The Oyster: Contributions to Habitat, Biodiversity, & Ecological Resiliency

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FLORIDA STATE UNIVERSITY
1851
‘Oysters suffered significant disease-related mortality under high-salinity, drought conditions, particularly in the summer.’ Dermo *Perkinsus marinus*

Factors Affecting Oyster Distribution & Abundance

Physical = River flow

Seasonal River Flow

• Major influence on physical & biological relationships

• Delivers low salinity H2O, turbidity, high nutrient & detritus concentrations

• River flow, when high, can extend far offshore influencing shelf-edge productivity
Factors Affecting Oyster Distribution & Abundance

Competition for space & food at different life stages

- Can be **intraspecific** - oysters competing with oysters - or **interspecific** - other species competing with oysters)
- Can affect settlement patterns, and so alter community structure
- Can reduce oyster density, growth, or physical condition

Oysters eat phytoplankton & other organisms within a small size range, competing with other filter feeders
Factors Affecting Oyster Distribution & Abundance

Species interactions – predation & disease

- Habitat complexity influences ability of predator & prey to locate & capture or avoid each other.
- Oysters can’t avoid predators, so they address predation risk with heavy armor.
- Marine predator invasions (e.g., crown conch oyster drills) tend to occur during high salinity events when river flow is relatively low.

Crown Conch - invaders

Oystercatcher

Oyster drills – economic pests

Bacterial Disease – *Vibrio vulnificus*
What is an Ecosystem Engineer?

It is a **keystone species** that creates, significantly modifies, or maintains habitats in a way that directly or indirectly changes the availability of resources to other organisms

- by their physical structure
  - Oyster Reef
  - Saltmarshes
  - Seagrass Meadows
  - Coral-sponge reefs

- by their activities
  - Beaver building dams
  - Red grouper excavating sea floor
Defining Biological Diversity

Taxonomic Diversity – Who is there?
- shorebirds, fish, crabs, sponges, worms
- juveniles of commercially valuable fish & invertebrates

Functional Diversity – What is their role?
resilience & ecosystem health
resistance to change

Genetic - How do they adapt to change?
Have genetic ability to cope with temperature variation & changes in salinity, air exposure & heavy metals.
Enhancing Water Quality

Removing suspended solids from surrounding waters

1 oyster can filter ~50 gal/day

• Promotes recovery of seagrass habitat
• Reduces harmful algae blooms
• Removes excess nutrients
Providing Natural Coastal Buffers
Stabilizes sediments, reduces erosion, flooding, storm damage

• Protects mangrove, seagrass, and marsh habitats
• Protects coastal property

Oyster protection used by municipalities & military bases in major armament projects
Enhancing Economies
Going beyond seafood

• Increases commercially important fish & invertebrate production
• Increases water quality which increases property values
• Enhances tourism and nature-based recreation industries
Oyster Reefs Threatened World Wide
% loss in estuaries & coastal seas compared to pristine state

Data from Jackson (2008). Ecological extinction & evolution in the brave new ocean. PNAS.
Global Condition of Oyster Reefs – 85% loss
Poor management, poor water quality, coastal development