

Water Quality at Ria Formosa:

Interactions with Clam Culture

FORWARD Workshop
February 21-22, 2011

**Carlos Vale, Domitília Matias, Florbela Soares, Maria João Botelho,
Miguel Caetano, Manuela Falcão**

IPIMAR

Ria Formosa

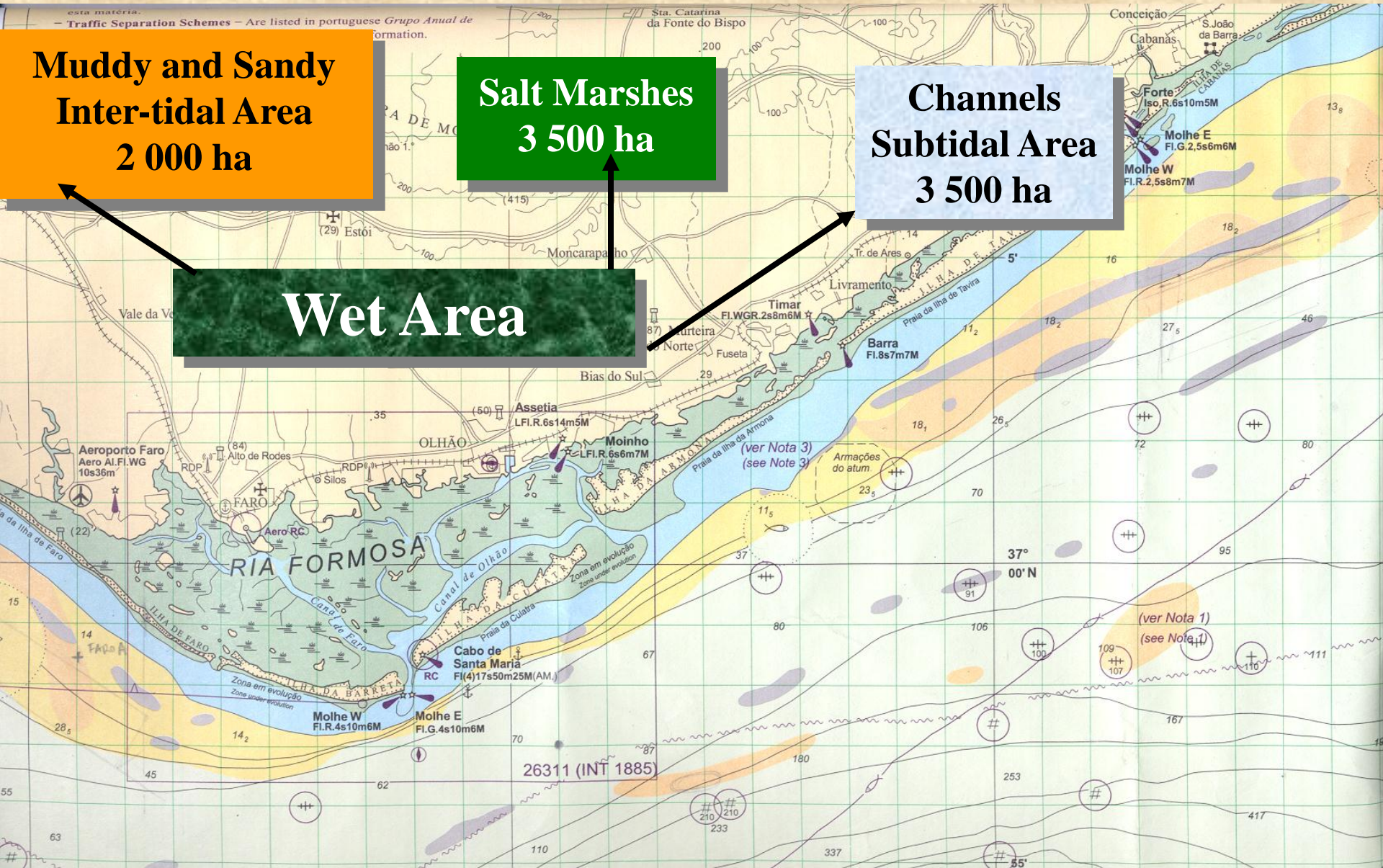
A shallow coastal lagoon with clam culture and permanent exchanges with the sea

**Muddy and Sandy
Inter-tidal Area
2 000 ha**

**Salt Marshes
3 500 ha**

**Channels
Subtidal Area
3 500 ha**

Wet Area



ECONOMIC ACTIVITIES

Living Resources and Aquaculture in the Lagoon

Clam culture (bivalve hand collection)



5 000 ton/year

Cockles hand dredge



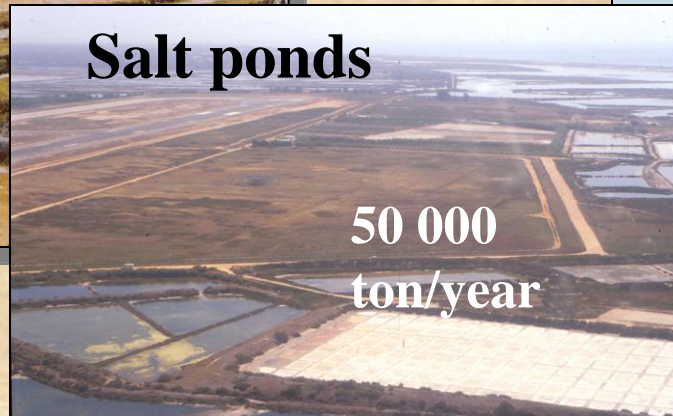
1 500 ton/year

2 000 t/year



Oyster culture

Salt ponds



50 000
ton/year

Fish farming (seabream and seabass)



700 ton/year

Water quality is influenced by

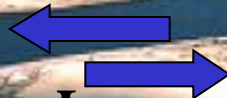
**Sediment-Water
Exchanges**



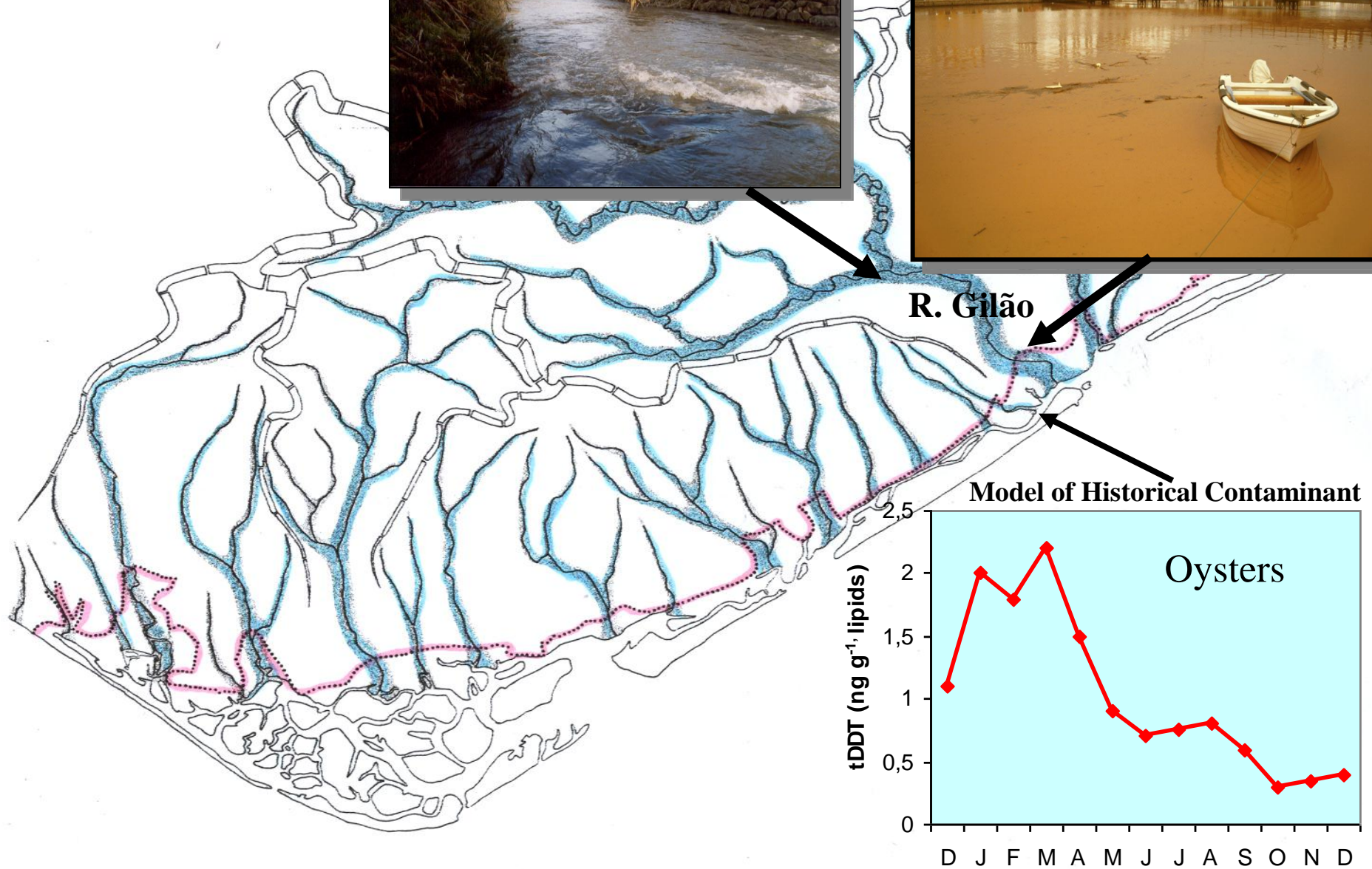
Drainage basin



**Lagoon-Sea
Exchanges**



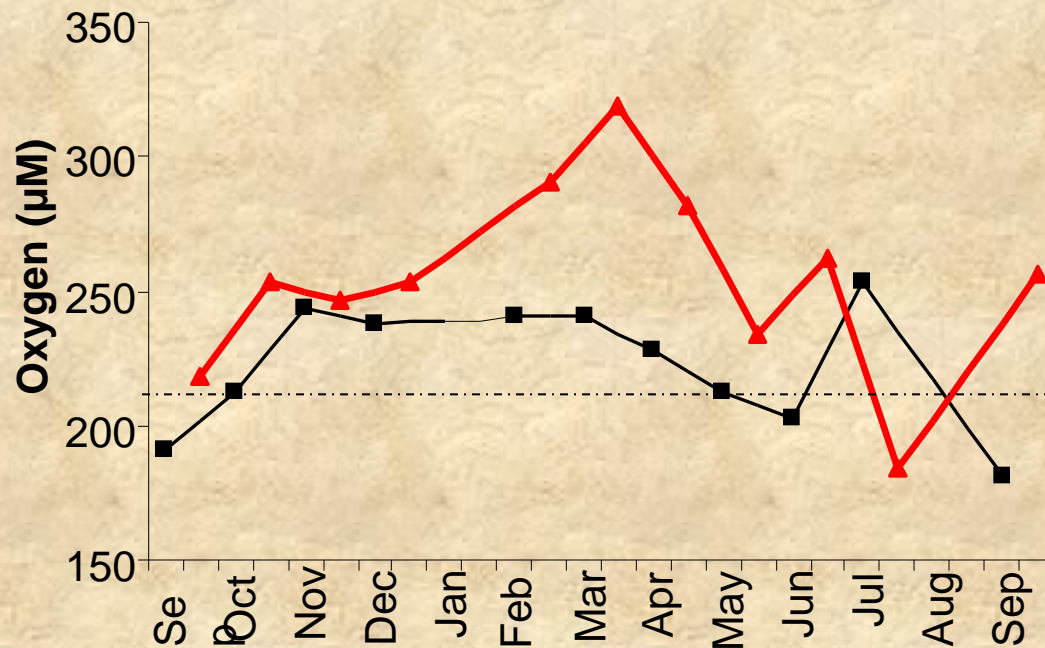
Effect of Torrencial Regime of runoff on the Quality of Bivalves



Well Oxygenated Lagoon Water

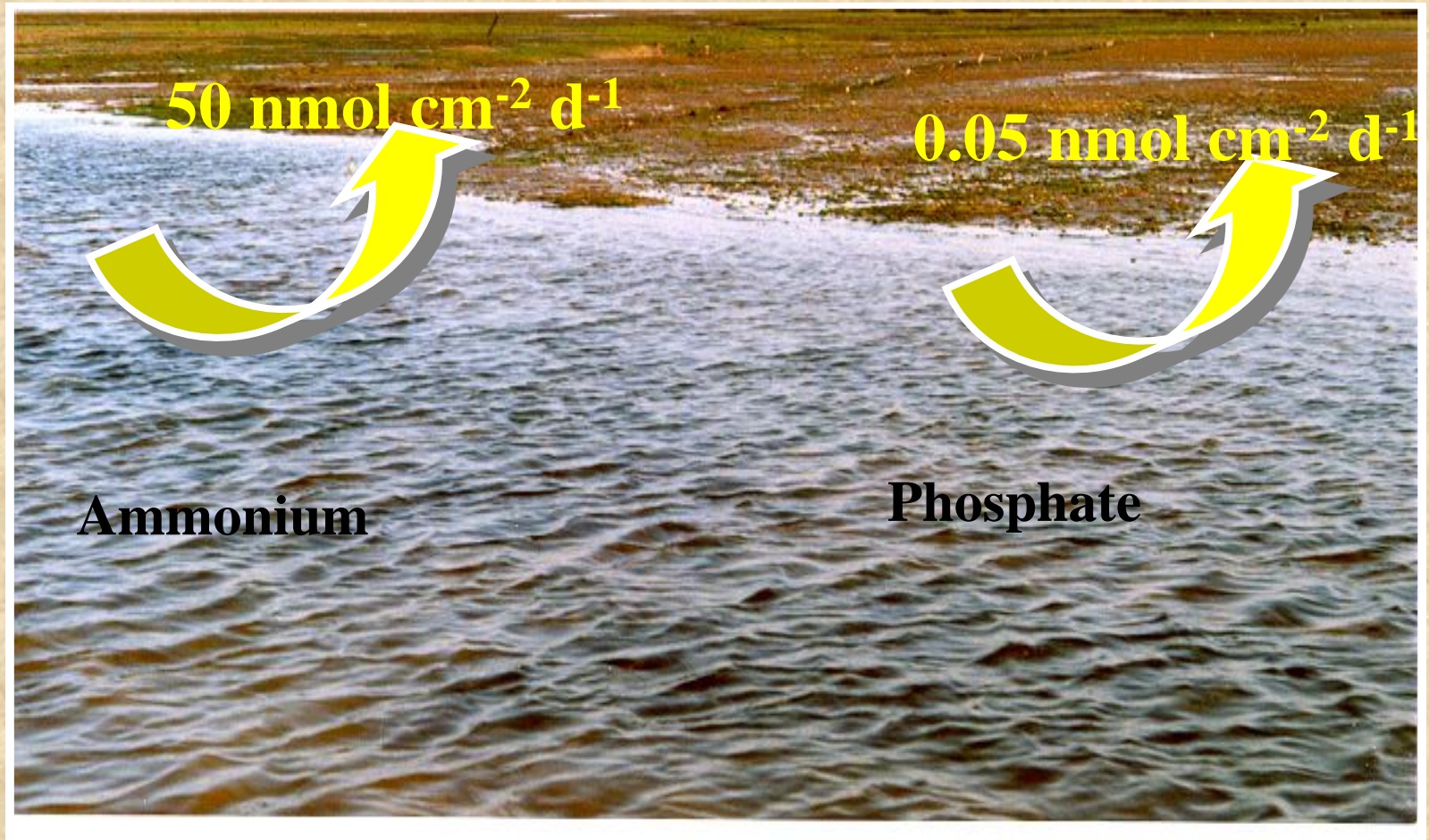
Effect of photosynthesis: higher values in the afternoon

Lower levels in summer (neap tide, night)

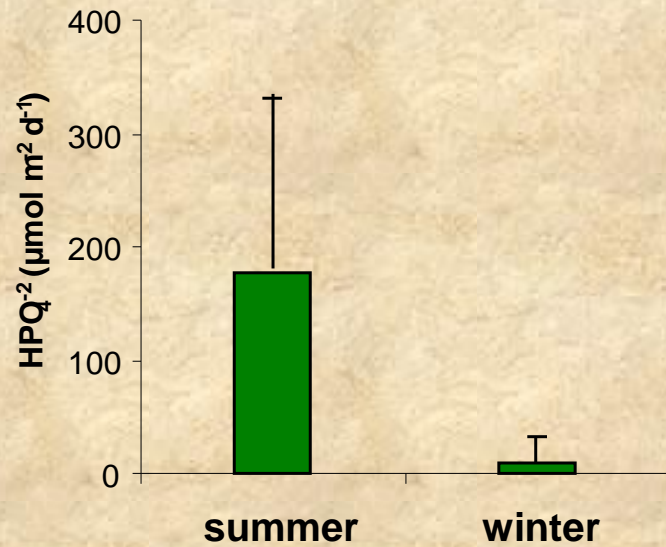


Nutrients in the Lagoon are influenced by clam hand dredging (sediment-water interactions)

**Tidal Flushing over Clam Grounds:
Export of Ammonium and Phosphorus**



Nutrient Fluxes from Clam Grounds differ between summer and winter



Current field experiments: Which symptoms exhibit clams cultured nearby urban and aquaculture effluents?



Small-size clams placed at **25 m²**
grounds



Water Quality and Clams

Observations and Analysis

Monitored Parameters:

Primary production: nutrients, chlorophyll

Contamination in water and sediments: chemicals and toxic algae

Clam conditions: length, weight, condition index, biochemistry, sexual maturation

Clam quality: total coliforms, *E. coli*, chemicals, chemicals and marine toxins

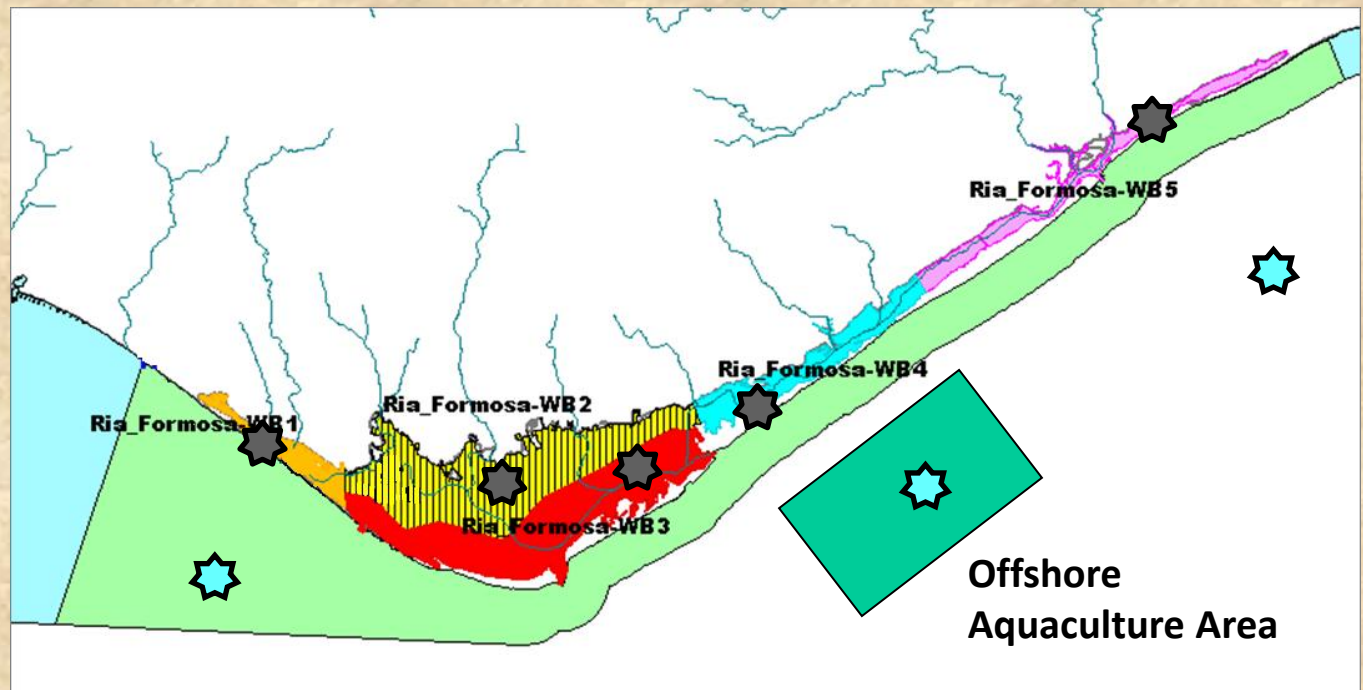


FORWARD and COEXIST interactions

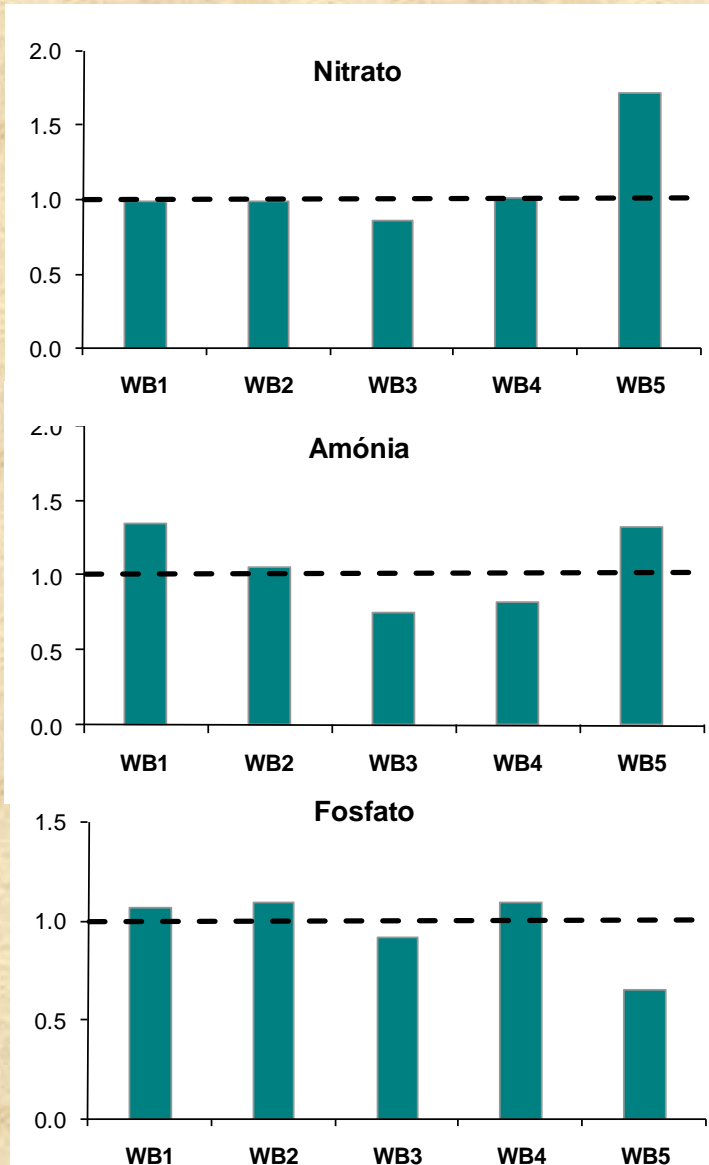
Does Water Quality parameters differ

- (i) inside the Lagoon (**Forward**)?
- (ii) between Lagoon and Coastal Area (**Coexist**)?

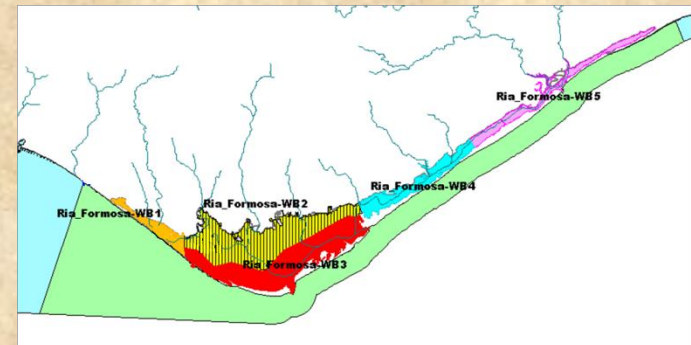
Water Bodies and sampling sites :



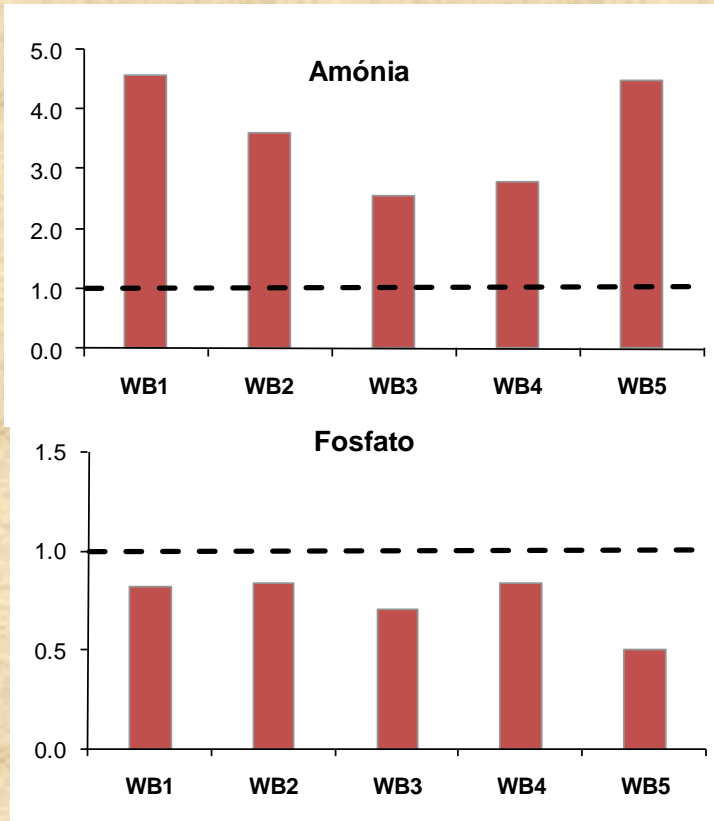
Water Quality parameters: small differences from Median values of Lagoon (Δ to 1.0)



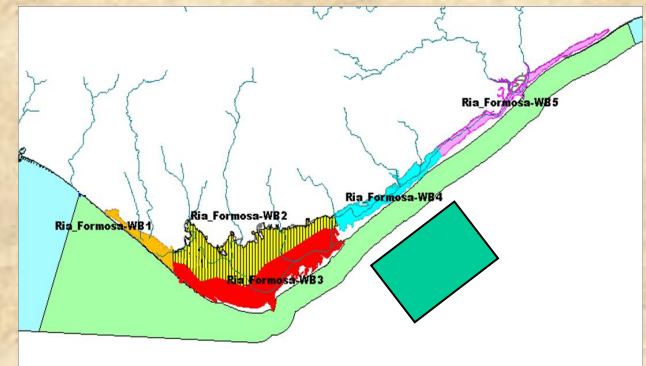
- Homogeneity in the lagoon, on WFD spatial scale



Water Quality parameters: larger differences from Median values of Coastal Waters (Δ to 1.0)



- Lagoon: a source of Ammonium to the coastal area (Offshore Aquaculture Area)
- Lagoon import Nitrate and Phosphate from the sea (Spring)



- Will this paradigm remain after Offshore Aquaculture Production?