Approaches and metrices for the evaluation of oyster-reef restoration efforts in SW Florida.

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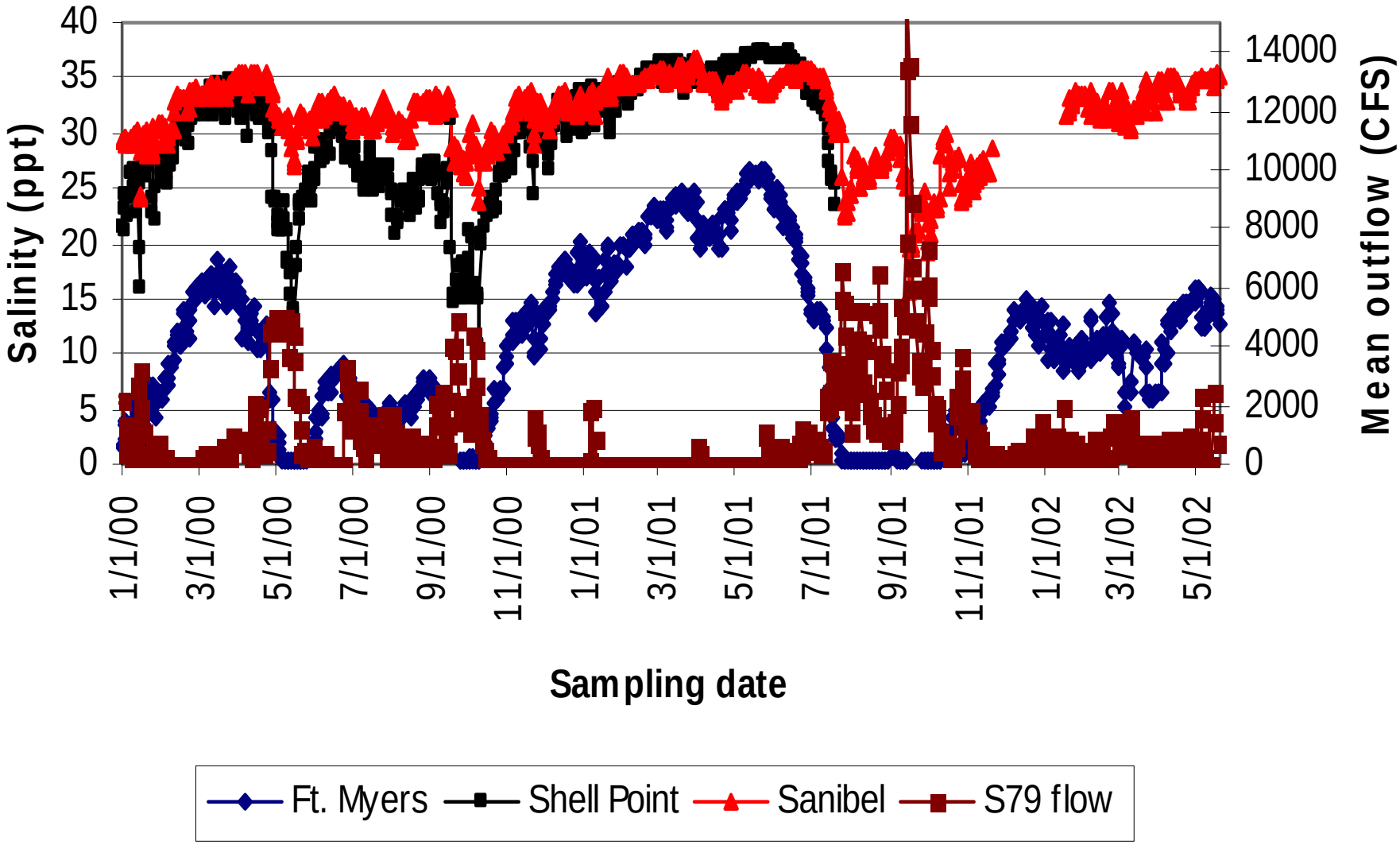
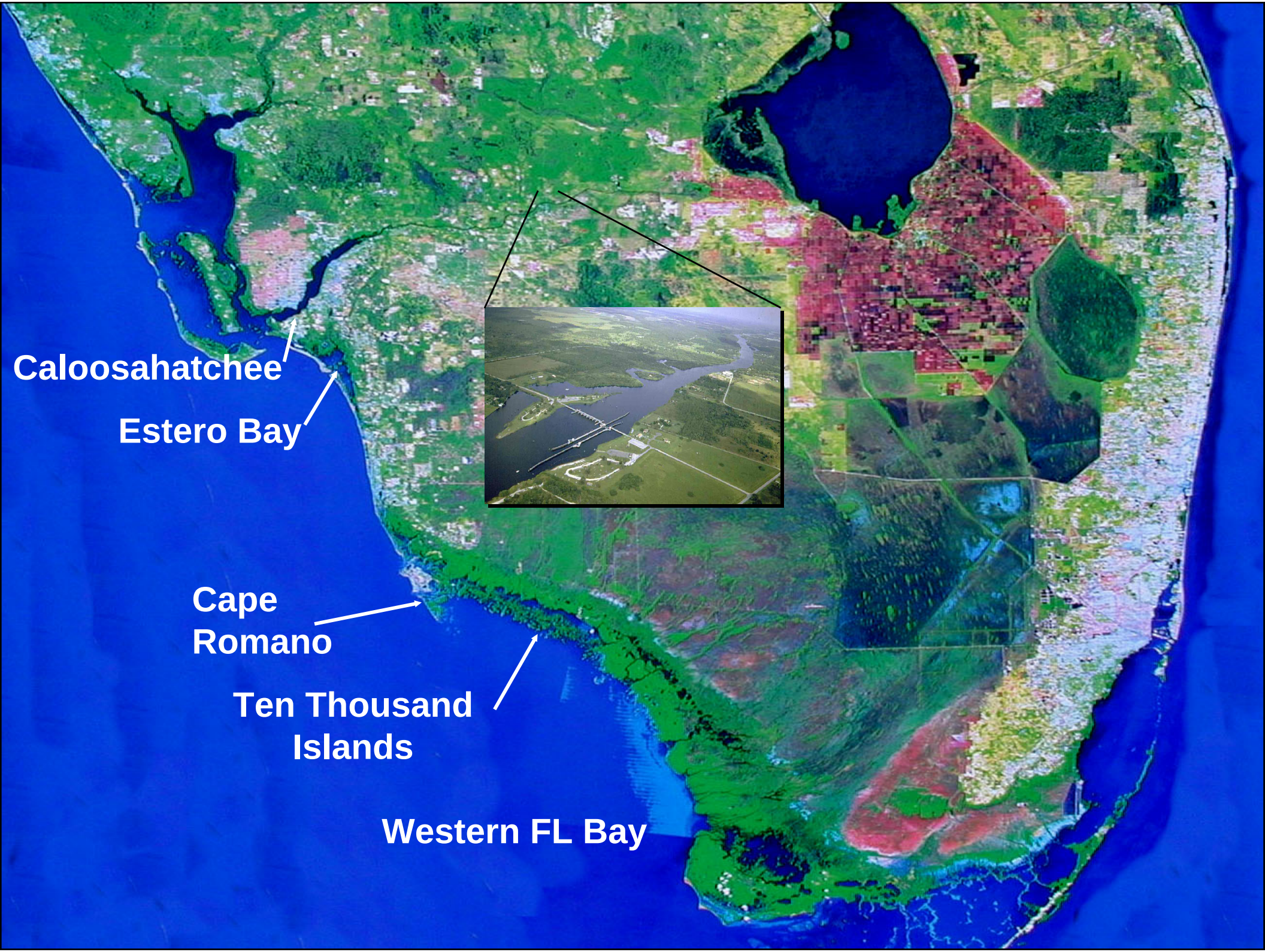
Southwest Florida's Estuarine Problems

- Part of Greater Everglades system & Comprehensive Everglades Restoration Plan (CERP).
- Water quality, quantity, & timing due to water management.
- Water management for potability, storm water, & agriculture.
- Altered salinity: too much, too little, disrupted seasonality.

Water Flow vs. Salinity



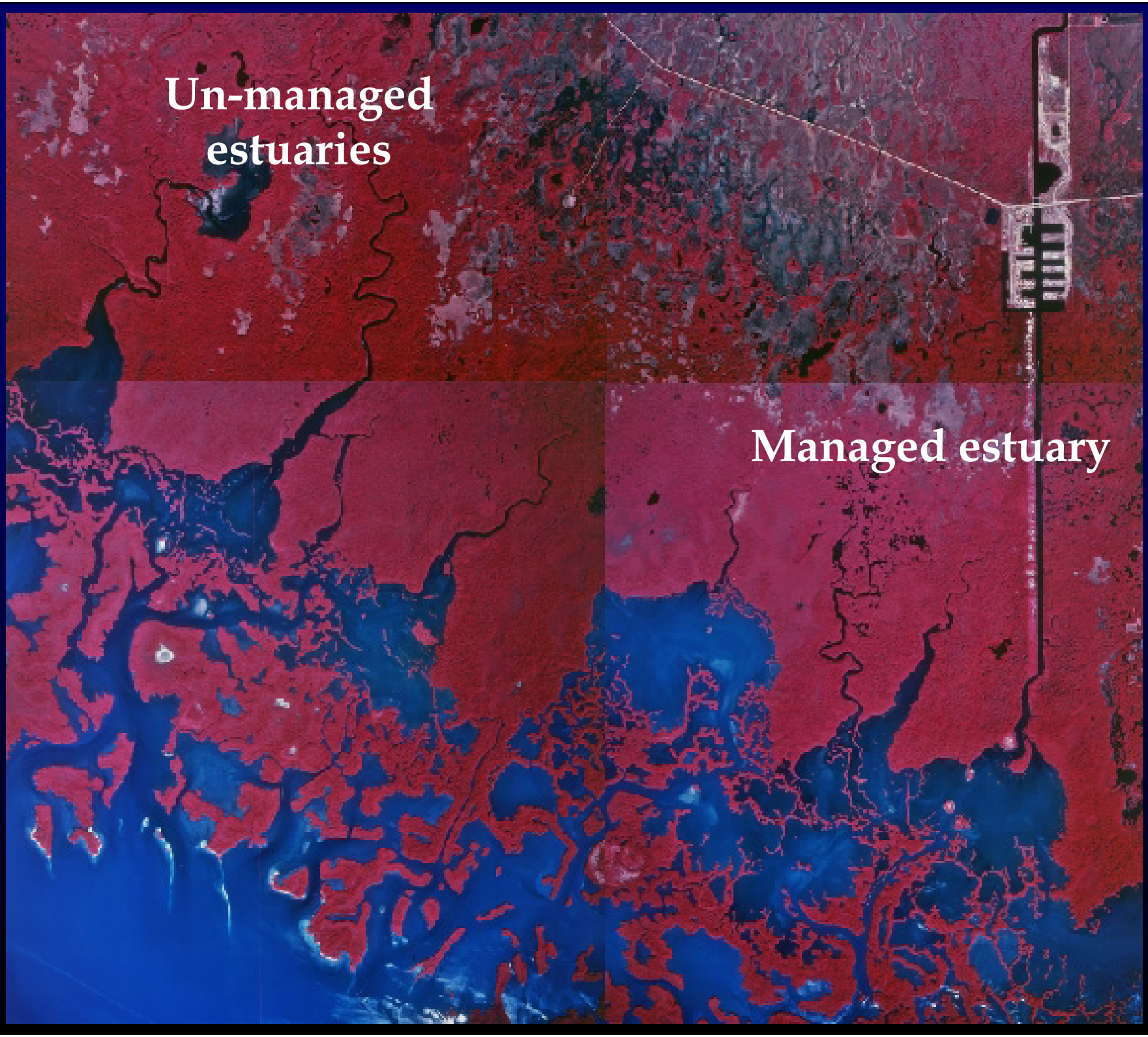

Caloosahatchee
Estero Bay
Cape Romano
Ten Thousand Islands
Western FL Bay

Research Questions

- How to gauge the environmental health of SWFL estuaries?
- How to establish estuarine restoration targets?
- How to monitor restoration effectiveness & adaptively manage restoration?
- What locations are ideal for restoring oyster reefs

Oysters Reefs as Indicators of Estuarine Health

- Use various aspects of oyster physiology and ecological distribution.
- Use of oyster reefs by decapod crustaceans and fishes.
- Importance for development of coastal geomorphology through late Holocene.
- Reefs primarily intertidal, upper meso- to polyhaline (15-35 ppt).
- Reefs occur in inner-middle regions of the “inner bays”.


Un-managed
estuaries
Managed estuary

Blackwater River & Bay

Why aren't the oysters there?

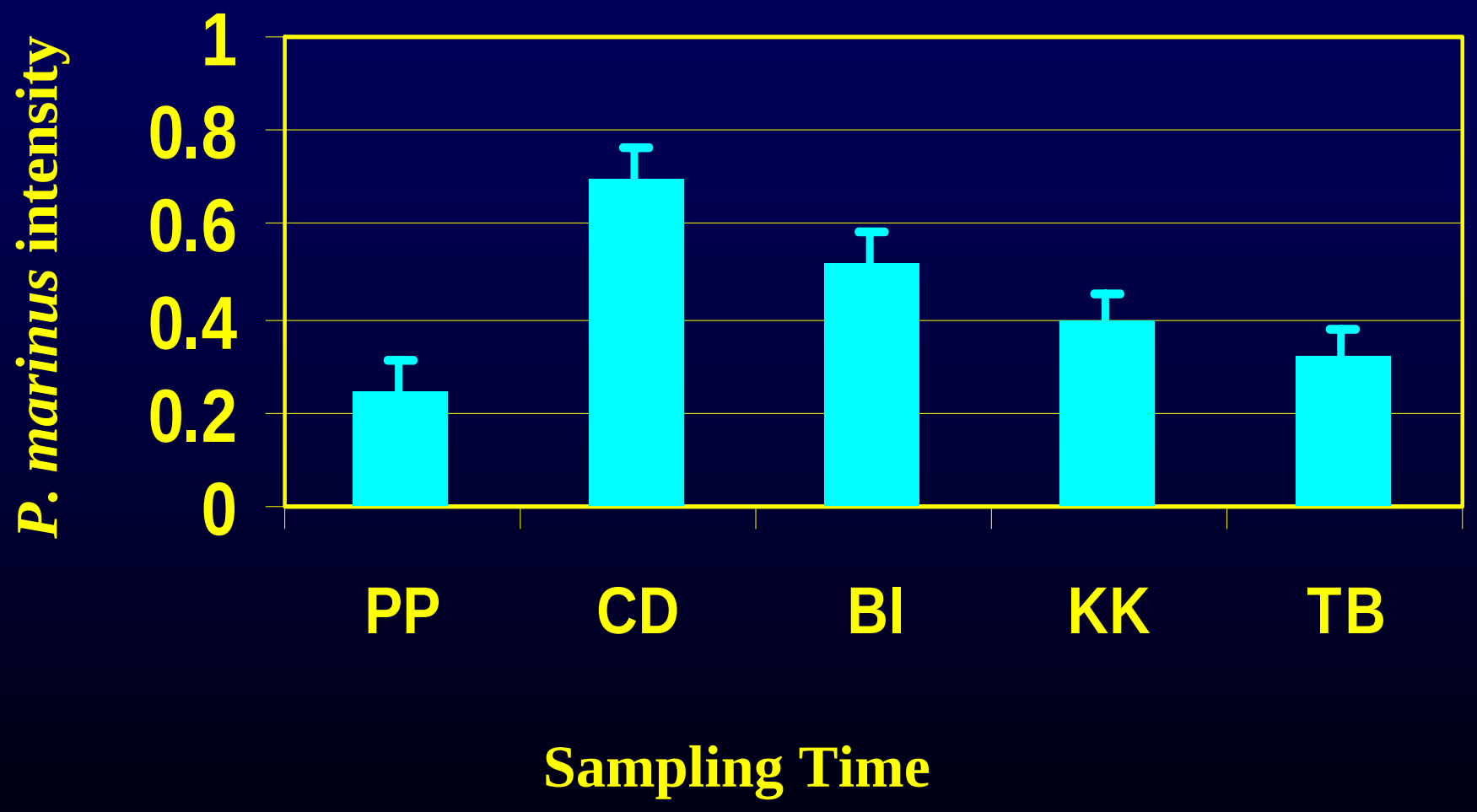
- One cannot go by historical accounts when restoring oyster reefs. Need to know the limiting factors.
- Larval recruitment (Shell strings).
- Water quality (Salinity, DO, contaminants).
- Suitable substrate (Substrate firmness and quality).
- Diseases, predators (*Perkinsus marinus*, custaceans, molluscs).
- Good growth, food (Juvenile growth).
- Water Flow / killing floods (Timing, Low salinity, larval flushing).

Reef Restoration

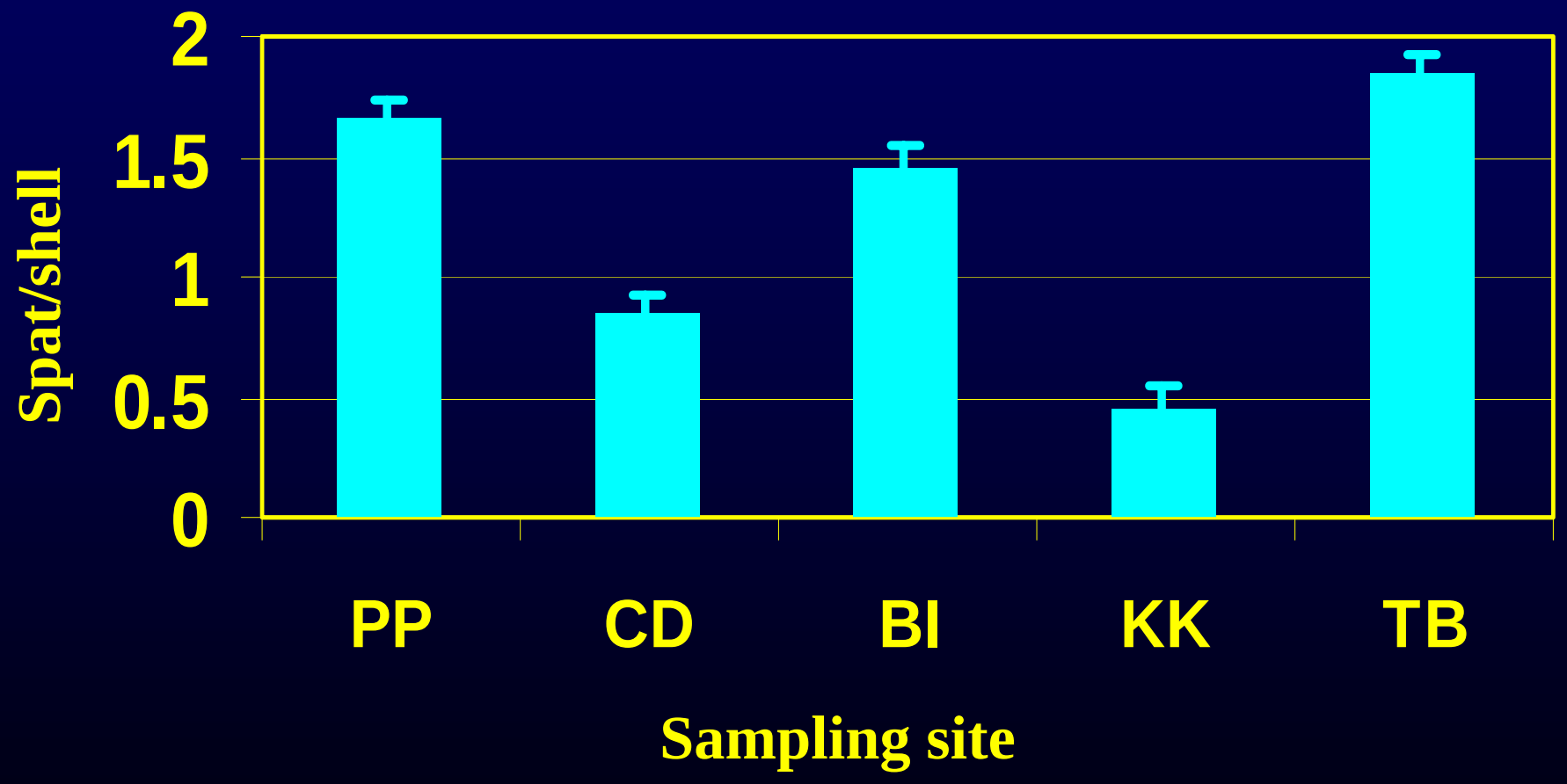
Select areas that have:

- **Suitable substrate (at least create hard substrate)**
- **Low disease intensity**
- **Good spat recruitment**
- **Good growth rate**
- **Low # of killing floods (suitable salinity)**
- **Low predation**
- **Support high diversity / biomass of organisms**

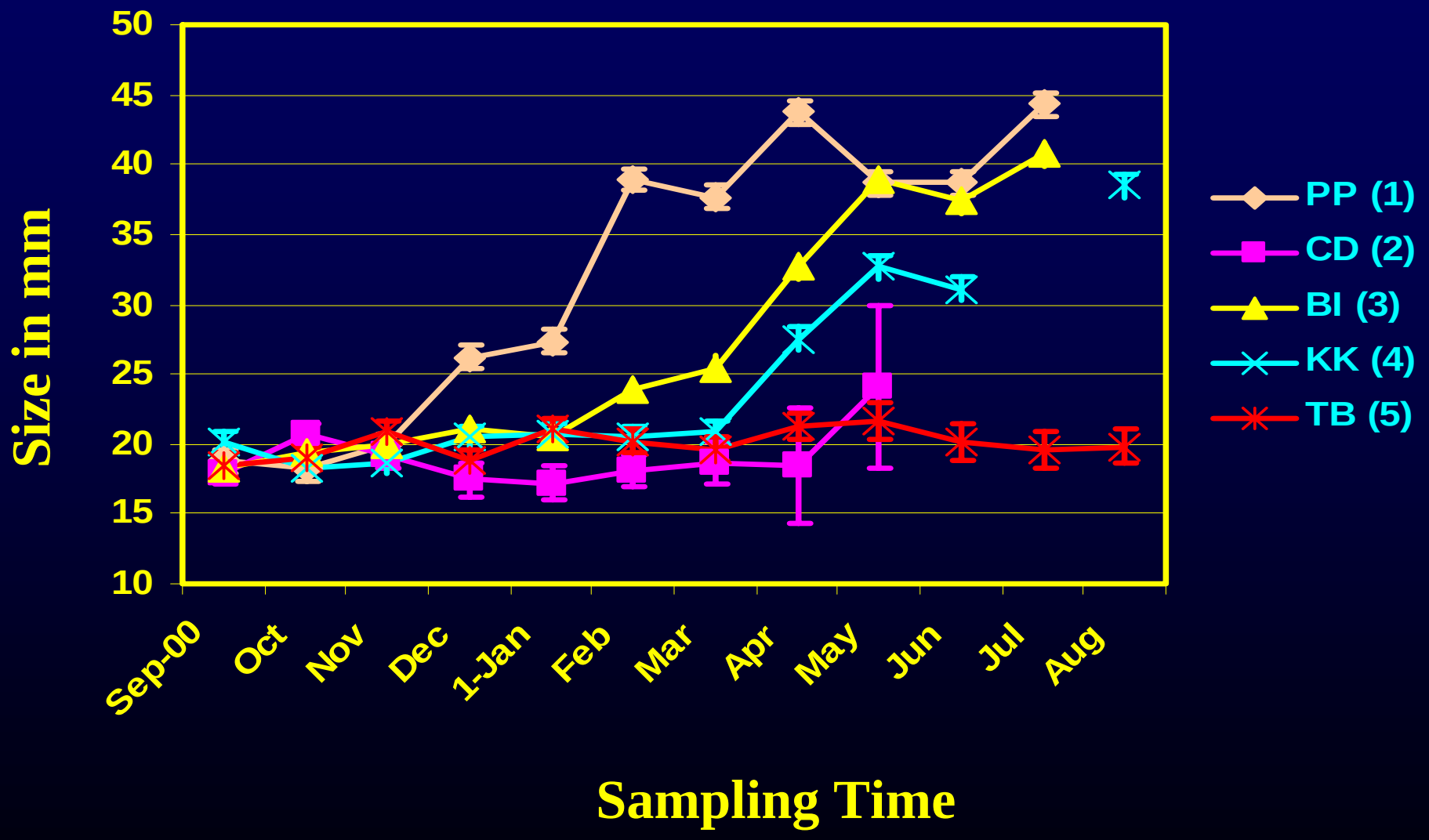
P. marinus intensity



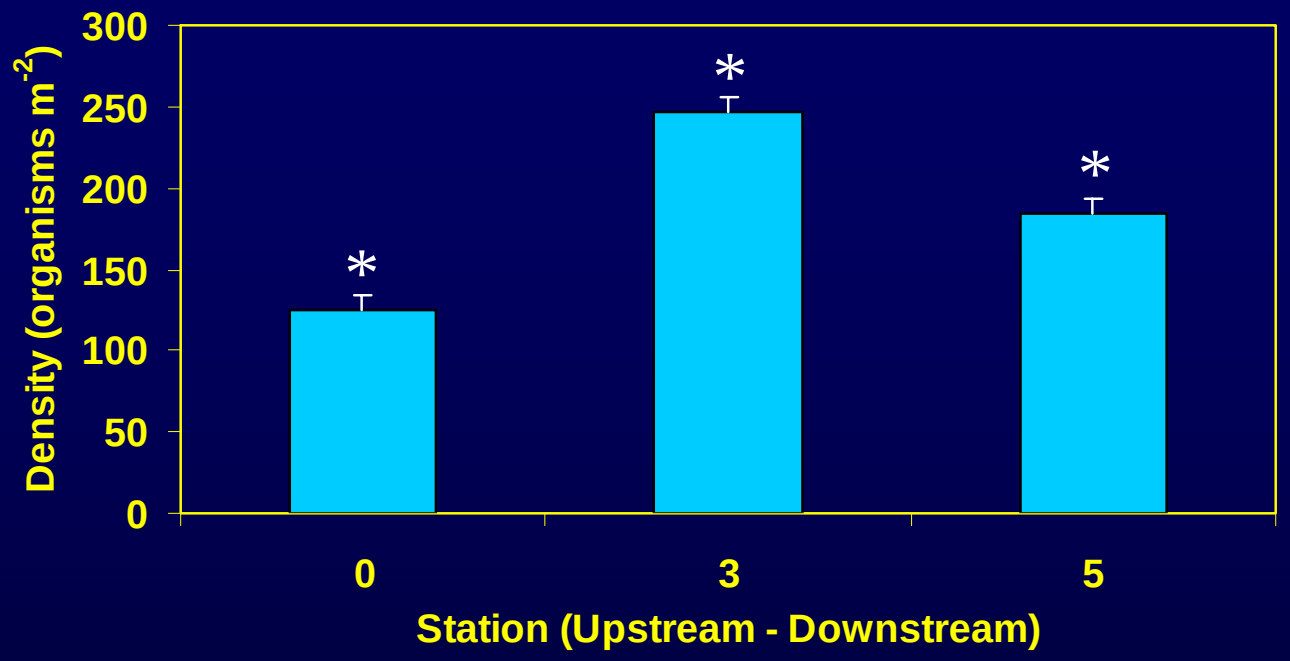
Spat Recruitment

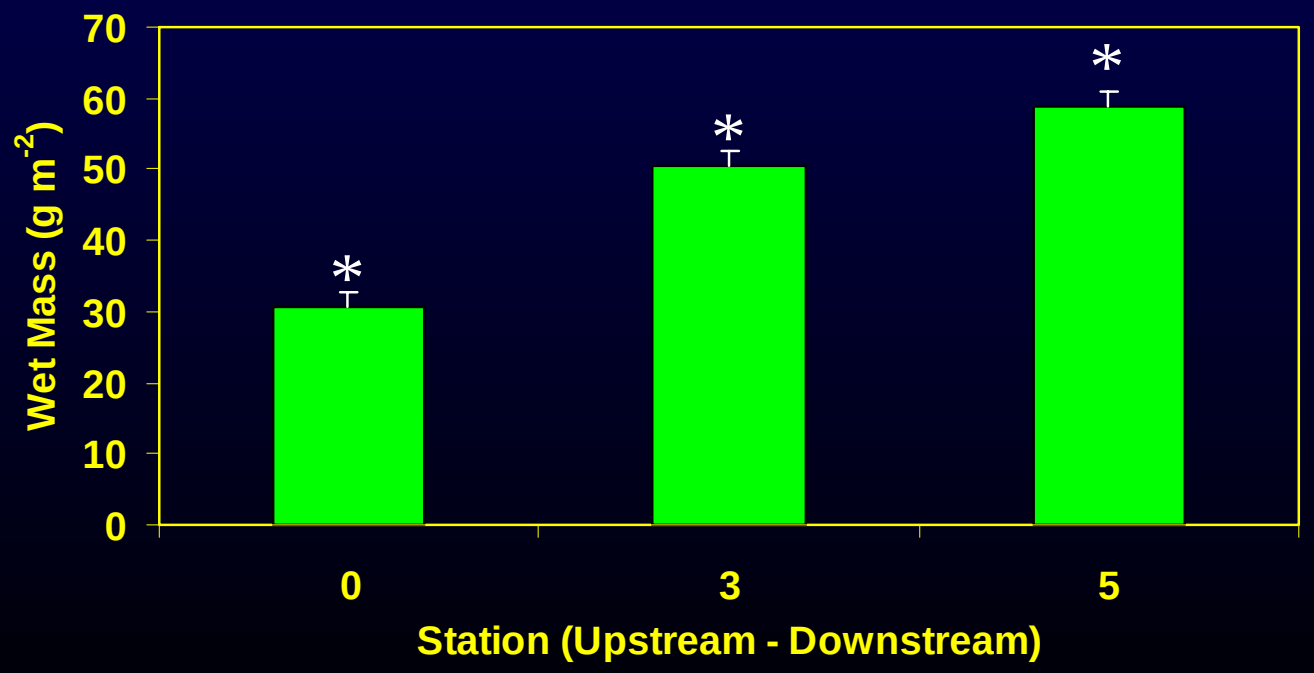


Growth of Juvenile Oysters



Geographic variation in abundance and biomass of oyster-reef decapods and fishes.





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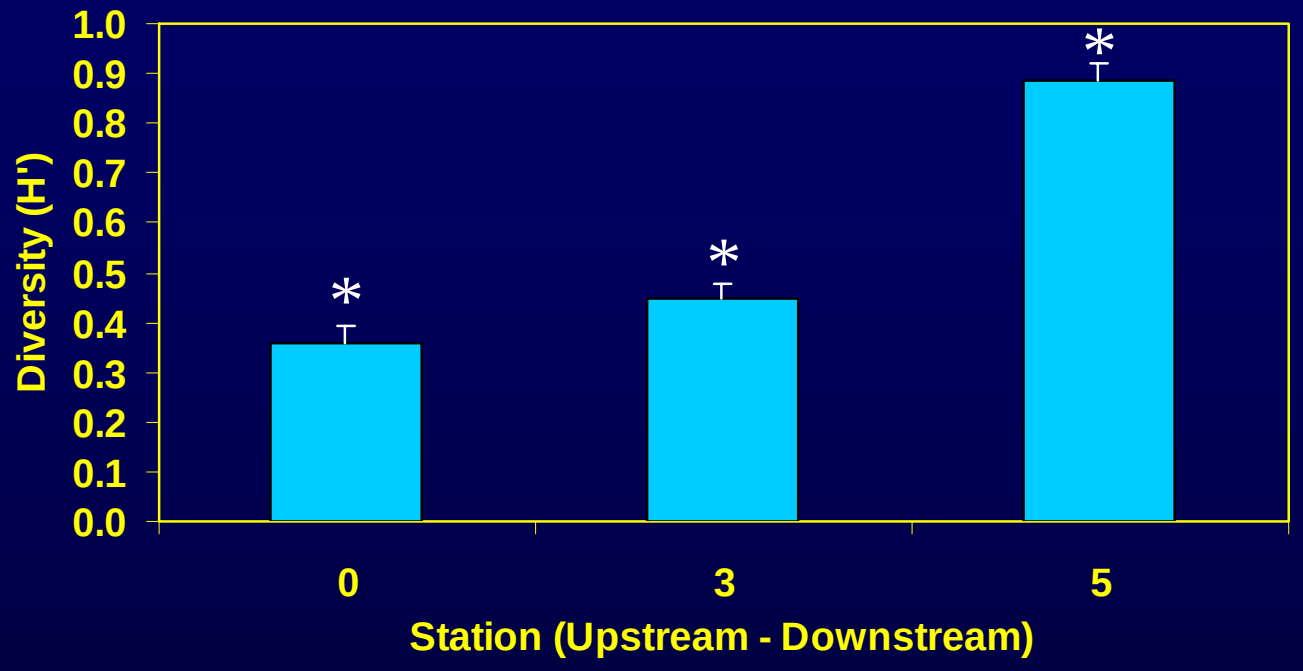
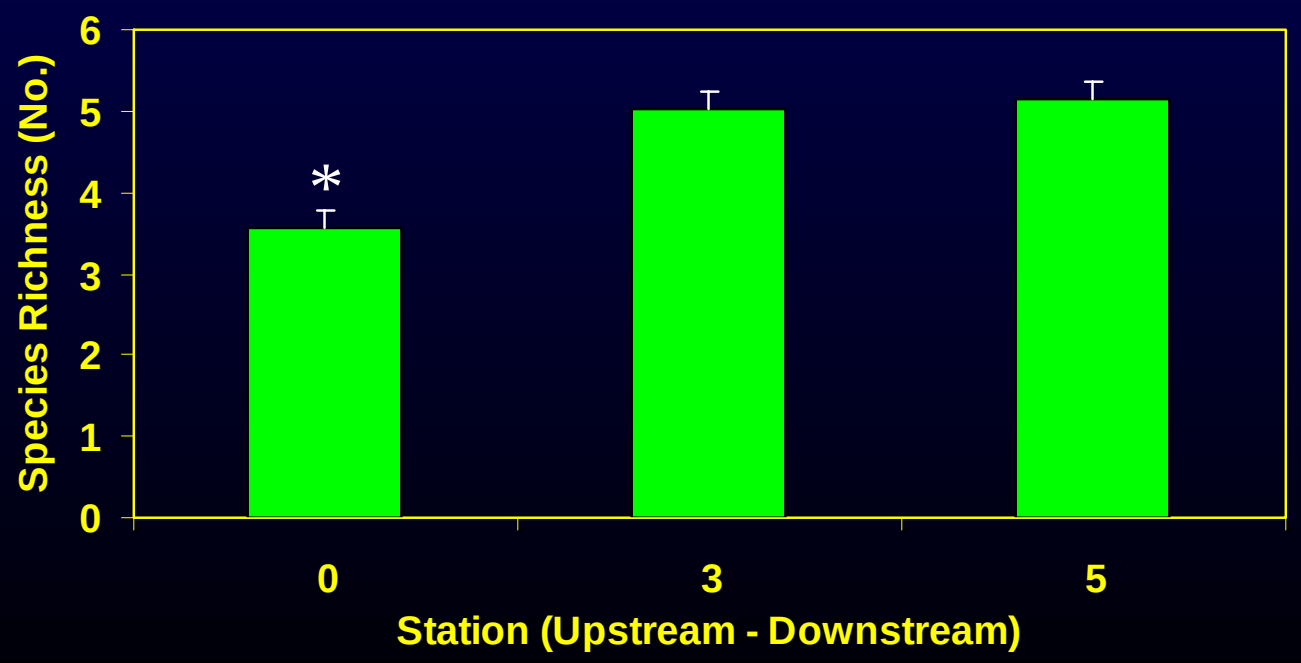
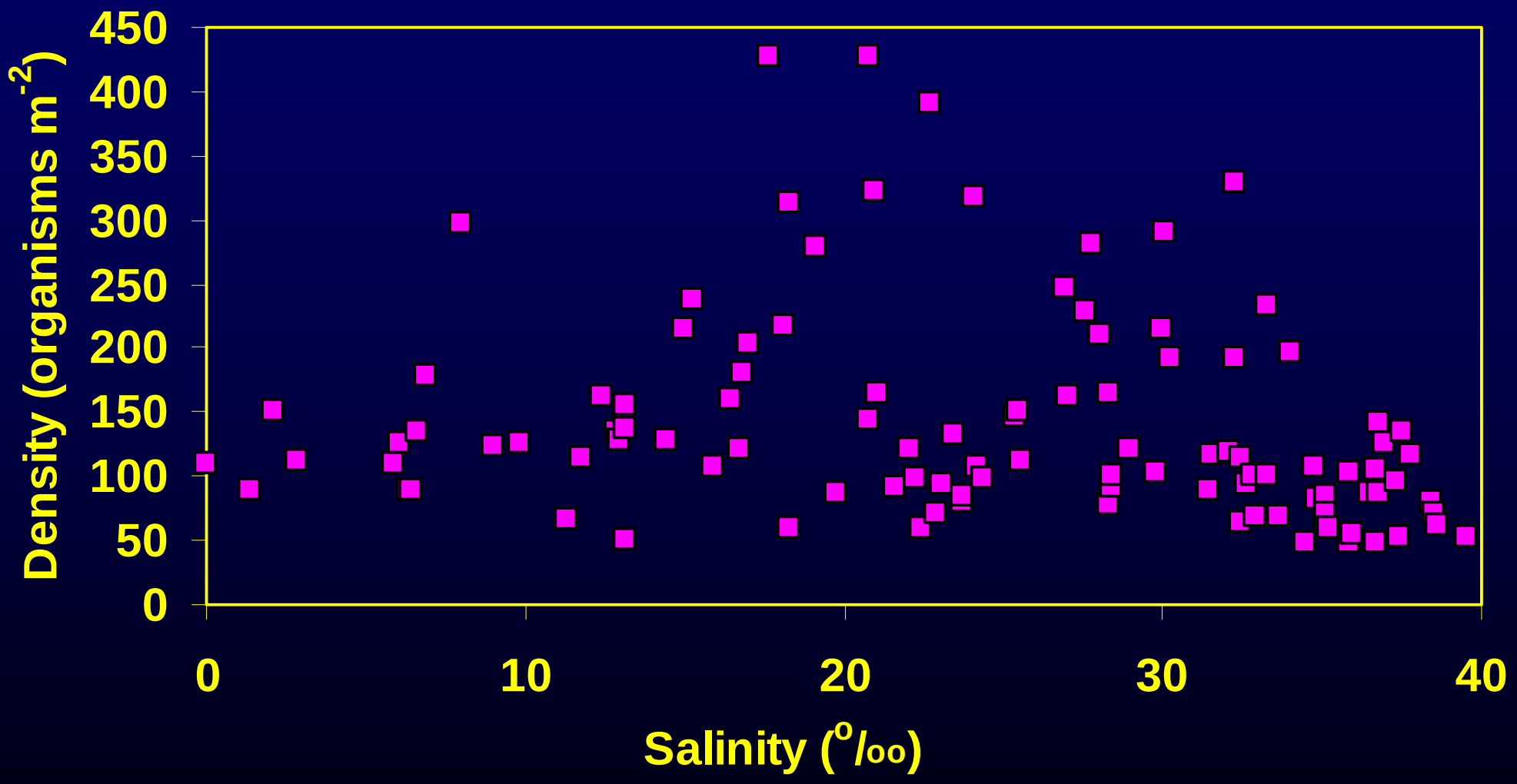




Relationship between salinity and corresponding density of oyster-reef decapods and fishes.



Results to date

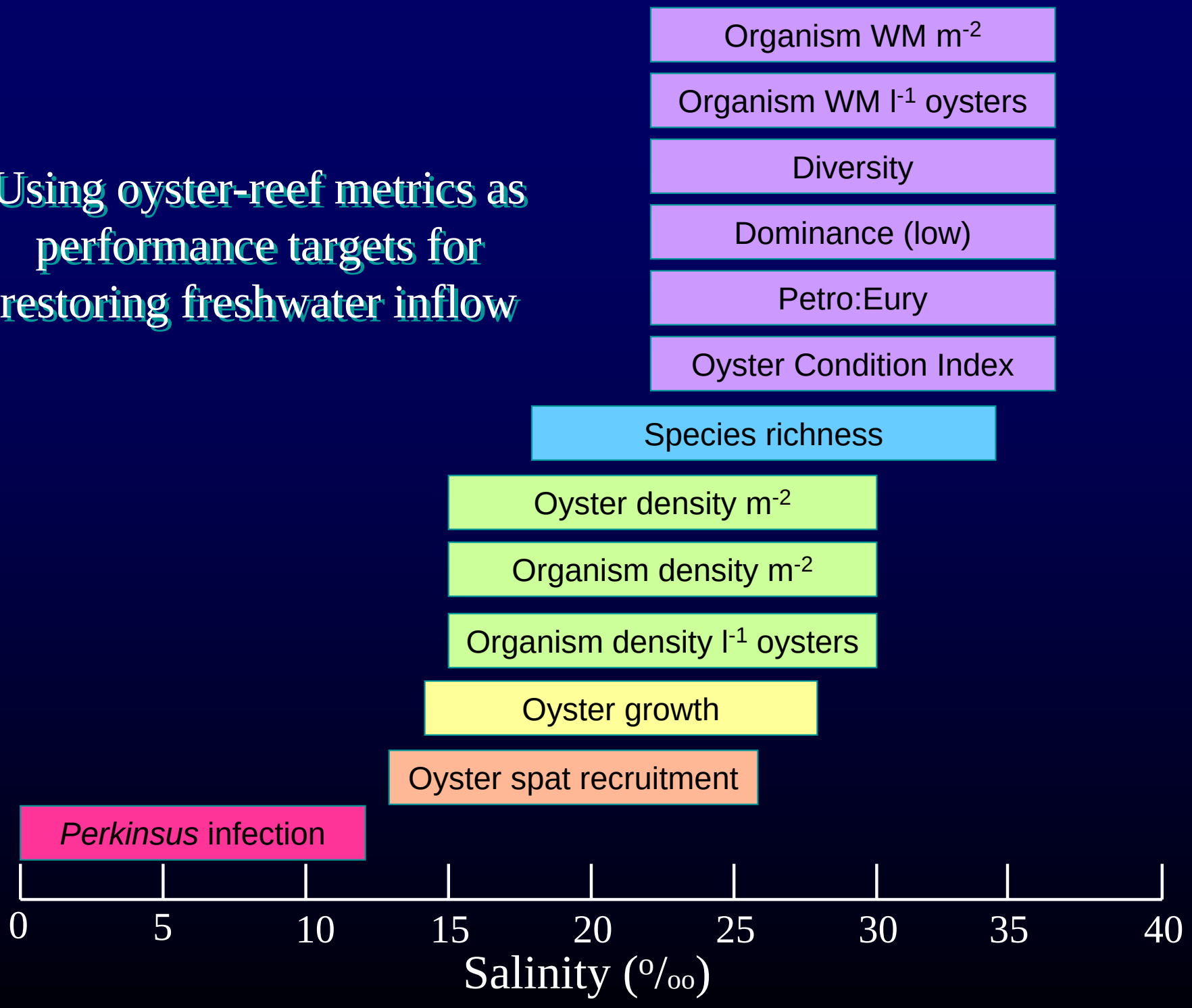
- Created 17 reefs measuring 10 – 20 sq. M. each.
- Fossil shell in wire-mesh bags (Coen et al.).
- Oyster gardening workshops.
- Community volunteers as well as local, state and federal agencies (over 200 volunteers).
- Funds from state and federal agencies.
- Oyster spat appear to recruit on to constructed reefs and growing well.


Adopt-A-Shore
6 TON TILT

Needs substrate!

Despite a an year with heavy rainfall, and high amounts of freshwater discharges (and unfavorable salinities), oyster spat that recruited towards the end of the spawning season survived and grew on constructed reefs

Using oyster-reef metrics as performance targets for restoring freshwater inflow



Summary

- Target organisms / water quality to pick?
- Results used to define formal “performance measures.”
- Oyster reefs currently being built / restored based on prior project results.
- Working collaboratively with resource managers.