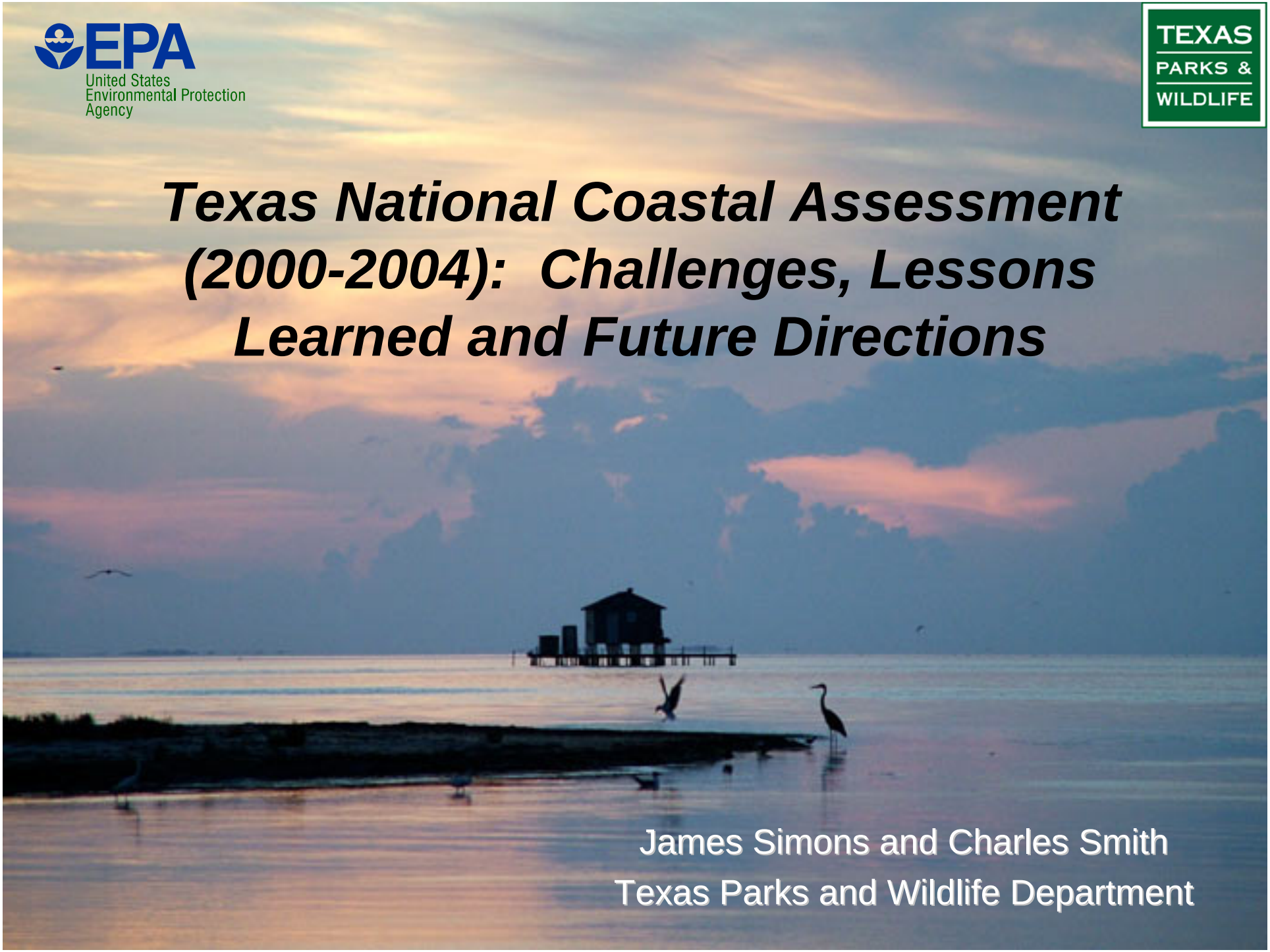

Texas National Coastal Assessment (2000-2004): Challenges, Lessons Learned and Future Directions

James Simons and Charles Smith
Texas Parks and Wildlife Department

EPA United States Environmental Protection Agency

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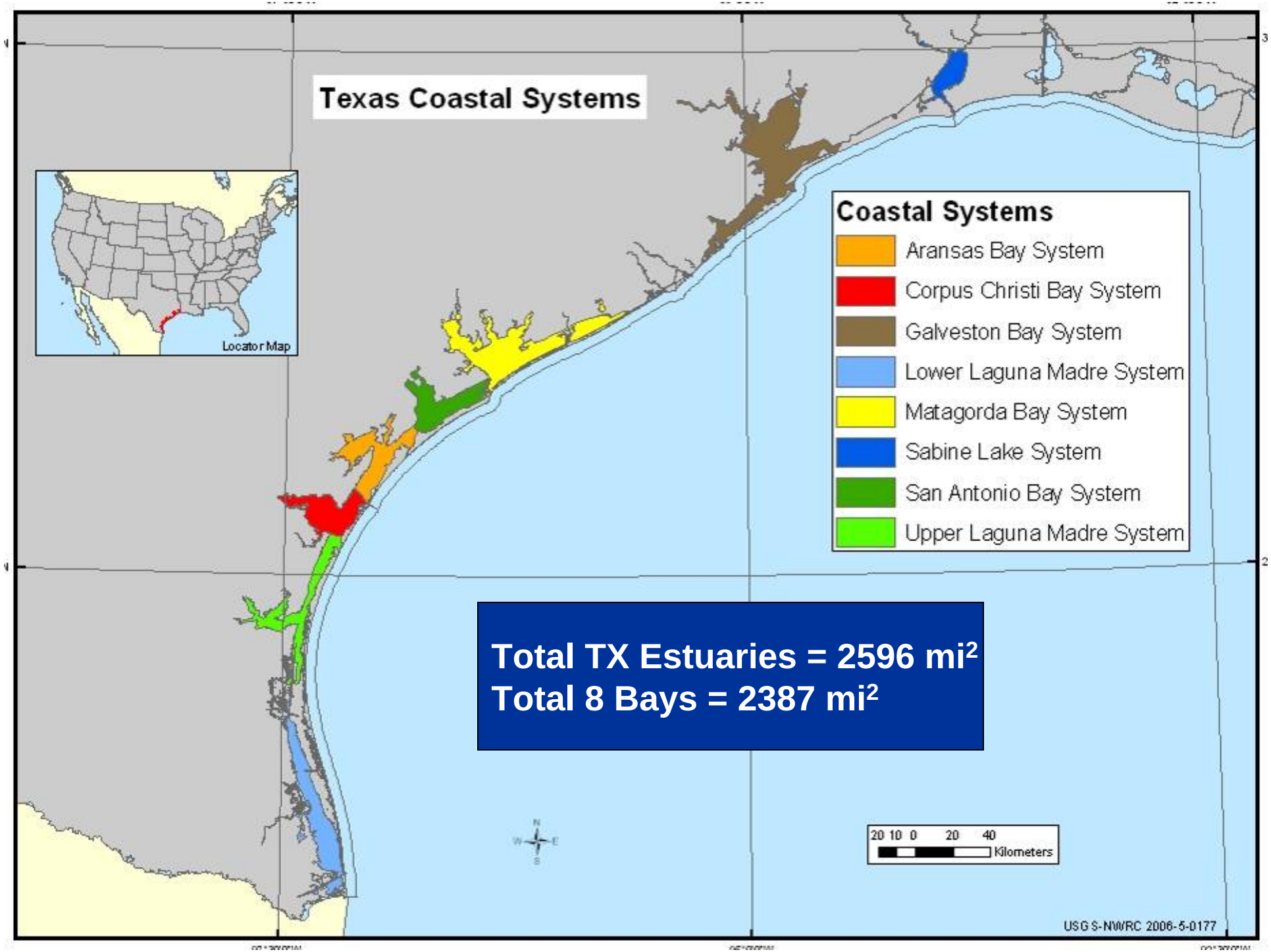
Outline

- Introduction
- Challenges
- Lessons Learned
- Future Directions


Texas Coastal Systems
Locator Map
Coastal Systems
Aransas Bay System
Corpus Christi Bay System
Galveston Bay System
Lower Laguna Madre System
Matagorda Bay System
Sabine Lake System
San Antonio Bay System
Upper Laguna Madre System
Total TX Estuaries = 2596 mi²
Total 8 Bays = 2387 mi²
20 10 0 20 40
Kilometers
USGS-NWRC 2006-5-0177

Texas NCA Surveys

- Estuaries surveyed annually 2000-2006
- Each station sampled once during summer (Jul-Sep)
- Water column profiles
  - DO, temperature, pH, salinity, light
  - Nutrients, TSS, chlorophyll a
- Sediment chemistry, toxicity, TOC, GS
- Benthic infauna community
- Benthic fish and macro-invertebrate community
- Fish tissue chemistry

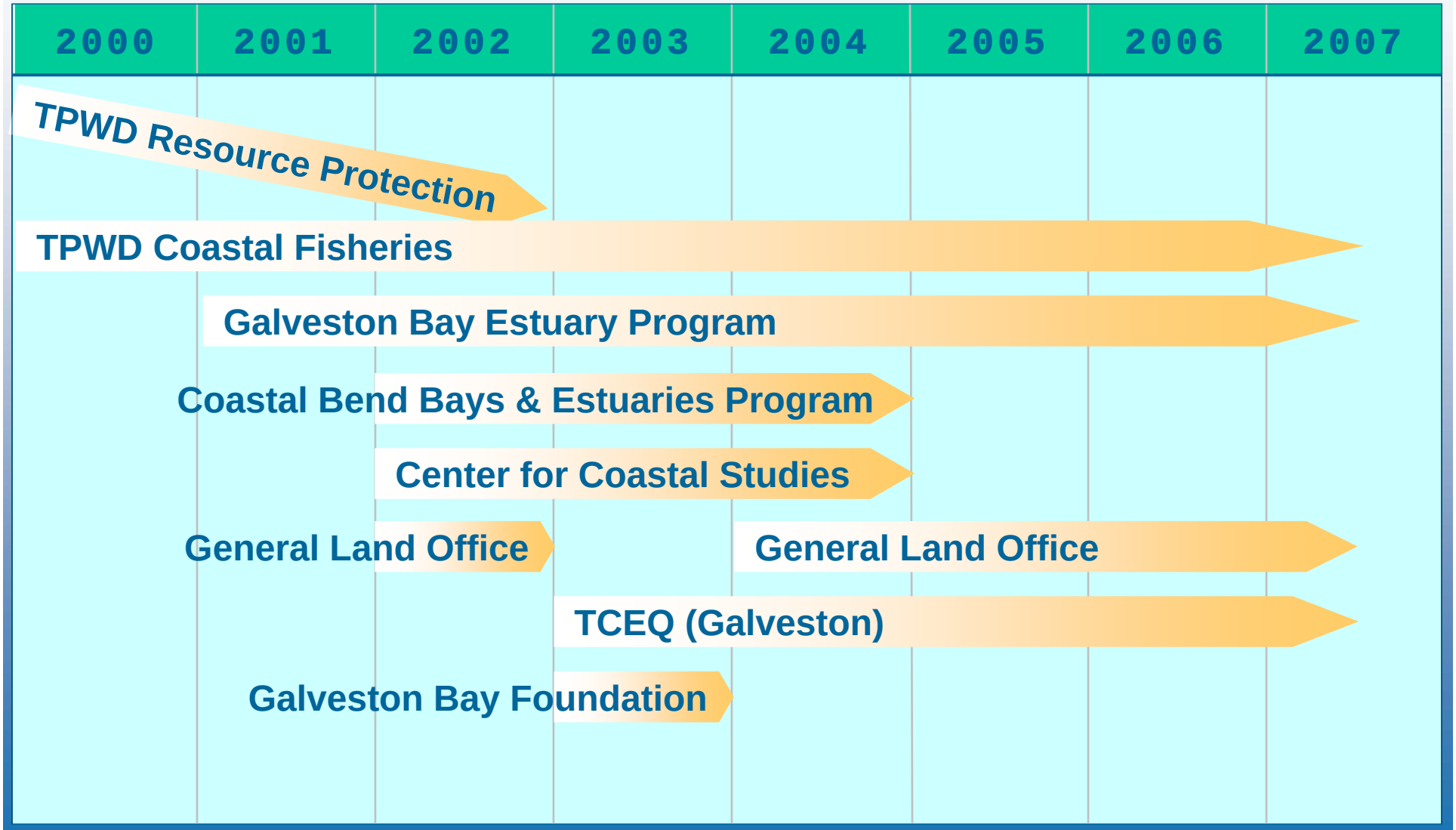
Challenges

- Meshing NCA sampling with the CF Division's FIM program, ie *Why are we doing this?? We're the Fish and Wildlife Agency!!*

Challenges

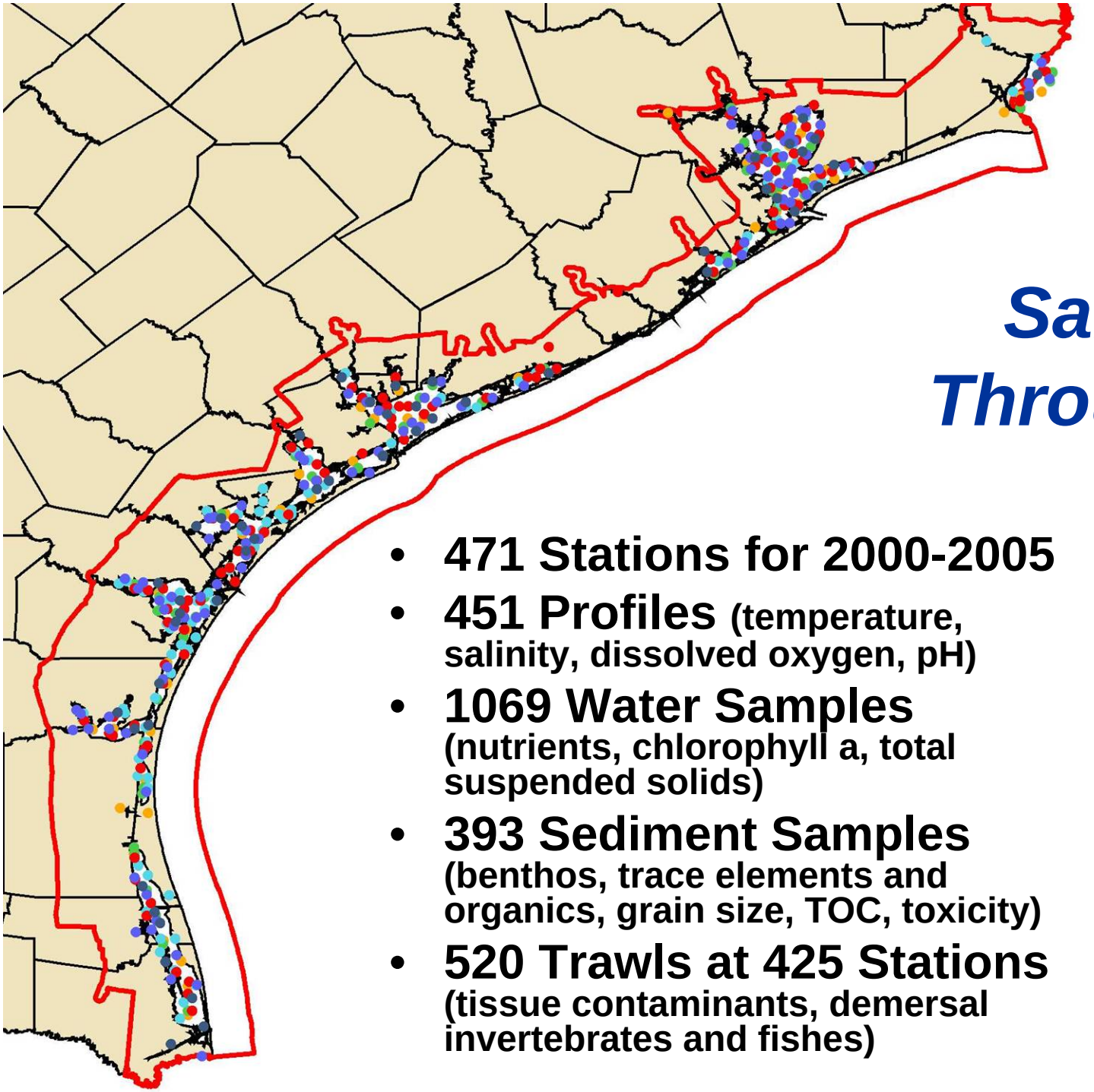
- Meshing NCA sampling with the CF Division's FIM program, ie *Why are we doing this?? We're the Fish and Wildlife Agency!!*
- Design issues, ie *Why such a long coastline and so few stations?*

Texas Collaborators



NCA – Texas Survey Design

- Incorporate existing TX Fisheries Monitoring Sites
- Designs
  - 2000 – 50 sites statewide
  - 2001 – 59 sites statewide
  - 2002 – 50 TPWD, 50 CBBEP
  - 2003 – 40 TPWD, 30 CBBEP
  - 2004 -- 35 TPWD, 32 CBBEP, 37 GBEP
  - 2005 & 2006 – 50 sites statewide



Sampling Through 2005

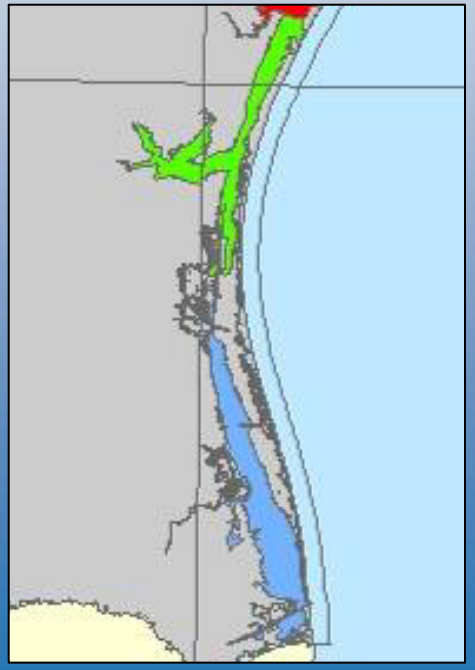
- **471 Stations for 2000-2005**
- **451 Profiles** (temperature, salinity, dissolved oxygen, pH)
- **1069 Water Samples** (nutrients, chlorophyll a, total suspended solids)
- **393 Sediment Samples** (benthos, trace elements and organics, grain size, TOC, toxicity)
- **520 Trawls at 425 Stations** (tissue contaminants, demersal invertebrates and fishes)

Challenges

- Meshing NCA sampling with the CF Division's FIM program, ie *Why are we doing this?? We're the Fish and Wildlife Agency!!*
- Design issues, ie *Why such a long coastline and so few stations?*
- **Shallow water lagoons, ie. *We can't get there from here!!***

Sampling shallow water lagoons

- Upper and Lower Laguna Madre have extensive areas less than 1m deep, and very large areas less than 0.5m deep.
- Even though these areas were less than the 1m NCA minimum, since they represented such a large percentage of these lagoons, they were sampled using airboats.



Challenges

- Meshing NCA sampling with the CF Division's FIM program, ie *Why are we doing this?? We're the Fish and Wildlife Agency!!*
- Design issues, ie *Why such a long coastline and so few stations?*
- Shallow water lagoons, ie. *We can't get there from here!!*
- **Using NCA to do 305b reporting.**

Challenges to using NCA data for 305(b)

- State Regulations
  - 305(b) data from > 1 season
    - NCA data only collected in summer
  - 305(b) data from multiple samples per site
    - NCA – each station sampled only once
  - Water Quality Standards
    - NCA doesn't include bacteria, water chemistry
- NCA state cooperating agency is not always the state 305(b) agency
  - NCA – TPWD; 305(b) – TCEQ

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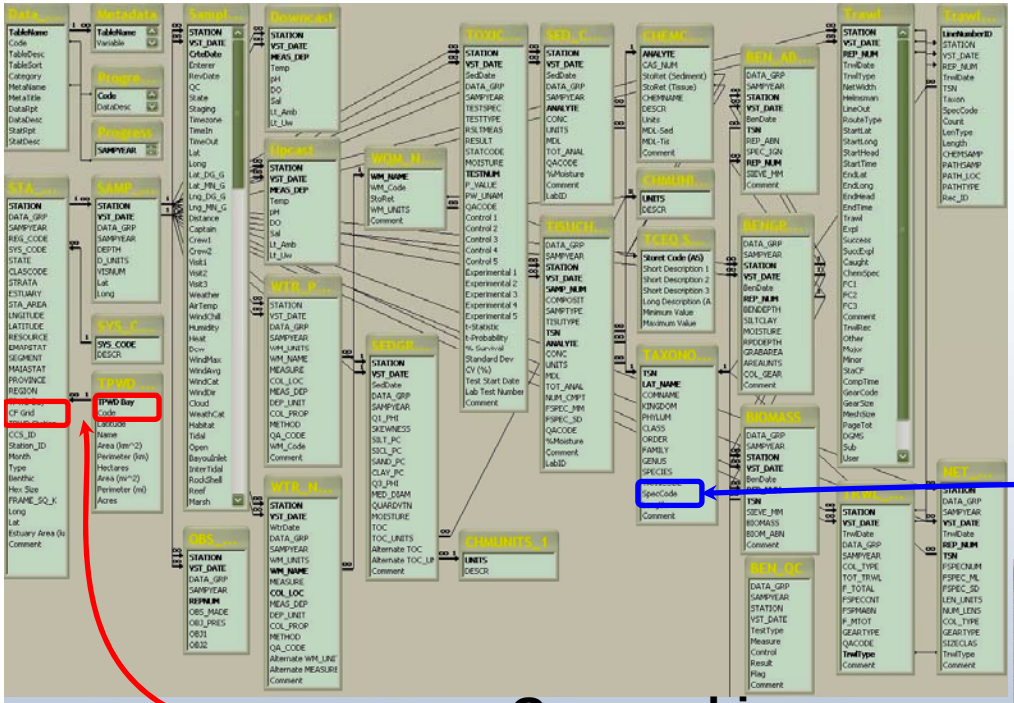
Bio-bags streamline benthos sampling

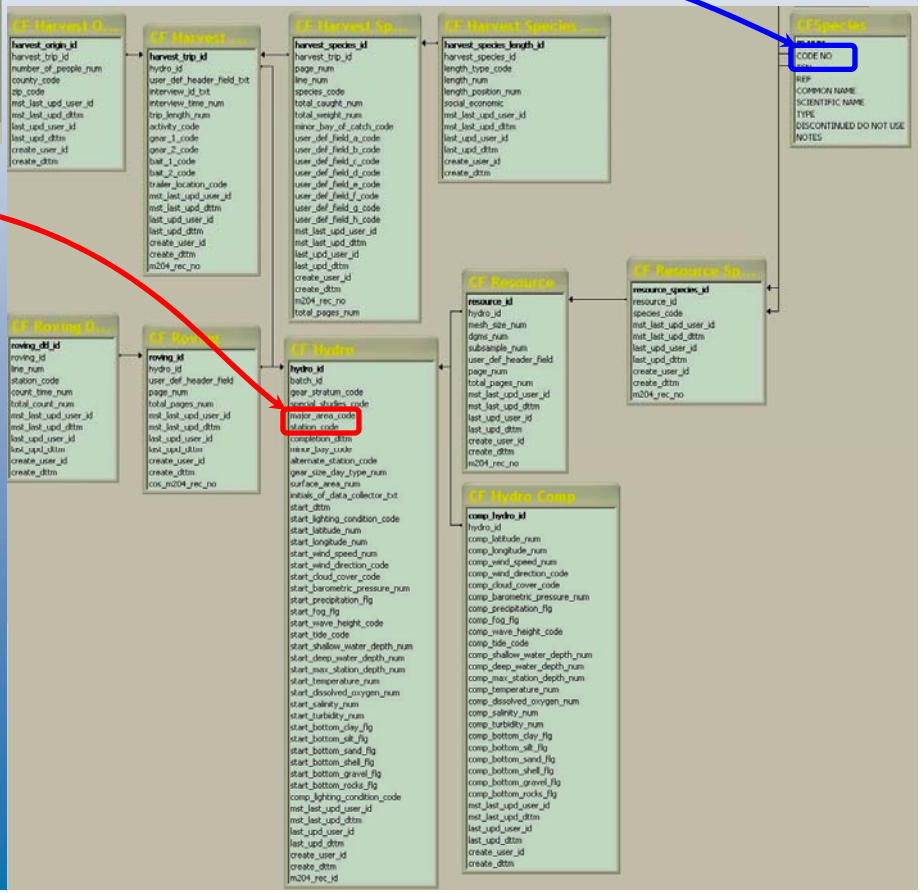
Lessons Learned

- Value of a good database
- Water clarity index
- NCA and 305(b)
- Patterns along the coast

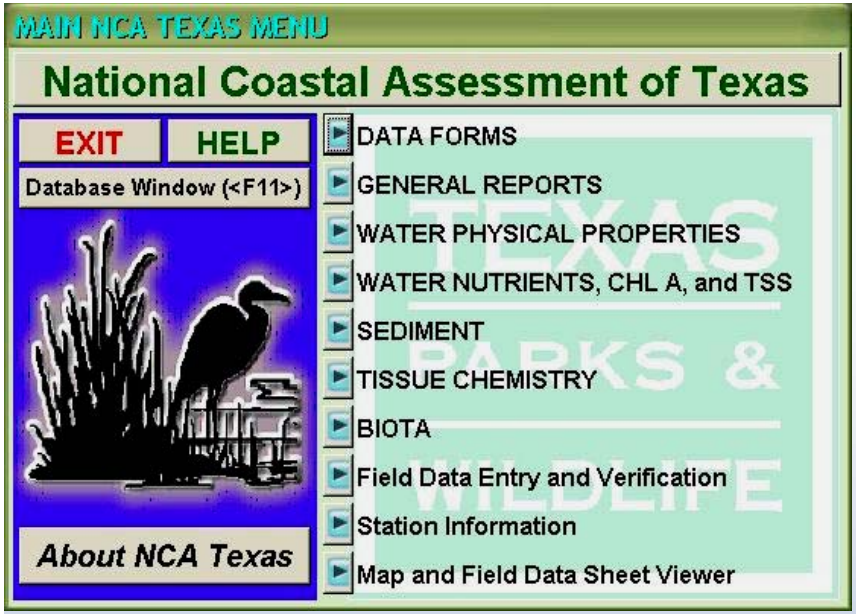


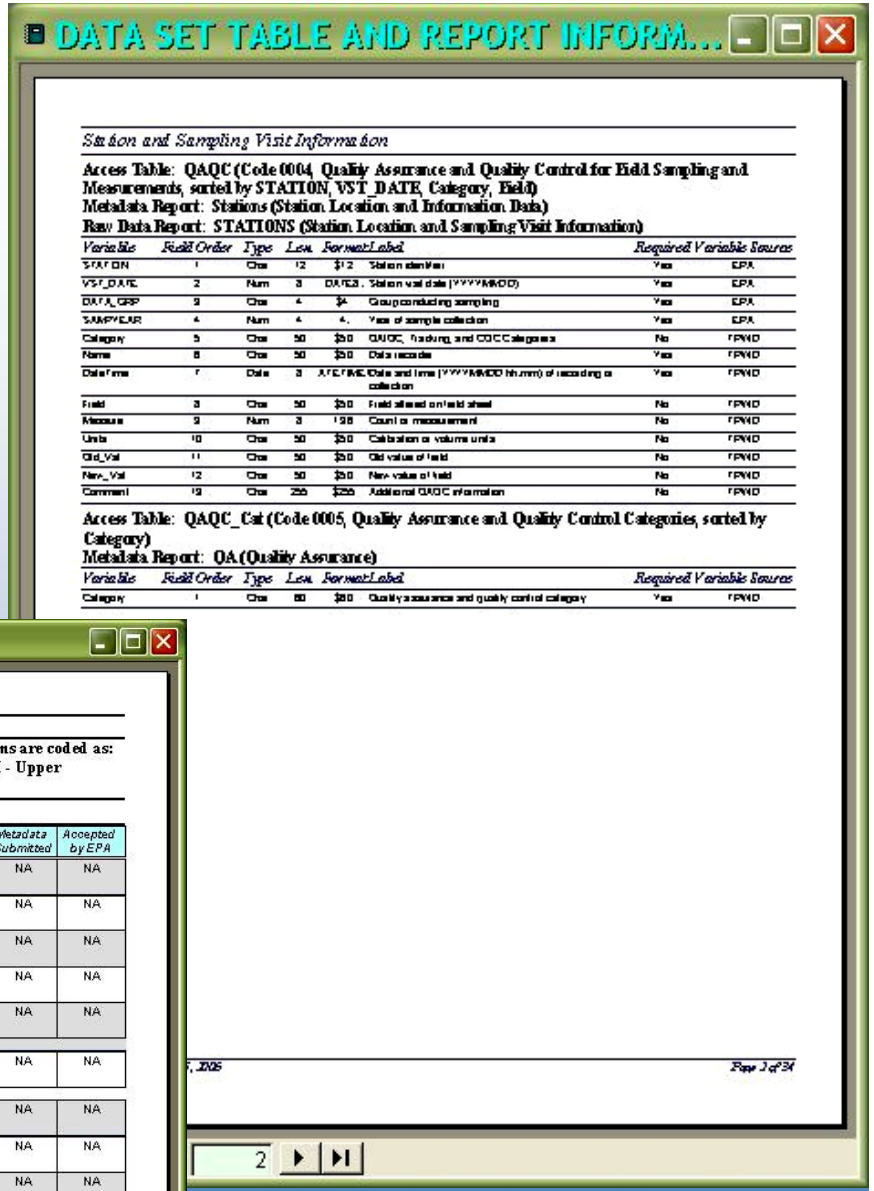
Taxonomic

Geographic



Making the Connections between NCA and Resource Monitoring Data





DATA SET TABLE AND REPORT INFORM...

Station and Sampling Visit Information

Access Table: QAQC (Code 004, Quality Assurance and Quality Control for Field Sampling and Measurements, sorted by STATION, VST_DATE, Category, Field)
Metadata Report: Stations (Station Location and Information Data)
Raw Data Report: STATIONS (Station Location and Sampling Visit Information)

Variable	Field Order	Type	Len	FormatLabel		Required	Variable Source
STATION	1	Char	12	$12.	Station identifier	Yes	EPA
VST_DATE	2	Num	8	DATE8.	Station visit date (YYYYMMDD)	Yes	EPA
DATA_GRP	3	Char	4	$4.	Group conducting sampling	Yes	EPA
SAMPYEAR	4	Num	4	4.	Year of sample collection	Yes	EPA
Category	5	Char	50	$50.	QA/QC, Grading, and CQC Categories	No	TPWD
Name	6	Char	50	$50.	Data records	Yes	TPWD
DateTime	7	Date	8	ATETIME.	Date and time (YYYYMMDD hh:mm) of recording or collection	Yes	TPWD
Field	8	Char	50	$50.	Field utilized on field sheet	No	TPWD
Measure	9	Num	8	12.8	Count or measurement	No	TPWD
Units	10	Char	50	$50.	Calibration or volume units	No	TPWD
Old_Val	11	Char	50	$50.	Old value of field	No	TPWD
New_Val	12	Char	50	$50.	New value of field	No	TPWD
Comment	13	Char	255	$255.	Additional QA/QC information	No	TPWD

Access Table: QAQC_Cat (Code 005, Quality Assurance and Quality Control Categories, sorted by Category)
Metadata Report: QA (Quality Assurance)

Variable	Field Order	Type	Len	FormatLabel		Required	Variable Source
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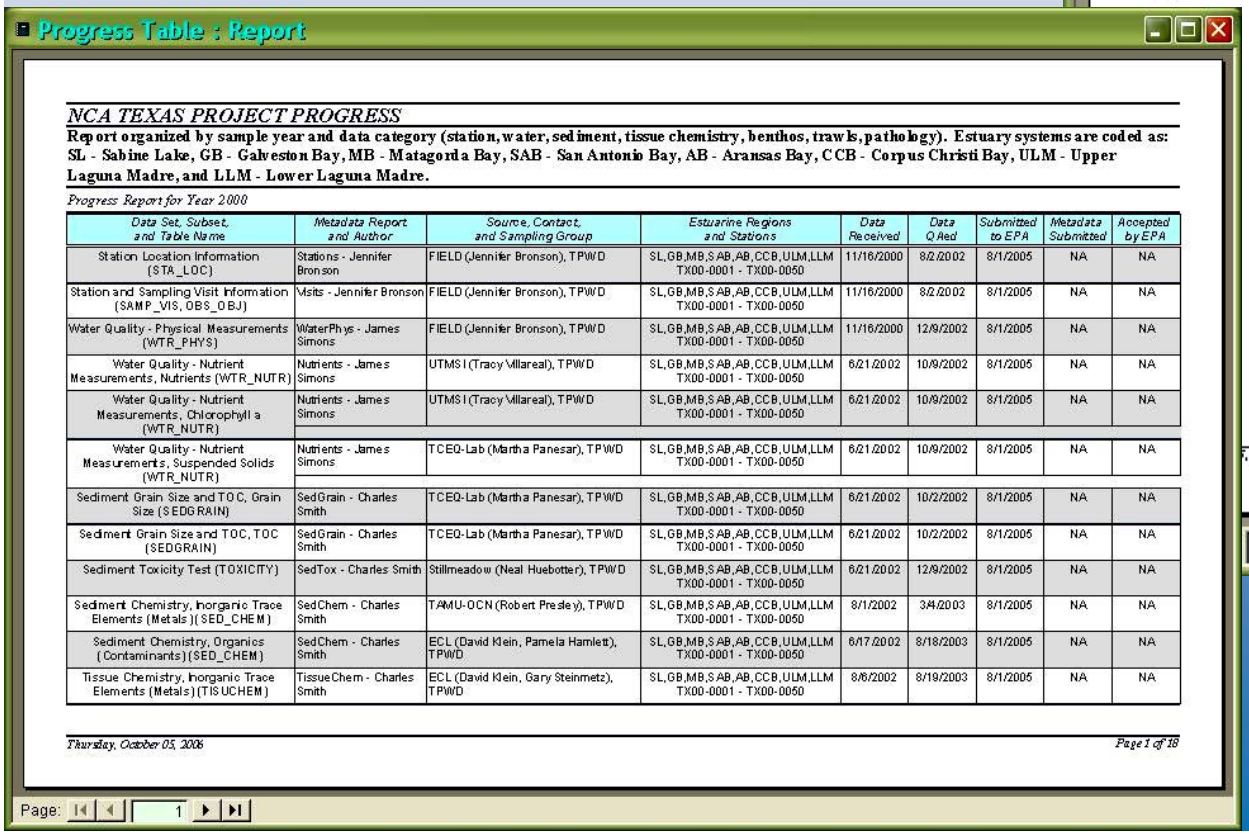
, 2005 Page 3 of 34

2



Progress Table : Report

NCA TEXAS PROJECT PROGRESS

Report organized by sample year and data category (station, water, sediment, tissue chemistry, benthos, trawls, pathology). Estuary systems are coded as: SL - Sabine Lake, GB - Galveston Bay, MB - Matagorda Bay, SAB - San Antonio Bay, AB - Aransas Bay, CCB - Corpus Christi Bay, ULM - Upper Laguna Madre, and LLM - Lower Laguna Madre.

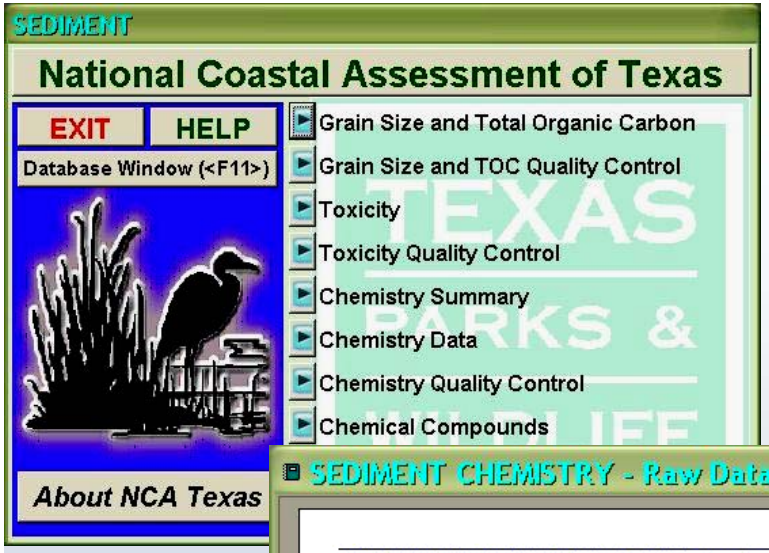
Progress Report for Year 2000

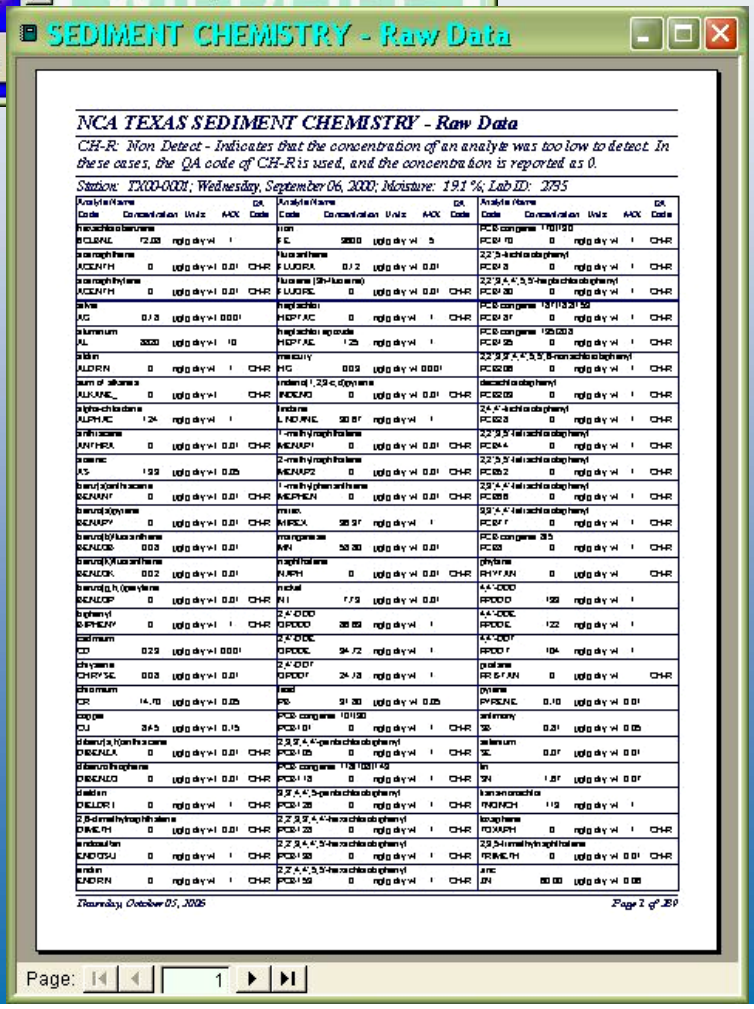
Data Set, Subset, and Table Name	Metadata Report and Author	Source, Contact, and Sampling Group	Estuarine Regions and Stations	Data Received	Data QAed	Submitted to EPA	Metadata Submitted	Accepted by EPA
Station Location Information (STA_LOC)	Stations - Jennifer Bronson	FIELD (Jennifer Bronson), TPWD	SL,GB,MB,SAB,AB,CCB,ULM,LLM TX00-0001 - TX00-0050	11/16/2000	8/2/2002	8/1/2005	NA	NA
Station and Sampling Visit Information (SAMP_VIS, OBS_OBJ)	Visits - Jennifer Bronson	FIELD (Jennifer Bronson), TPWD	SL,GB,MB,SAB,AB,CCB,ULM,LLM TX00-0001 - TX00-0050	11/16/2000	8/2/2002	8/1/2005	NA	NA
Water Quality - Physical Measurements (WTR_PHYS)	WaterPhys - James Simons	FIELD (Jennifer Bronson), TPWD	SL,GB,MB,SAB,AB,CCB,ULM,LLM TX00-0001 - TX00-0050	11/16/2000	12/9/2002	8/1/2005	NA	NA
Water Quality - Nutrient Measurements, Nutrients (WTR_NUTR)	Nutrients - James Simons	UTMSI (Tracy Villareal), TPWD	SL,GB,MB,SAB,AB,CCB,ULM,LLM TX00-0001 - TX00-0050	6/21/2002	10/9/2002	8/1/2005	NA	NA
Water Quality - Nutrient Measurements, Chlorophyll a (WTR_NUTR)	Nutrients - James Simons	UTMSI (Tracy Villareal), TPWD	SL,GB,MB,SAB,AB,CCB,ULM,LLM TX00-0001 - TX00-0050	6/21/2002	10/9/2002	8/1/2005	NA	NA
Water Quality - Nutrient Measurements, Suspended Solids (WTR_NUTR)	Nutrients - James Simons	TCEQ-Lab (Martha Panesar), TPWD	SL,GB,MB,SAB,AB,CCB,ULM,LLM TX00-0001 - TX00-0050	6/21/2002	10/9/2002	8/1/2005	NA	NA
Sediment Grain Size and TOC, Grain Size (SEDGRAIN)	SedGrain - Charles Smith	TCEQ-Lab (Martha Panesar), TPWD	SL,GB,MB,SAB,AB,CCB,ULM,LLM TX00-0001 - TX00-0050	6/21/2002	10/2/2002	8/1/2005	NA	NA
Sediment Grain Size and TOC, TOC (SEDGRAIN)	SedGrain - Charles Smith	TCEQ-Lab (Martha Panesar), TPWD	SL,GB,MB,SAB,AB,CCB,ULM,LLM TX00-0001 - TX00-0050	6/21/2002	10/2/2002	8/1/2005	NA	NA
Sediment Toxicity Test (TOXICITY)	SedTox - Charles Smith	Stillmeadow (Neal Huebotter), TPWD	SL,GB,MB,SAB,AB,CCB,ULM,LLM TX00-0001 - TX00-0050	6/21/2002	12/9/2002	8/1/2005	NA	NA
Sediment Chemistry, Inorganic Trace Elements (Metals) (SED_CHEM)	SedChem - Charles Smith	TAMU-CCN (Robert Presley), TPWD	SL,GB,MB,SAB,AB,CCB,ULM,LLM TX00-0001 - TX00-0050	8/1/2002	3/4/2003	8/1/2005	NA	NA
Sediment Chemistry, Organics (Contaminants) (SED_CHEM)	SedChem - Charles Smith	ECL (David Klein, Pamela Hamlett), TPWD	SL,GB,MB,SAB,AB,CCB,ULM,LLM TX00-0001 - TX00-0050	6/17/2002	8/18/2003	8/1/2005	NA	NA
Tissue Chemistry, Inorganic Trace Elements (Metals) (TISUCHEM)	TissueChem - Charles Smith	ECL (David Klein, Gary Steinmetz), TPWD	SL,GB,MB,SAB,AB,CCB,ULM,LLM TX00-0001 - TX00-0050	8/6/2002	8/19/2003	8/1/2005	NA	NA

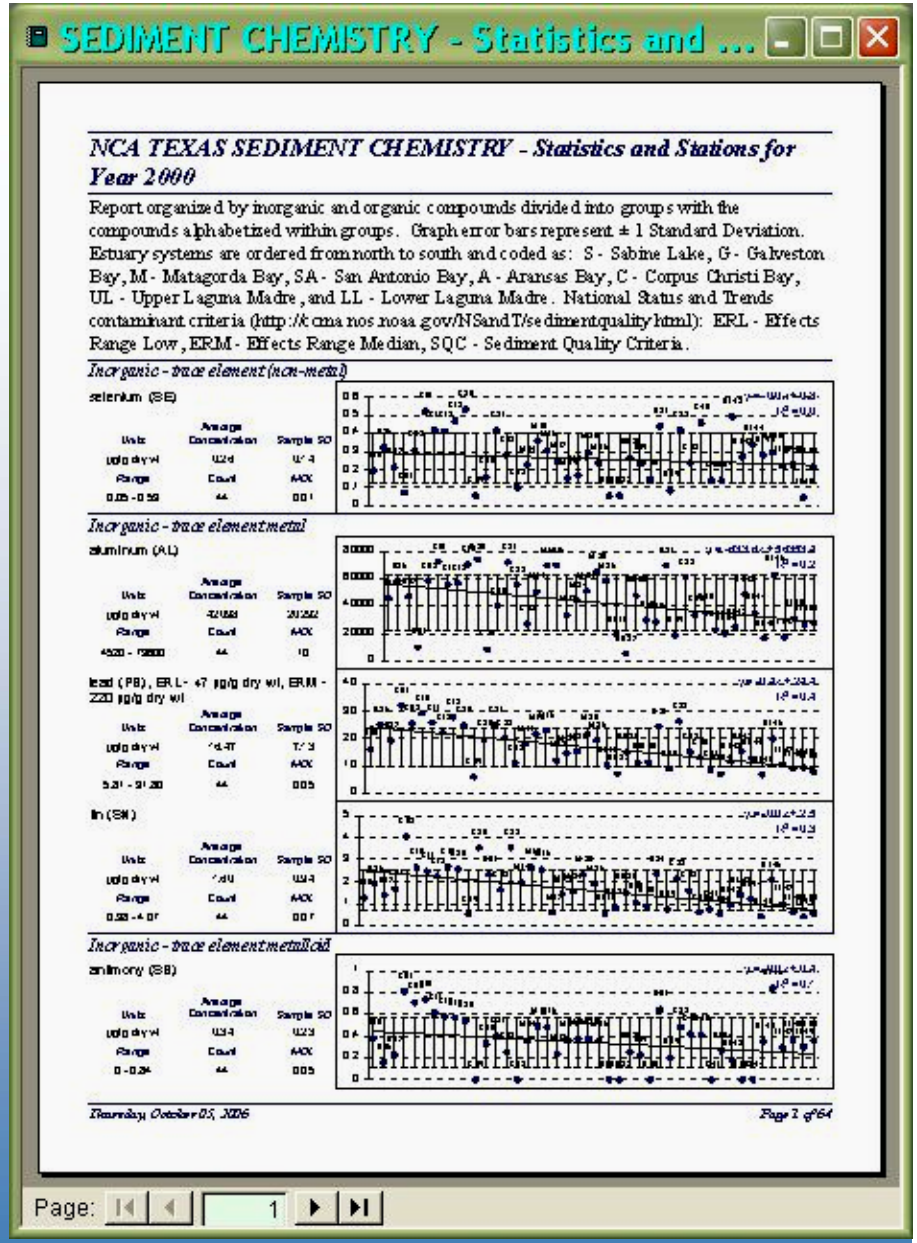
Thursday, October 05, 2006 *Page 1 of 18*

Page: 1

Database also used for project management, documentation, data input, and quality assurance.

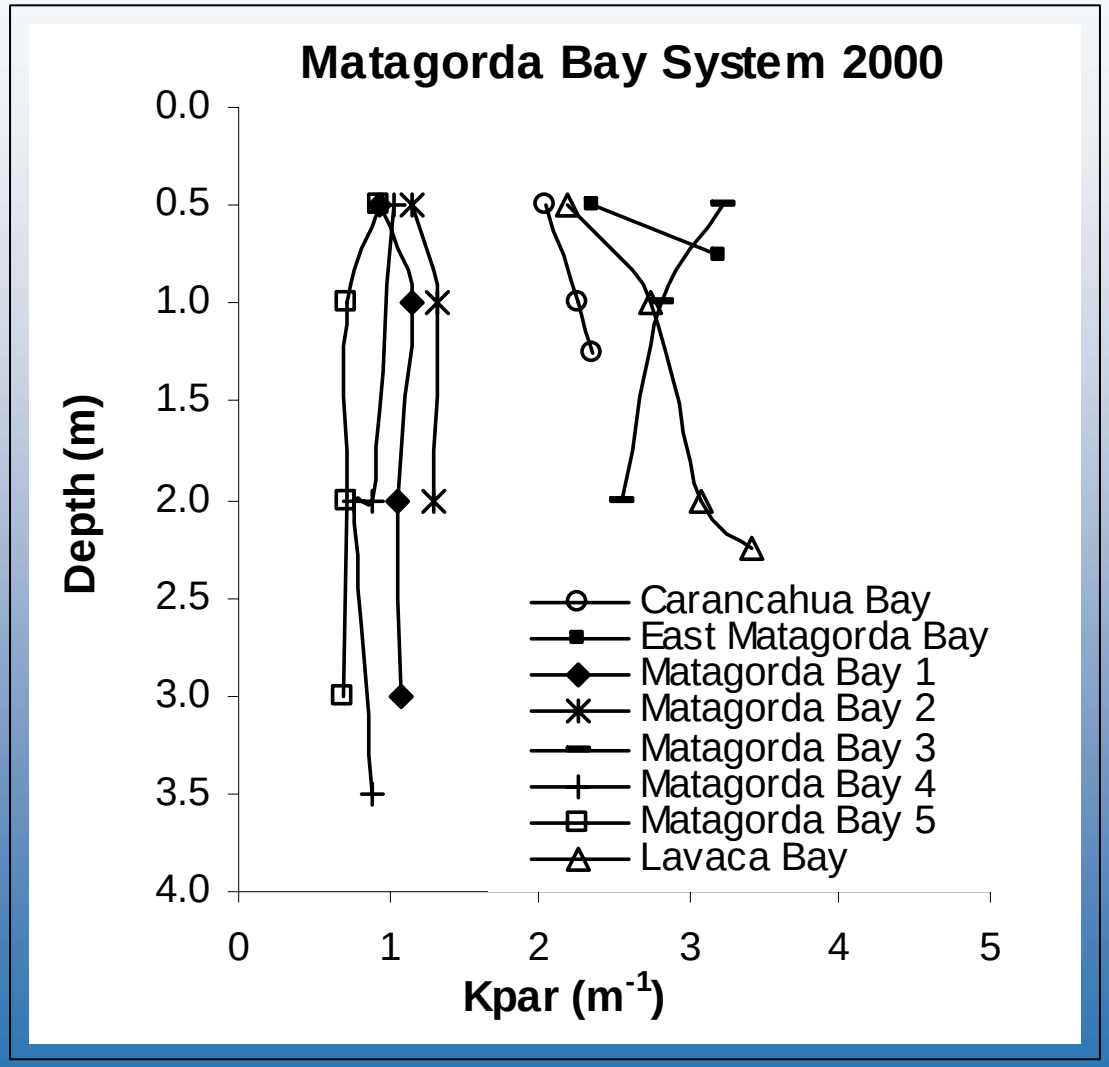






Reports for raw data and descriptive statistics.

Water clarity index



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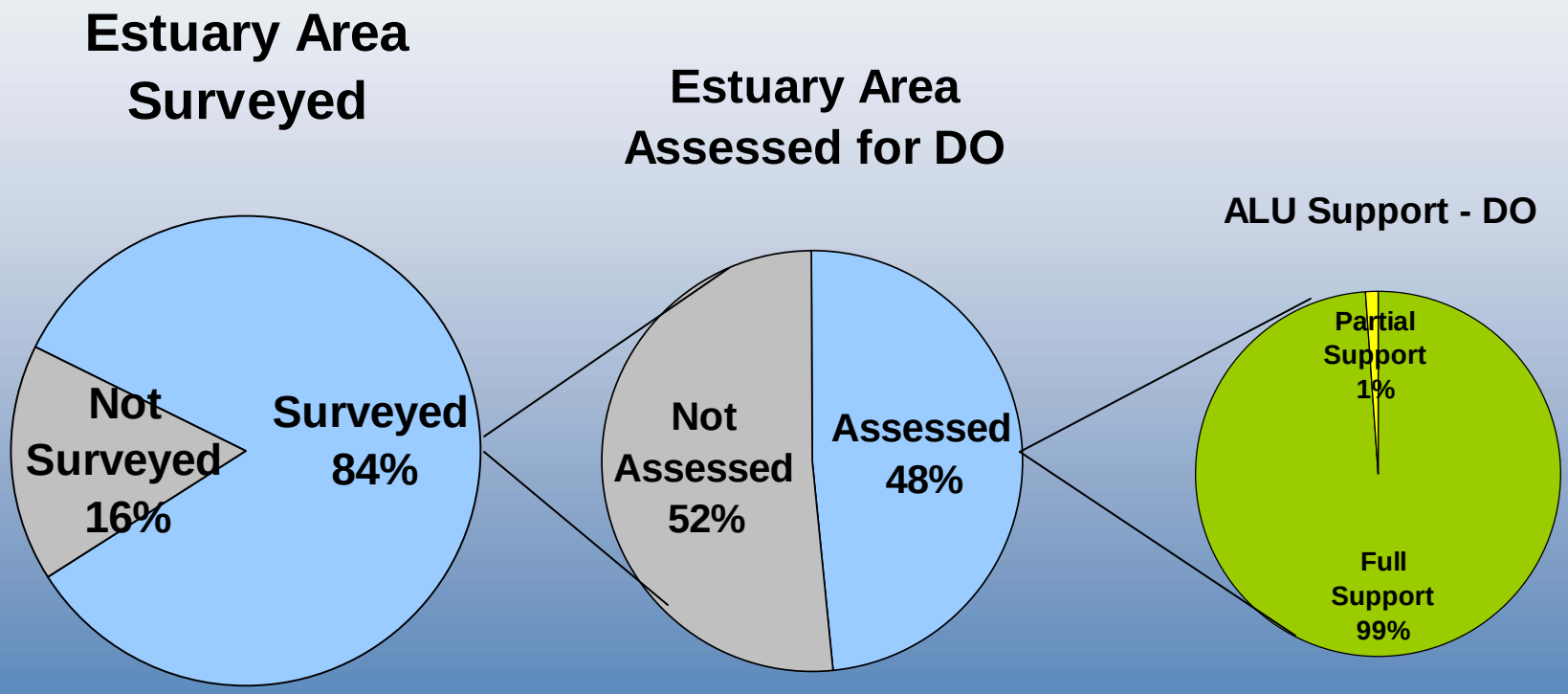
What if we used NCA data for 305b?

- Can use attainment be determined from NCA data?
- Do good/fair/poor equate to use support categories 1-5?
- How do we translate NCA ecological assessment to designated use support attainment?

National Coastal Assessment & 305(b)

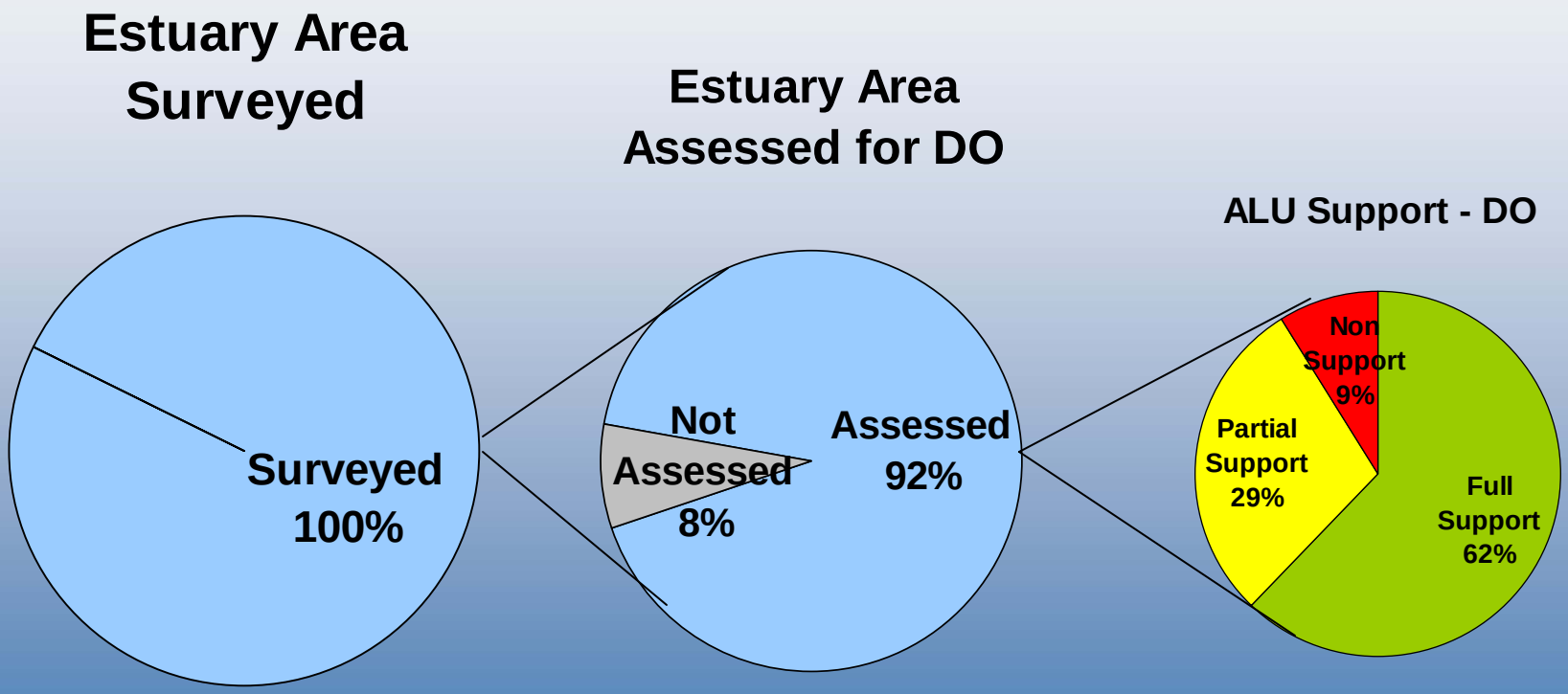
- NCA – Ecological Assessment of Condition
  - Water Quality
  - Biological Condition
  - Sediment Quality
  - Tissue Contaminants
- 305(b) – Water Quality Inventory
  - Attainment of Designated Uses
  - Causes of non-attainment
  - Potential Sources

TX Estuaries – 2002 305(b)



Total estuaries = 2394 mi^2

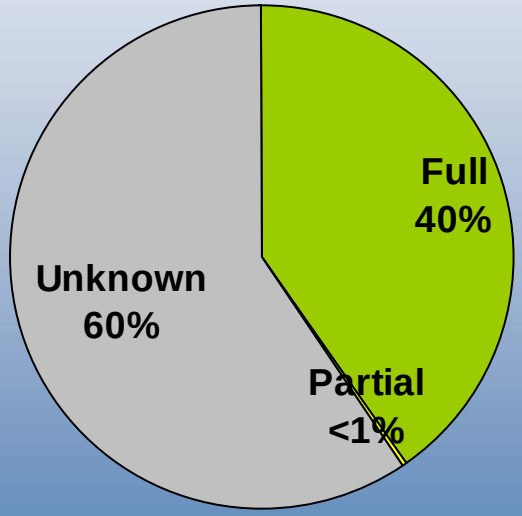
TX Estuaries - NCA 2000-2003



Total estuaries = 2596 mi^2

TX 305(b) vs TX NCA

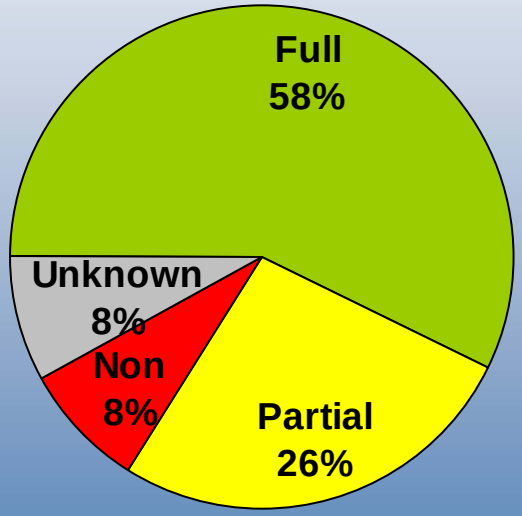
TX 305(b) - 2002
ALU DO Assessment



Total estuaries = 2394 mi²
Total assessed = 971 mi²

=?

TX NCA 2000-2002
DO Assessment



Total estuaries = 2596 mi²
Total assessed = 2397 mi²

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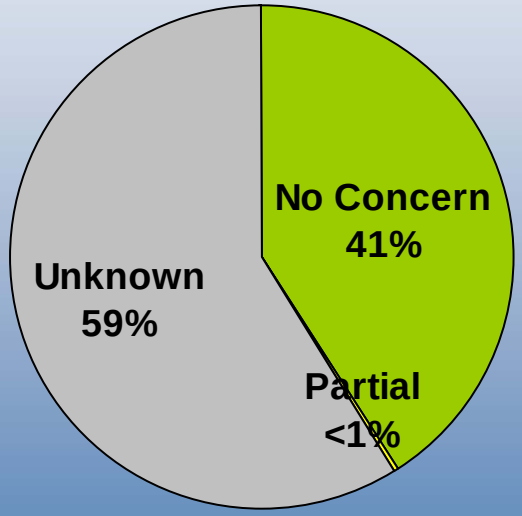
Estuary	Area (mi^2)	% Meeting DO Criteria	% Not Meeting DO Criteria	ALU Support
Sabine Lake	126.2	100	0	Full
Galveston Bay	577.9	100	0	Full
Matagorda Bay	463.6	89	11	Partial
San Antonio Bay	212.7	71	29	Non
Aransas Bay	242.3	91	9	Full
Corpus Christi Bay	220.3	92	8	Full
Upper Laguna Madre	223.9	86	14	Partial
Lower Laguna Madre	319.9	91	9	Full

TX 305(b) vs TX NCA

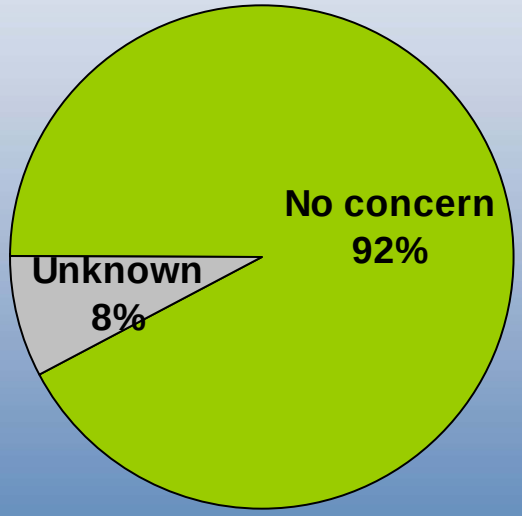
TX 305(b) - 2002 Nitrogen Concern



Total estuaries = 2394 mi²
Total assessed = 987 mi²

=?

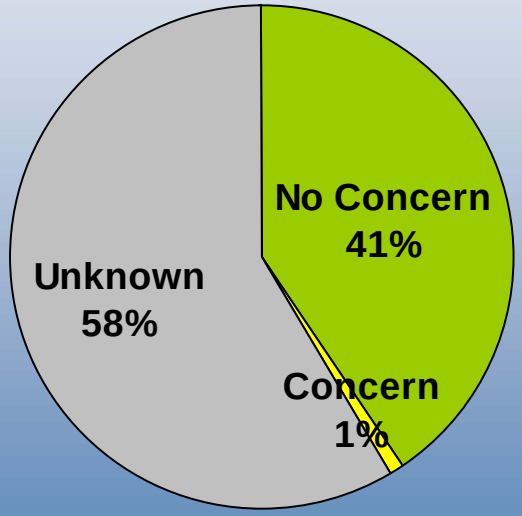
TX NCA 2000-2002 Nitrogen Assessment



Total estuaries = 2596 mi²
Total assessed = 2397 mi²

TX 305(b) vs TX NCA

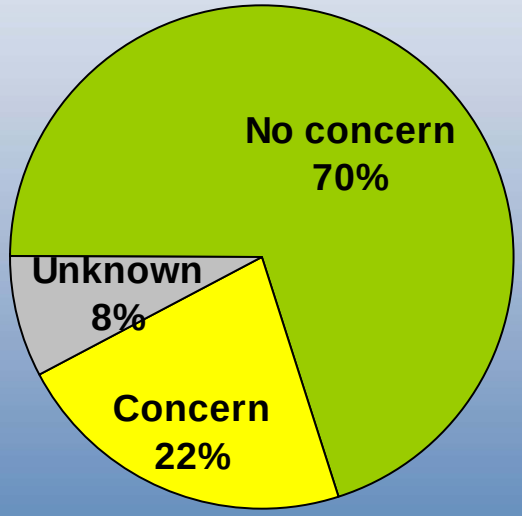
TX 305(b) - 2002 Phosphate Concern



Total estuaries = 2394 mi²
Total assessed = 966 mi²

=?

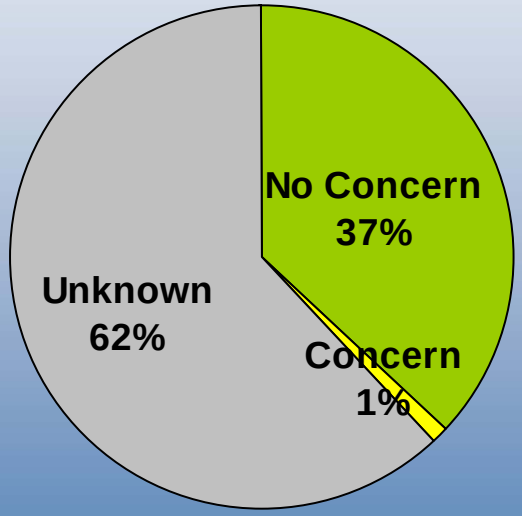
TX NCA 2000-2002 Phosphate Assessment



Total estuaries = 2596 mi²
Total assessed = 2397 mi²

TX 305(b) vs TX NCA

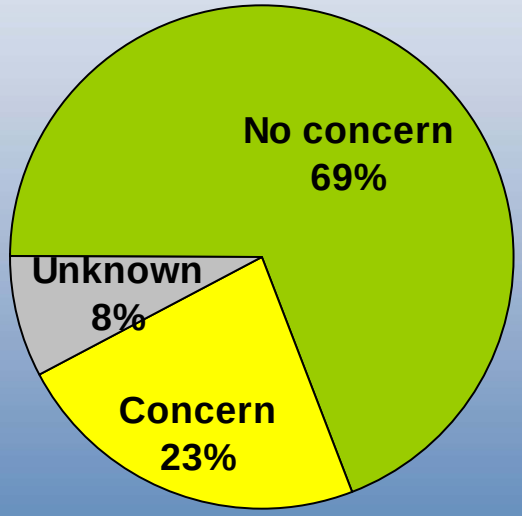
TX 305(b) - 2002 Chlorophyll Concern



Total estuaries = 2394 mi²
Total assessed = 913 mi²

=?

TX NCA 2000-2002 Chlorophyll Assessment



Total estuaries = 2596 mi²
Total assessed = 2397 mi²

Secondary Concerns

TX NCA Estuaries - % Area > Screening Level (Concern if > 25%)				
Estuary	Ammonia	Nitrate + Nitrite	Ortho-phosphate	Chlorophyll
Sabine Lake	0	0	0	20
Galveston Bay	4	2	29	55
Matagorda Bay	0	0	0	36
San Antonio Bay	0	7	0	50
Aransas Bay	0	0	0	4
Corpus Christi Bay	0	0	0	31
Upper Laguna Madre	4	0	0	25
Lower Laguna Madre	0	0	0	9

Coastal Patterns

- Salinity and dissolved oxygen
- Nutrients and chlorophyll a
- PCA analysis of nutrients
- Sediment Organic Contaminants
- Sediment Pb and As
- Tissue DDTs and PCBs
- Arsenic contamination in tissues and sediments

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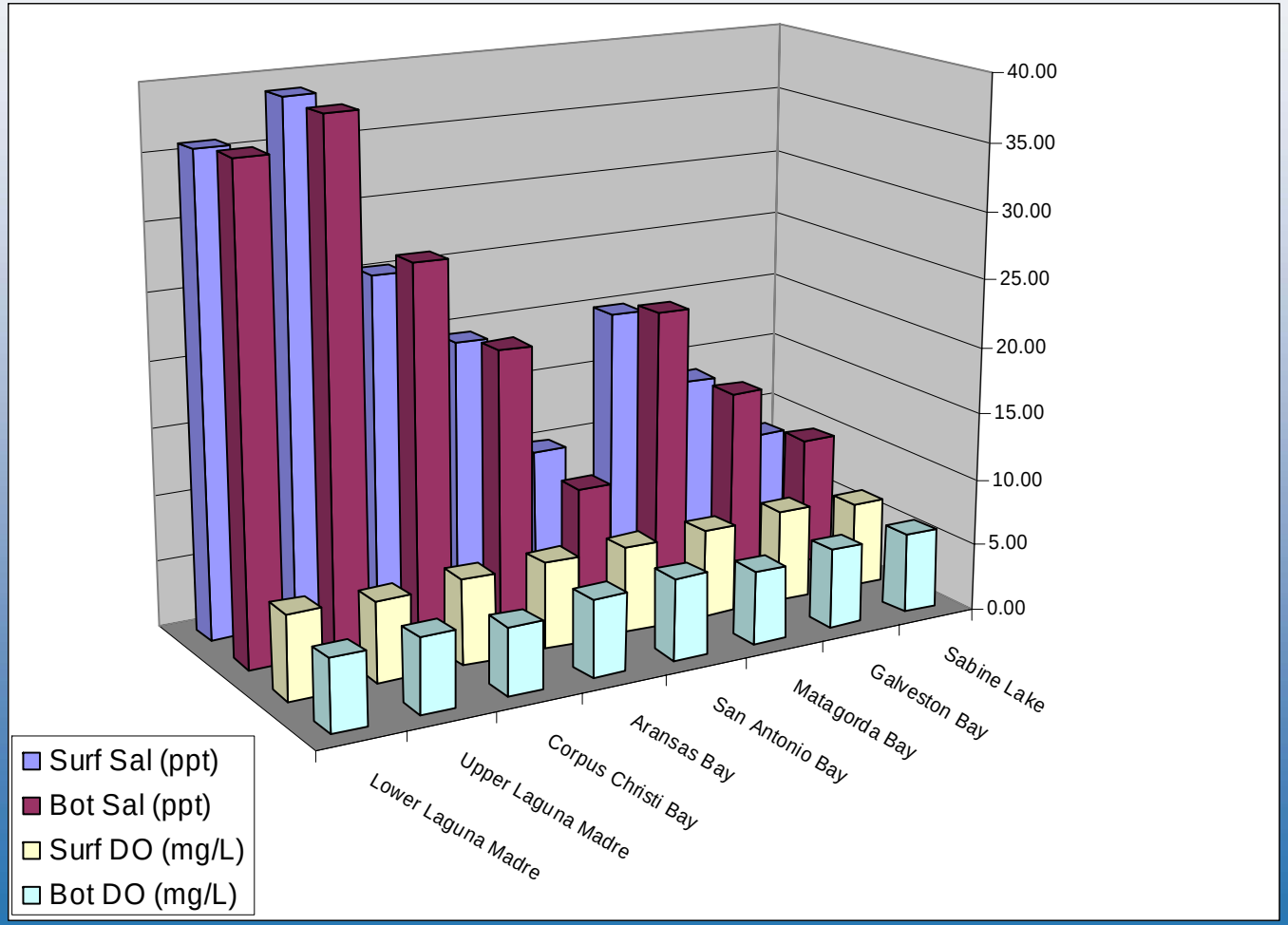
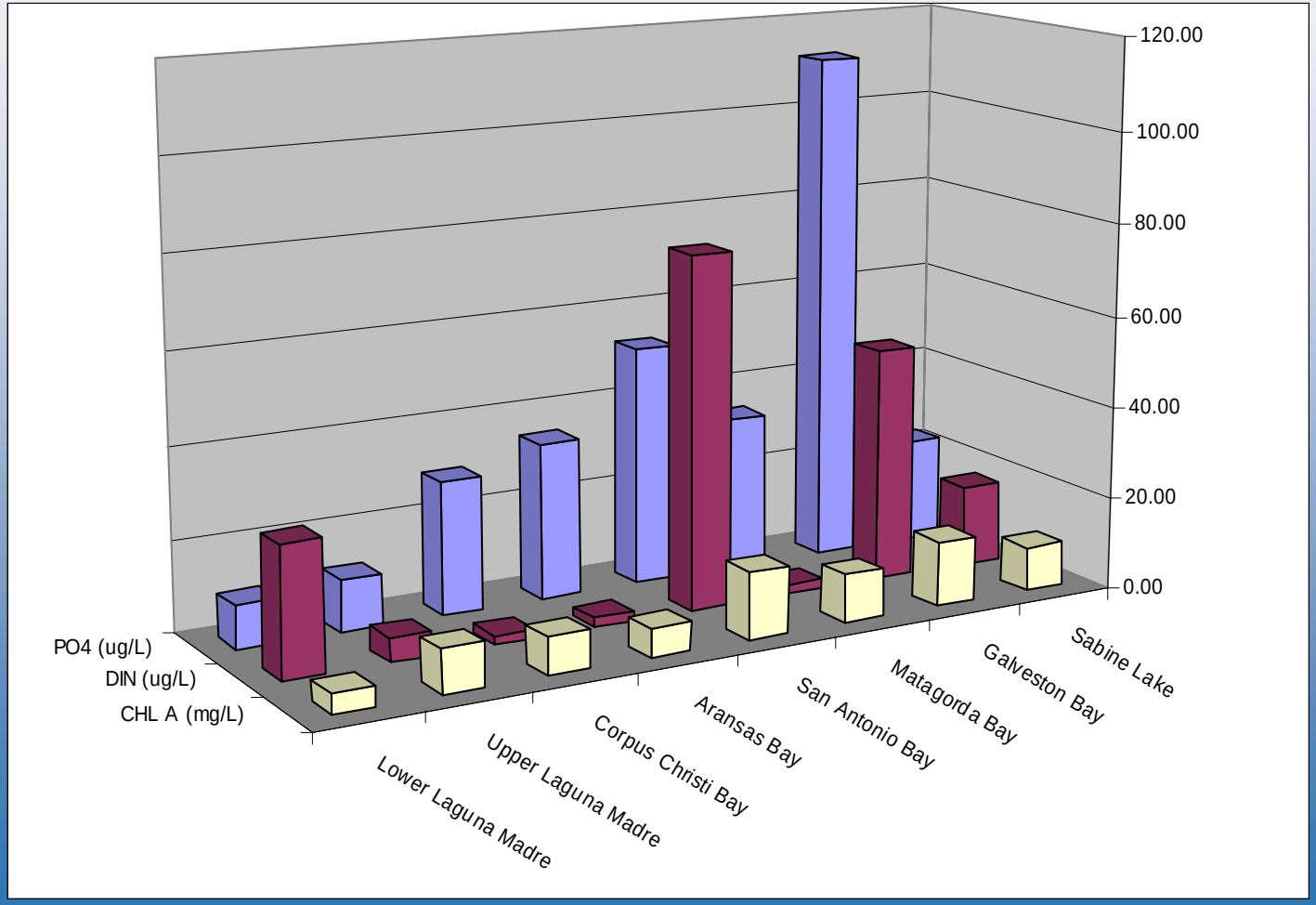
Salinity and Dissolved Oxygen



Water nutrients and chlorophyll a



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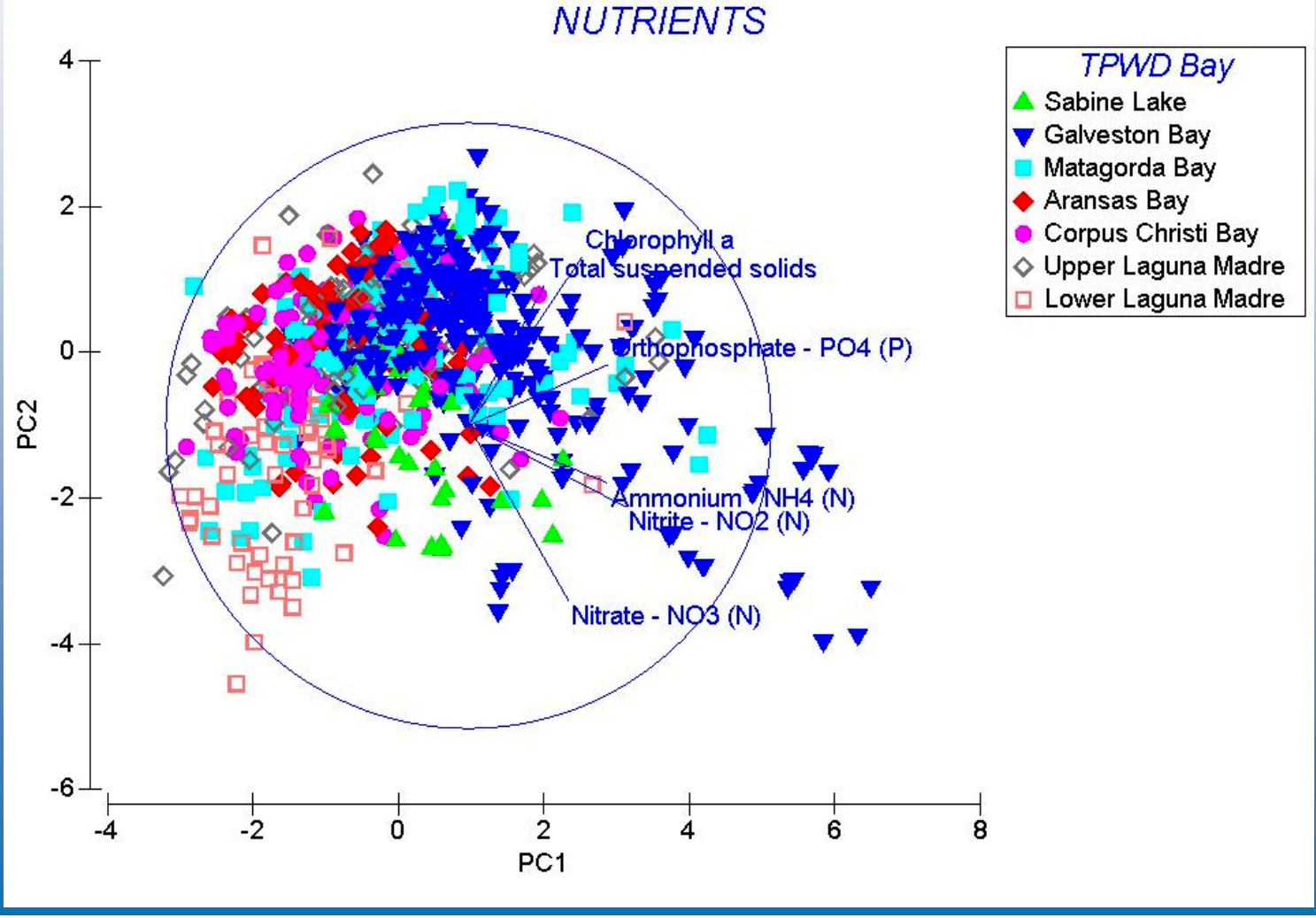
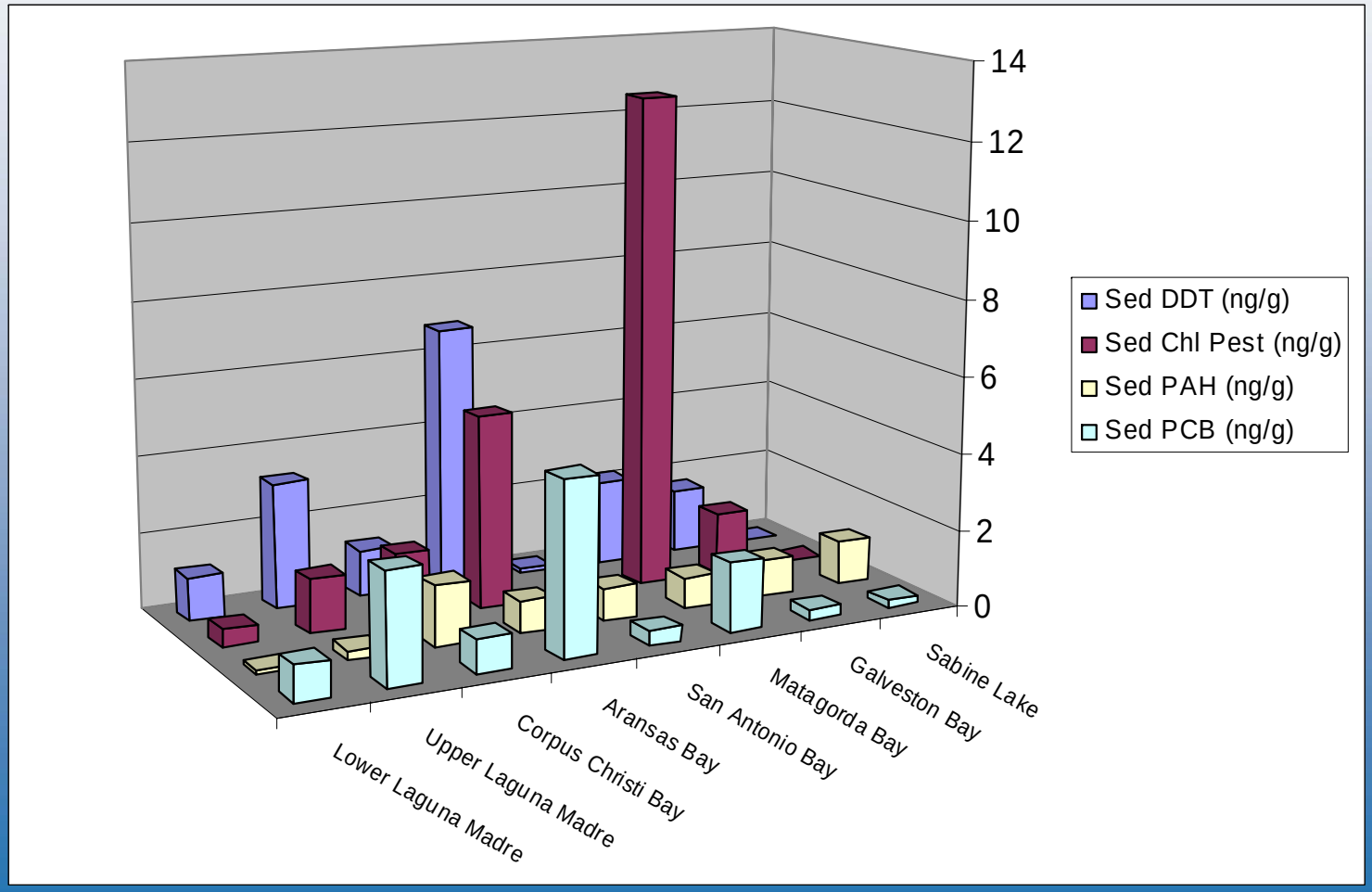
Ecosystem Characterization: Nutrients increase from south to north along the Texas Coast.



Sediment Organic Contaminants



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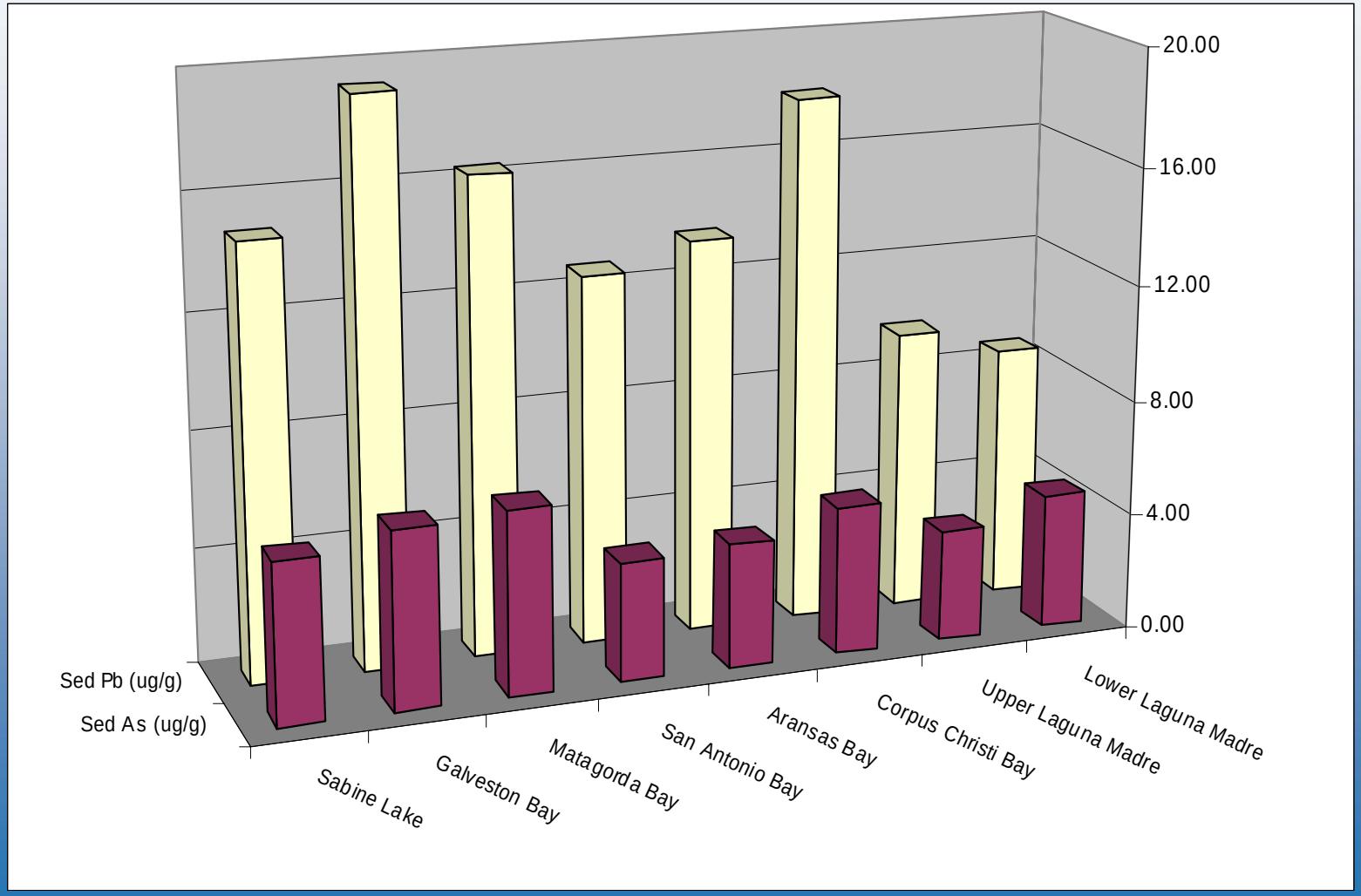
Sediment Pb and As



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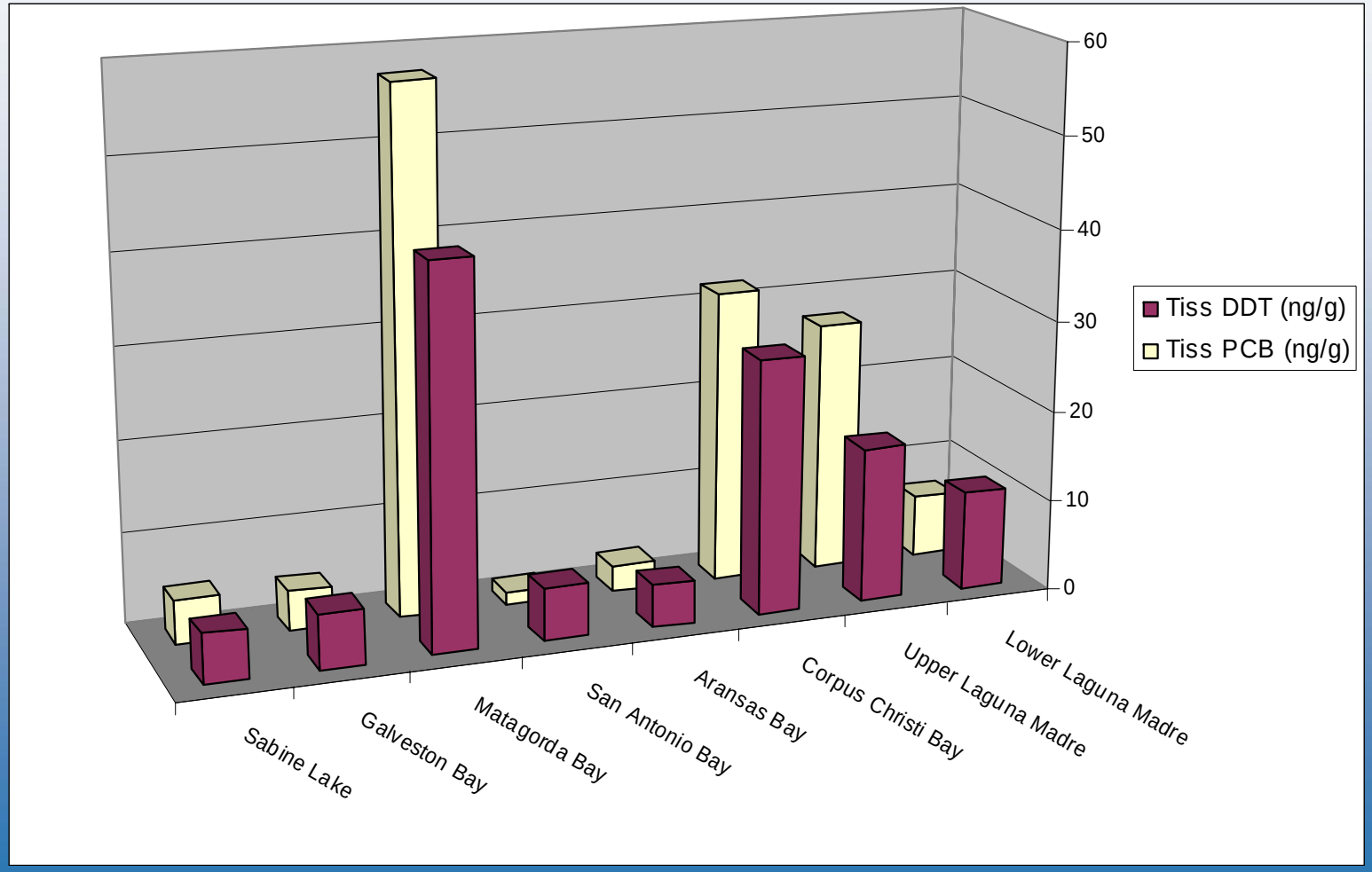
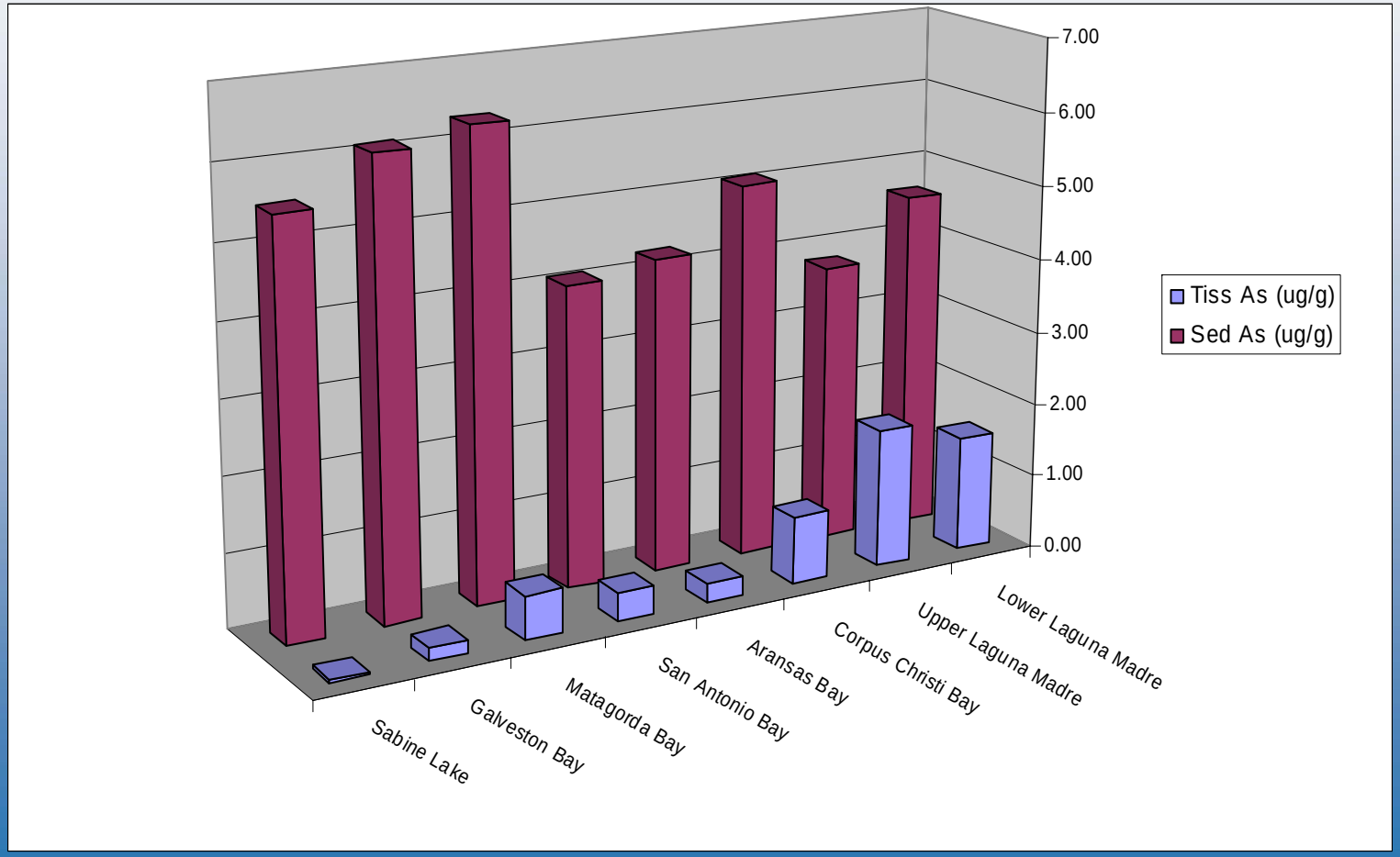
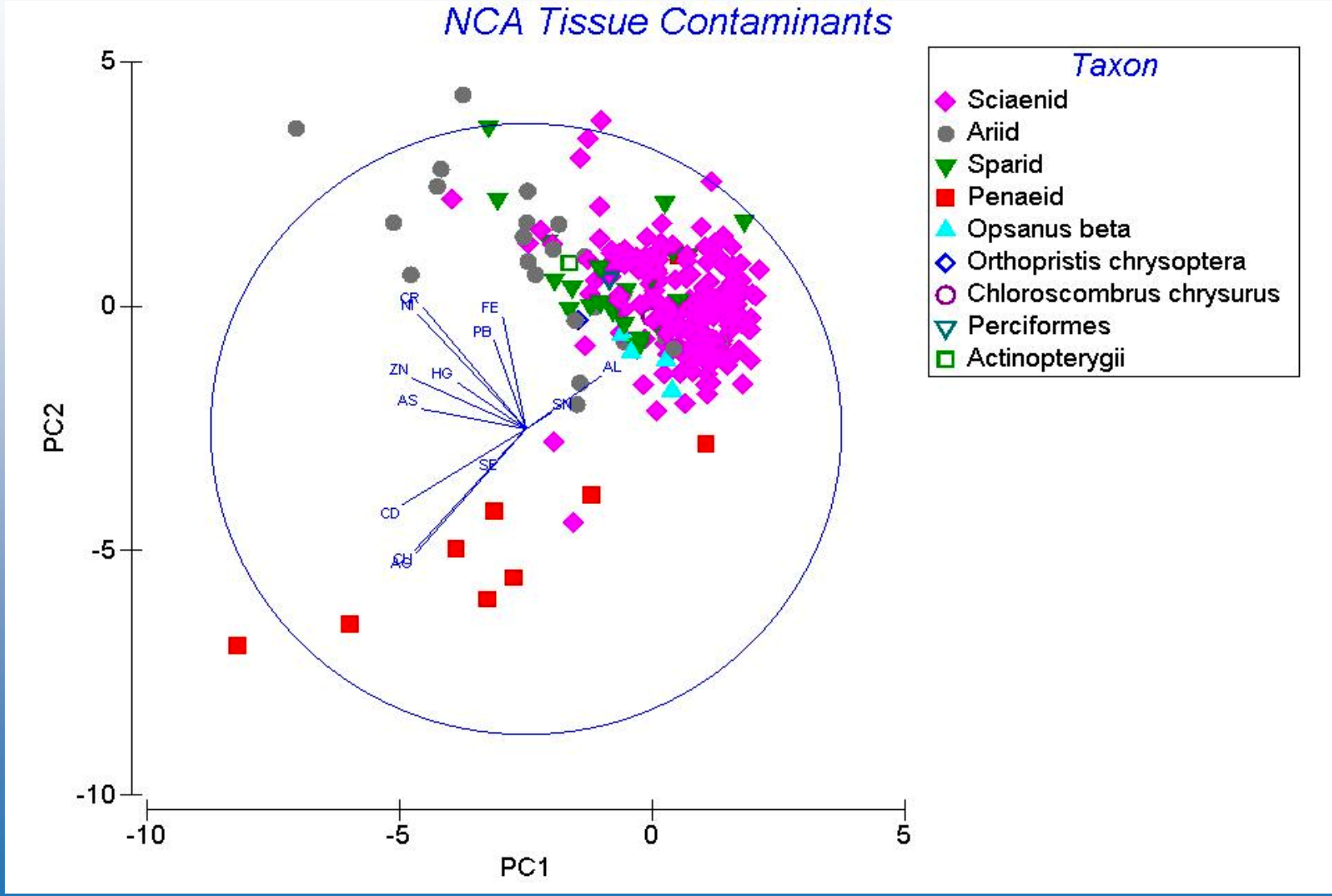
Tissue DDTs and PCBs



Arsenic contamination in tissues and sediments



Ecosystem Characterization: Tissue contaminants segregate along taxa



EPA United States Environmental Protection Agency

TEXAS PARKS & WILDLIFE

Future Directions

- Ecosystem-based Management

  (TPWD's CF Division)
- Texas Coastal Assessment

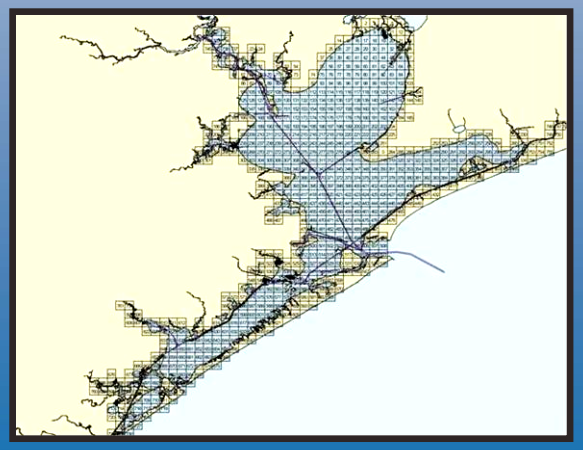
  (TCEQ, TPWD partnership)

Recent Relevant Policies, Plans and Guidance

- TPWD – *Land and Water Resources Conservation and Recreation Plan* (August 2002)
- EPA – *Elements of a State Water Monitoring and Assessment Program* (March 2003)
- NOAA – *Strategic Guidance for Implementing an Ecosystem-based Approach to Fisheries Management* (May 2003)
- US President – Executive Order: *Facilitation of Cooperative Conservation* (August 26, 2004)
- EPA – *2006 - 2011 EPA Strategic Plan* (2006)

The Near Future - 2007

- 50 Stations to be sampled across the coast, including the 18 TCEQ stations in Galveston Bay.
- Water, sediment, and benthic characterization as in the past with the exception of tissue contaminants, sediment organics and sediment toxicity.
- Random sampling based on the TPWD Coastal Fisheries grid selection.
- Sampling during index period of 1 July to 31 August.



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