

**Study to investigate nonpoint sources of  
bacteria pollution to support development  
and implementation of the bacteria TMDL in  
the Oso watershed**

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# Funding

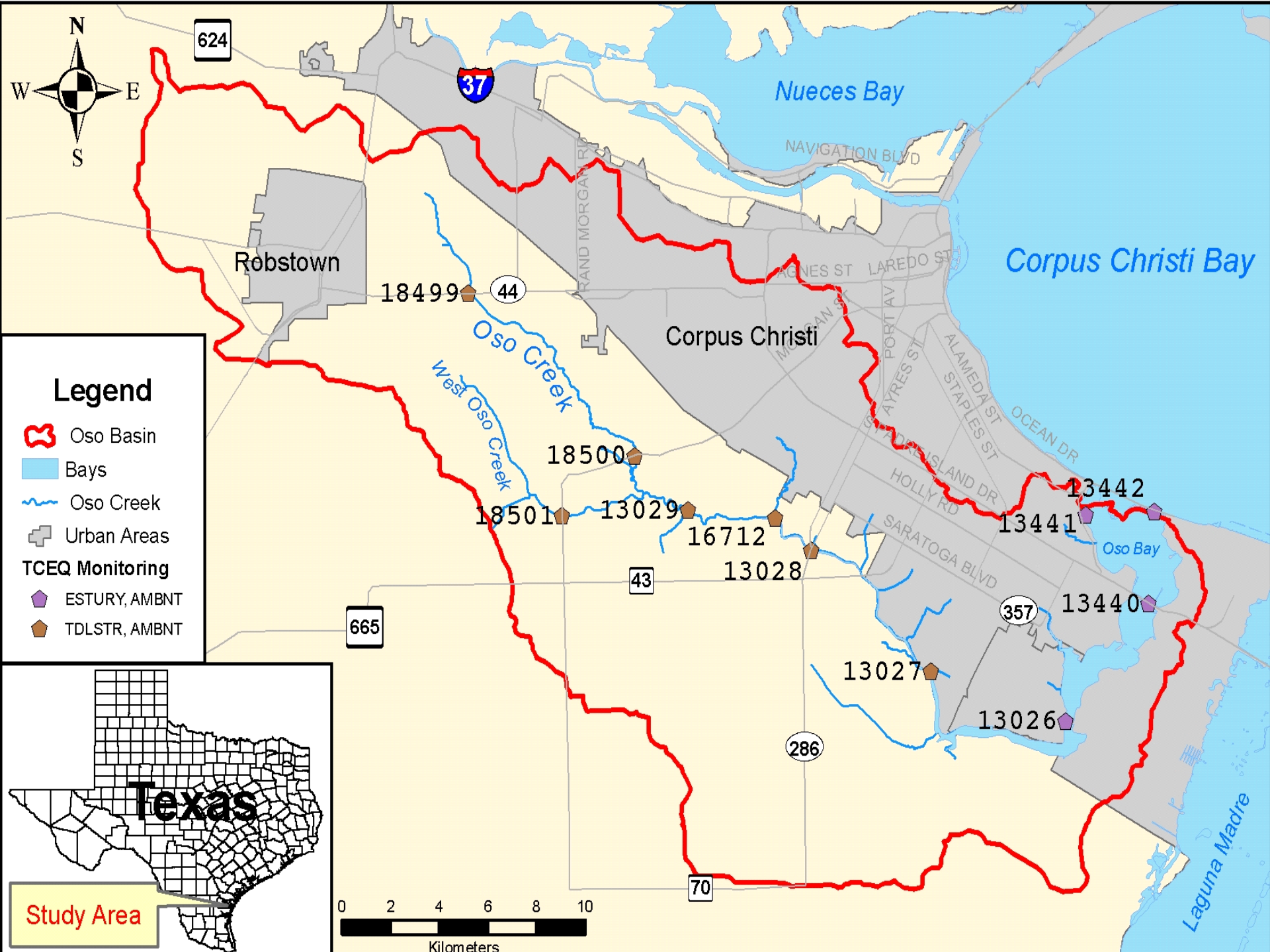
- **Clean Water Act Section 319(h) Nonpoint Source Grant**
- **Texas State Soil and Water Conservation Board**
- **Three year project (Oct. 1, 2007 to Sept. 30, 2010)**

# PROJECT GOAL






- To provide information on nonpoint sources of enterococci in the upstream section of Oso Creek to state agencies and local planning entities in support of the Implementation Phases of the Oso Creek/Oso Bay watershed TMDLs.

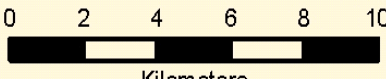
# Background

- There are elevated enterococci levels and loading in upstream sections of the creek.
- Modeling work unable to discern the source of the elevated enterococci levels and “dry weather” loading.
- Upper sections run through primarily rural agricultural row crop fields with no obvious sources of fecal bacteria.
- Elevated levels of enterococci in agricultural land runoff
- Creek is effluent driven (Robstown treatment plant). The plant is permitted and bacterial levels meet standards.
- Other studies have indicated sediments may play a role as reservoirs for fecal bacteria



### Legend

-  Oso Basin
-  Bays
-  Oso Creek
-  Urban Areas
- TCEQ Monitoring**
-  ESTURY, AMBNT
-  TDLSTR, AMBNT



# AMBIENT STATIONS (previous project)

(Enterococci cfu/100 ml data from all samples 05/09/05 – 08/06/06)

Location	Value Min	Value Mean	Value Max
Ambient Station 18501 ( West Oso Creek at FM 665)	300	4323.9	26500
Ambient Station 18500 (Oso Creek at FM 665)	143	2938.8	21667
Ambient Station 18499 (Oso Creek at SH44)	118	6183	54500
Ambient Station 13029 (Oso Creek at FM763)	138	3703.9	56000

# TARGETED STATIONS (previous project)

(Enterococci cfu/100 ml data from all samples 05/09/05 – 08/06/06)

Location	Value Min	Value Mean	Value Max
Targeted Station S9 (Rose Acres Colonia)	2650	13975	34500
Targeted Station S7 (US 77 just below Robstown WWTP)	8	2553.5	20000
Targeted Station S4 (CR 55 and FM 2444 near London Community)	1167	10672.75	36250
Targeted Station S3 ( East Main Ave, Robstown, between US 77 and Ballpark)	9	6027.9	31900
Targeted Station S10 ( FM 2444 and unnamed tributary of Oso Creek - USGS station 08211525)	200	4957.8	20000

# Objectives

- To provide information for effective planning by local and state agencies the project addresses two questions:
  - What are the nonpoint sources for the upstream section of the creek i.e. where are the bacteria originating from ?
  - What are the animal sources of the enterococci, including human/sewage vs. other categories

# Tasks and Status

- **To prepare a comprehensive sampling design to determine sources of enterococci in the upstream section of Oso Creek**
- **To develop a QAPP and submit for approval by TSSWCB and EPA**

# Status

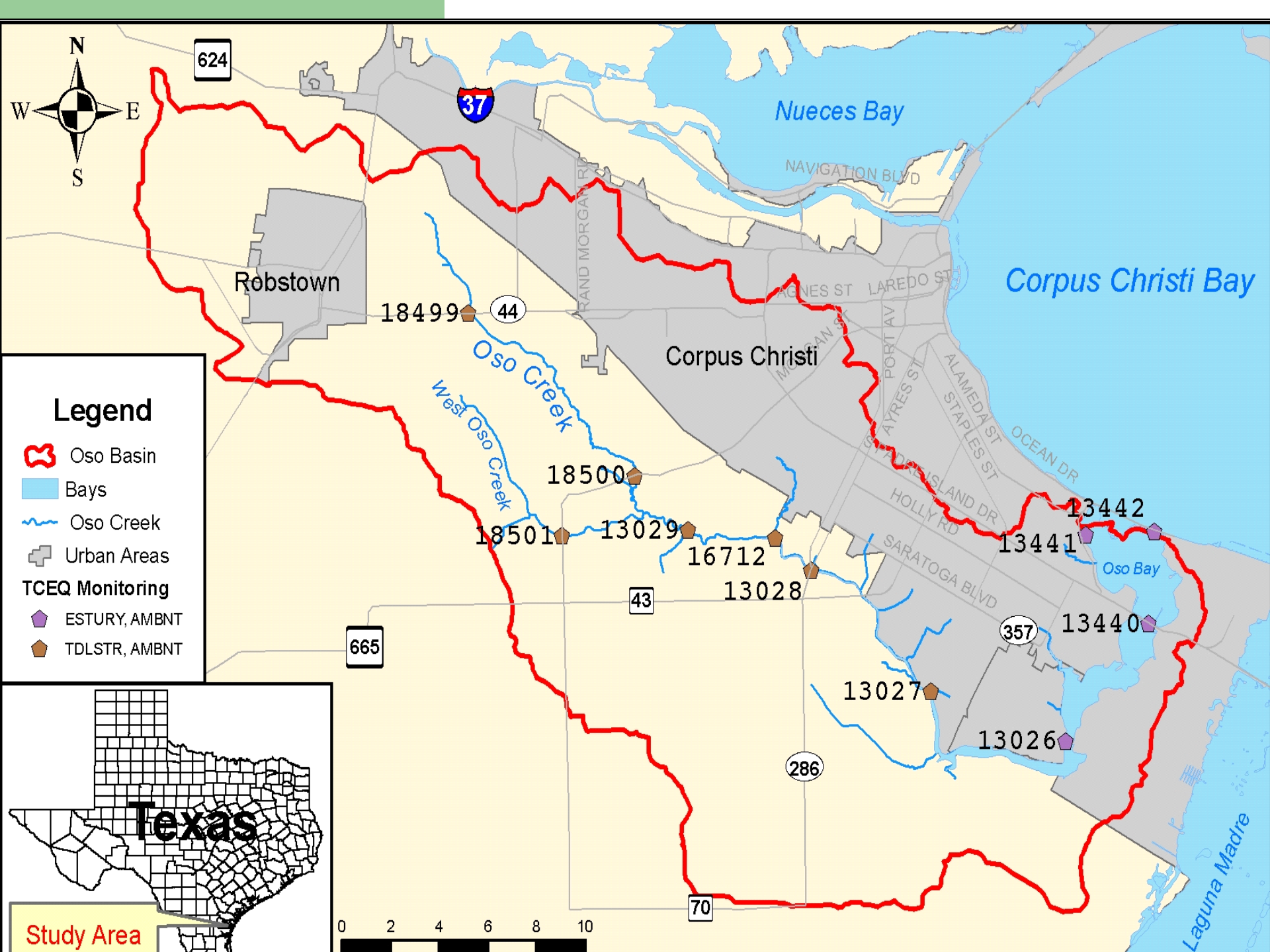
- Stakeholder Meeting Jan 28, 2008
  - Input from community and agencies on sampling plan
- Participation in other Oso Watershed meetings
- Maps of the area, previous field survey information and current field surveys
  - to help identify potential sources e.g. rural residences, livestock etc.
  - to determine accessible sites
- Contacts with local farmers for access - in progress
- Collaboration with TX AgriLife Research and TSSWCB personnel, NRCS and SWCDs to identify soil sample locations
- QAPP written and submitted

# **TASKS not yet initiated**







- **To conduct field sampling (and lab analysis for enterococci) of potential sources of enterococci**
- **To conduct bacteria source tracking to determine animal sources of contamination**

# Sampling to include:

- Water at 3 upper section historical stations (18499, 18500, 18501)
  - Quarterly throughout project – to maintain updated database
  - Field parameters and *Enterococcus*
  - Ambient, regardless of rainfall
  - Third year may modify to capture particular conditions if needed (e.g. following rainfall)



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Study Area



# Sampling con't

- Water from 10 wells (groundwater)
  - Paired, at 5 locations - one shallow (~10 ft), one deep (~25 ft)
  - Near 4 historic stations and an agricultural NPS station (TX AgriLife Research project)
  - Quarterly Year 1, plus additional rain event
  - Year 2 and 3 dependent on Year 1 results

# Groundwater (well) Stations

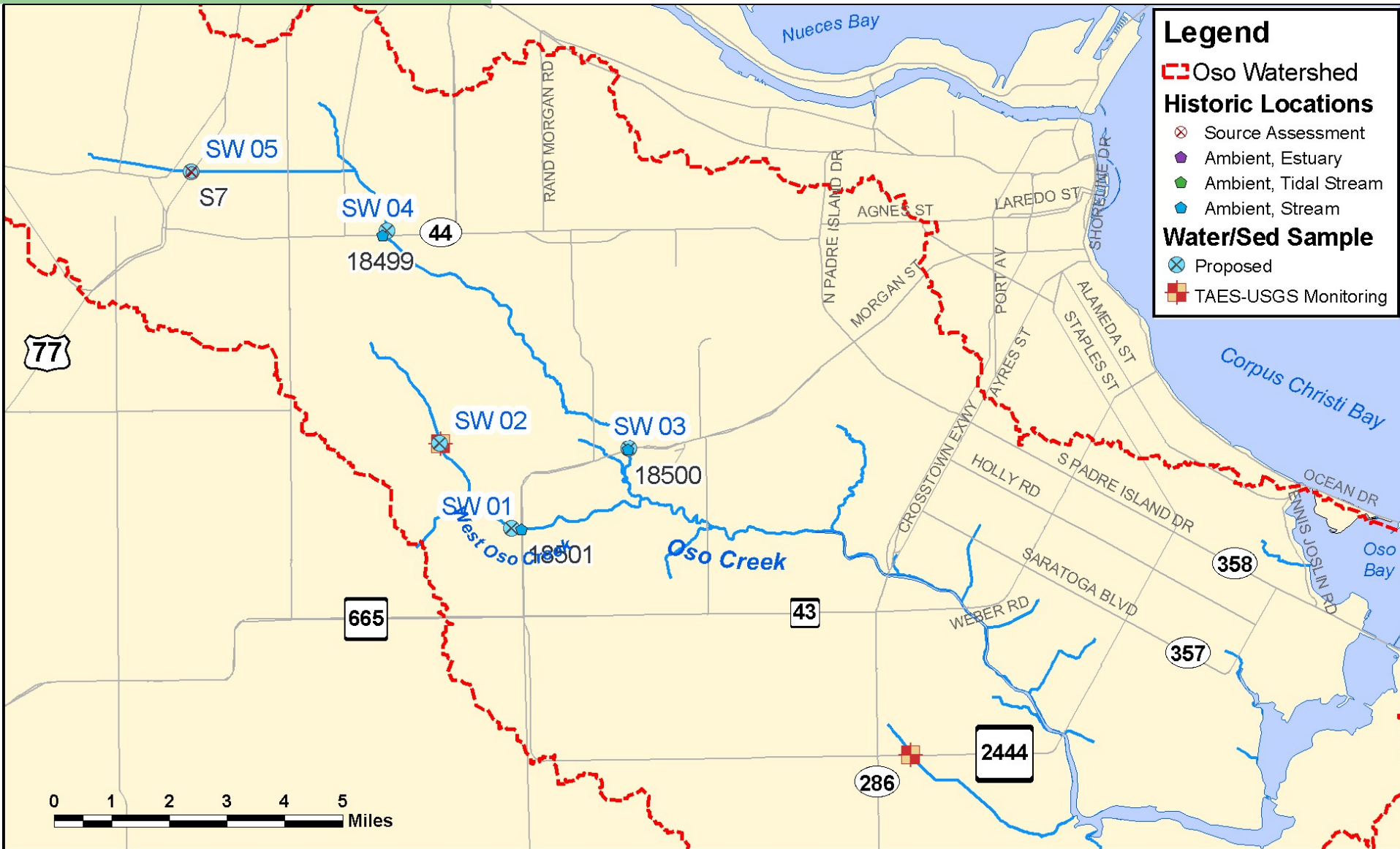
(13, 14, 16, 25, 26)



# Sampling con't

- Water and sediments at 5 stations
  - Upstream from the 3 historic stations, upstream from USGS gage station (AgriLife project), downstream from Robstown WWTP (targeted station S7 from TMDL study)
  - Quarterly Year 1
  - Subsequent sampling and/or lab experiments with sediments, dependent on Year 1 results

# Sediment and water sampling stations (SW01-05)



# Sampling con't

- Seepage into creek at 3 of the 5 water and sediment stations (SW01, 03, 04), upstream from historic stations
  - Seepage meters modified from Lee (1977)
  - Sampling for two events following rainfall

# Sampling con't

- Soils from agricultural fields adjacent to creek
  - Five fields from 2 sub-watersheds with minimal human impact and different cover, two locations per field – good and bad drainage areas
  - Specific locations to be selected with input from local SWCD, USDA NRCS, AgriLife Res., City of CC, and TSSWCB Project Manager
  - Surface soils, composite samples
  - Four sampling events Year 1 – 2 wet, 2 dry
  - Subsequent small scale lab experiments, dependent on initial results

# Sampling con't

- Bacteria Source Tracking sampling (commence once initial sampling results analyzed):
  - Fecal sampling of animal sources and water sampling for unknown source isolates
  - Animal selection based on previous sanitary survey, land use information from TCEQ, comments from stakeholders at meetings
  - Current library of ~400 isolates includes human, dog, seagull and cow, final library to total at least 1000
  - ~800 unknown source isolates

- Fecal samples dependent on source
  - Sewage
  - Livestock
  - Domestic animals
  - Wildlife (avian and non avian) with assistance from TPWD, high degree of certainty of source
- Water samples for unknown source isolates
  - anticipated from historical stations, may include sediment, depending on initial results

# Laboratory work

- Enumeration of enterococci from field samples
- Small scale laboratory experiments, dependent on field results
- Bacteria source tracking analyses using two library based techniques (CSU, ARP) and subset for gene analysis

# Measures of Success

- Enterococci levels in the upper section of Oso Creek will be explained by identification of nonpoint sources of fecal contamination
- Enterococci levels in the upper sections of the creek, sediments and subsurface waters will be quantified
- Enterococci isolated from the creek under dry and wet conditions will be categorized by source type (human/non human etc.)