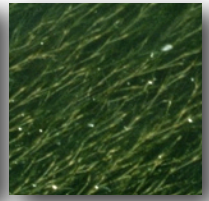
Our Texas Seagrasses

Halodule wrightii

Shoal grass

Halophila engelmannii

Star grass



Ruppia maritima

Widgeon grass

Thalassia testudinum

Turtle grass

Syringodium filiforme

Manatee grass

TEXAS COASTAL BAYS AND ESTUARIES

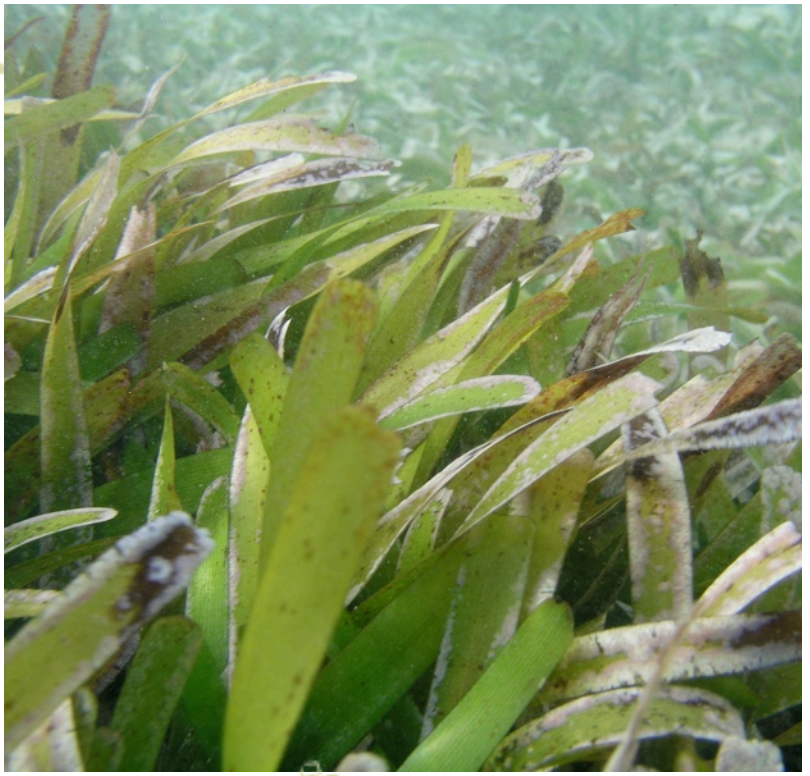
Report Card

"Start by doing what's necessary; then do what's possible; and suddenly you are doing the impossible."
- St. Francis of Assisi

MONITORING HEALTH

How do we determine the health of an estuary? We keep an eye on certain parameters in estuarine environments. Slight changes can indicate that more is going on behind the scenes.

- Water and Sediment Quality Indicators:
  - Nutrients
  - Salinity
  - Dissolved Oxygen
  - Light Levels
- Seagrass Condition Indicators:
  - Biomass
  - Root: Shoot Ratios
  - Community Composition



SUPPORT THE TEXAS SEAGRASS CONSERVATION PLAN!

This "experimental draft" compiled by Ken Dunton and colleagues at The University of Texas Marine Science Institute.

This report card shows the health of your local Texas estuaries. Not the grades you want to see? We'll help you improve them.

Environmental indicators are used to monitor seagrass communities.
What makes an area ideal for seagrasses?

GETTING GOOD GRADES: WHICH PARAMETERS DO WE USE TO ASSESS EACH AREA?

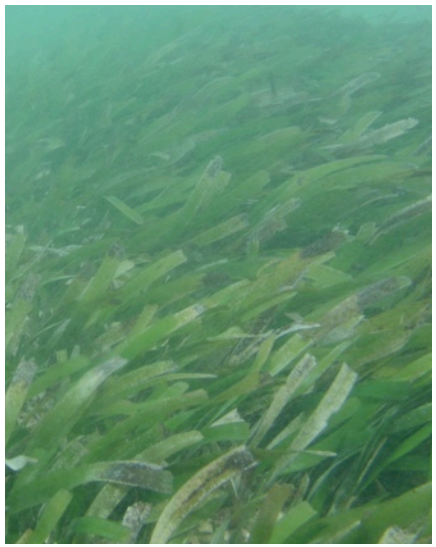
THE SCORING SYSTEM

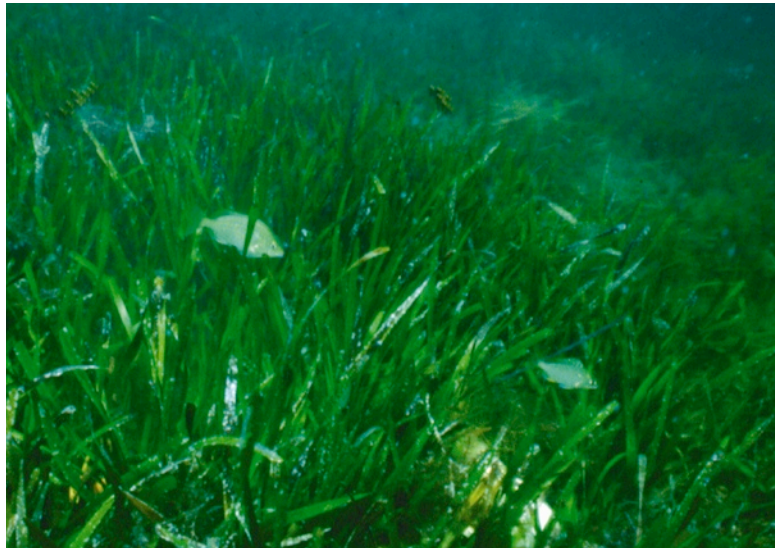
A: In order to receive a grade of A, a bay or lagoon estuarine system must have reasonably high water quality and low nutrient loading to achieve a *k* value between 0 and 0.69. This means that 25% of the sunlight at the water surface will reach at least a 2 m depth. We use 25% as a threshold because Texas seagrass species require at least this much light on the bottom for prolific growth.

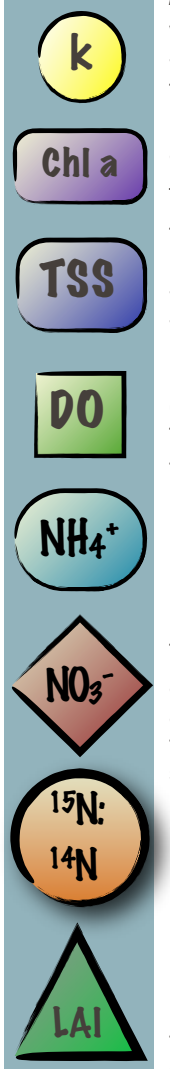
B: To receive a grade of B, a bay or lagoon system must have good water quality and moderate levels of nutrient loading to achieve a *k* value between 0.69 and 0.92. This means that 25% of the light reaching the surface will extend between1.5 - 2.0 m below the surface, which is the maximum depth of seagrasses in most estuarine waters of the northern Gulf of Mexico.

C: For a passing score of C, a bay or lagoon system is characterized by relatively poor water quality and nutrient loading that is reflected in a *k* value in the range of 0.92 - 1.39. This value indicates that 25% of surface irradiance reaches a depth between 1.0 - 1.5 m.

D: At *k* values exceeding 1.39, seagrass growth and survival is severely compromised by low irradiance values caused by algal blooms and high turbidity. The minimum light requirements of 25% of surface light is only met a depths shallower than 1 m. Higher nutrient loading facilitates epiphytic growth, further hindering seagrass health.







k = The Light Attenuation Coefficient

Values of *k* reflect the transparency of the water, with lower values reflective of clearer conditions. The main contributions to *k* are chlorophyll *a* (from phytoplankton) and TSS (from turbidity). Both absorb light but at different wavelengths.

TSS = Total Suspended Solids

TSS both absorbs and scatters light. Particulate matter, particularly sediments resuspended by winds and waves contribute to TSS (turbidity of the water).

Chl *a* = Chlorophyll *a*

Chl *a* is a measure of phytoplankton abundance. These microscopic plants absorb light throughout the water column in estuarine waters.

DO = Dissolved Oxygen

High DO is attributed to healthy aquatic habitats.

NH_4^+ = Ammonium NO_3^-= Nitrate

The inorganic nutrients, particularly NH_4^+ and NO_3^-, are often attributed to algal blooms. Seagrasses are adversely affected by high nutrient levels, since faster growing algal epiphytes outcompete the slower growing seagrasses.

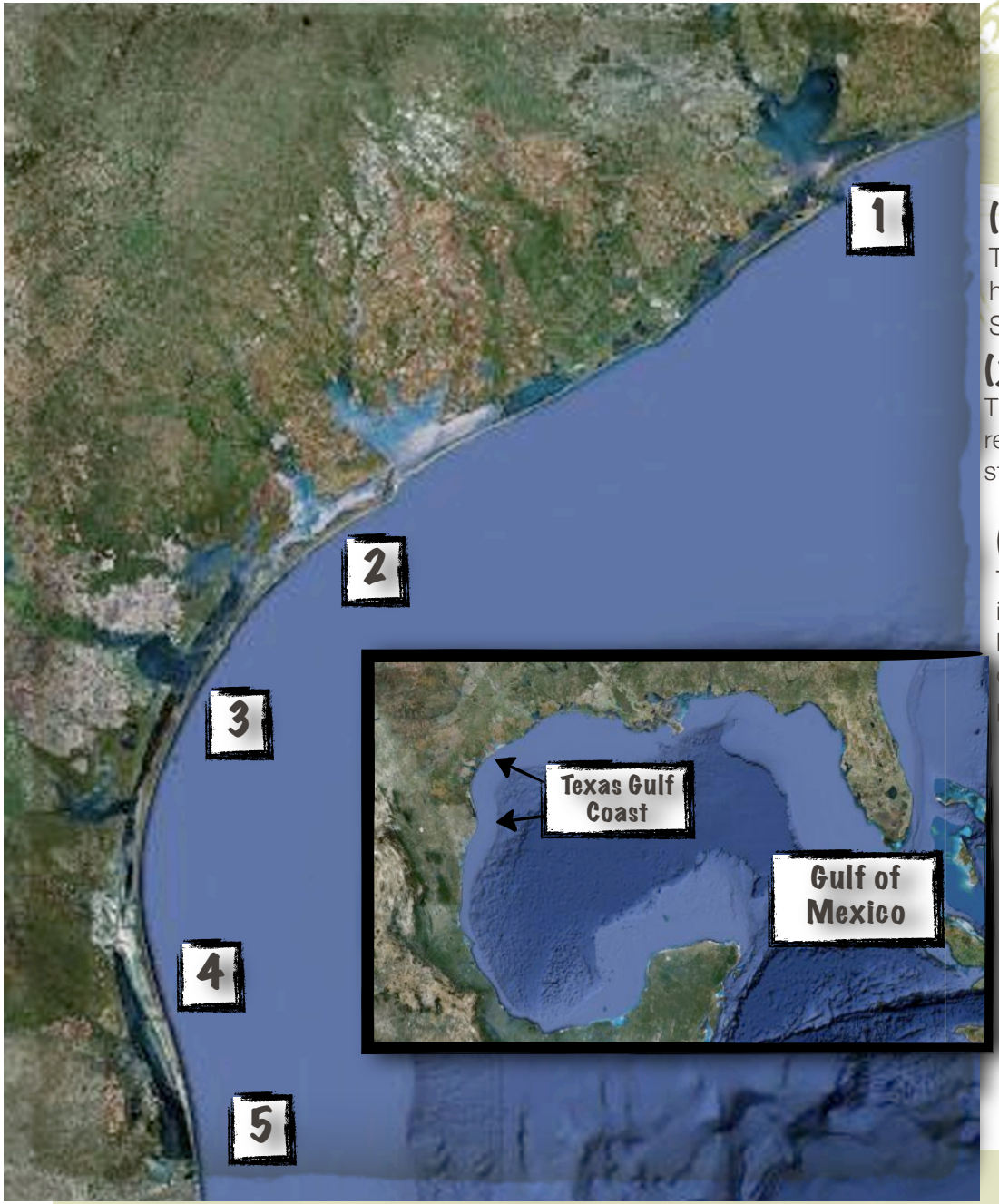
Stable Isotopic Analysis

Isotopic analyses of carbon and nitrogen provide information on the ultimate sources of dissolved inorganic carbon and nutrients for plant growth.

LAI = Leaf Area Index

Monitoring biomass, density, and percent cover through measures such as LAI reflects overall plant condition. The distribution of tissues between leaves, roots, and rhizomes can reflect plant overall health.

"Man's heart away from nature becomes hard."
- Standing Bear



*SELECTED TEXAS ESTUARIES REPORT CARD

(1) Galveston Bay — C-

This highly developed area displays only moderate water quality and high light attenuation values (*k*), reflective of low water transparency. Seagrasses are not widespread.

(2) Mission-Aransas — C+

This region is characterized by fairly turbid and shallow waters, and is also reported to have low levels of DO and high epiphytic growth. Seagrasses struggle in this area due to lower light levels and higher TSS (water turbidity).

(3) Southeastern Corpus Christi Bay — B-

The central Texas Coast is characterized by high nutrient levels and is influenced by heavy seasonal runoff. Elevated nutrient and chlorophyll *a* levels are likely responsible for abundant phytoplankton in the water column, which indicates low water transparency. Higher *k* values and poorer conditions prevail overall.

(4) Upper Laguna Madre — B

Along the lower coast, we see improved water quality conditions. Higher DO levels, lower *k* values along with balanced carbon:nitrogen ratios despite a 20 year brown tide algal bloom, are providing acceptable conditions for all species.

(5) Lower Laguna Madre — A-

Slow growing *Thalassia testudinum* (turtle grass) thrives in this area. Lower TSS and lower nutrient loading ensure epiphytic growth does not out-compete the seagrasses. Dredging events are the largest threat to seagrasses in this system since these activities produce enormous levels of TSS.

*This is a draft and does not reflect actual measurements.