

# Seagrasses: An Overview and Current Research

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# **Outline**

## **Introduction to Seagrasses and Seagrass Ecosystems**

- \* Nursery Role of Seagrasses**
- \* Herbivory**
- \* Top Down vs. Bottom Up Control**
- \* Importance of Water Clarity**
- \* Habitat Fragmentation**

# Seagrasses are:

- Clonal flowering plants with submarine pollination that form large meadows along the coasts of all continents except Antarctica
- Species poor, with only 58 species known from 11 genera
- Often extraordinarily productive
- Understudied by plant biologists





**Thalassia and Syringodium**

# Thalassia Flowering Shoot



# Seagrasses of the Mobile Bay and Mississippi Sound

*Vallisneria americana*

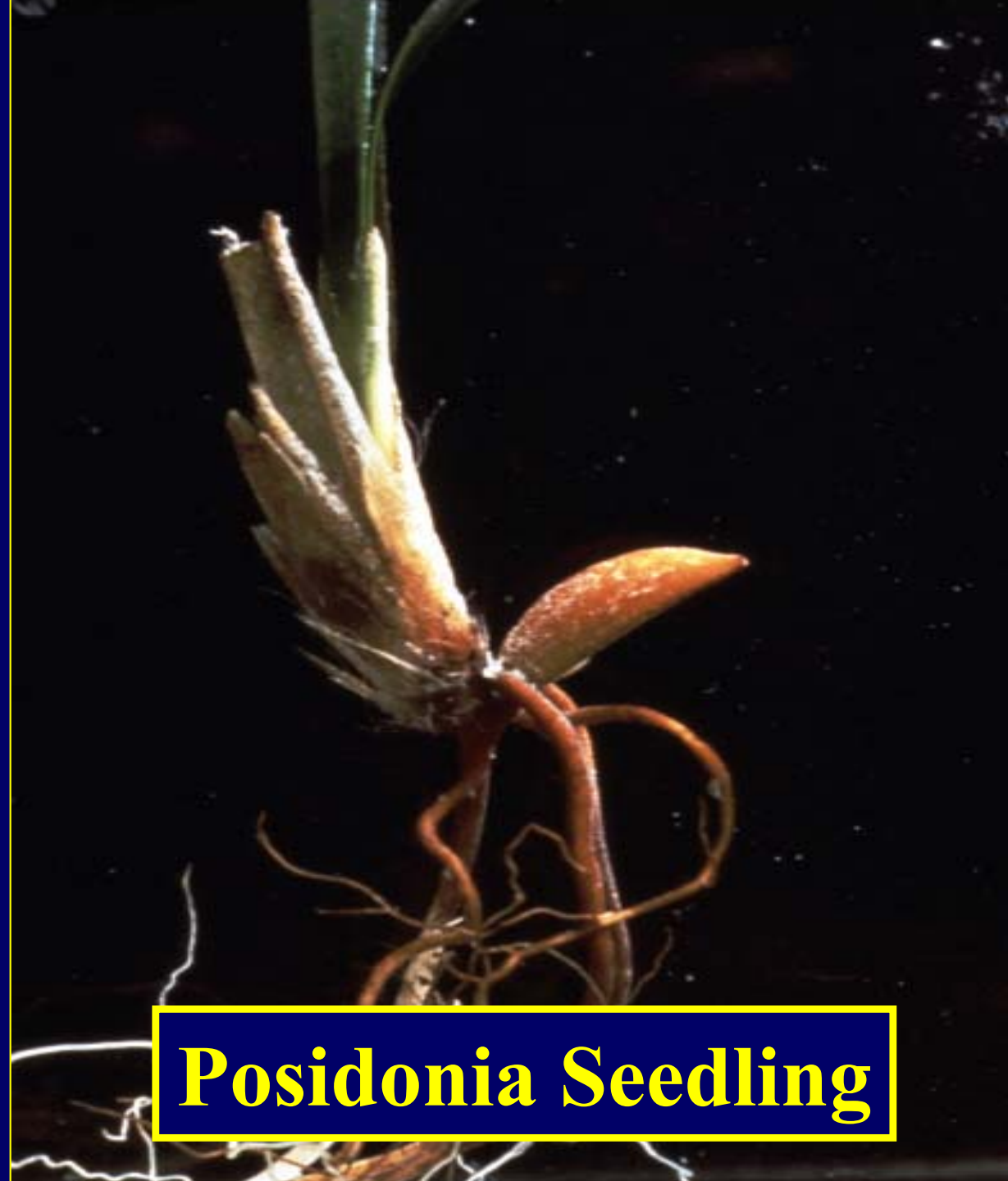


*Ruppia maritima*



*Halodule wrightii*





**Posidonia Seedling**





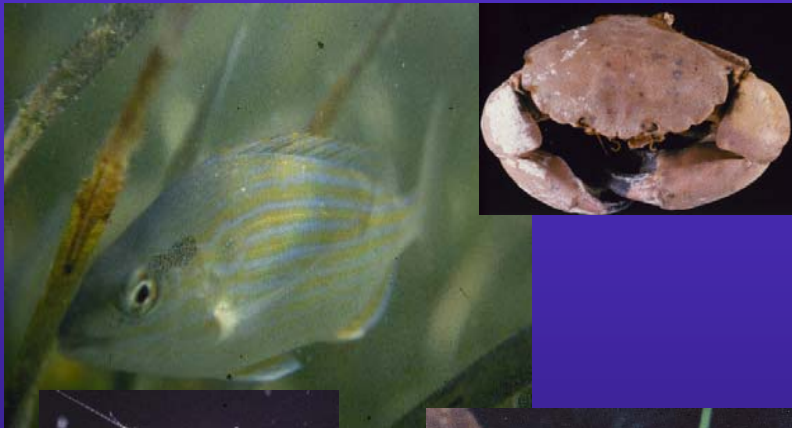
gae

lea

rhizo

# Seagrasses as habitats

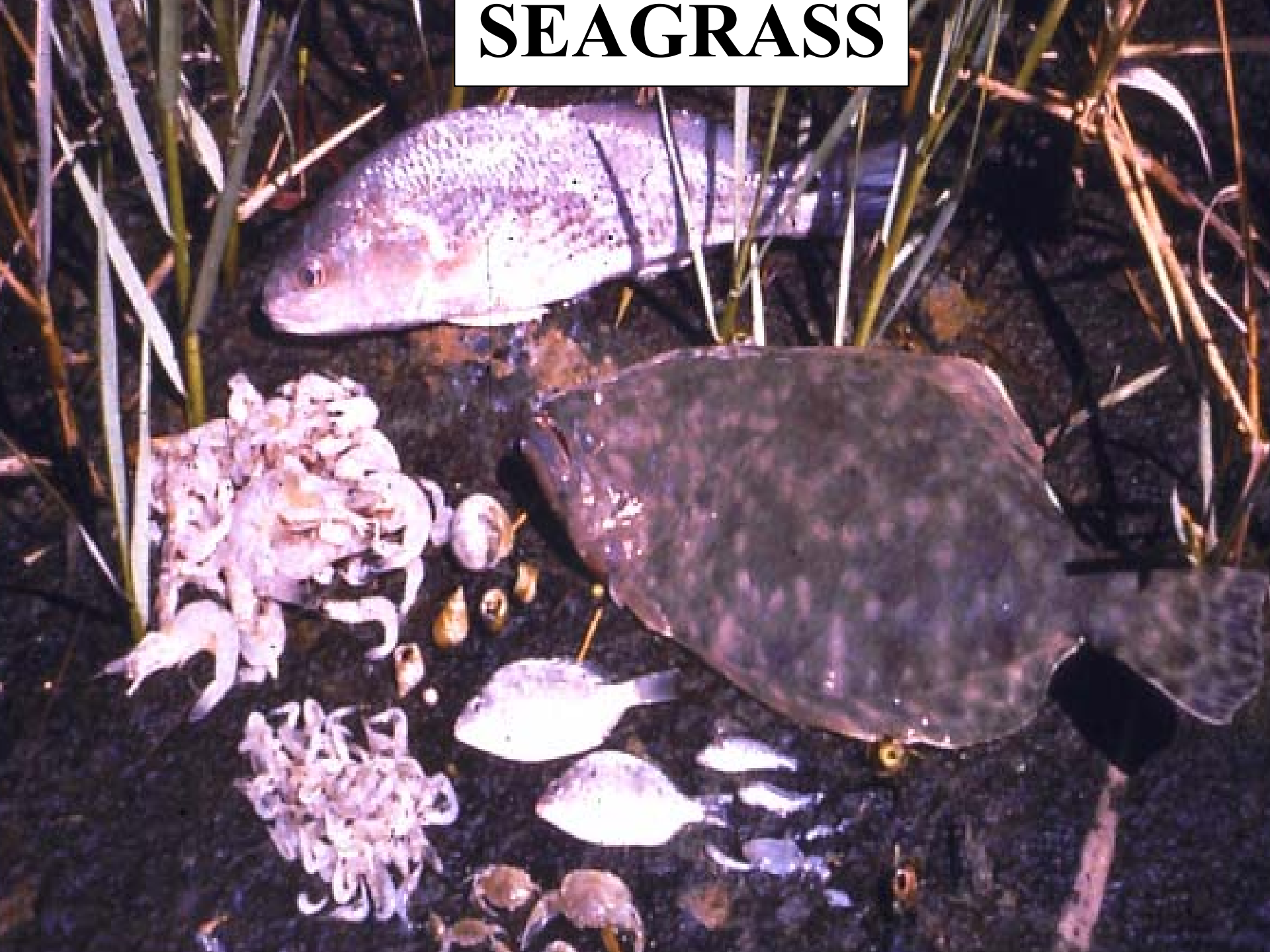
- Seagrasses often support diverse and abundant assemblages of small fishes and invertebrates
  - often densities of these organisms are 1 to 3 orders of magnitude greater than on nearby unvegetated substrates

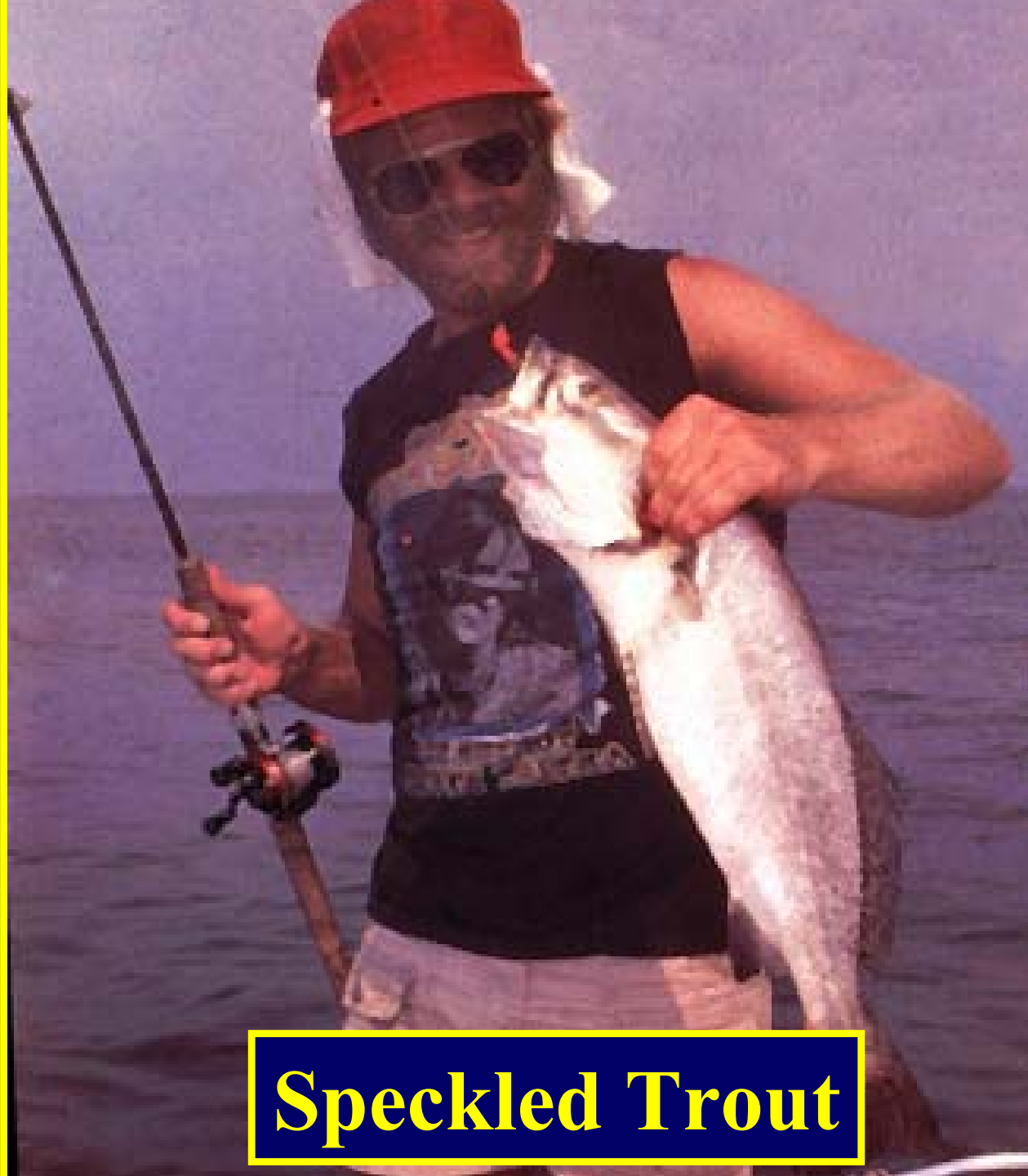




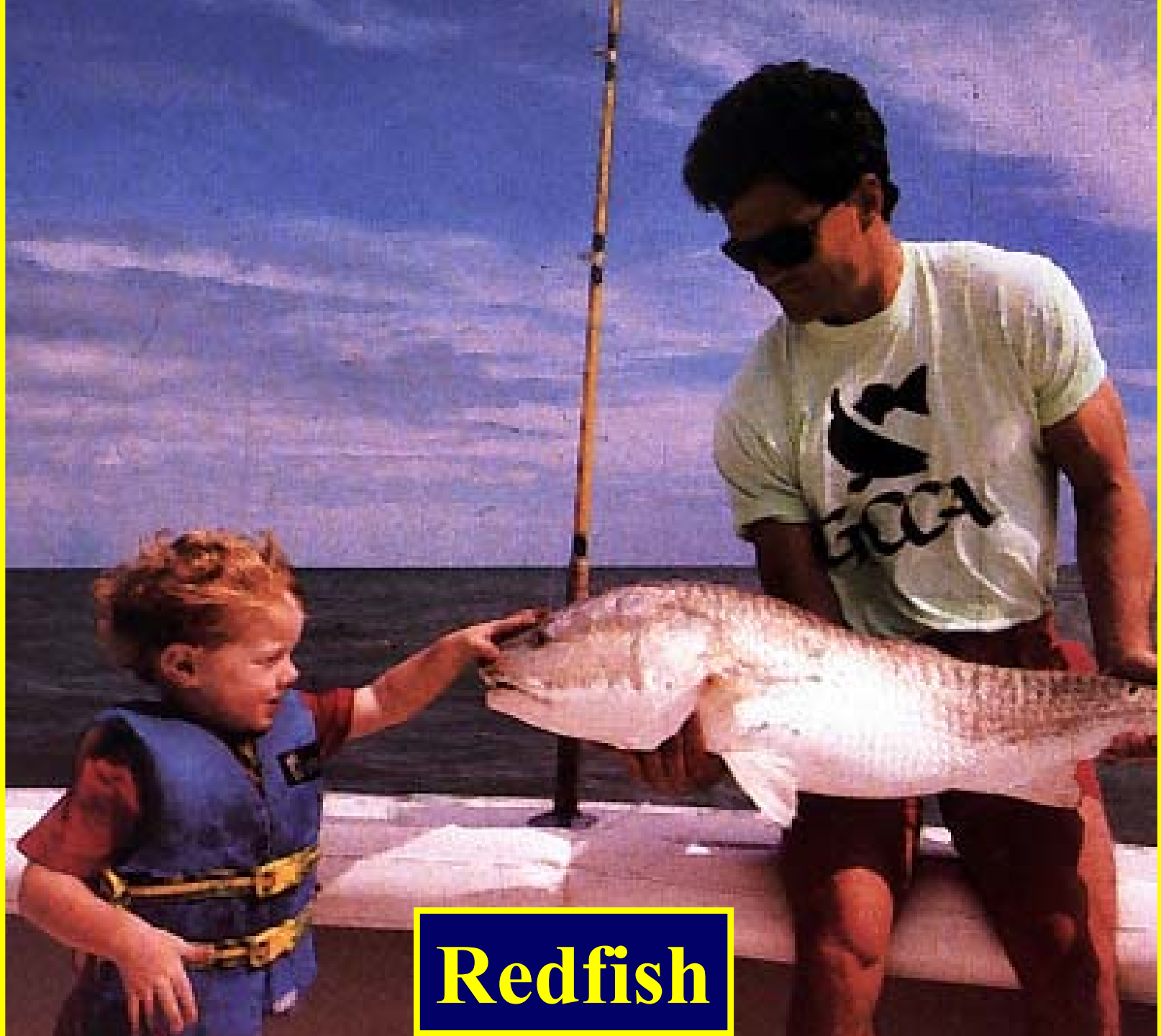
MUD CRAB

# SEAGRASS





**Speckled Trout**



**Redfish**

# Mangrove Snapper



# Yellowfin Grouper





# Shrimp

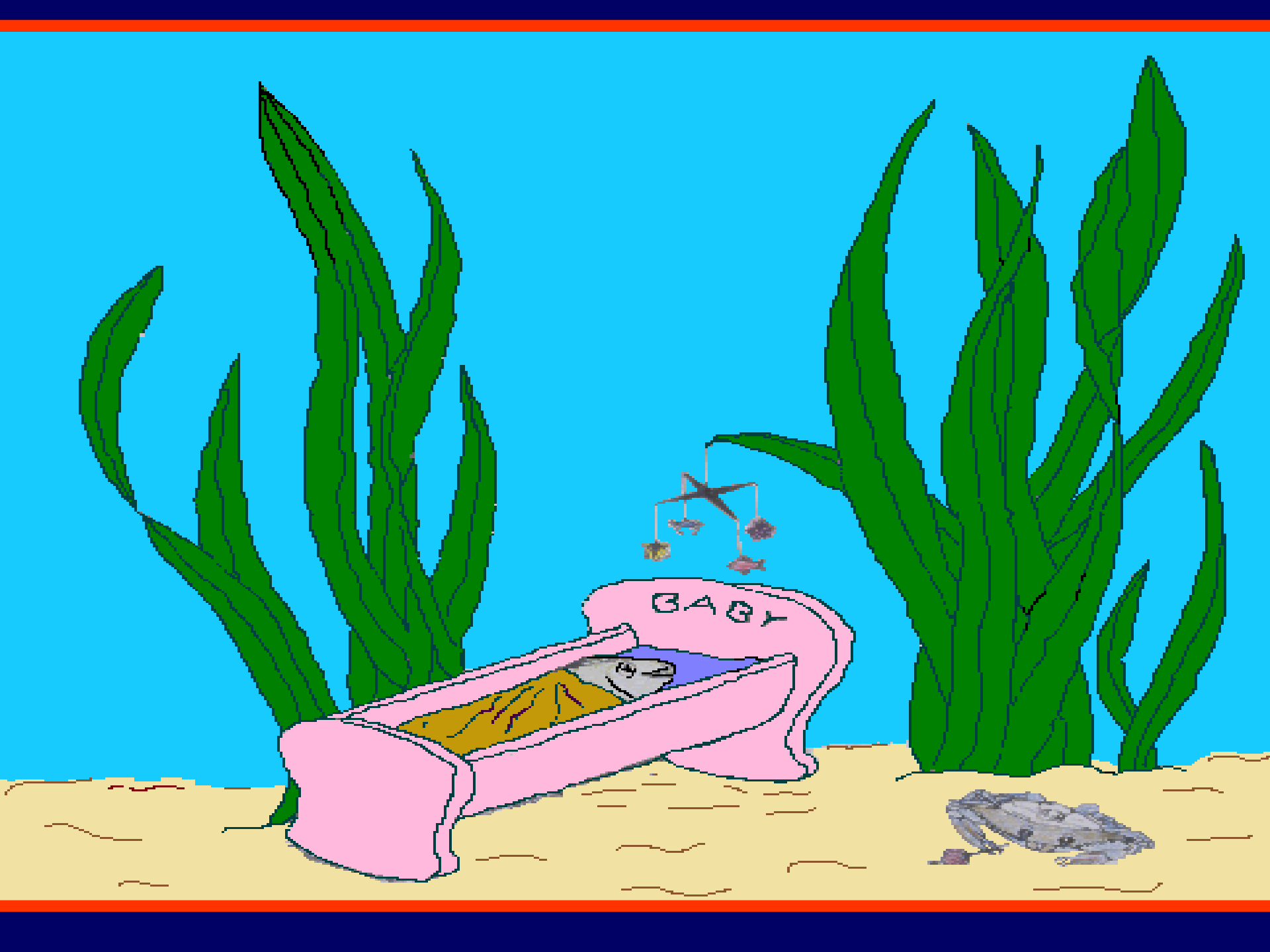


# Blue Crabs



# Scallops





# **Nursery Role Of Seagrasses**

- **Protection from Predators**
- **Higher Growth Rates**

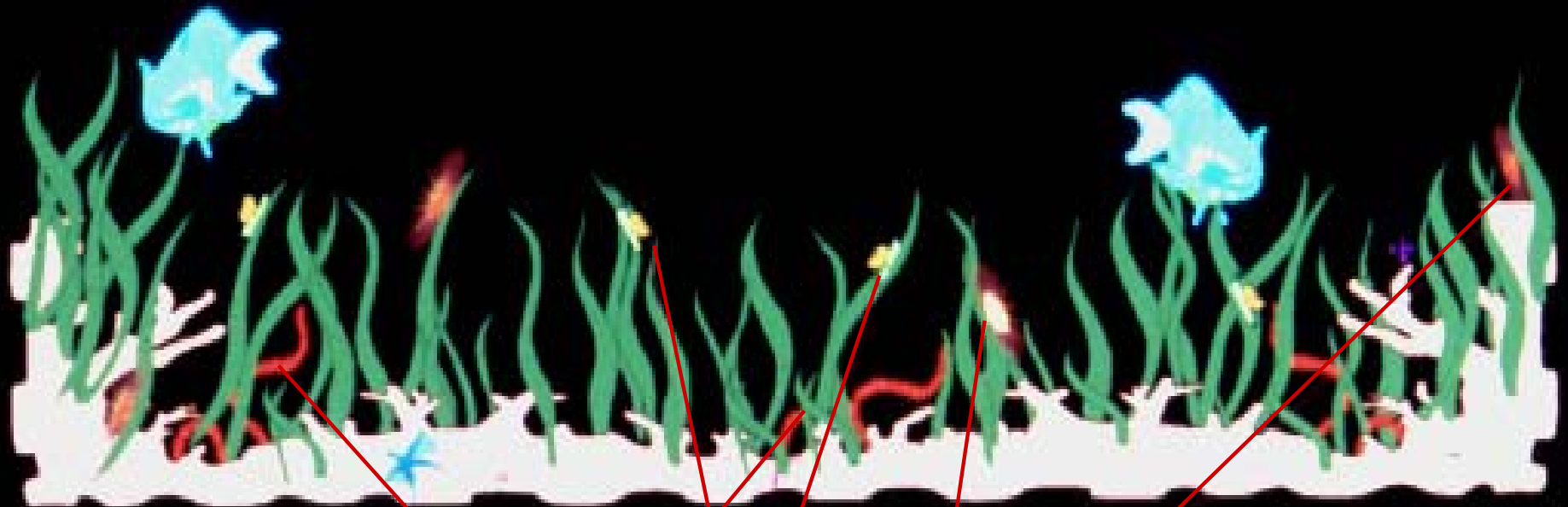
# Proposed Gradient in Seagrass Nursery Role for Economically Important Species



(Various Sources)

# Herbivory

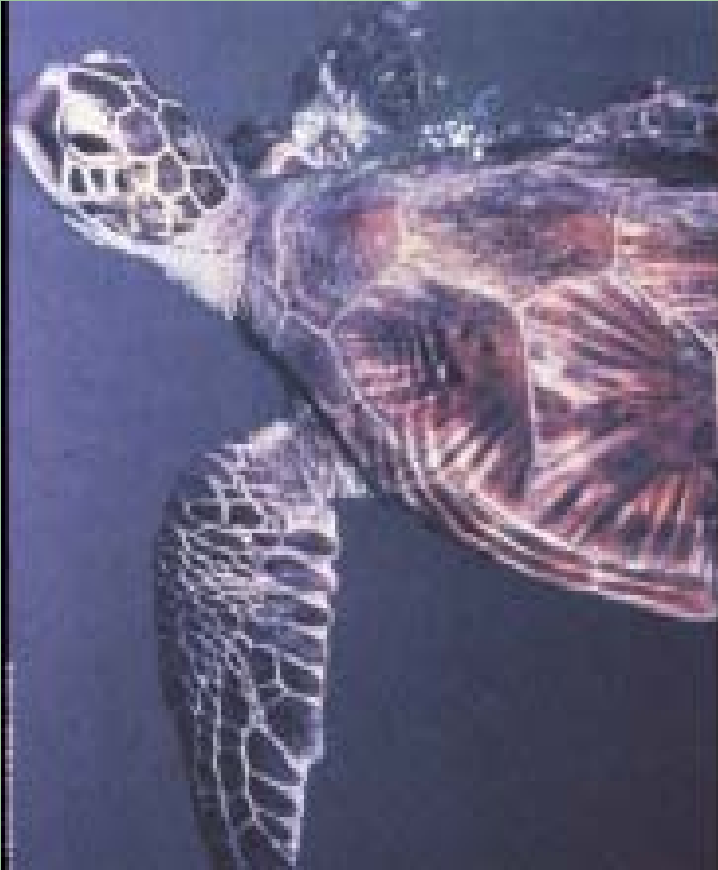
# Pathways of energy flow in a seagrass ecosystem







# Seagrass Food Webs Were Once Dominated by Megaherbivores



**Green Turtles**



**Manatees**

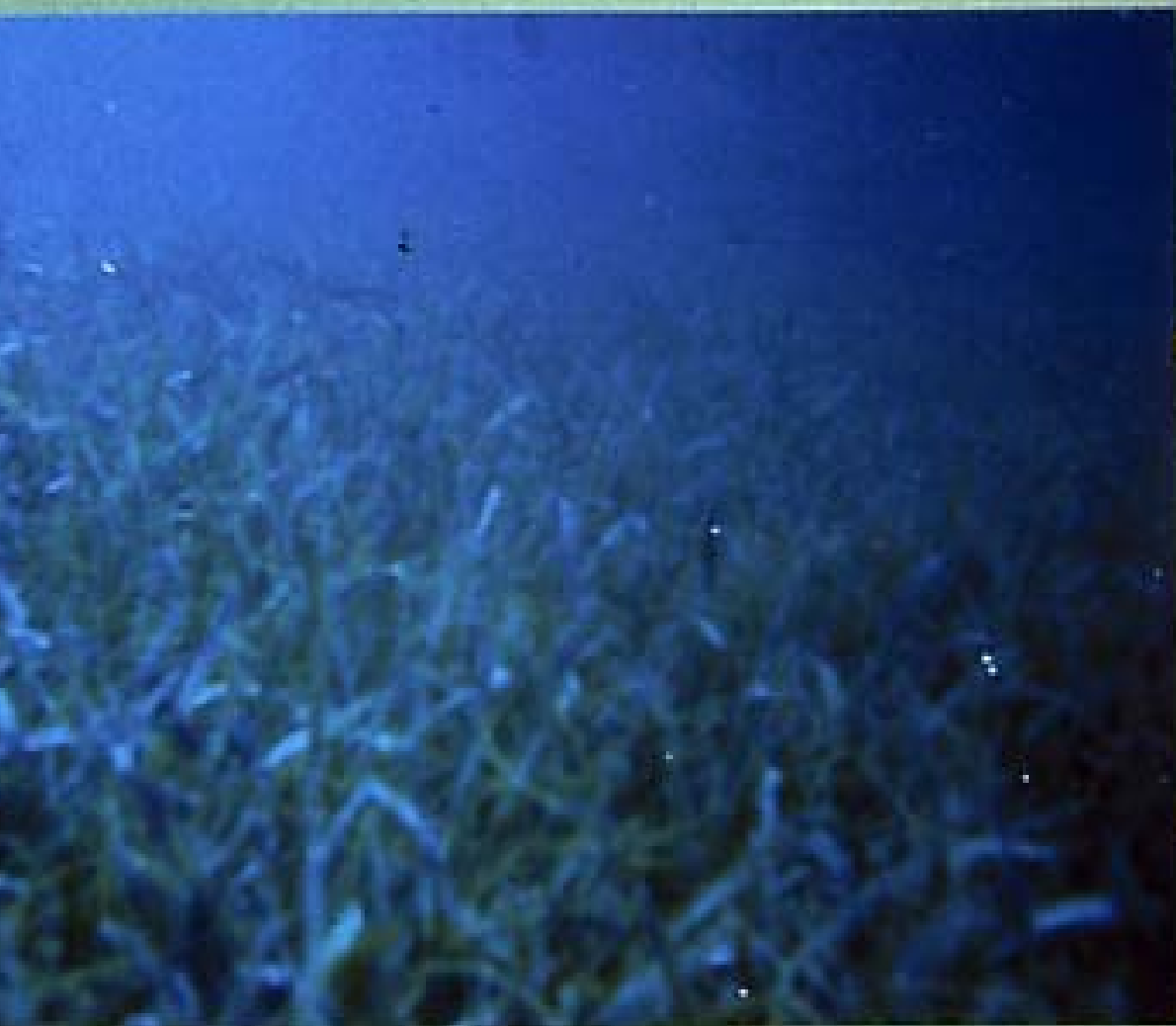




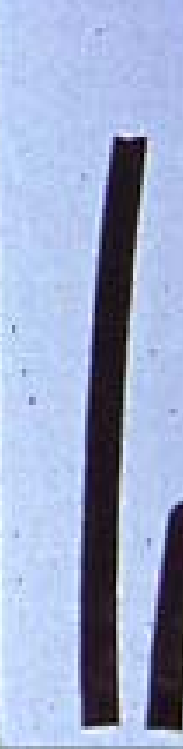




Seagrass Herbivory:  
is underestimated importance



**Parrotfish Bite:**



**Urchin Bite:**



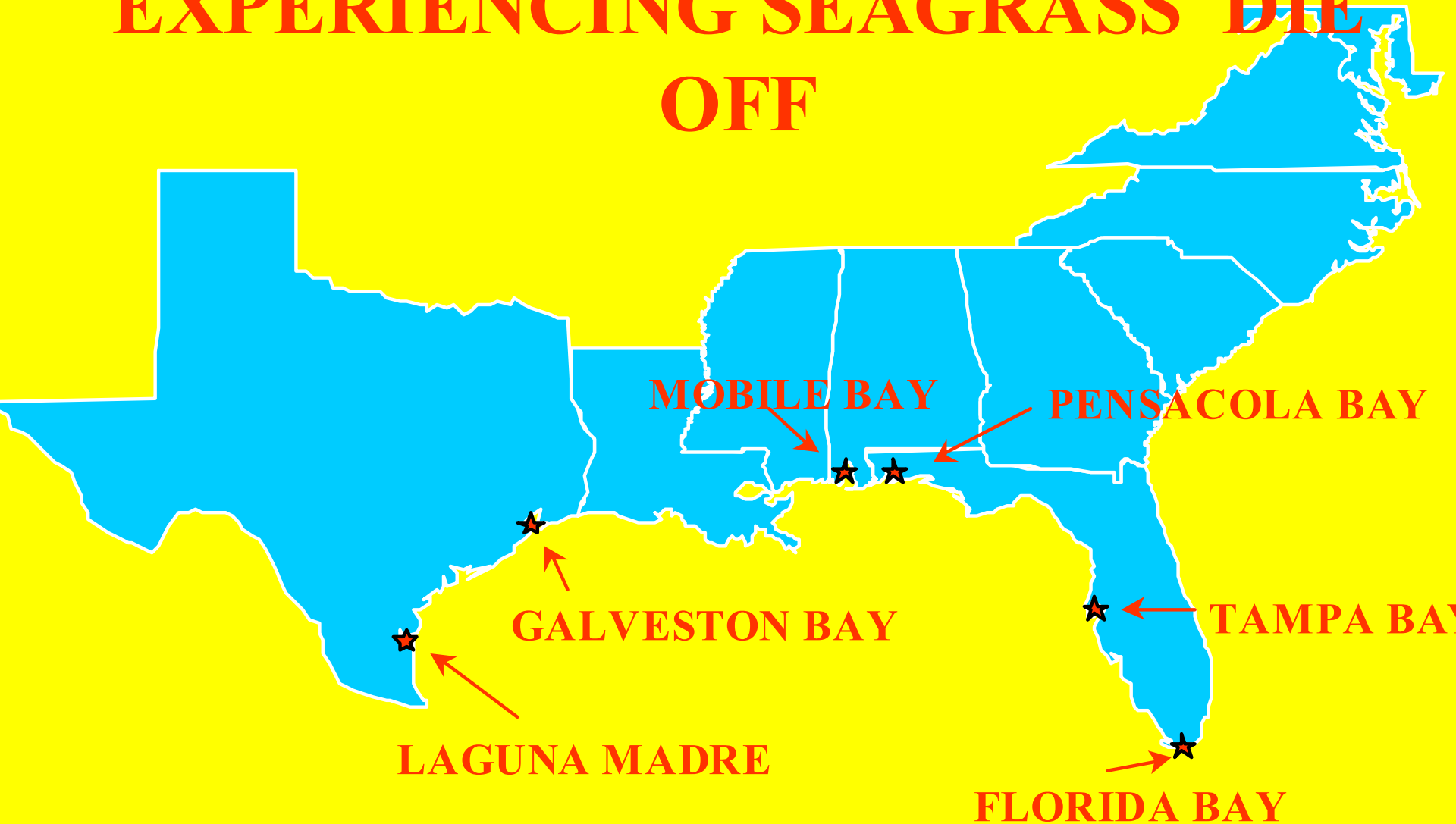
**Top Down vs. Bottom Up  
Controls Theories to Explain  
Seagrass Loss**



# Sites of Significant Seagrass Loss



# AREAS IN THE GULF OF MEXICO EXPERIENCING SEAGRASS DIE OFF



# Bottom - up Control (Eutrophication)

**Nutrients Increase**

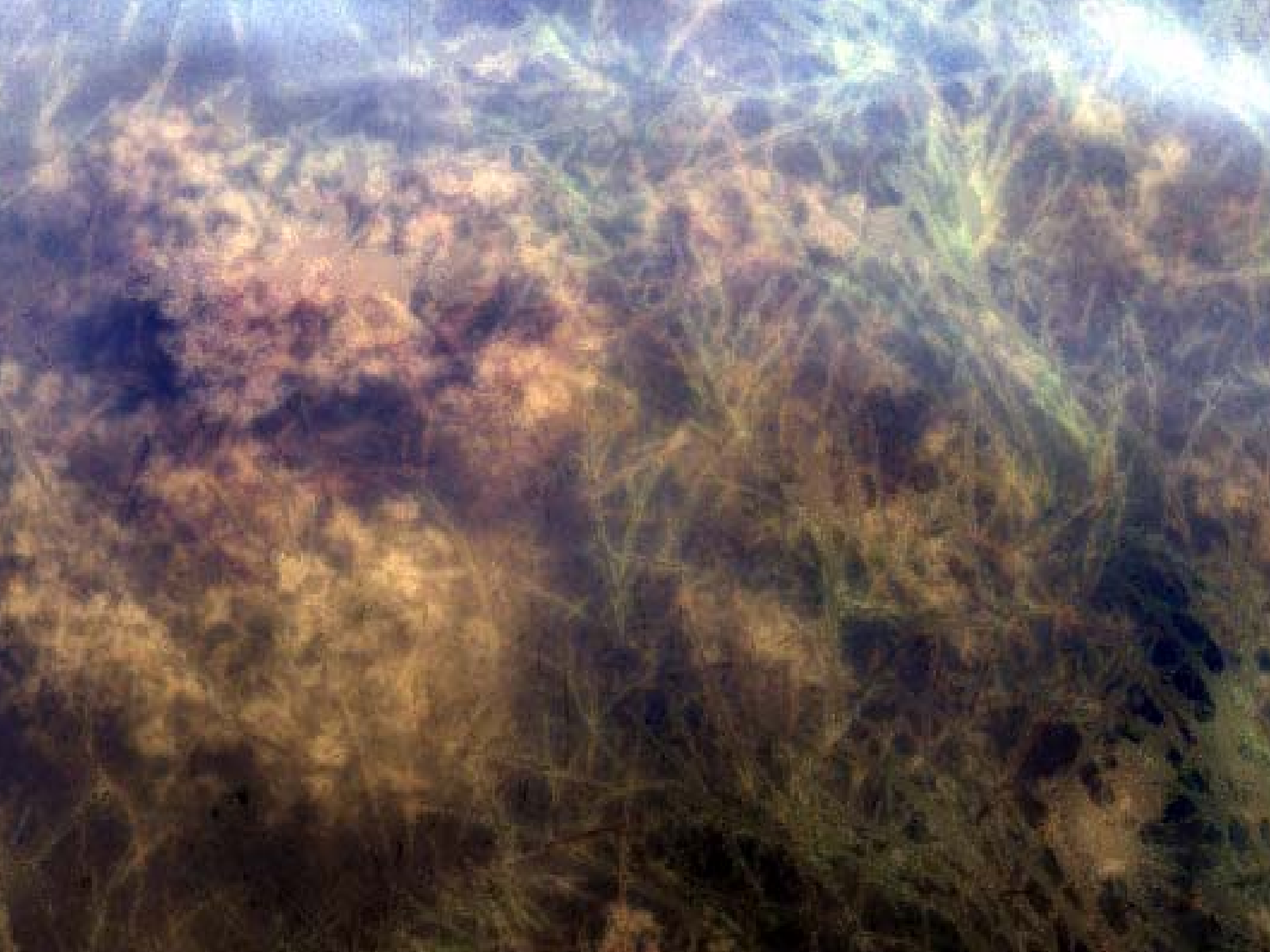


**Epiphytes Increase**



**Seagrass Loss**





# Top-Down Control (Overfishing)

**Fewer fish due to overfishing**



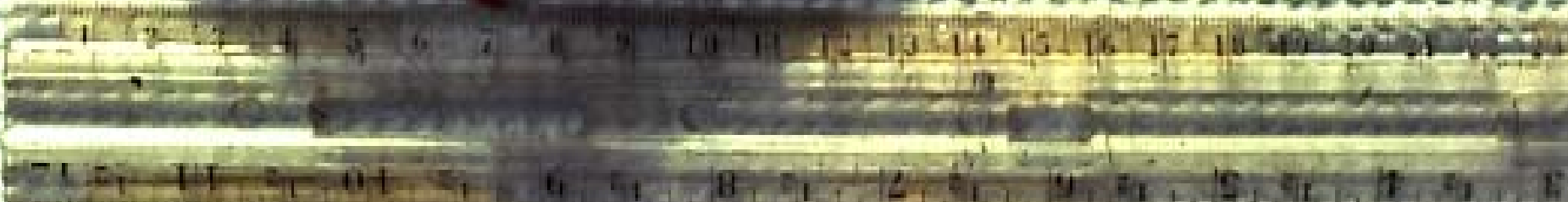
**Greater number of smaller predators (pinfish)**



**Fewer grazers of epiphytic algae  
(gastropods, amphipods, etc.)**



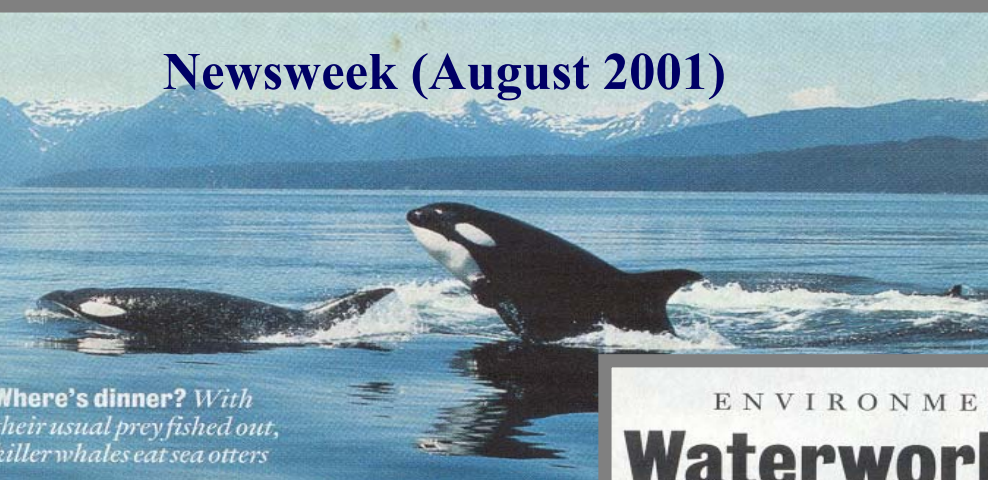
**Seagrass Loss**



# Effects of Overfishing on Marine Ecosystems

**Historical Overfishing and the Recent Collapse of Coastal Ecosystems-** *Jackson et al. 2001, Science 293: 629-638*

**Newsweek (August 2001)**



*Where's dinner? With their usual prey fished out, killer whales eat sea otters*

Science & Technology 9/10/01

## **Deep Trouble**

*Overfishing has torn the sea's web of life. Mending it won't be easy*

BY THOMAS HAYDEN [usnews.com](http://usnews.com)

ENVIRONMENT

## **Waterworld**

Fishing, not pollution, has decimated the seas



# Potential Causes of SAV Die-Off

**Eutrophication  
(Bottom Up)**

**Overfishing  
(Top Down- Trophic Cascade)**

**+ NUTRIENTS**

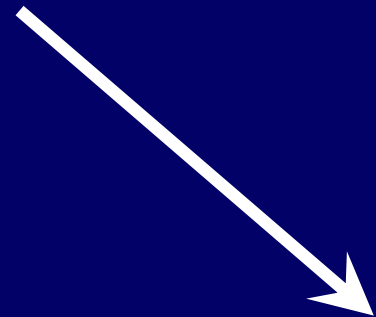
**- LARGE PREDATOR**

**+ SMALL PREDATOR**

**- MESOGRAZERS**

**+ EPIPHYTES**

**- SUBMERGED AQUATIC VEGETATION**



# Conclusions

**Nutrient enrichment is unlikely to cause algal overgrowth of seagrasses and subsequent seagrass loss, unless additional factors substantially reduce small grazer abundances.**

# Implications

**Reducing nutrient input into coastal waters is unlikely to increase seagrass abundance where grazer numbers are significantly lower than historical averages.**

# **Importance of Water Clarity**







**Ambient Light Treatment**

**Shaded Light Treatment**







# Habitat Fragmentation







# Artificial Seagrass Units (ASUs)



# Study Significance

- **Better understand the impacts of fragmentation on the structure and function of seagrass habitats.**
- **Aid in the prediction of benefits to seagrass animals from different seagrass restoration plans.**

# Seagrass= Fish Production

