Seagrass Beds of the Indian River Lagoon[1]

Jorge R. Rey and C. Roxanne Rutledge[2]

What are Seagrasses?

Seagrasses are flowering vascular plants that inhabit shallow areas of oceans, estuaries, and lagoons worldwide (Figure 1). They are the only flowering plants that live their entire lives totally in seawater. Seagrass beds are one of the most important habitats of the Indian River Lagoon.

Figure 1. Seagrasses are flowering plants.

Although seagrasses are flowering plants and produce seeds through sexual reproduction, the major mode of reproduction is asexual, through extension of underground parts. Thus, seagrass beds are composed of one to many clones, each of which can be quite extensive.

Major parts of a typical seagrass (Figure 2) include the blade, which is the main photosynthetic organ, and the short shoot, which is analogous to a land plant stem. The rhizomes are mostly underground organs that function in anchoring the plant to the subtrate, in the movement of nutrients and waste products throughout the clone, and in extension and asexual reproduction of the clone. The roots function as anchoring devices and also absorb nutrients and excrete waste products.

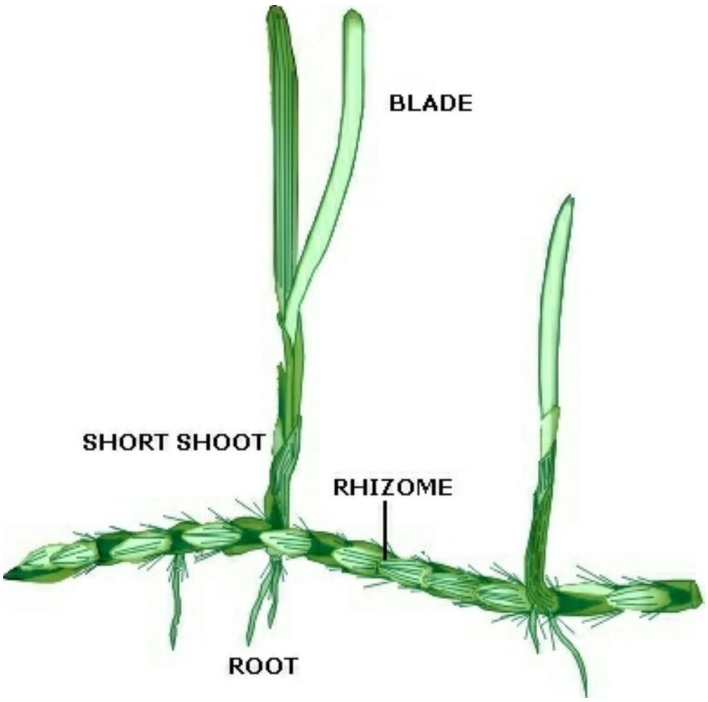

Figure 2. Seagrass Parts.

1. This document is ENY-647, one of a series of the Entomology and Nematology Department, UF/IFAS Extension. Original publication date August 2001. Revised January 2006 and September 2013. Visit the EDIS website at http://edis.ifas.ufl.edu.

2. Jorge R. Rey, professor, and C. Roxanne Rutledge, assistant professor, Entomology and Nematology Department, Florida Medical Entomology Laboratory, Vero Beach, UF/IFAS Extension.

Resources and Sunlight

Seagrasses are green plants, and as such, need sunlight for photosynthesis. Patterns of resource allocation in seagrasses can vary seasonally (Dawes et al. 1979, Best and Visser 1987, Madsen 1991). Stored resources, such as soluble carbohydrates, are often important for maintenance of seagrasses during unfavorable conditions and for regrowth after diebacks or winter dormancy (Dawes and Lawrence, Olessen and Sand-Jensen 1993). Resource stores may also reflect ambient conditions, declining during unfavorable, and increasing during favorable periods (Tomasko and Dawes 1989, Rey and Stephens 1996), and thus, may be used as indicators of present and (short-term) past habitat suitability for seagrasses.

In the IRL, as in many of the nation's estuaries (Koch et al. 1974, Buesa 1990, Gordon et al. 1994) light availability appears to be the most important factor affecting seagrass abundance (Rice et al. 1983, Short et al. 1993). In the Lagoon, light transmittance through the water column is typically low (Howard and Short 1986) and conditions are often near the lower limits for seagrass growth. Thus, any factor that further diminishes light availability for seagrasses can have important consequences.

Indian River Lagoon Seagrasses

Seven species of seagrasses can be found in the Indian River Lagoon:

- Turtle Grass - *Thalassia testudinum* (Figure 3).
- Shoal Grass - *Halodule wrightii* (Figure 4).
- Manatee Grass - *Syringodium filiforme* (Figure 5).
- Johnson's Sea Grass - *Halophila johnsoni* (Figure 6).
- Star Grass - *Halophila engelmannii,* (Figure 7).
- Paddle grass - *Halophila decipiens* (Figure 8).
- Widgeon Grass - *Ruppia maritima* (Figure 9).

The most common species in the IRL are shoal grass and manatee grass, with turtle grass and *Halophila* spp. usually accounting for less than 5% of the seagrass cover (Thompson 1978; Virnstein and Carbonara 1985). Widgeon grass is also common, but tends to occur in less salty areas than the others. Although turtle grass is sparsely distributed, it may form dense beds at some locations, particularly towards the southern end of the lagoon.

Figure 3. Turtle Grass, *Thalassia testudinum*.

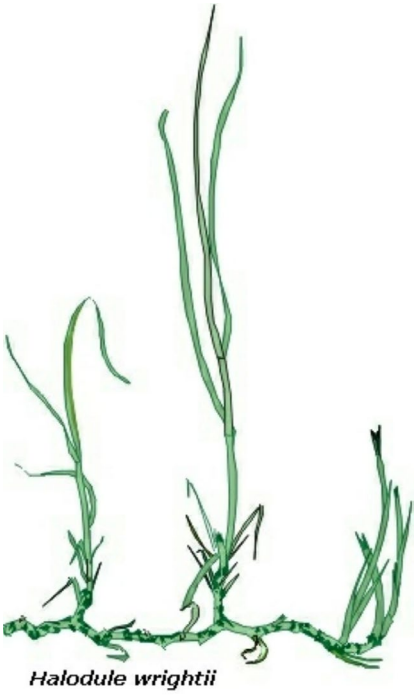

Figure 4. Shoal Grass, *Halodule wrightii*.

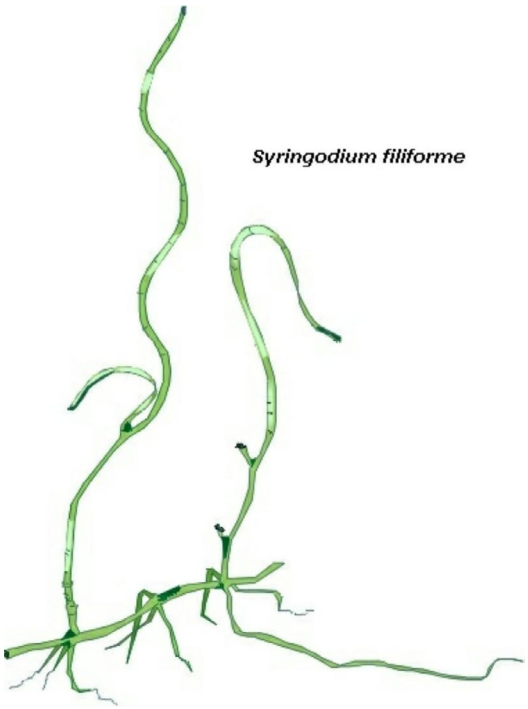

Figure 5. Manatee Grass, *Syringodium filiforme.*

Figure 6. Johnson's Sea Grass, *Halophila johnsonii.*

Figure 7. Star Grass, *Halophila engelmannii.*

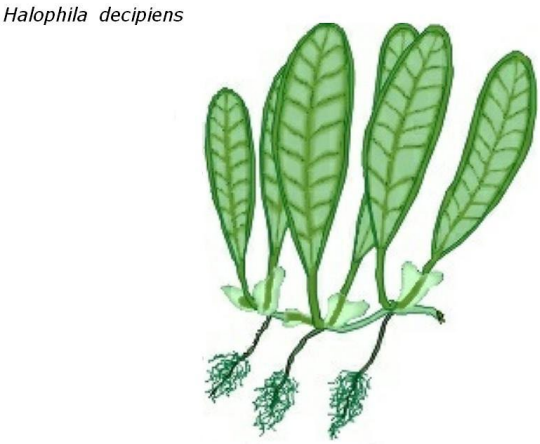

Figure 8. Paddle Grass, *Halophila decipiens*.

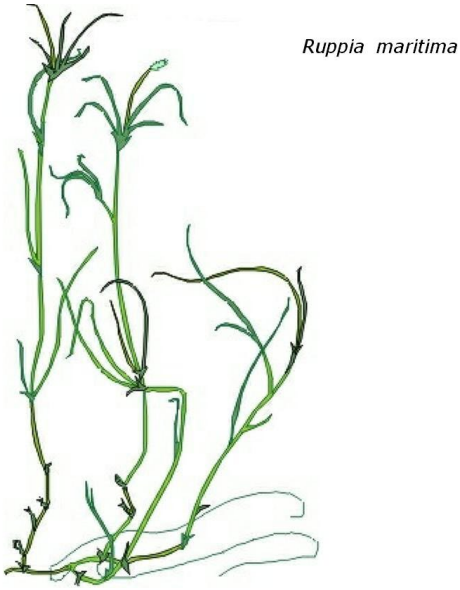

Figure 9. Widgeon Grass, *Ruppia maritima*.

Impacts to Seagrasses

Over the past 20 years, losses of seagrasses along the lagoon have been severe, with some areas losing up to 95 percent of their coverage. Other areas, however, have remained stable and productive. Reduced light transmittance through the water column has been one of the major factors implicated in losses of seagrass coverage. Seagrass loss due to light attenuation usually starts at the outer (deeper) edge of the beds, where the light reaching the plants is only marginal, and progresses towards the shallower regions as conditions deteriorate. Several factors are important in reducing light penetrating to a given depth of the water column:

- Absorption by other floating vegetation.
- Suspended and dissolved substances.
- Color due to dissolved organic materials.
- Eutrophication (excessive organic production and nutrient content).

Phytoplankton (tiny floating plants) and algal blooms are often caused by increased nutrient loads from sewage discharges and from agricultural and residential fertilizers, which run off into the lagoon. Increased nutrient levels also cause an increase in the density of epiphytes (organisms that attach to the seagrass blades and block light).

Suspended particles are introduced into the water column via runoff from commercial, agricultural, and residential areas, and also from activities within the estuary such as dredging and sediment resuspension caused by boat propellers. Dissolved material has many sources, including residential and commercial pesticides and fertilizers, marsh vegetation, and others. Some of these materials, such as pesticides, herbicides and industrial and commercial runnoff are also directly toxic to seagrasses and may cause localized die-backs in exposed seagrass beds.

Human activity has other direct impacts upon segrasses; For example, outboard motors can can cause long lasting "scars" and eliminate seagrasses from large, heavily used areas. Commercial shellfish harvesting can also cause considerable damage and local elimination of seagrasses. Dredging and filling for residential /commercial construction, and for navigation can result in direct removal of potential seagrass habitat.

Seagrass Protection

Seagrass protection and preservation are integral parts of most estuarine management systems including the Indian River Lagoon National Estuary Program (Hart 1992, IRLNEP 1996), and the Florida Surface Water Improvement and Management Program (SWIM, Virnstein and Morris 1996). In the Indian River Lagoon, in east central Florida, seagrasses provide the base for a fishery industry worth approximately one billion dollars yearly (Virnstein and Morris 1996). More information on management and protection of seagrasses can be found at: http://www.cop.noaa.gov/pubs/das/das12.pdf.

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