Seagrasses: An Overview and Current Research

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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
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
SEAGRASS
Redfish
Mangrove Snapper
Scallops
Nursery Role Of Seagrasses

• Protection from Predators

• Higher Growth Rates
Proposed Gradient in Seagrass Nursery Role for Economically Important Species

(Various Sources)
Pathways of energy flow in a seagrass ecosystem
Seagrass Food Webs Were Once Dominated by Megaherbivores

Green Turtles

Manatees
Seagrass Herbivory: it’s underestimated importance
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

- LAGUNA MADRE
- GALVESTON BAY
- MOBILE BAY
- PENSACOLA BAY
- TAMPA BAY
- FLORIDA BAY
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


Newsweek (August 2001)

Deep Trouble
Overfishing has torn the sea’s web of life. Mending it won’t be easy

BY THOMAS HAYDEN usnews.com
Potential Causes of SAV Die-Off

Eutrophication
(Bottom Up)

- + NUTRIENTS
- + EPIPHYTES
- - SUBMERGED AQUATIC VEGETATION

Overfishing
(Top Down- Trophic Cascade)

- - LARGE PREDATOR
- + SMALL PREDATOR
- - MESOGRAZERS
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.
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