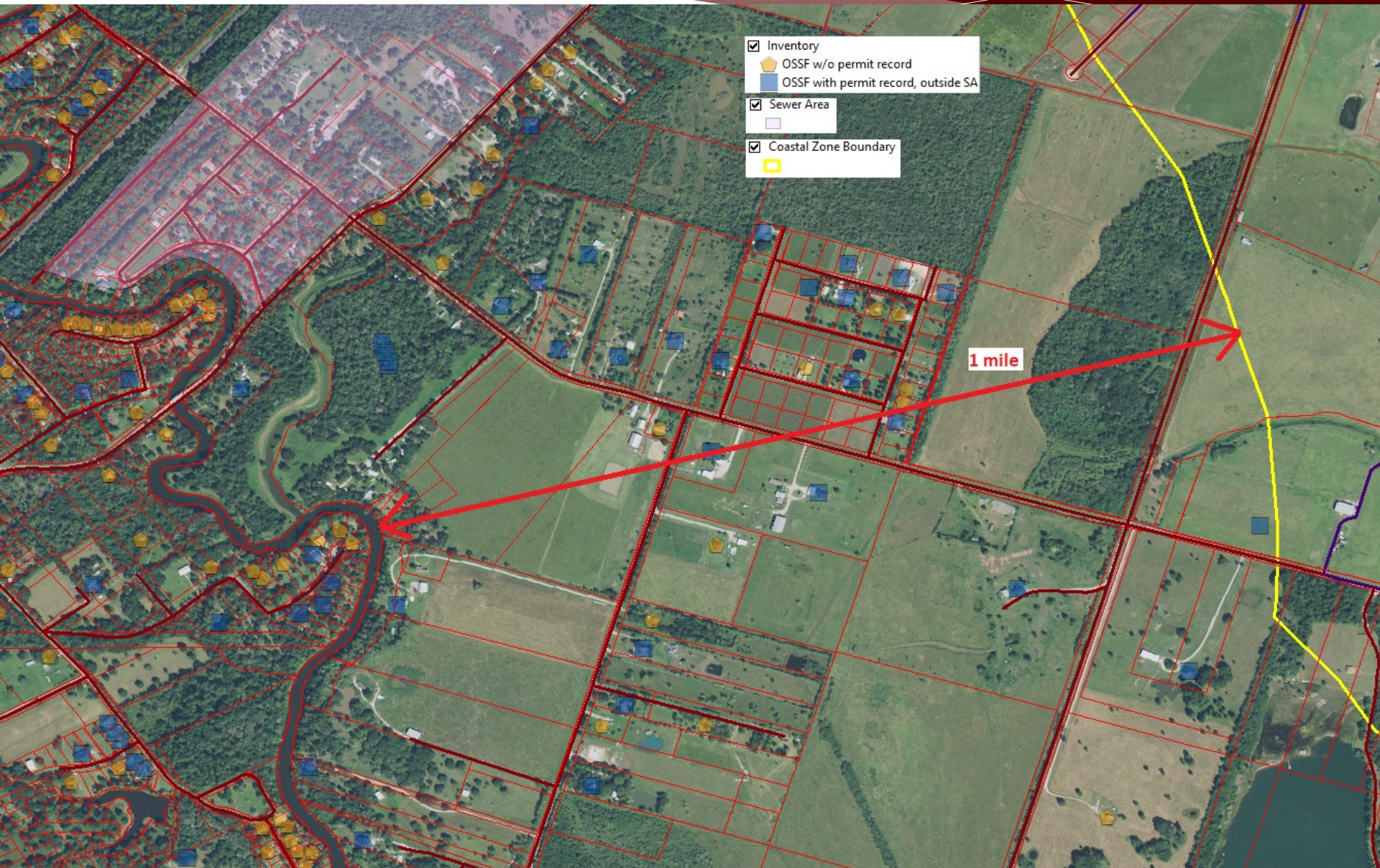
Coverage Availability/Geographic Extent:

Texas

Footprint:

Texas Coastal





Steps

- 1) Gather information and **geolocate OSSF permits** (Authorized Agents, 911 address, legal description)
- 2) Determine **Sewer Service Areas** (Authorized Agents, service providers information, CCN, city limits)
- 3) Estimate **non-permitted OSSF** outside Service Areas (911 address, appraisal parcels, satellite) – NOTE: Could include OSSF permits (not received from AAs, not identified address/parcel)
- 4) Estimate systems **categories and attributes**:
 - With/without permit
 - System Type: Aerobic/Conventional (permit, parcel built date)
 - Year installed (permit, parcel built date)

Challenges

- **Permits:** missing/incomplete location, format, date, type
- **Sewer service area:** many providers, boundary/line/list, format
- **911 address points:** location, missing points, type
- **Appraisal district parcel:** incomplete, format
- **Aerial imagery:** varies (3D, street view, year)

Step 1) OSSF permits overview

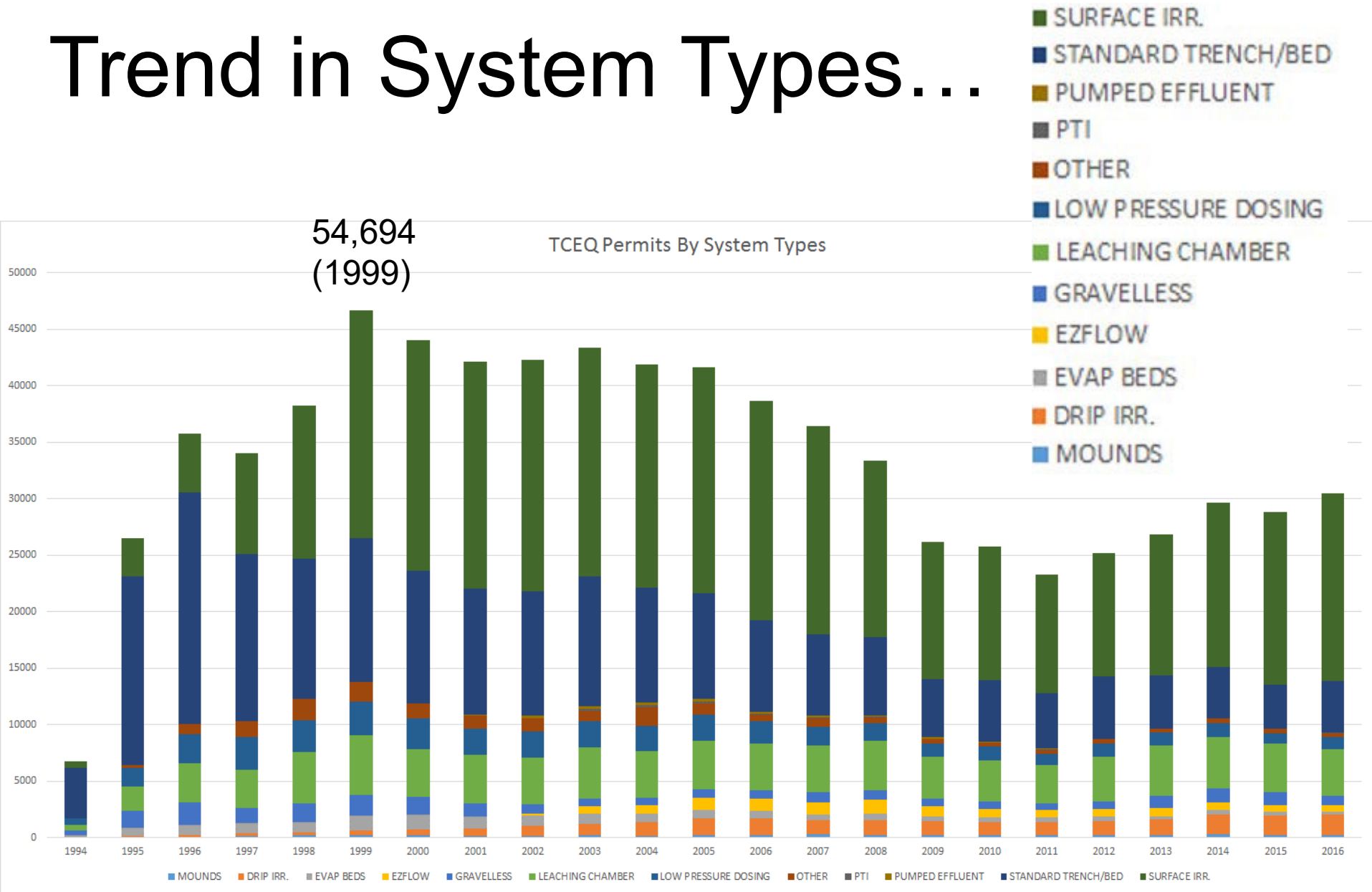
● Historic steps:

All conventional

Most conventional

- <1989 no statewide guidance for installing OSSFs;
 - 1997 rules for site evaluation and wastewater treatment;
 - 2008 maintenance of advanced treatment units
- ## ● Locally regulated: **Authorized Agents** collect data, and can set more stringent rules
- ## ● TCEQ On-site Activity Reporting System (**OARS**):
- Monthly reports (count, type)
 - Aerobic systems: >40% (1999), >55% (2016)

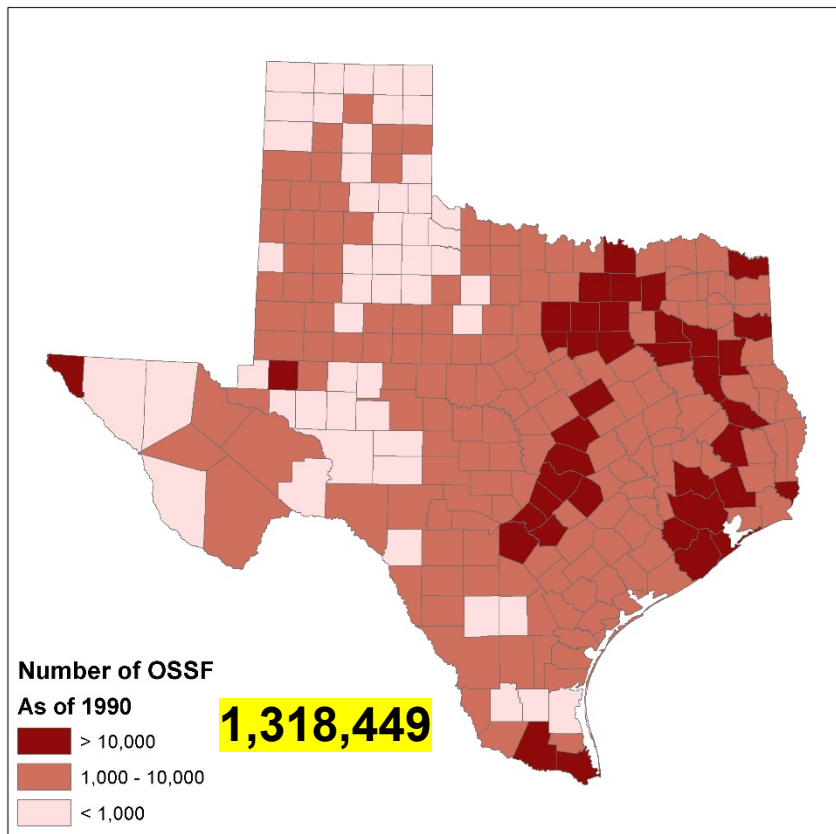
Trend in System Types...



This information was compiled from OARS data from TCEQ.

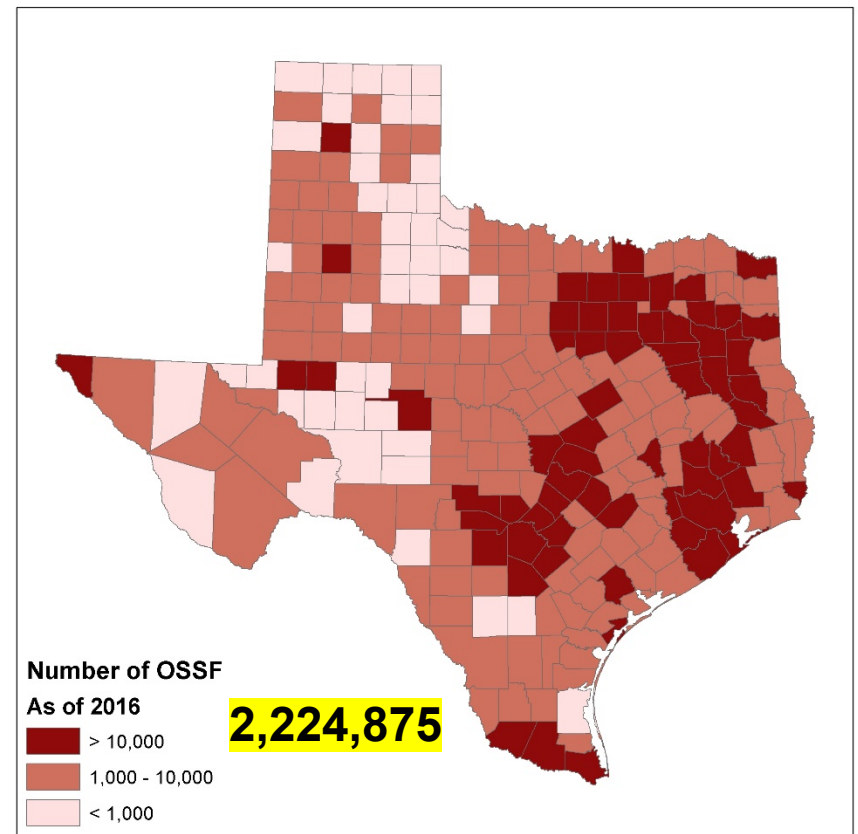
Number of OSSFs in TX then and now...

1990



2016

(2,260,461 in 2017)

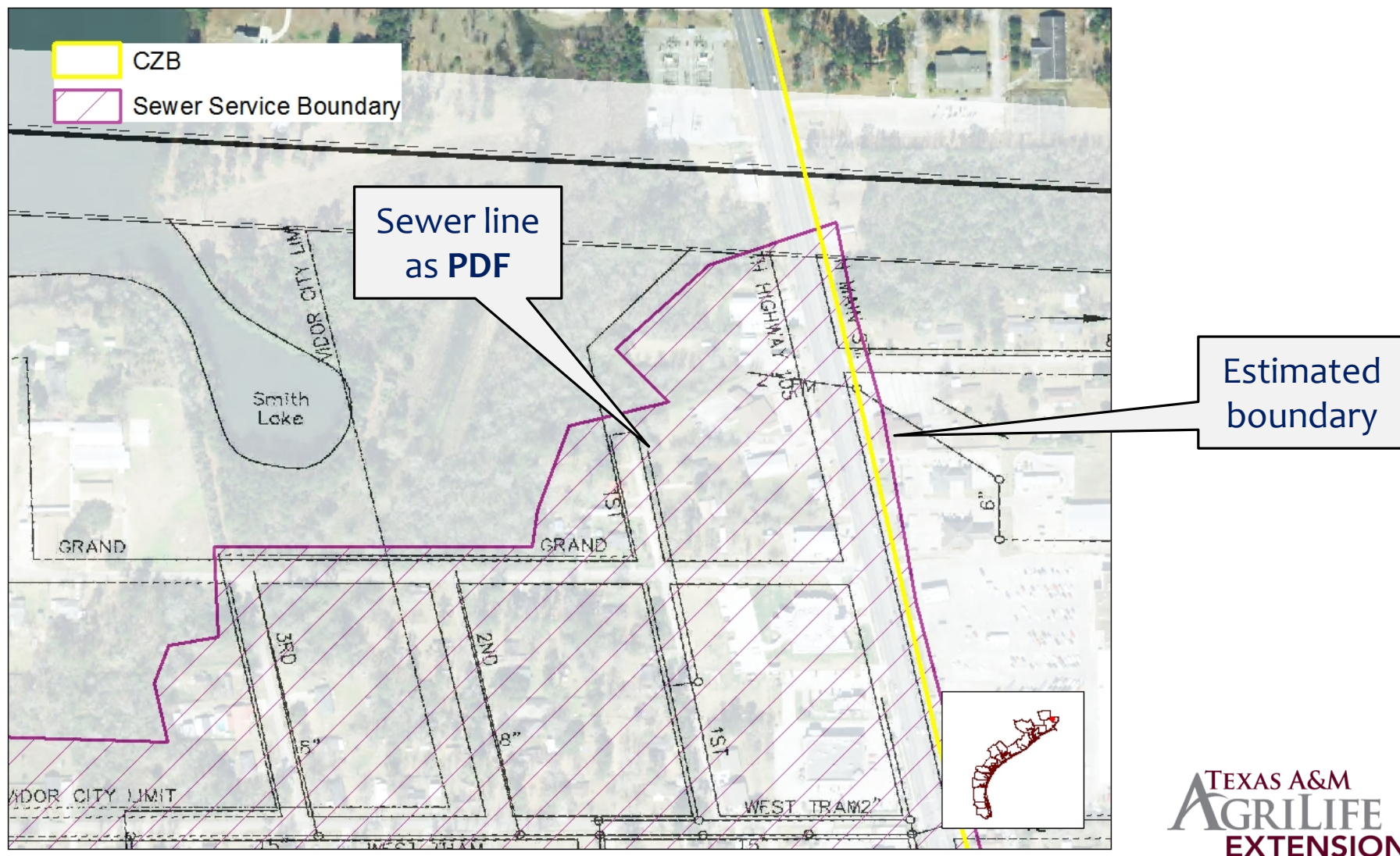


This information was compiled from 1990 Census data and OARS data from TCEQ.

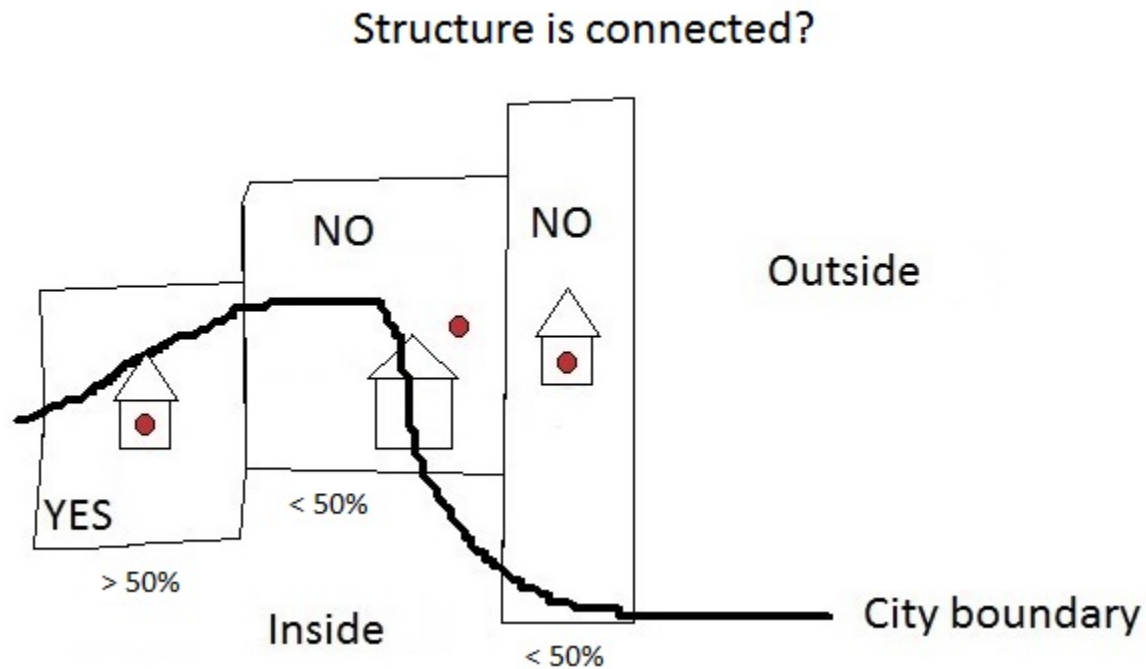
Visits: key step (example: Jackson County)



Step 2) Sewer service area challenges

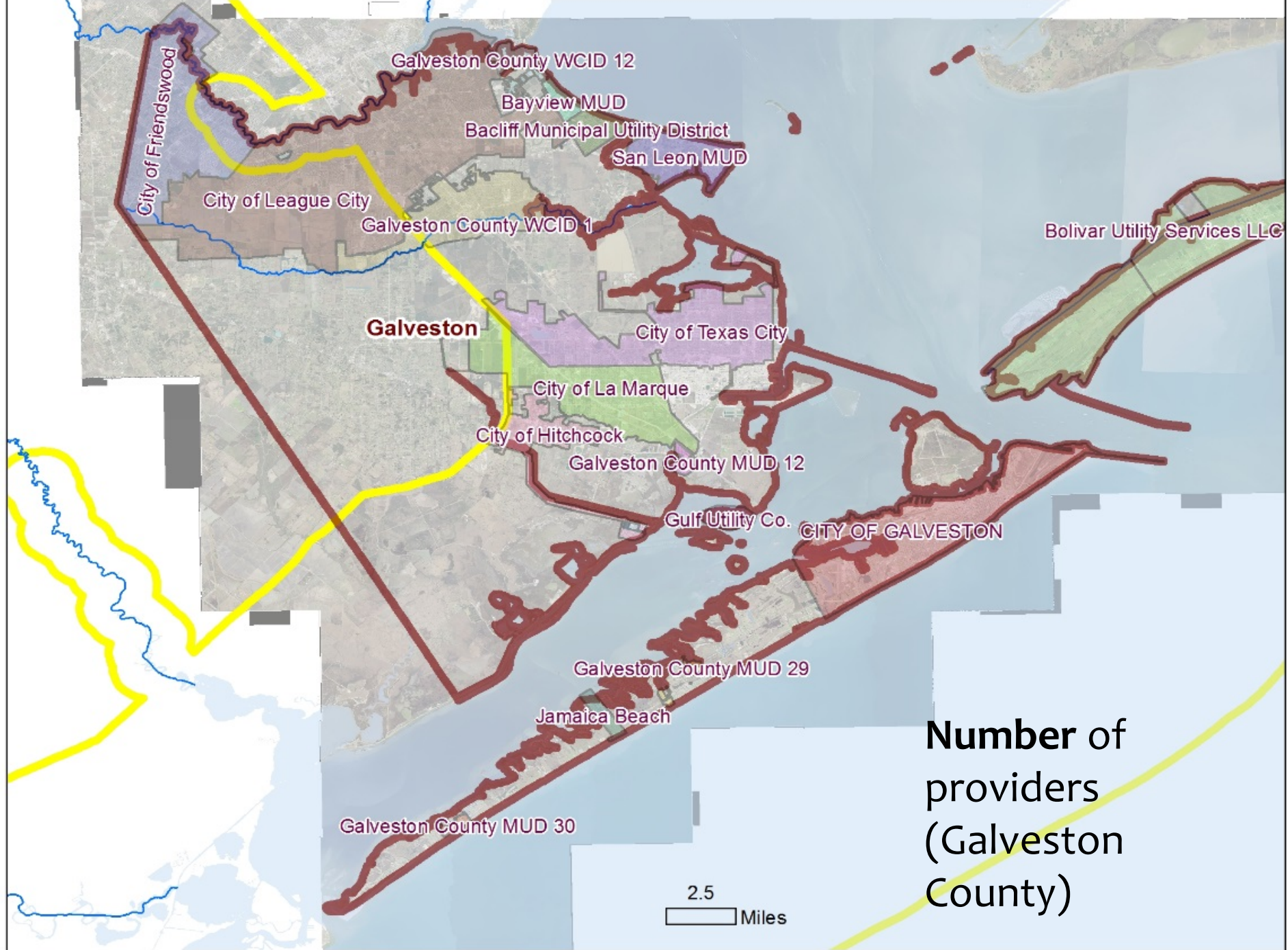


In sewer service area?



Geolocate one by one (example: Bolivar peninsula, Galveston)

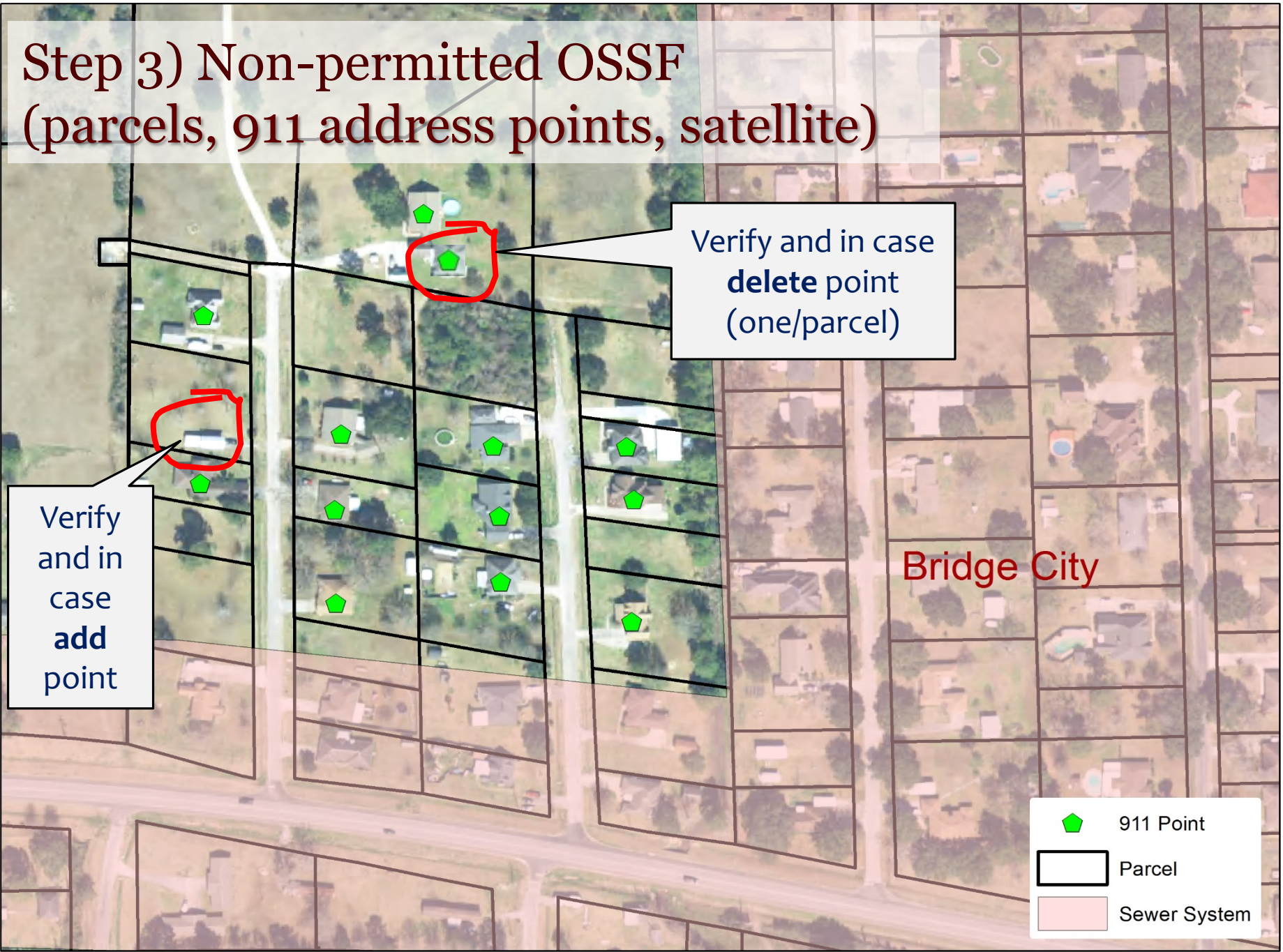




Number of providers (Galveston County)

2.5 Miles

Step 3) Non-permitted OSSF (parcels, 911 address points, satellite)



Excluded?



Step 4) Categories/Attributes

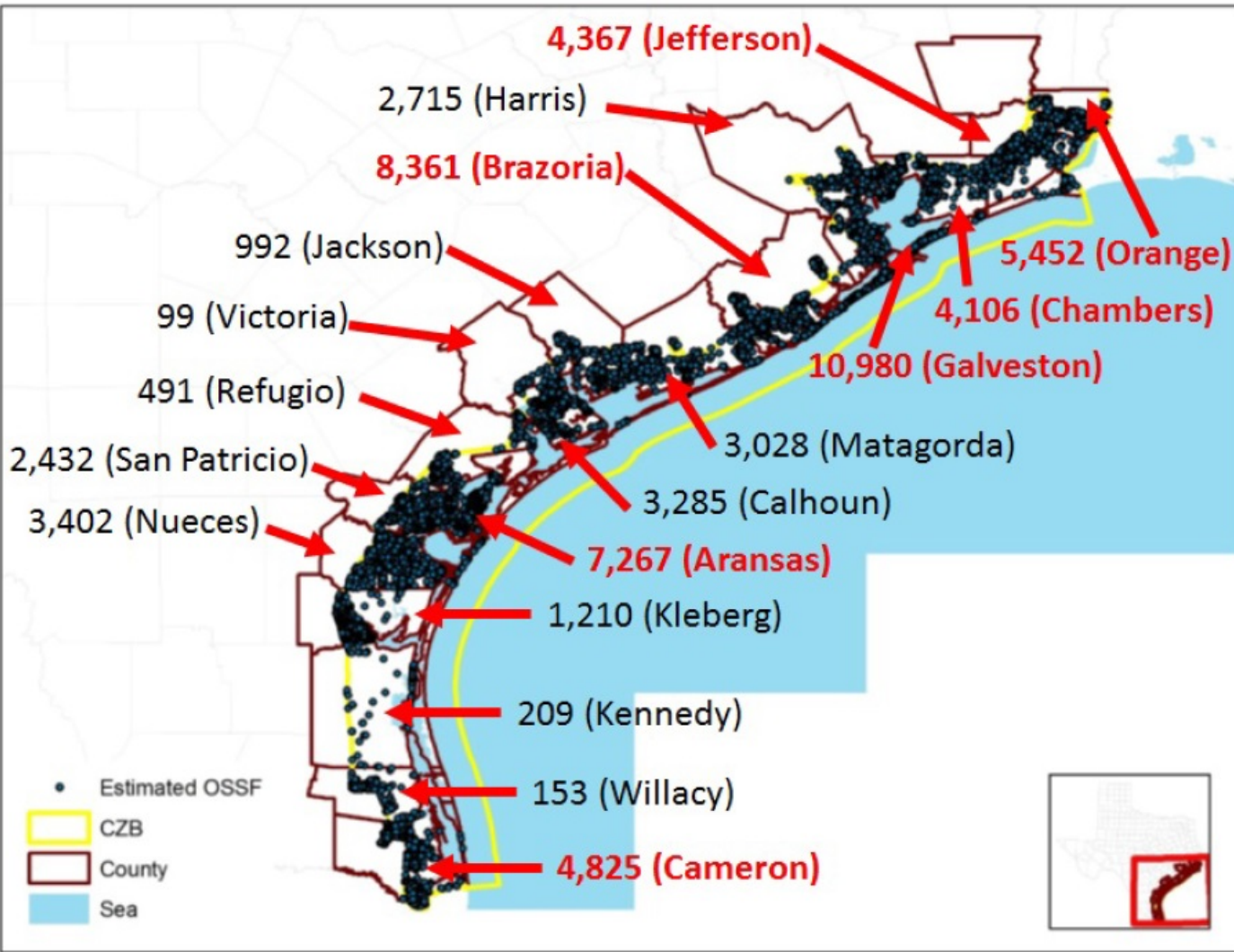
⦿ **Estimated OSSF**

- ⦿ **Without permit** outside SA
- ⦿ **With Permit**
 - ⦿ Outside SA
 - ⦿ Inside SA
 - ⦿ Service is “Available”
 - ⦿ Service is “Mandatory”
 - ⦿ In approximate location

Attributes (method)

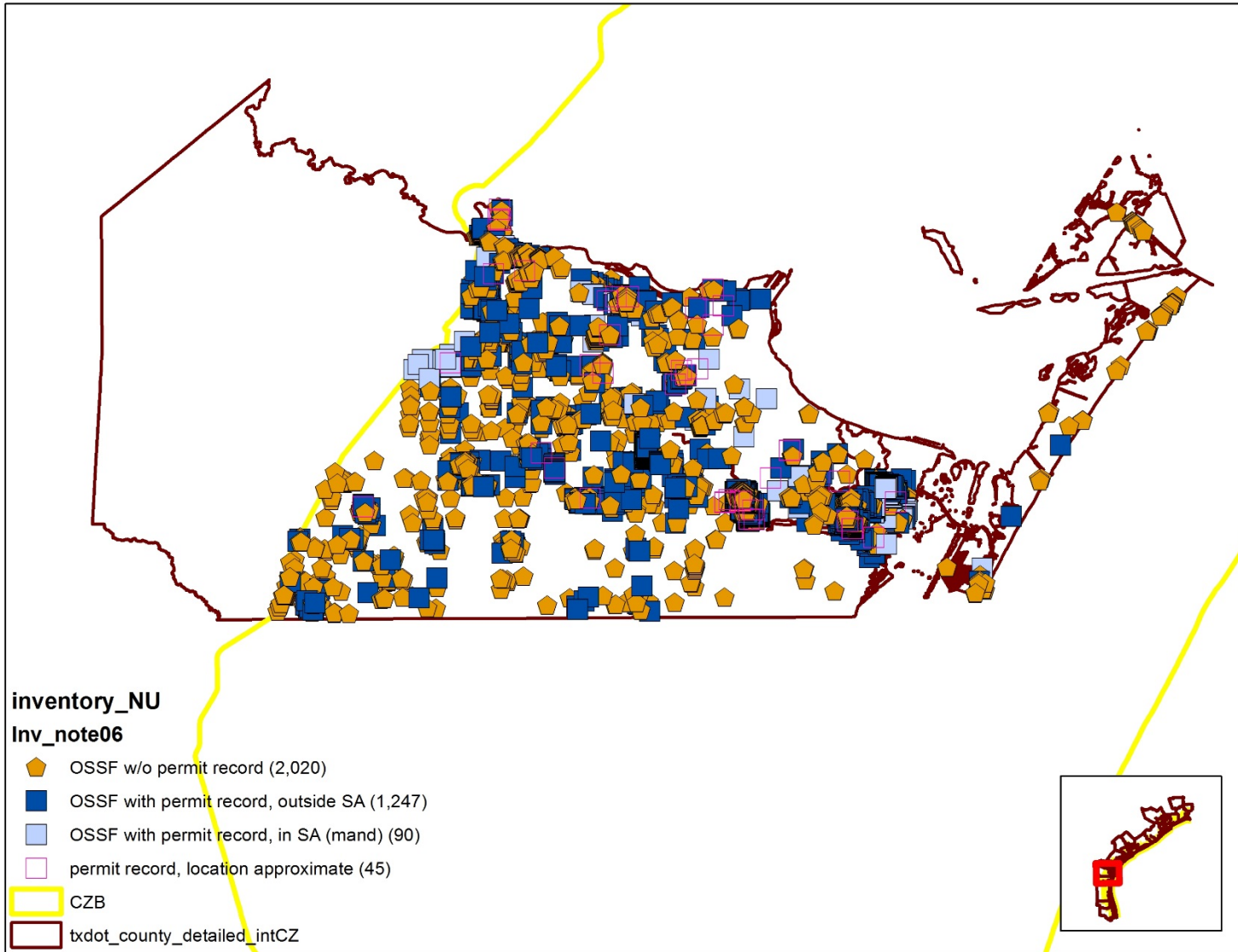
Table 1. Description of classes used to identify or infer system age and type

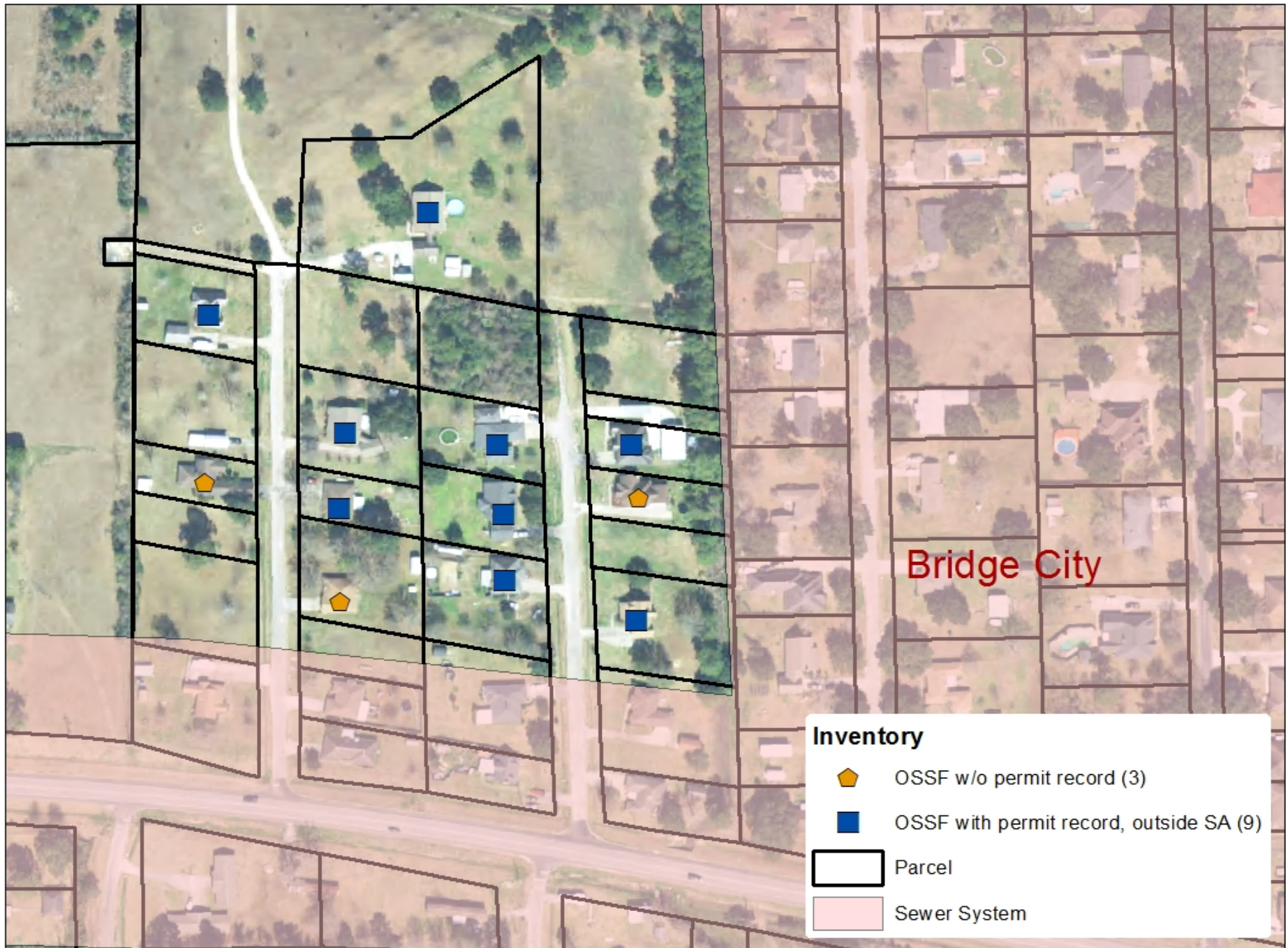
	Flag	Category Description
System Year	1	there is one or more permits and permit date is available; use <u>permit year</u> (note: if there are overlapping permits, use <u>most recent</u> one among all sources [e.g. DR and/or TCEQ Region]);
	2	there is one or more permits and no permit date is available but built year is available; use <u>built year</u> (note: if there are overlapping parcels, use <u>oldest</u> one)
	3	there is no permit and built year is available; use <u>built year</u>
	4	there is one or more permits but nor permit date nor built date is available; <u>enter 0</u>
	5	there is no permits and no built year is available; <u>enter 0</u>
System Type	1	there is one or more permits, and type for permit is available (“most recent permit”, in case of overlapping permits; if a permit has same year and different type, investigate source in detail to decide); enter <u>permit type</u>
	2	there is one or more permits, and type for permit is not available (“most recent permit”, in case of overlapping permits), but permit date for the permit is available; if permit year (most recent) is ≤ 1989 , then enter <u>conventional</u> , if permit year is ≥ 1990 , then <u>enter N/A</u>
	3	there is one or more permits, and type for permit is not available nor permit date (“most recent permit”, in case of overlapping permits), but building date is available; if built year (oldest) is ≤ 1989 , then enter <u>conventional</u> , if built year is ≥ 1990 , then <u>enter N/A</u> . <u>NOTE</u> : in case maintenance contract details are available for all records, enter <u>aerobic</u> if there is a maintenance contract date OR an installer brand name, and <u>conventional</u> in all other cases
	4	there is one or more permits, and type for permit is not available, nor permit or building date; <u>enter N/A</u>
	5	there is no permit, but building date is available; if built year (oldest) is ≤ 1989 , then enter <u>conventional</u> , if built year is ≥ 1990 , <u>enter N/A</u>
	6	there is no permit nor building date; <u>enter N/A</u>



Estimated
OSSF as of
8/2017:
63,374

Nueces County





Additional tasks - Information

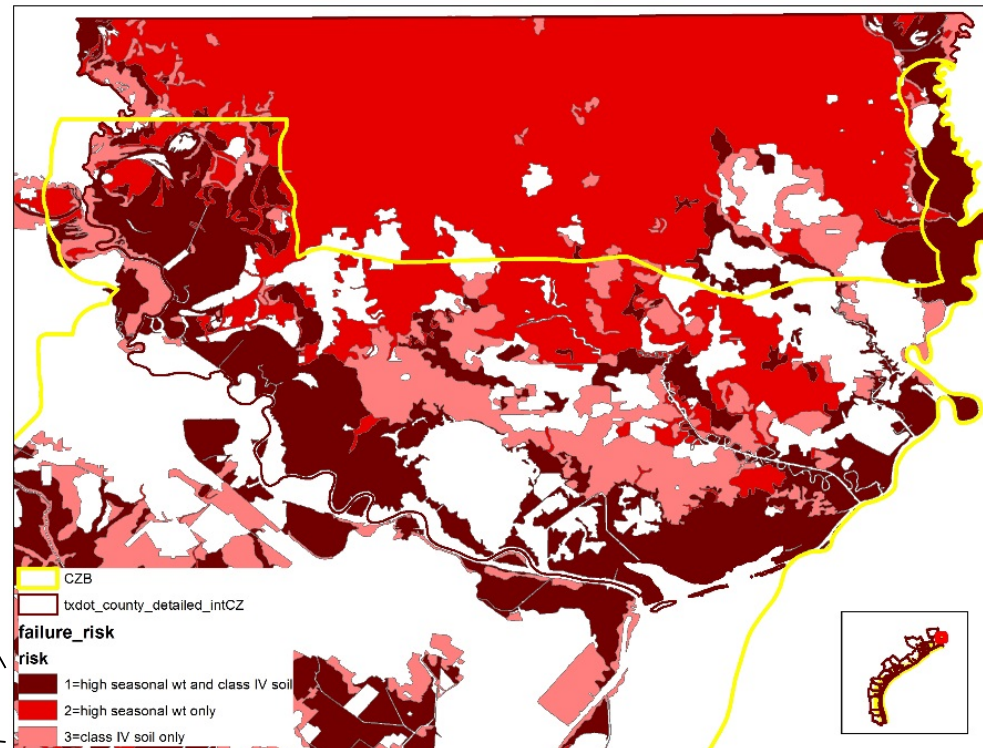
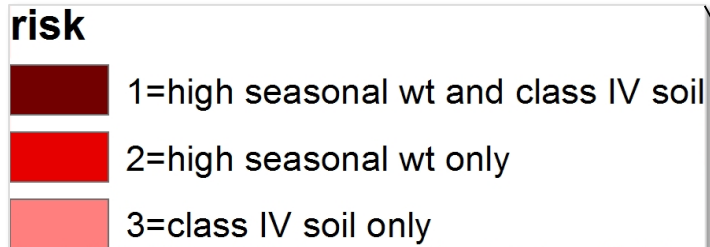
- Domestic waste data collected by the Texas Department of State Health Services
- Census population and housing 2010
- TCEQ On-Site Activity Reporting System (OARS) data
- 100 year floodplain data
- USDA NRCS SSURGO soil data
- HUC-12 watershed boundaries
- Stream segments, assessment units, and impairment status
- WPPs and TMDLs/I-Plans boundaries
- MS4 jurisdictions

Additional tasks - Analysis

- **Exemptions** (must include all):

- 1) Single family
- 2) Density \leq one OSSF/20 acres
- 3) \geq 1,250 feet from a surface water

- ***“Risk of system failure may be high”*** map



3) Refinements to update COSSI

A. Update

B. Develop/maintain an **OSSF History Tracking Table**

- Update count of inspections needed

(A) Update inventory annually

- ⦿ Sewer areas
- ⦿ OSSF systems validation
- ⦿ OSSF permits automated data entry
- ⦿ Deliver geodatabase and maps:
 - ⦿ Master OSSF layer with **One point/records for an OSSF (ID) + Filter/export maps**
 - ⦿ Related permit tables with **multiple points/records for an OSSF**

Semi-automated OSSF permit data entry

- ⦿ **AA shares permit data with AgriLife:**
 - ⦿ Consistent format (e.g. agreed Excel format or database export)
 - ⦿ Periodical sharing (permit number, location, type, inspections; daily/quarterly)
 - ⦿ Consider XY coordinates (measure/validate)
- ⦿ **AgriLife supports AA:**
 - ⦿ Conversion of archived data into electronic format
 - ⦿ Updated interactive online maps (including mobile web applications)
 - ⦿ Education
 - ⦿ Guidance material to data management/sharing
 - ⦿ Training sessions with Authorized Agents and Maintenance Providers (CEUs)
 - ⦿ Materials (GPS hand held devices, software license)

Updated interactive online maps

OSSF permit location for the Galveston County (6/2018-1/2019):

Red = automatic location before correction; **Green** = corrected position.

The screenshot shows an ArcGIS online map titled "Galveston County OSSF Permits2". The map displays a satellite view of Galveston County, Texas, with a yellow boundary line representing the Coastal Zone Boundary. Numerous red dots represent automatic permit locations, and several green dots represent corrected positions. The interface includes a legend, navigation tools, and a search bar.

Legend

- Galveston_OSSF2 - XYEvent (Red dot)
- Galveston_OSSF2 - Proposed Location (Green dot)
- Galveston_OSSF2 - Coastal Zone Boundary (Yellow line)




Map Interface Elements:

- Navigation: Home, Galveston County OSSF Permits2, New Map, Create Presentation, gabriele
- Tools: Details, Add, Basemap, Analysis, Share, Directions, Bookmarks
- Search: Find address or place
- Map Controls: Zoom in (+), Home, Zoom out (-), Refresh
- Scale: 0 to 10 miles
- Powered by: esri

[Details](#) [Add ▾](#) [Basemap](#) [Analysis](#) [Share](#) [Directions](#) [Bookmarks](#)

[About](#) [Content](#) [Legend](#)

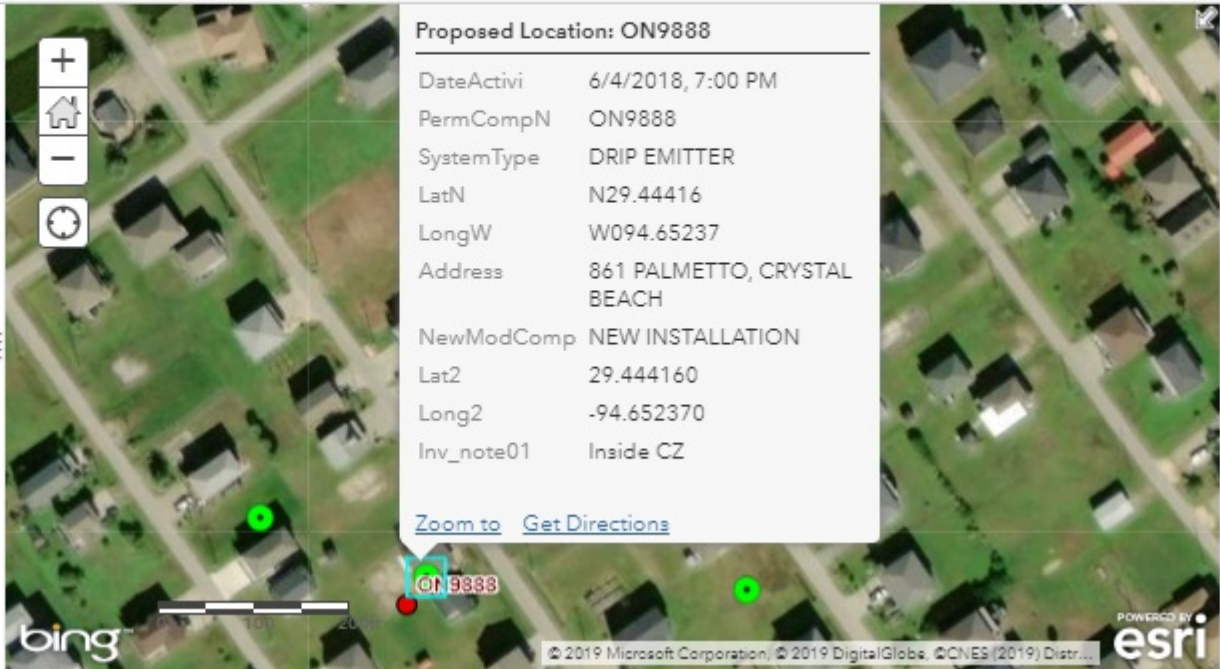
Legend


- Galveston_OSSF2 - XYevent 
- Galveston_OSSF2 - Proposed Location 
- Galveston_OSSF2 - Coastal Zone Boundary 

Proposed Location: ON9888

DateActivi	6/4/2018, 7:00 PM
PermCompN	ON9888
SystemType	DRIP EMITTER
LatN	N29.44416
LongW	W094.65237
Address	861 PALMETTO, CRYSTAL BEACH
NewModComp	NEW INSTALLATION
Lat2	29.444160
Long2	-94.652370
Inv_note01	Inside CZ

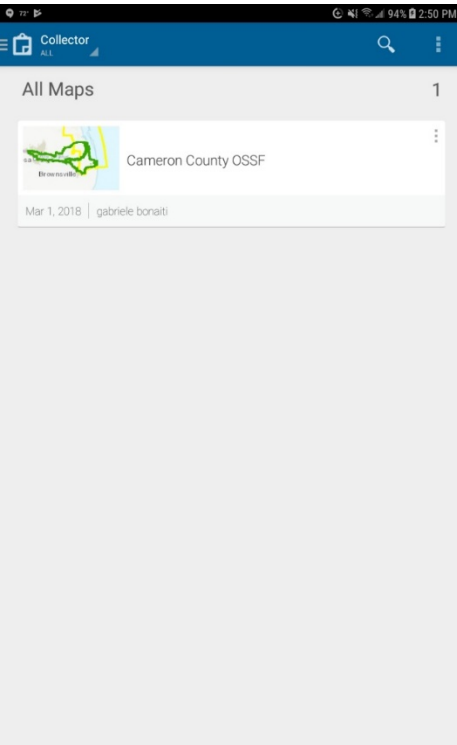
[Zoom to](#) [Get Directions](#)



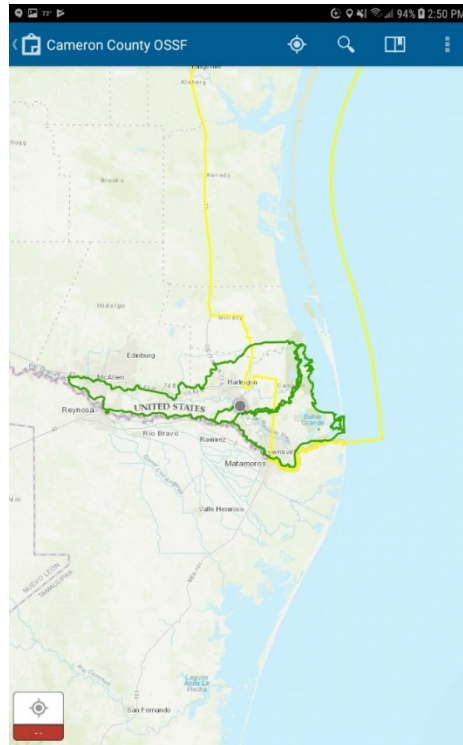
bing © 2019 Microsoft Corporation, © 2019 DigitalGlobe, © CNES (2019) Distr... 

Mobile application for field work

Find Map



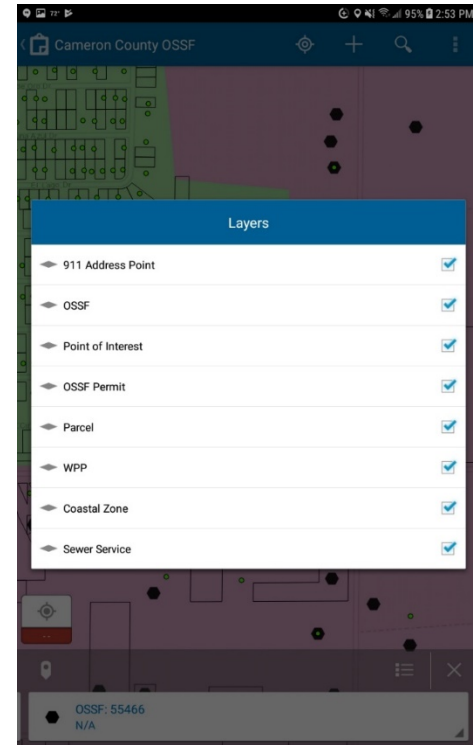
Open Map



Zoom to area



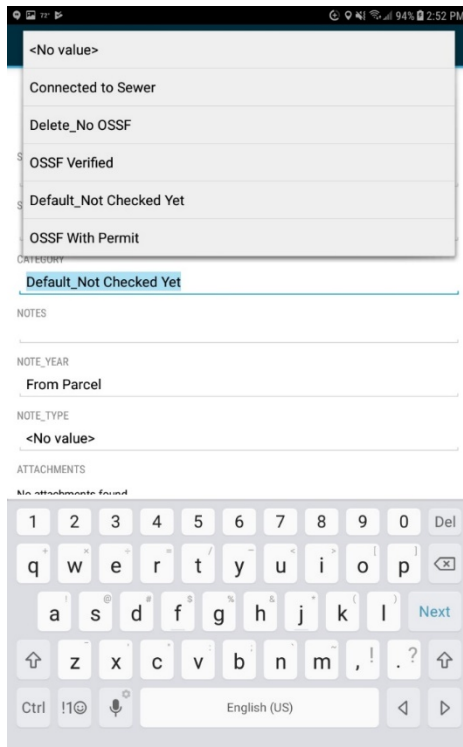
Turn on/off layers



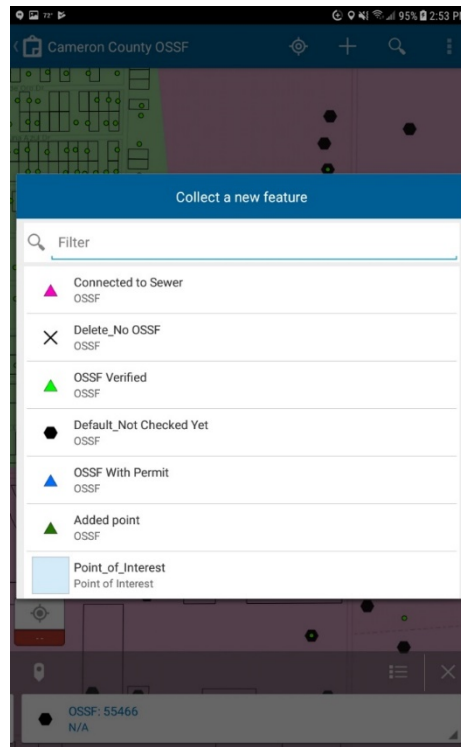
Select feature



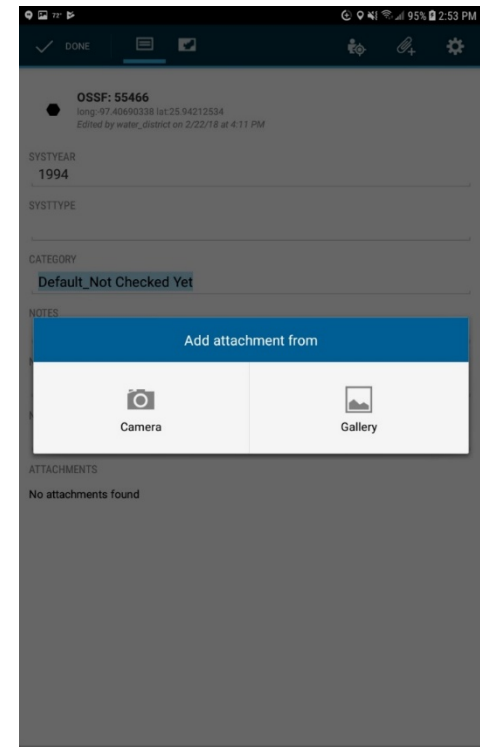
Edit attributes/location



Add new feature



Add attachments



Guide

“
... ”

- ⦿ Working with GPS handheld receiver
- ⦿ Set up GPS ...
- ⦿ Use GPS ...”

MARK WAYPOINT



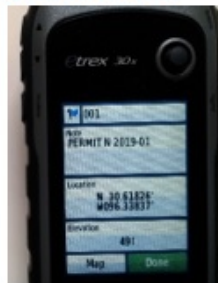
ADD INFORMATION TO WAYPOINT



SEE WAYPOINT ON MAP (optional)



SAVE WAYPOINT

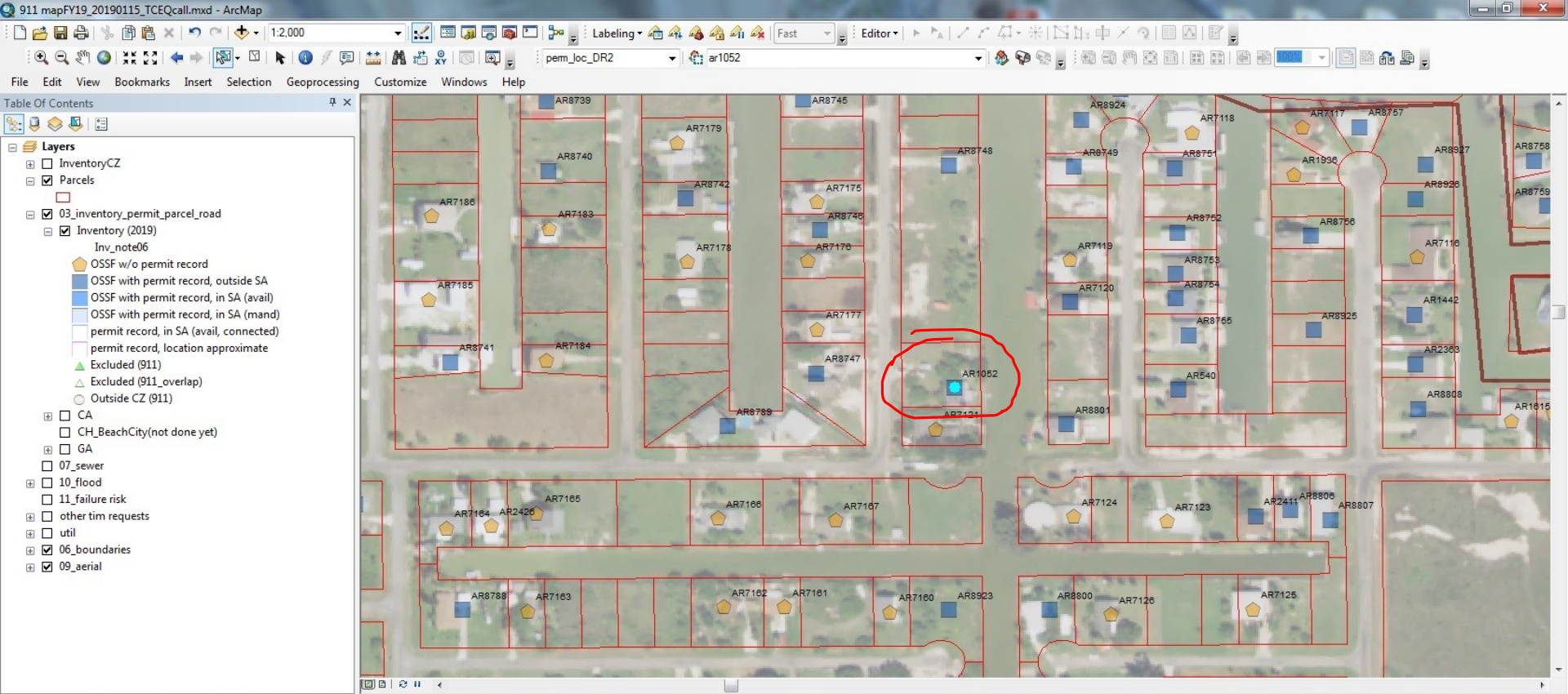


Local Authorized Agent OSSF Database/Software



(B) OSSF History Tracking Table

- ⊙ **Inspections** (existing practices Authorized Agents and Real Estate Community)
- ⊙ **Update OSSF History Tracking Table:**
 - 1) Contractor inspection
 - 2) Maintenance (contractor, owner)
 - 3) New or revised permit for existing OSSF
 - 4) Site Visit (AA or TCEQ)
 - 5) Decommissioned (sewer extensions, connected to existing sewer service)
 - 6) Removed error
- ⊙ **Identify “Inspected/Removed since 2017”** (NOTE: inspections \geq 2015 only)
- ⊙ **Update inspections needed count: 63,374** (FY2017) – **Inspected/Removed since 2017**



Table

Since2017_Inspected

OBJECTID*	InvID_Long	Date	Year	Insp_Type	Note	Note_2
3	AR1052	12/4/2016	2016	Maintenance OSSF (contractor, owner)	<Null>	<Null>

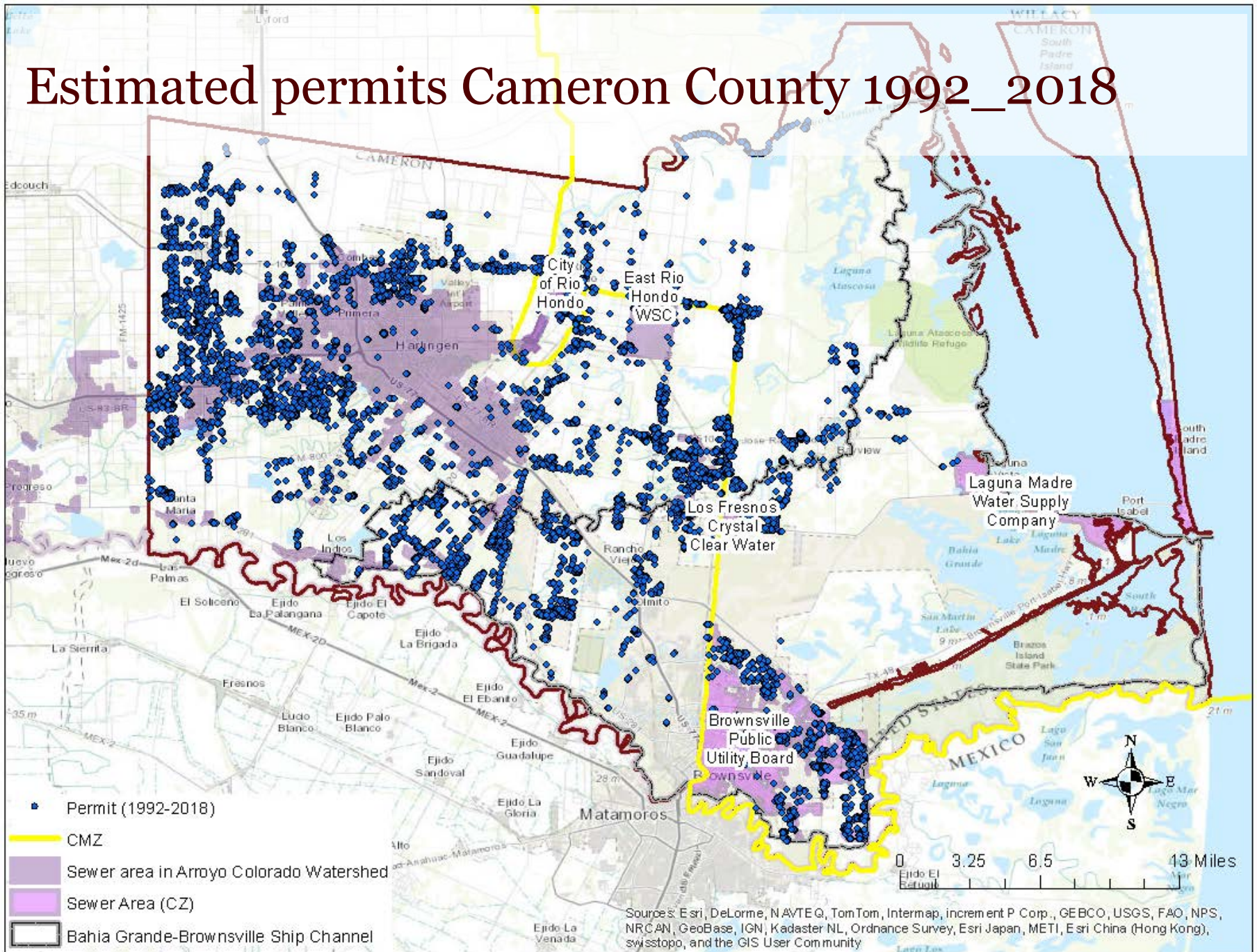
↑ ↑ (1 out of 3 Selected)

Inventory (2019) Permit_AR_DR [Since2017_Inspected]

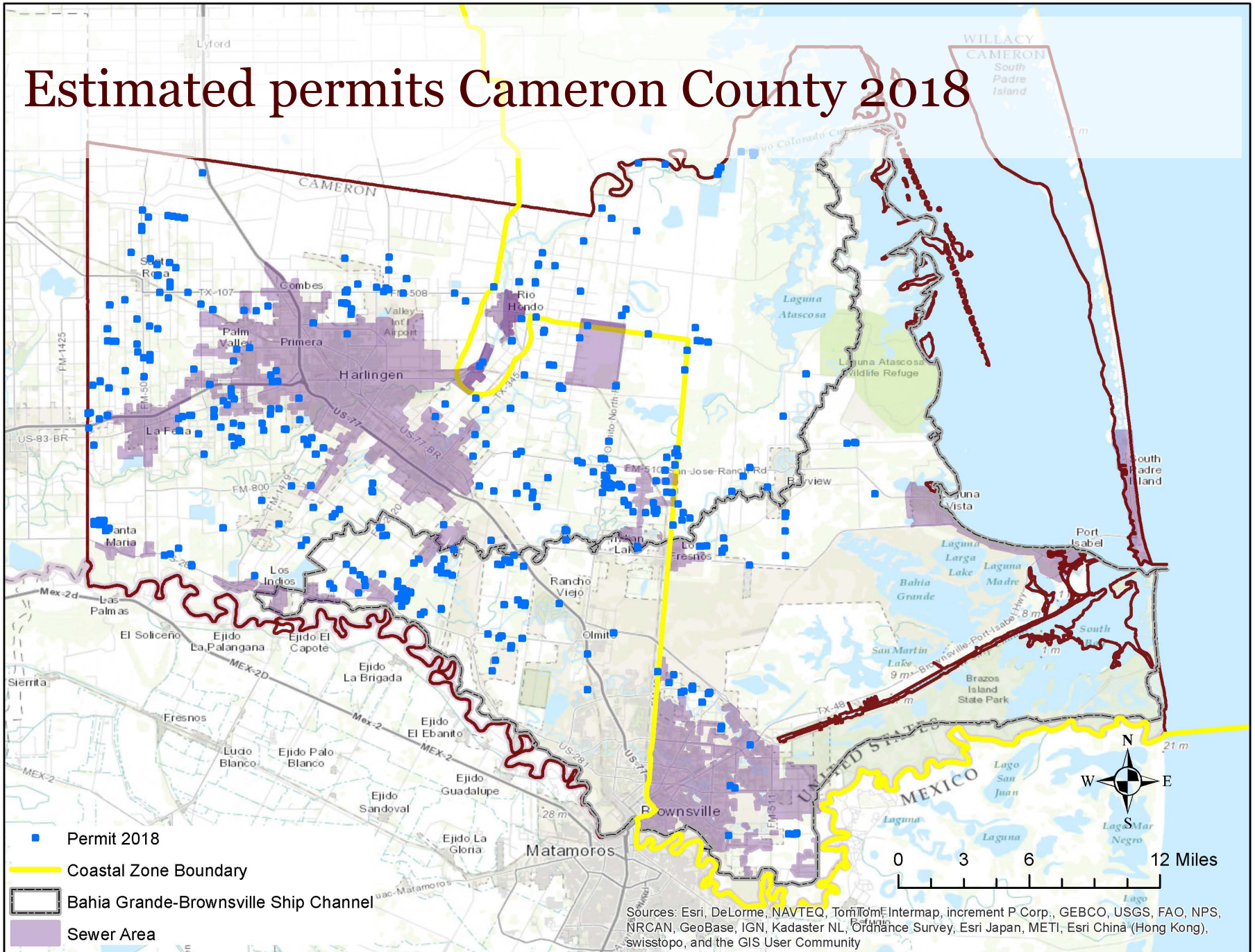
4) Applications in Texas

- ⊙ The Texas Water Resources Institute (TWRI) and The University of Texas Rio Grande Valley (UTRGV) are **expanding the inventory beyond the coastal zone** for the Arroyo Colorado and Brownsville Ship Channel watersheds.
- ⊙ The inventory will serve as a supporting tool in the development of the **Brownsville Ship Channel Watershed Protection Plan (WPP)** and the implementation of the Arroyo Colorado WPP.

Estimated permits Cameron County 1992_2018



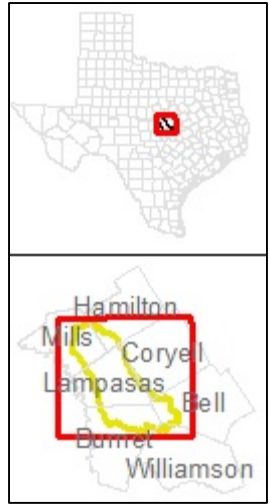
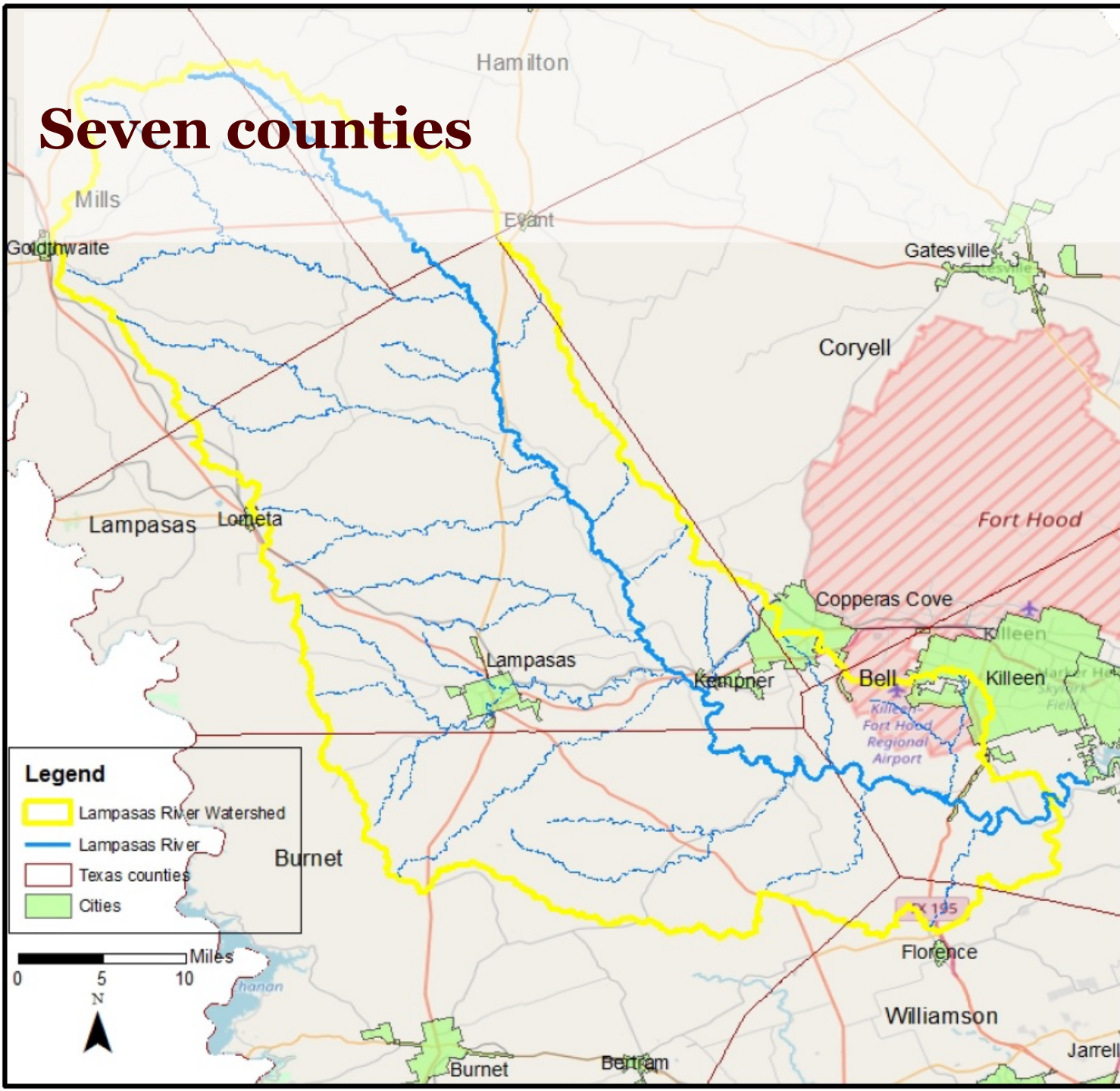
Estimated permits Cameron County 2018



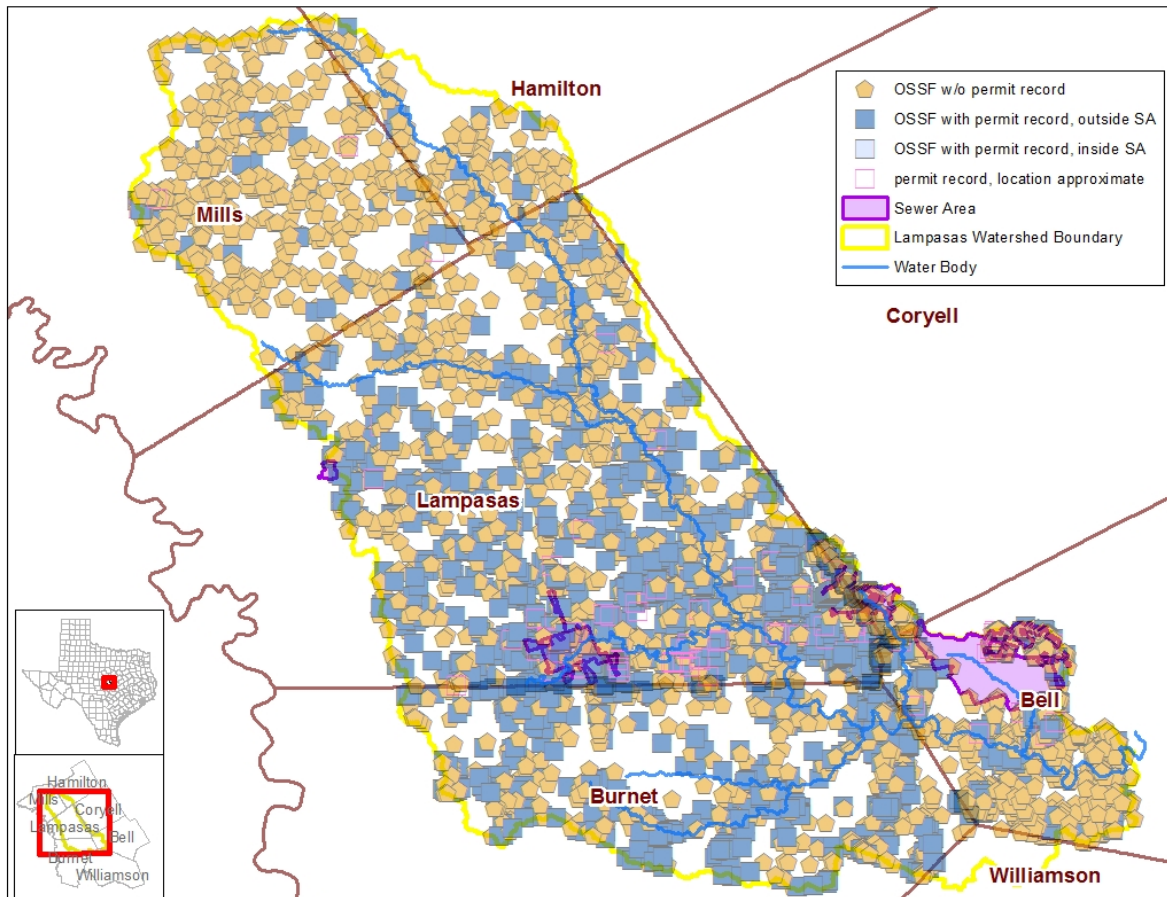
OSSF Inventory in Lampasas Watershed

- ⊙ Based on the methodology created for the Texas Coastal Zone
- ⊙ **Help implement the Lampasas River Watershed Protection Plan**, a stakeholder developed plan to address bacteria in the Lampasas River and its tributaries

Seven counties



- Estimated OSSFs: 11,255
- Geolocated permits (average): 93%
- Type (aerobic or conventional): 69% of points
- Year of installation: 57% of points



Questions?!

- ⊙ Gabriele Bonaiti
- ⊙ BAEN Department
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