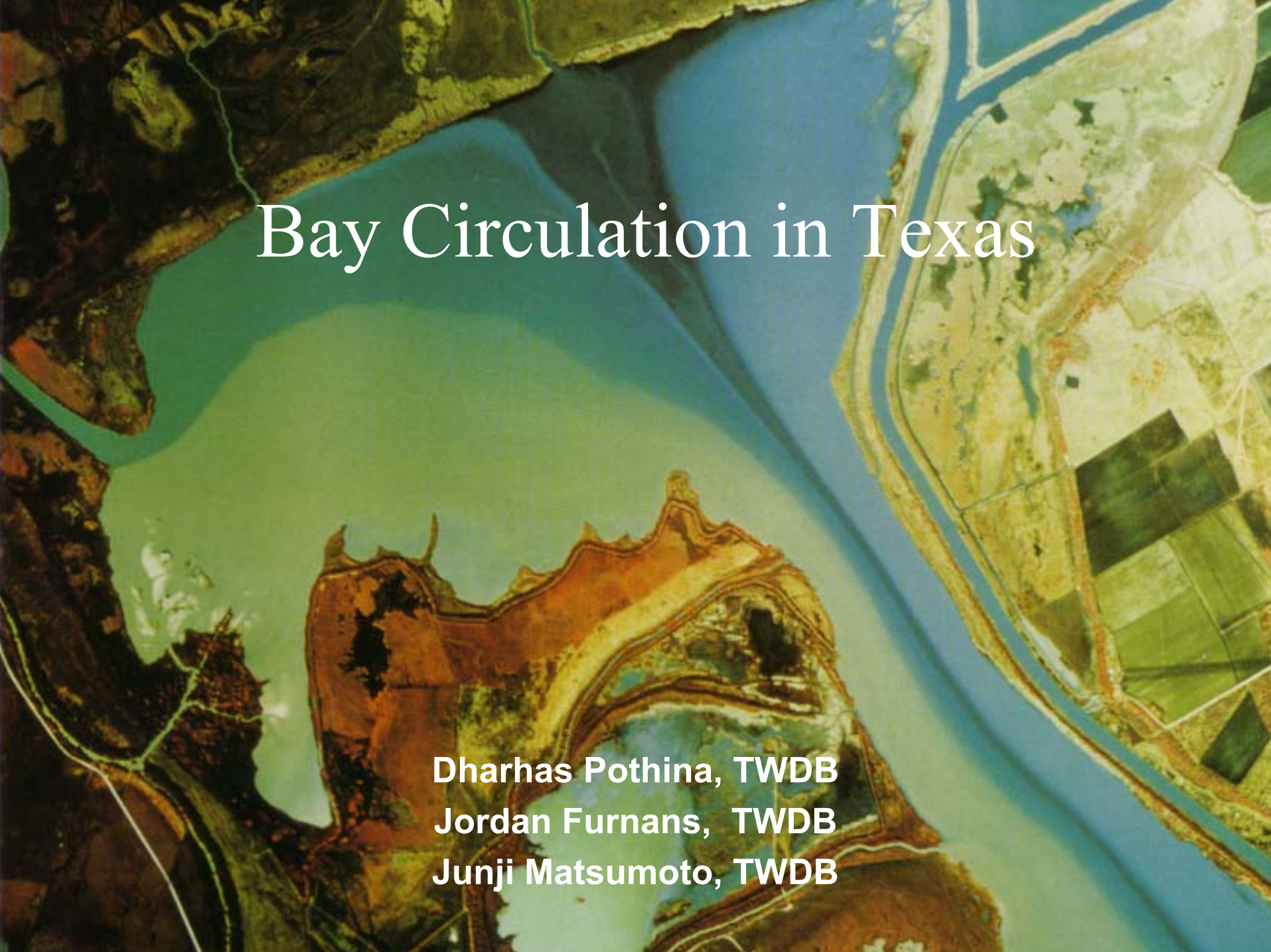


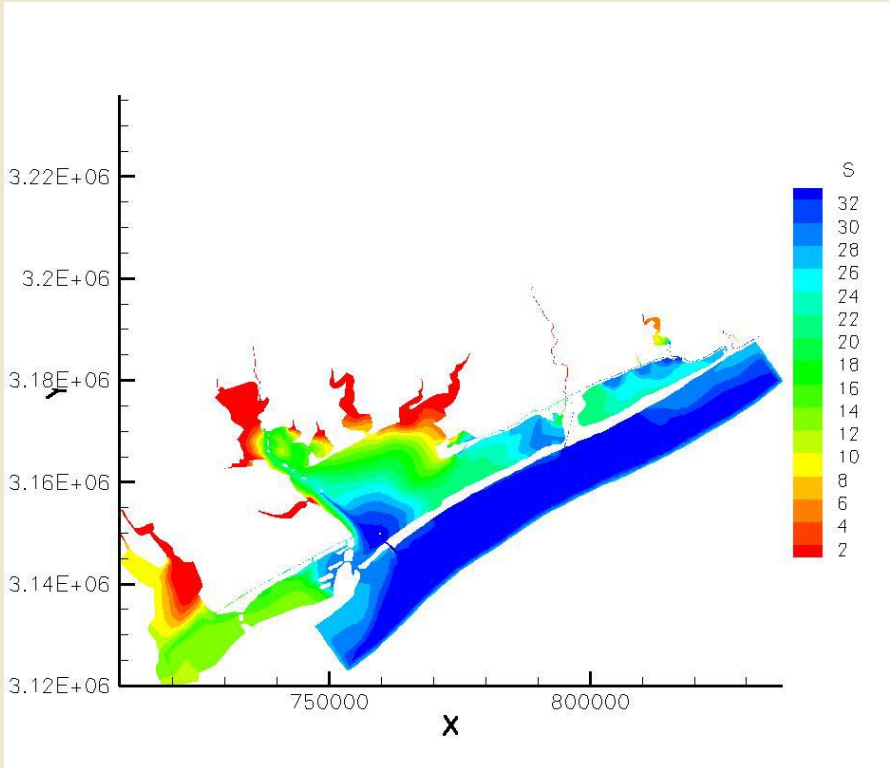
Bay Circulation in Texas

Dharhas Pothina, TWDB
Jordan Furnans, TWDB
Junji Matsumoto, TWDB

Freshwater Inflow Needs

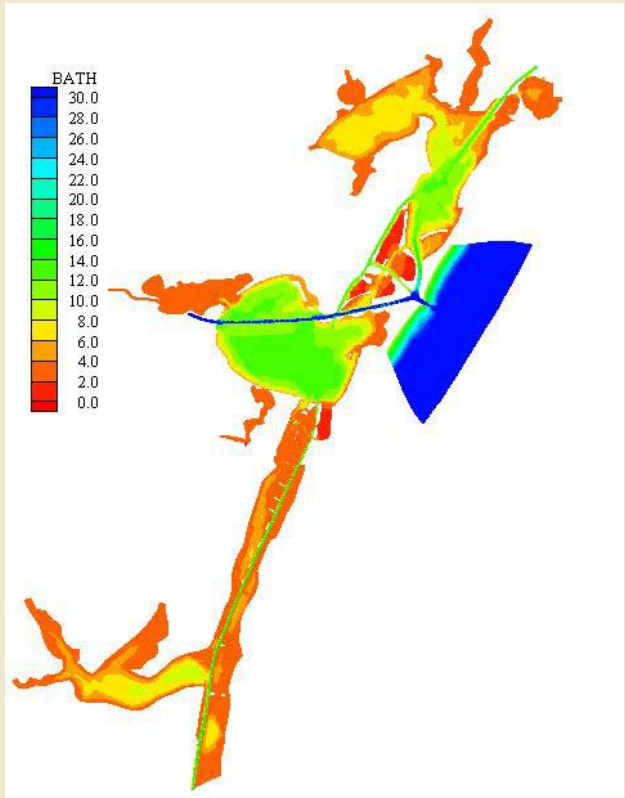
"a salinity, nutrient, and sediment loading regime adequate to maintain an ecologically sound environment in the receiving bay and estuary system that is necessary for the maintenance of productivity of economically important and ecologically characteristically sport or commercial fish and shellfish species and estuarine life upon which such fish and shellfish are dependent."

An accurate model of bay circulation and salinity transport is required.



Characteristics of Texas Bay

- Very Shallow Bays
- Presence of Deep Navigational Channels
- Presence of Barrier islands
- Tidal Range not Large (<3ft)
- Tides are Diurnal & Semi-Diurnal
- Hyper Saline conditions possible



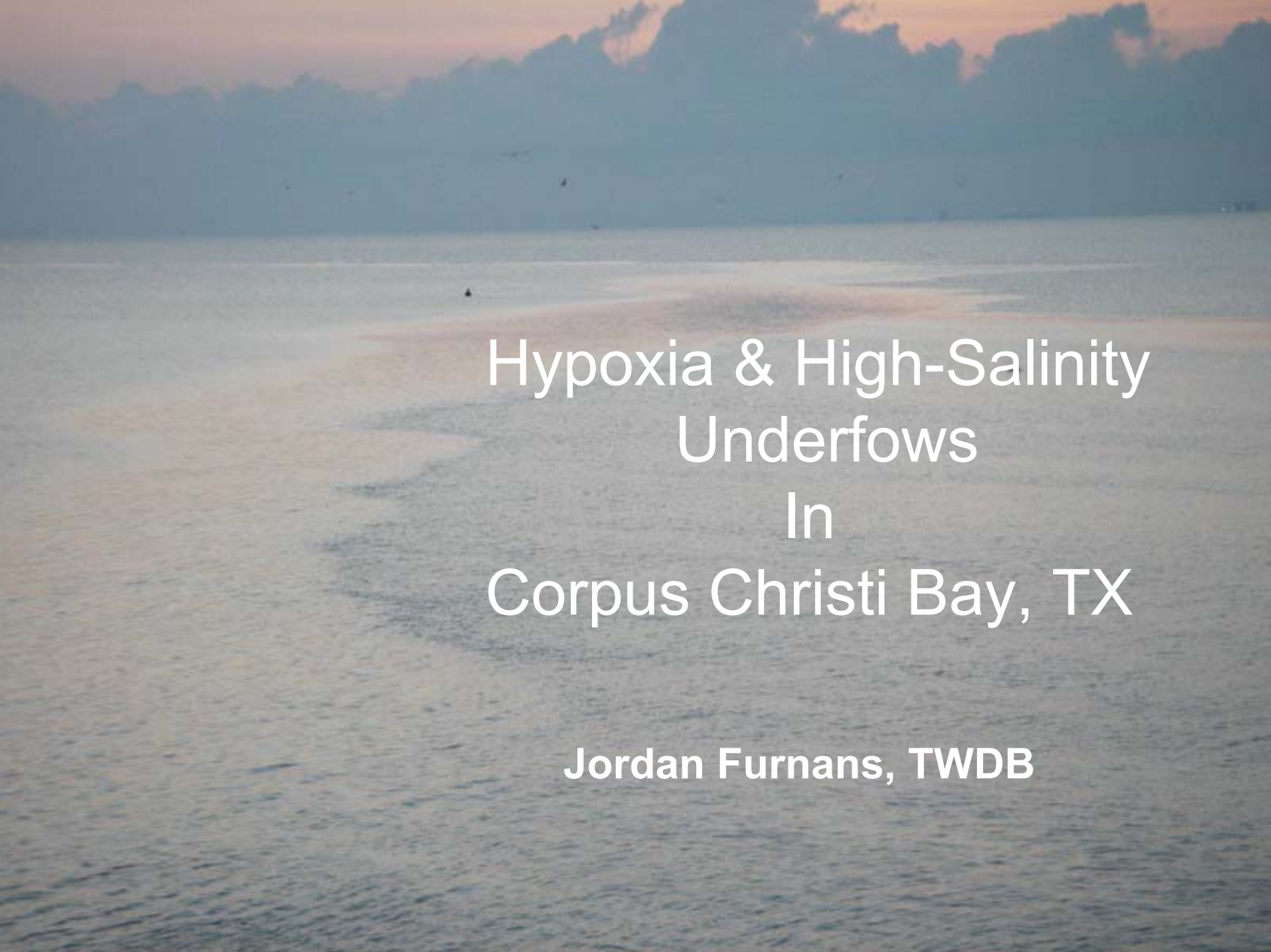
Models

TxBLEND : Finite Element Model based on GWCE Formulation. Dr. Junji Matsumoto, TWDB

ELCIRC : Finite-volume/Finite-difference Eulerian-Lagrangian Formulation. Dr. Antonio Baptista *et al,* OHSU

UTBEST : Discontinuous Galerkin Formulation. Clint Dawson, University of Texas.

We are in the early stages of testing UTBEST & ELCIRC

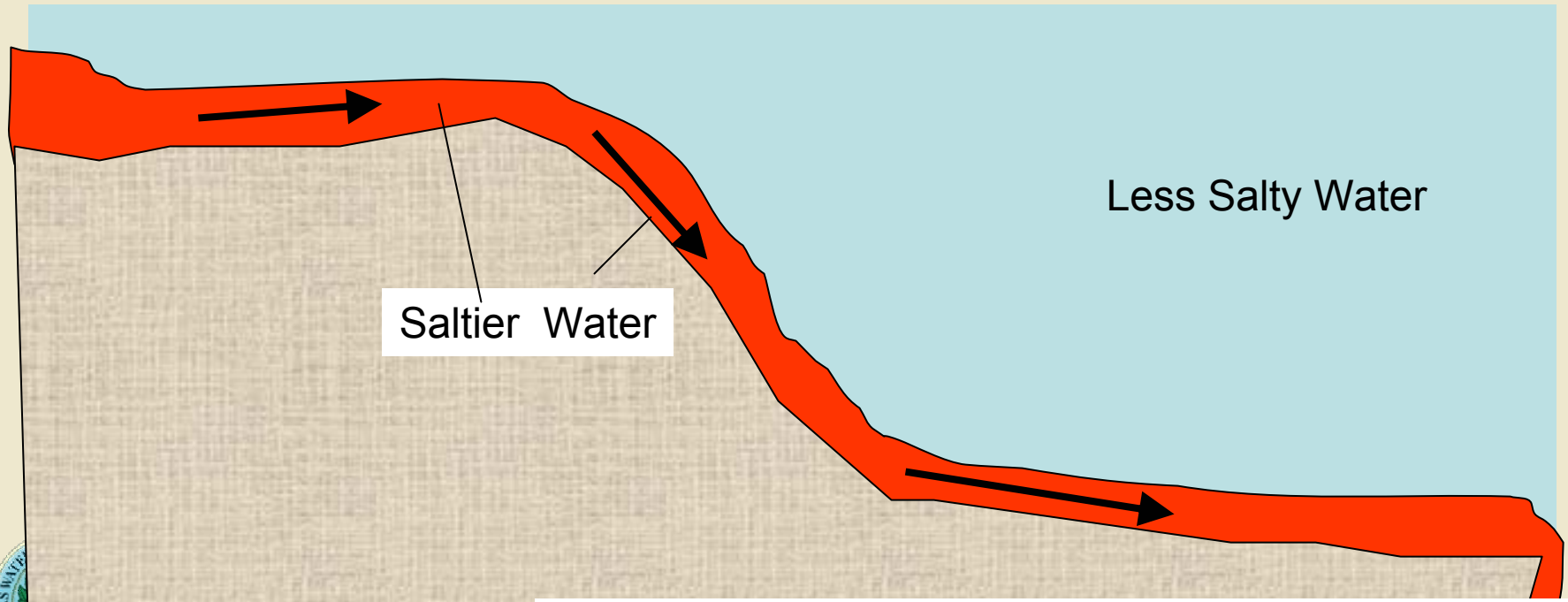


Hypoxia & High-Salinity Underfows In Corpus Christi Bay, TX

Jordan Furnans, TWDB

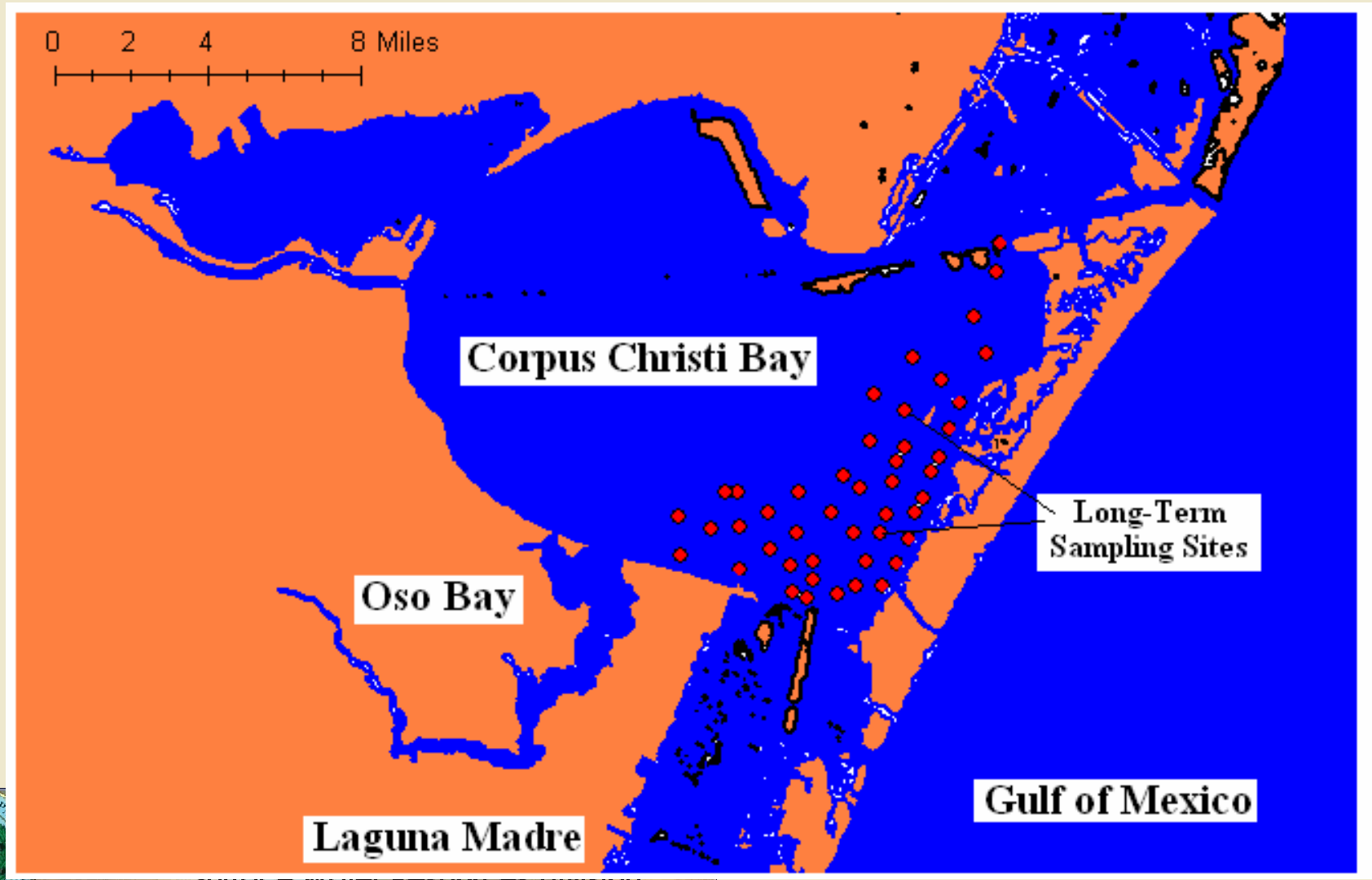
?What?

- Hypoxia = Dissolved Oxygen < 2.0 mg/L [1]
- High Salinity Underflow:

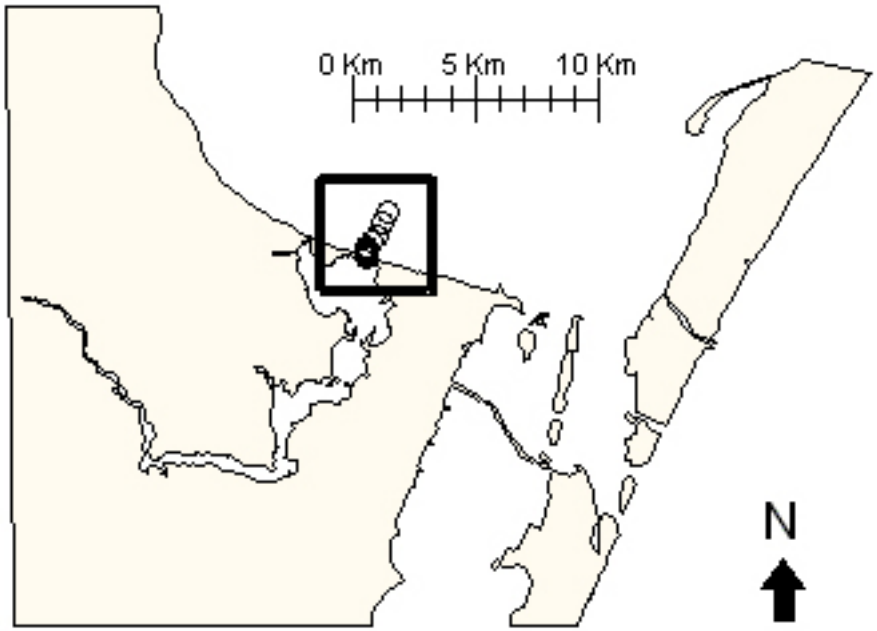


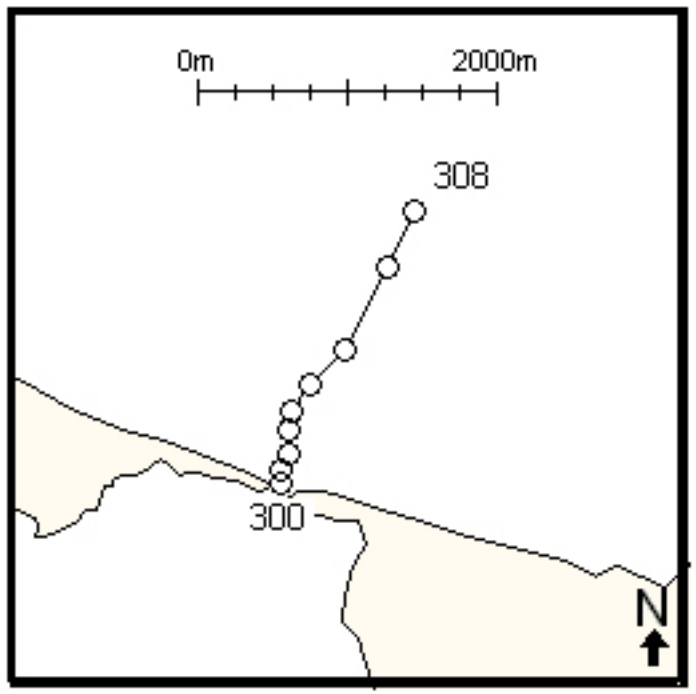
Dauer, D.M., A.J. Rodi Jr., and J.A. Ranasinghe. 1992. Effects of low dissolved oxygen events on the macrobenthos of the lower Chesapeake Bay. Estuaries 15:384-391

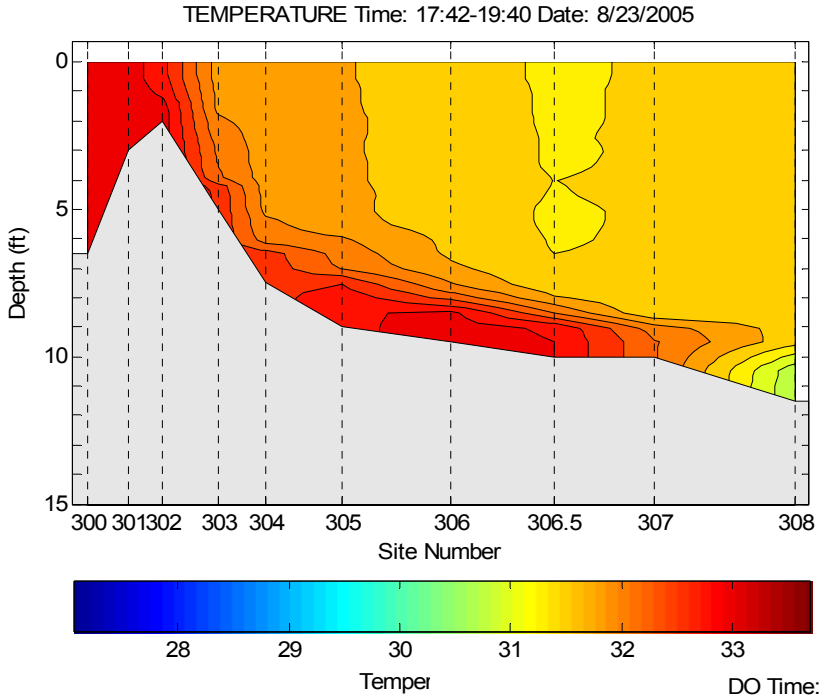
Area Map

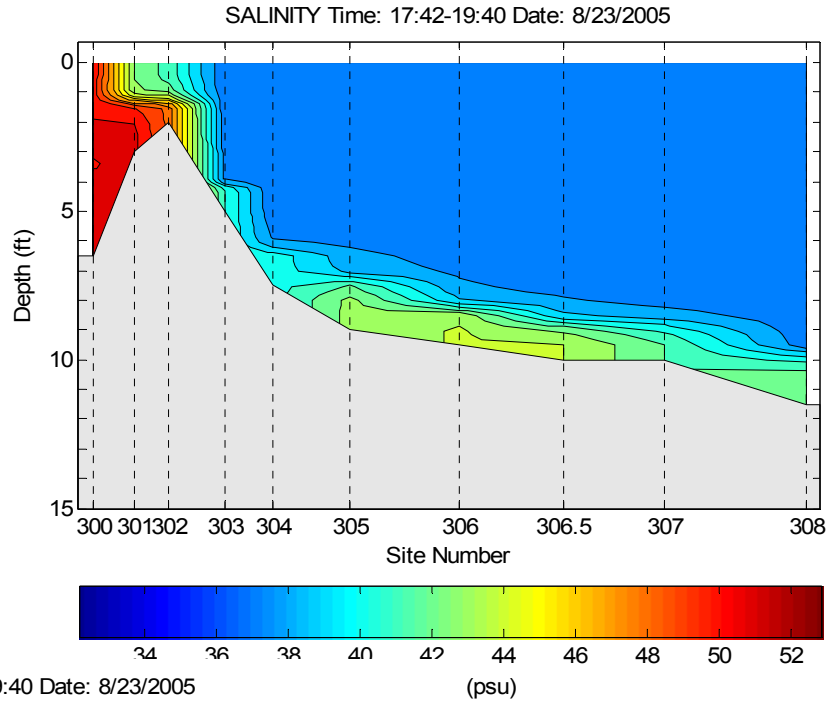

0 2 4 8 Miles
Corpus Christi Bay
Long-Term Sampling Sites
Oso Bay
Gulf of Mexico
Laguna Madre

Underflow Sampling Locations

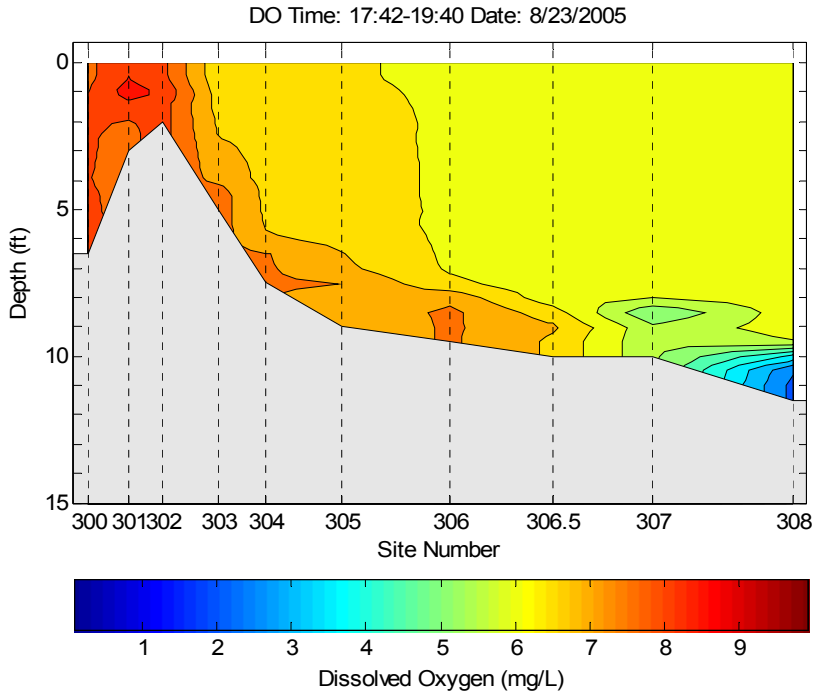


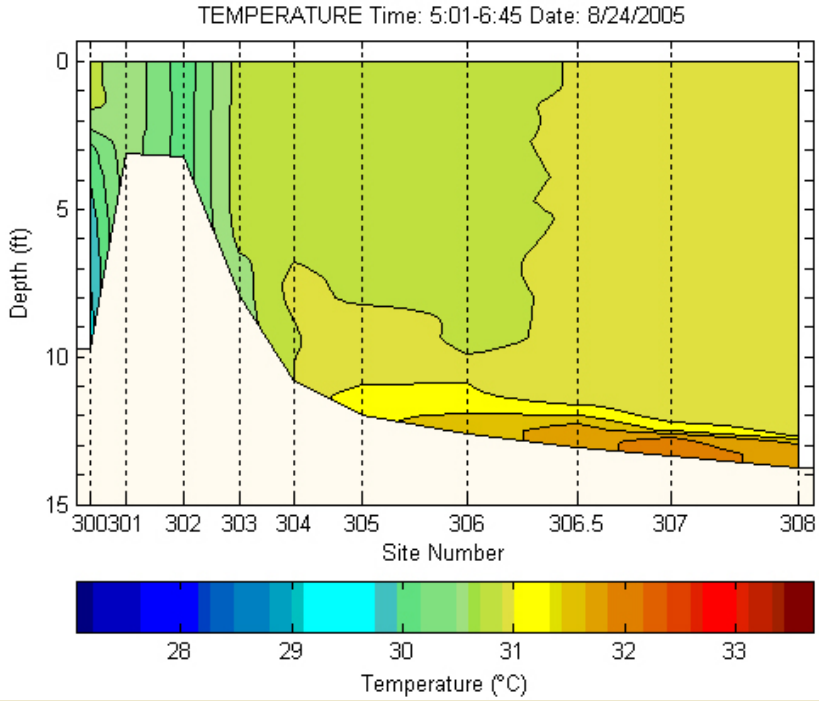


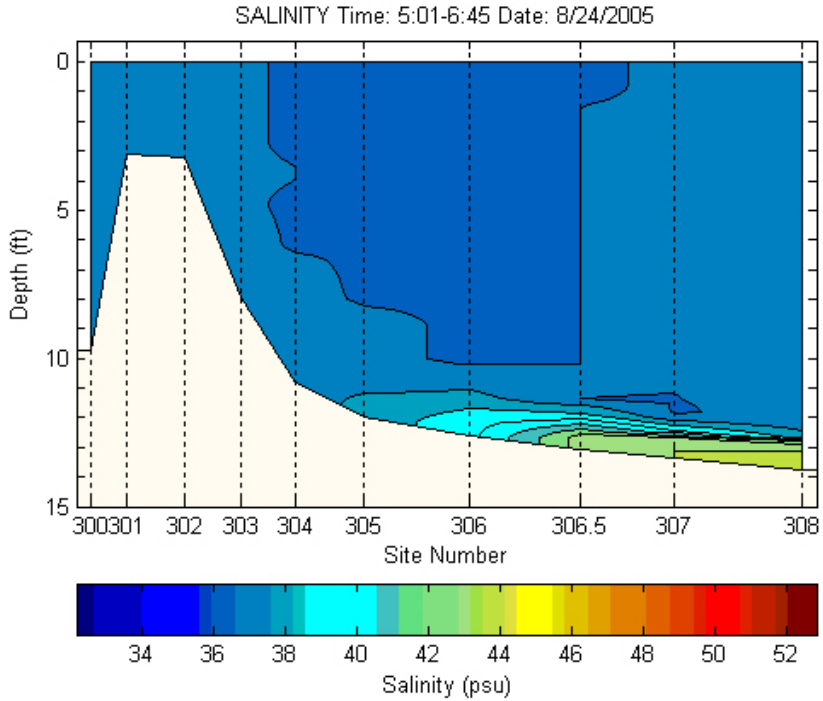




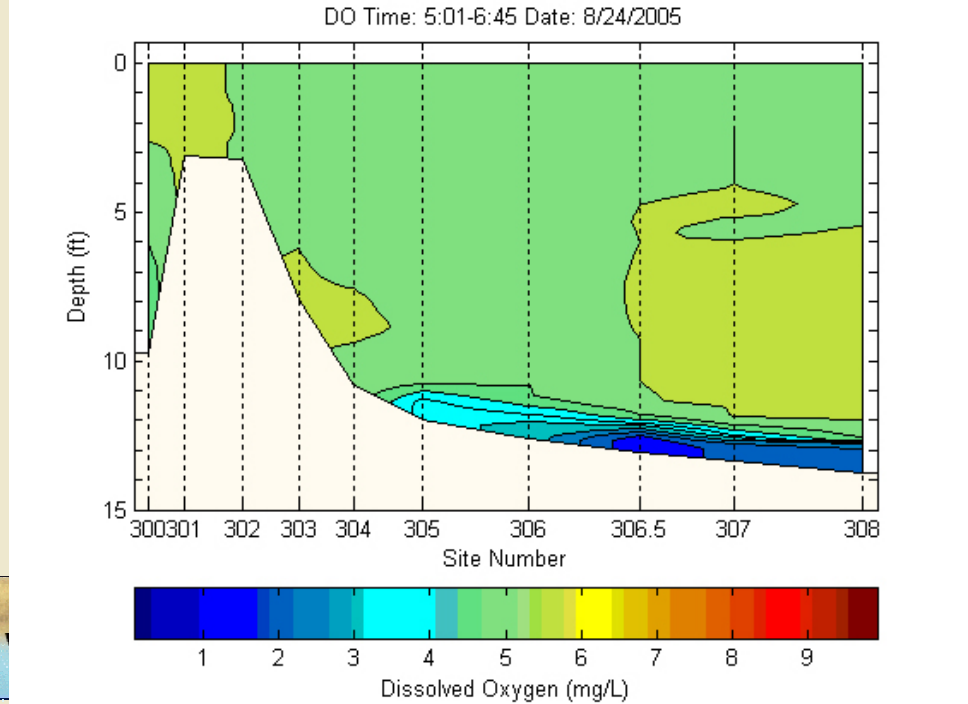
17:42-19:40
8/23/05







5:01-6:45
8/24/05



What's Next?

- Hydrodynamic Modeling
  - Can the model reproduce field observations?
  - More salt added to Oso Bay?
- Couple CC Bay model & Underflow model
  - Using ELCIRC for CC Bay
  - Using modified EFDC for Underflow
- Modify ELCIRC Hydrodynamic Model
  - Operate in Windows
  - Spatially Variable winds
  - Flexible Input/Output formats

ELCIRC Modifications

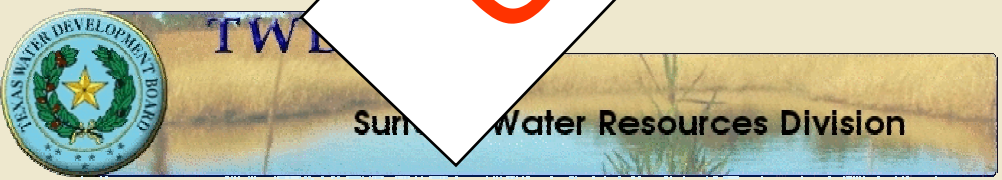
- Modular Format
- Dynamic Allocation of va
  - No fixed array sizes
  - Compiles in Windo
    - Lahey Fujistu Fo piler v. 5.7
- User-specified le names
  - “param.in” gr3” not required
  - File for changed

IMPLEMENTED

ELCIRC Modifications

- Output to NetCDF format, ASCII
  - Exported to Matlab, TecPlot
- Selective Data Output per
  - Layers, Sheets, Curtains erages, full domain
- Semi-Lagrangian Pa cking Capability
- Updated Surface T ynamics
  - HDF data form uired (although allowed)

Under Development



Questions