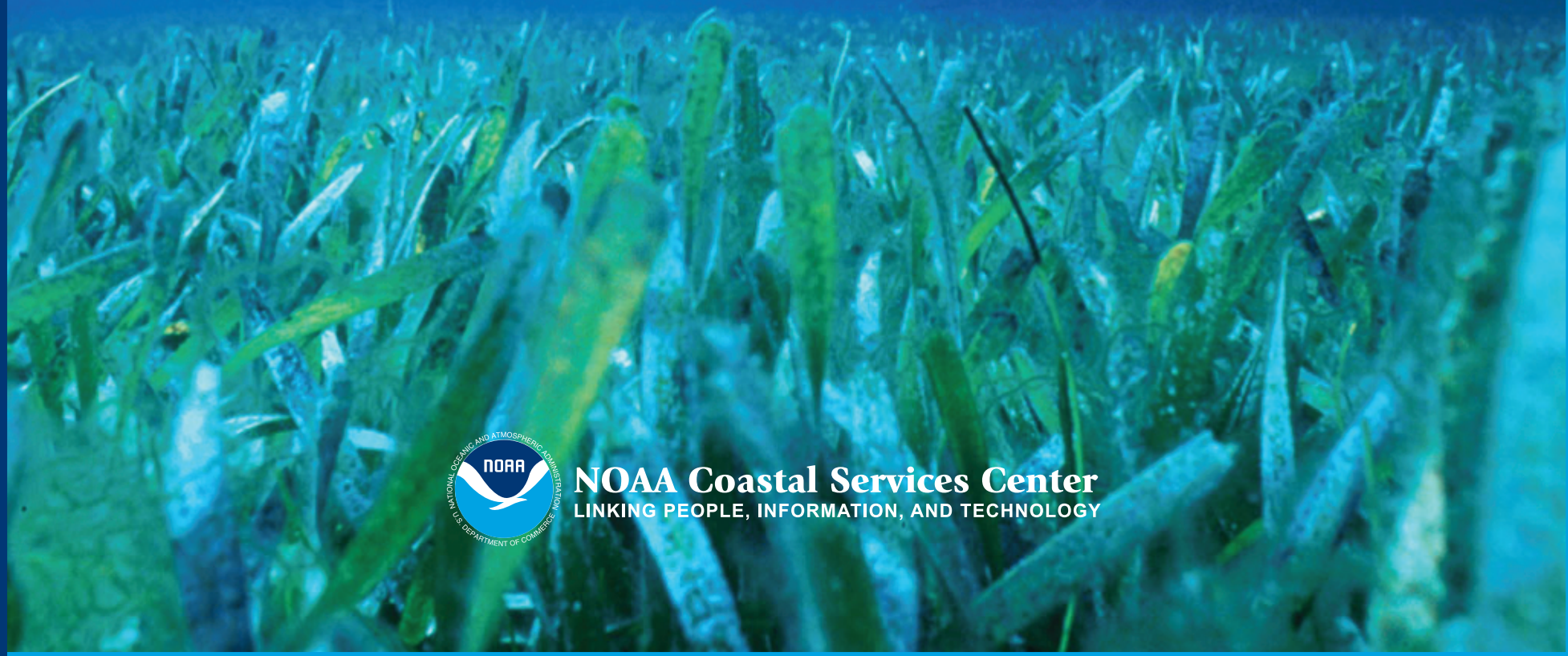
Guide to the Seagrasses
of the
United States of America
(Including U.S. Territories in the Caribbean)

This field guide was designed to help scientists and resource managers identify seagrasses that may occur in the coastal waters of the continental United States, Alaska, the Hawaiian Islands, and U.S. territories in the Caribbean Sea.



NOAA Coastal Services Center
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Preface

This field guide was developed in conjunction with the National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center's *Submerged Aquatic Vegetation: Data Development and Applications* CD-ROM. Seagrass descriptions and distribution maps were summarized from *Seagrasses,* a 1988 Smithsonian Institution Press publication. Complete references are included at the end of this document.

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Seagrasses are flowering, rooted, vascular plants. Unlike algae, seagrasses have complex specialized parts, such as leaves, stems, rhizomes, and roots. Unlike marsh plants, most seagrasses live completely submerged in saline water during the entire life cycle (including reproduction) and are fully adapted to life underwater.

Kingdom PLANTAE

Division ANTHOPHYTA

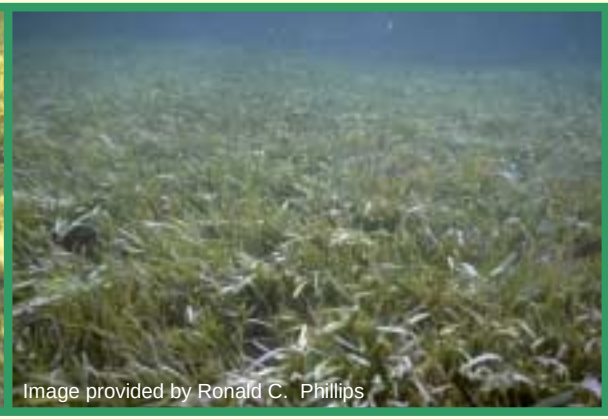
Class MONOCOTYLEDONEAE

Order HELOBIAE

Family POTAMOGETONACEAE

Family HYDROCHARITACEAE


Image provided by Ronald C. Phillips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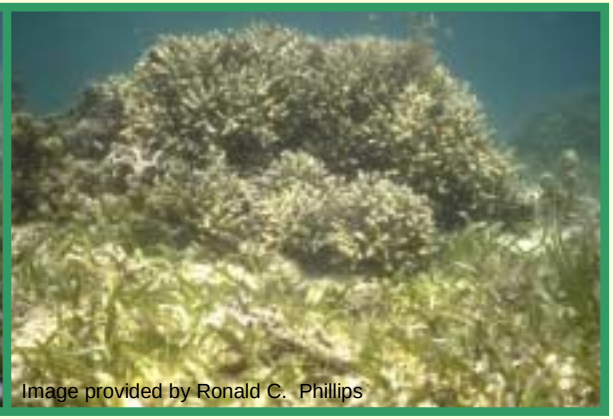
Image provided by Ronald C. Phillips

Guide to the Seagrasses of the United States of America (Including U.S. territories in the Caribbean)

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* common name unknown

Zostera marina
eelgrass


Image provided by Ronald C. Phillips

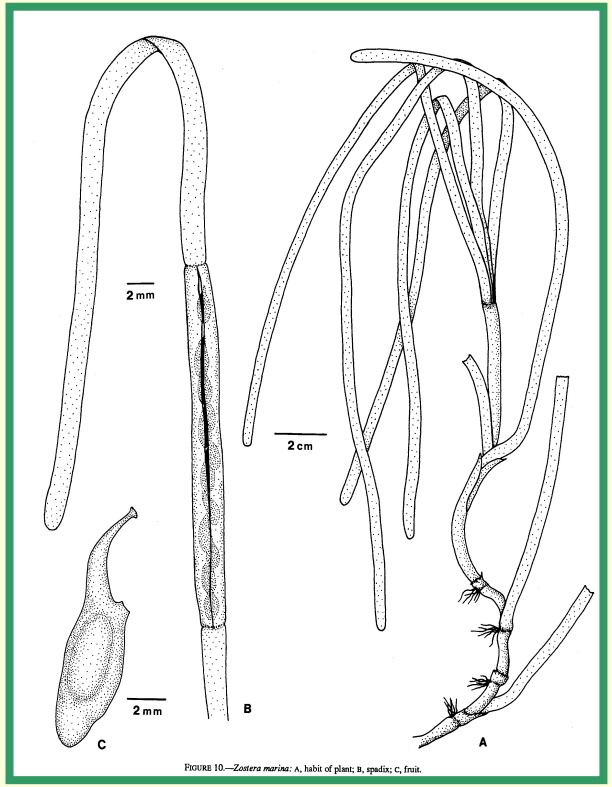


FIGURE 10.—*Zostera marina:* A, habit of plant; B, spadix; C, fruit.

Distribution

- Distributed in the northern Pacific and Atlantic Oceans, as well as north of the Arctic Circle

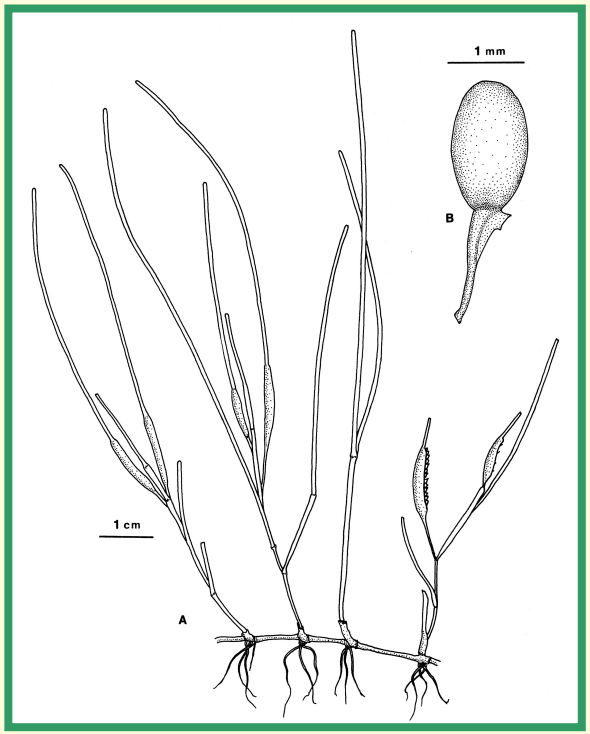
Physical Description

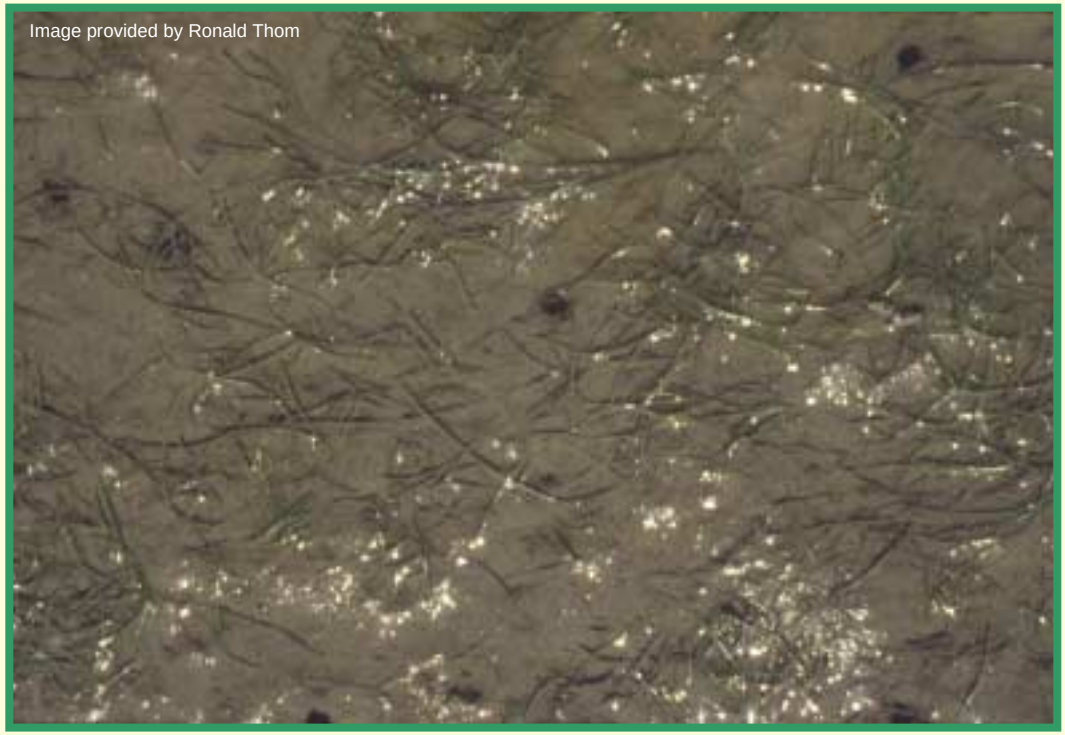
- **Deciduous** plant
- Long and narrow leaves, the **leaf blades** are up to 2 m long and 1.5–12 mm wide with 5–11 **leaf veins**
- Leaf **sheath** is long (5–20 cm) and closed (ruptures open with age)
- **Rhizome** is 2–5 mm wide and each **node** on the rhizome has numerous roots and a leaf
- Seeds are ridged

Habitat

- Grows in extensive meadows
- Found in the **intertidal** and **subtidal** zones
- Common in clear water, 7–10 m deep (can be found between 1.2–30 m depending on water clarity, seasonality, wave action, and tidal ranges)
- Produces flowers when temperatures rise above a threshold (typically greater than 22°C)

Zostera japonica





Physical Description

- **Leaf blades** are 3–30 cm long and 0.75–1.5 mm wide
- On tidal flats the leaves are short and narrow; in lagoons the leaves are long and wide
- Leaves have three **leaf veins**
- Leaf tip is **obtuse** (older leaves may be indented)
- **Rhizomes** have 2 roots at each **node**
- Leaf **sheath** is open and typically shorter than *Z. marina* (1.25–6 cm long)
- Seeds are **ellipsoid** and smooth

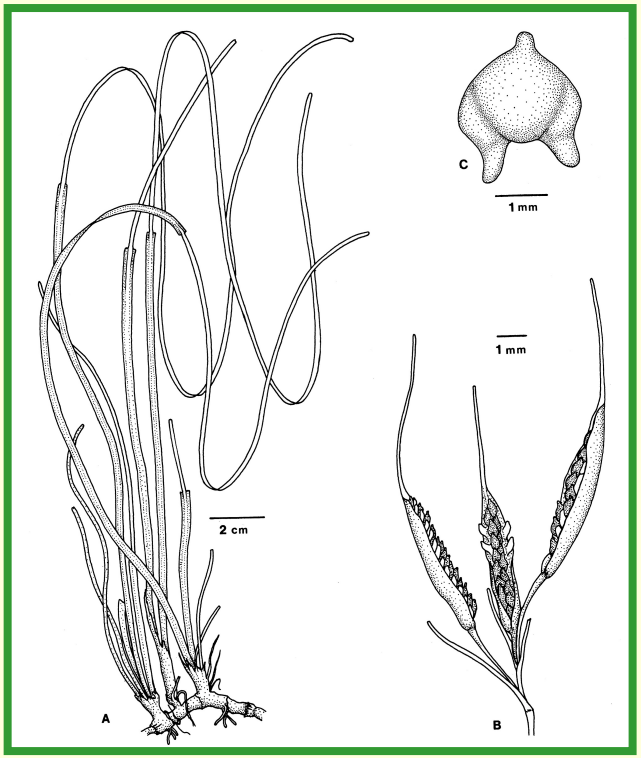
Habitat

- Common on sheltered tidal flats but also found in **brackish** coastal lagoons

Distribution

- *Zostera japonica* is native to the waters of Eastern Asia, but has been introduced to the Pacific Northwest, possibly by the oyster trade

Phyllospadix torreyi



Habitat

- Occurs on rocky, surf-beaten coasts
- Ranges from the lower **intertidal** zone to about 15 m deep; avoids the most exposed sites
- When *P. torreyi*, *P. scouleri*, and *P. serrulatus* occur together, this species grows at the lower (less exposed) level

Distribution

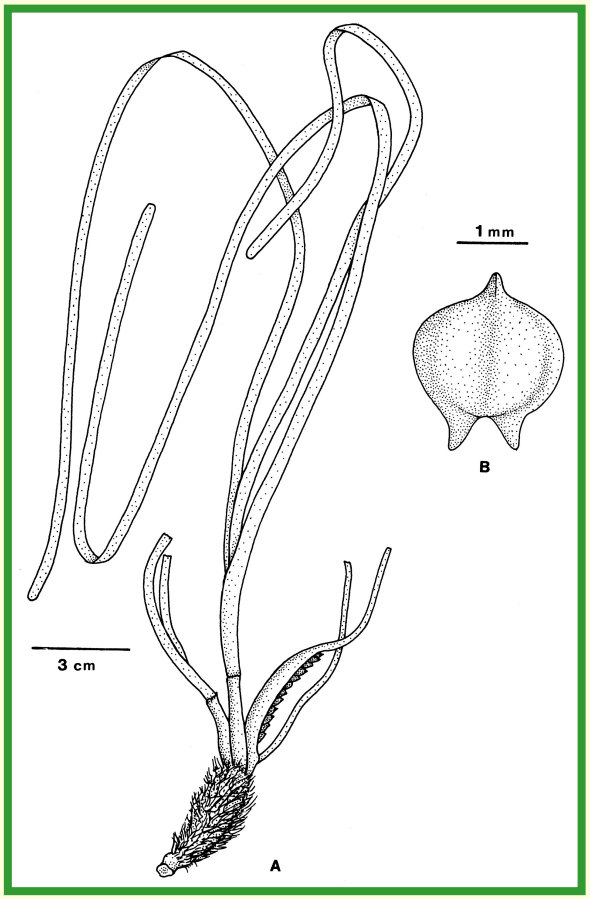
- Distributed from northern Vancouver Island to the Tropic of Cancer on Baja California

Physical Description

- **Leaf blades** are 0.5–2 m long and 0.5–1.5 mm wide
- Leaf tip is **obtuse,** slightly **emarginate**
- Leaf **sheath** is 7–55 cm long
- Leaves have three **leaf veins**
- **Rhizome internodes** have 6–10 roots (2 groups of 3–5)
- Older parts of **rhizome** may be covered in pale yellow or gray fibers


Image provided by Ronald C. Phillips

Phyllospadix scouleri



Habitat

- Occurs on rocky, surf-beaten coasts
- Ranges from the lower **intertidal** zone to the shallow **subtidal** zone and can tolerate high energy wave action

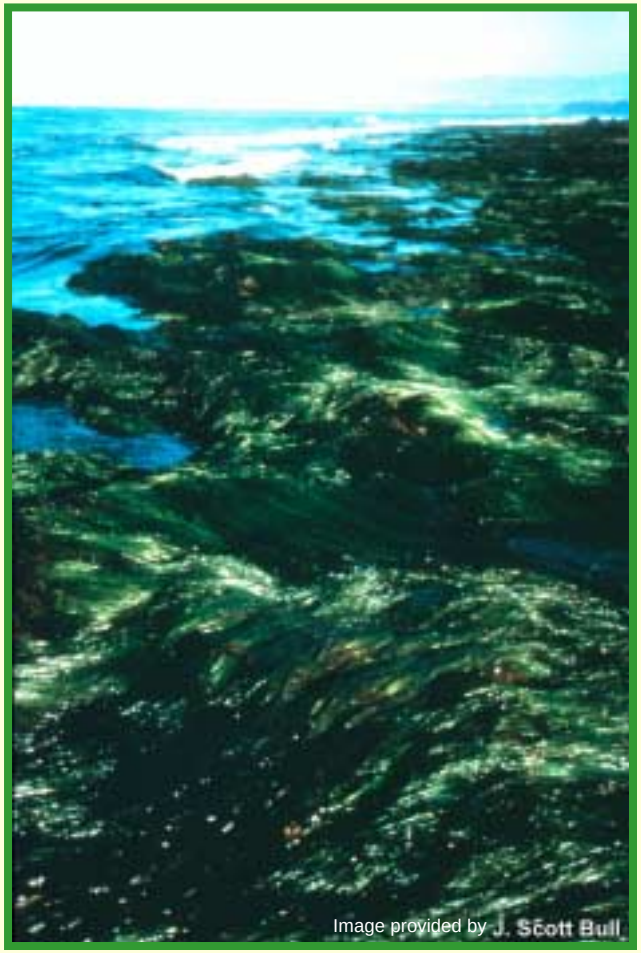
Distribution

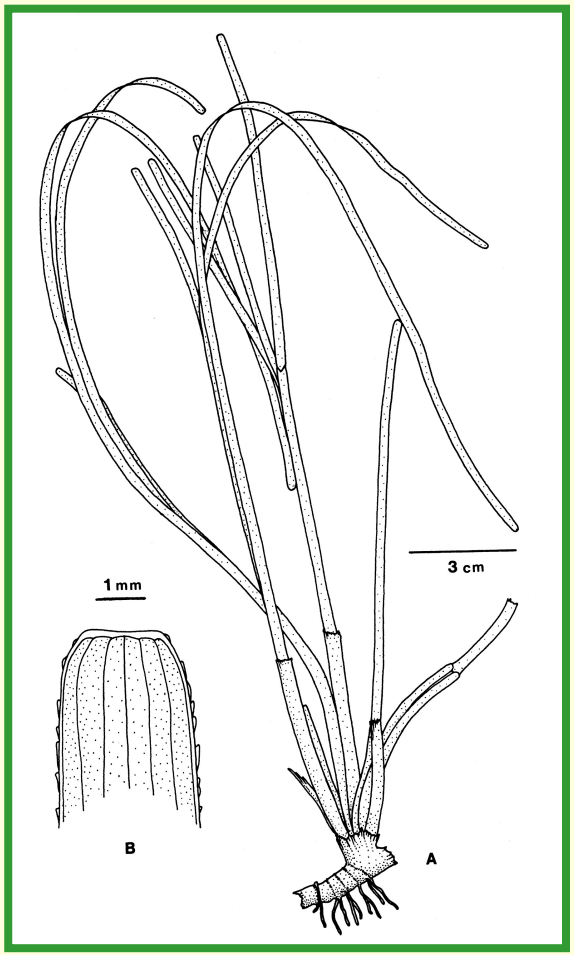
- Distributed from Alaska south to the Tropic of Cancer on Baja California.

Physical Description

- **Leaf blades** are 0.5–2 m long and 1–4 mm wide with three **leaf veins**
- Tip of the leaf is **obtuse,** sometimes slightly **truncate** or indented
- Leaf **sheath** 4–30 cm long
- **Rhizome internodes** have 6–10 roots (2 groups of 3–5), older parts may be covered in pale yellow or gray fibers

Phyllospadix serrulatus
surfgrass





Habitat

- Grows from +1.5 m to mean low-low water line (Note: once observed as a large **subtidal** meadow from -1.5 m to -6 m deep on muddy substrate)
- Occurs on rocky, surf-beaten coasts
- When *P. torreyi*, *P. scouleri*, and *P. serrulatus* occur together, this species grows at the highest level

Distribution

- Distributed from southern Oregon north to the Gulf of Alaska.

Physical Description

- **Leaf blade** up to 1 m long and 2.0–8.3 mm wide
- Leaf **sheath** is 3.5–18 cm long
- Leaves have 5–7 **leaf veins**
- Leaf tip is **truncate**
- **Rhizome internodes** have 2 roots
- Older parts of **rhizome** may be covered in yellowish-brown fibers

Ruppia maritima
widgeon grass

Habitat*

- Grows in **brackish** to freshwater (wide tolerance) habitats
- Typically grows in water up to 2 m deep
- Grows in all substrate types

Physical Description*

- Thread-like leaves with a pointed tip
- Leaves are **alternate,** less than 1 mm wide and less than 20 cm long
- Leaf tips vary from **obtuse** and **serrate** to **acute** and **entire**
- Leaves grow from a branched stem
- In extreme environments, the plant behaves as an **annual**
- In more stable habitats, the plant behaves as a **perennial**

Distribution*

- Seagrasses of the *Ruppia* genus occur on all continents of the world and on many islands: the northern limit is about 69 degrees North, the southern limit is at least 55 degrees South.

*Information source: Kantrud HA. 1991. Wigeon grass (*Ruppia maritima* L.): A literature review. U.S. Fish and Wildlife Service, Fish and Wildlife Research 10. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. www.npwrc.usgs.gov/resource/literatr/ruppia/ruppia.htm (Version 16JUL97).

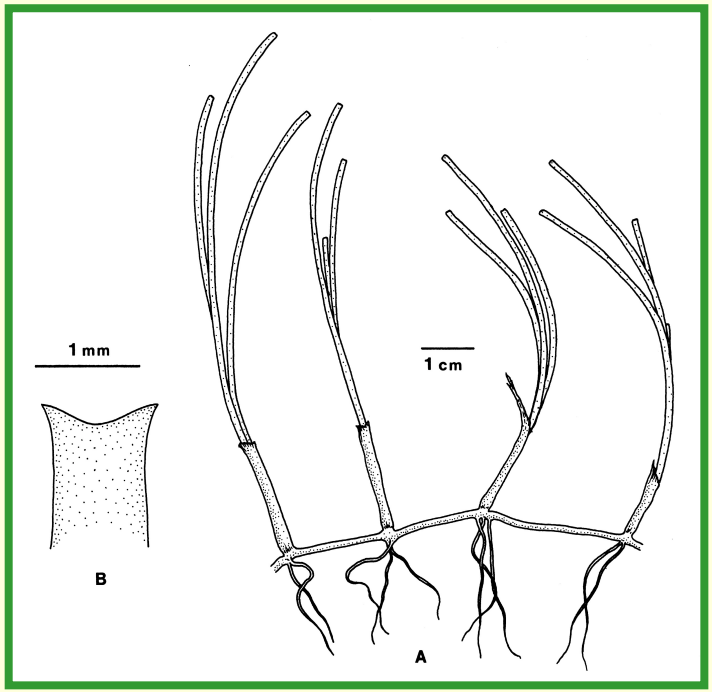



Image provided by Ronald C. Phillips

Halodule wrightii
shoalgrass

Physical Description

- **Leaf blades** are 3.5–32 cm long and 0.3–2.2 mm wide
- Leaf tip is **truncate** and **bidendate** at the edge of mature leaf tip
- The leaves are clustered from a distinct **node** on the **rhizome**
- 2–5 roots and a leafy shoot emerge from each **node**
- The roots are not branching

Habitat

- Grows in the lower **intertidal** and upper **subtidal** zones on sandy and muddy substrates in sheltered and exposed locations
- Grows on coral reefs and in creeks in mangrove swamps
- Found in waters up to 8–12 m deep

Distribution

- *Halodule* is found in the Caribbean Sea

Syringodium filiforme
manatee grass

Physical Description

- Leaves are **terete**
- **Leaf blades** are 10–30 cm long and 0.8–2 mm wide
- Leaves have 2 **pericentral veins**

Habitat

- Restricted to the **subtidal** zones and thrives at 0.7–0.5 m deep
- Often occurs in mixed meadows with *Thalassia testudinum*
- May form **monospecific** meadows down to 18 m deep

Distribution

- Distributed in the western tropical Atlantic, the Gulf of Mexico, eastern Florida, and Bermuda

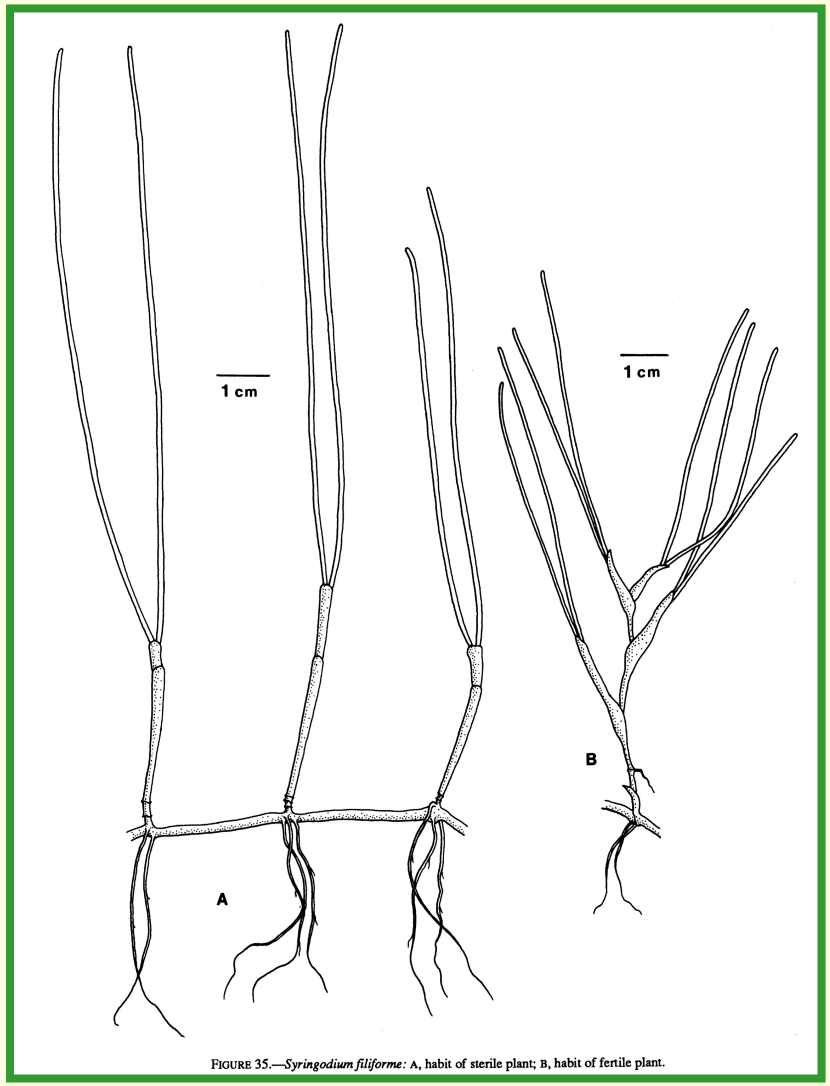
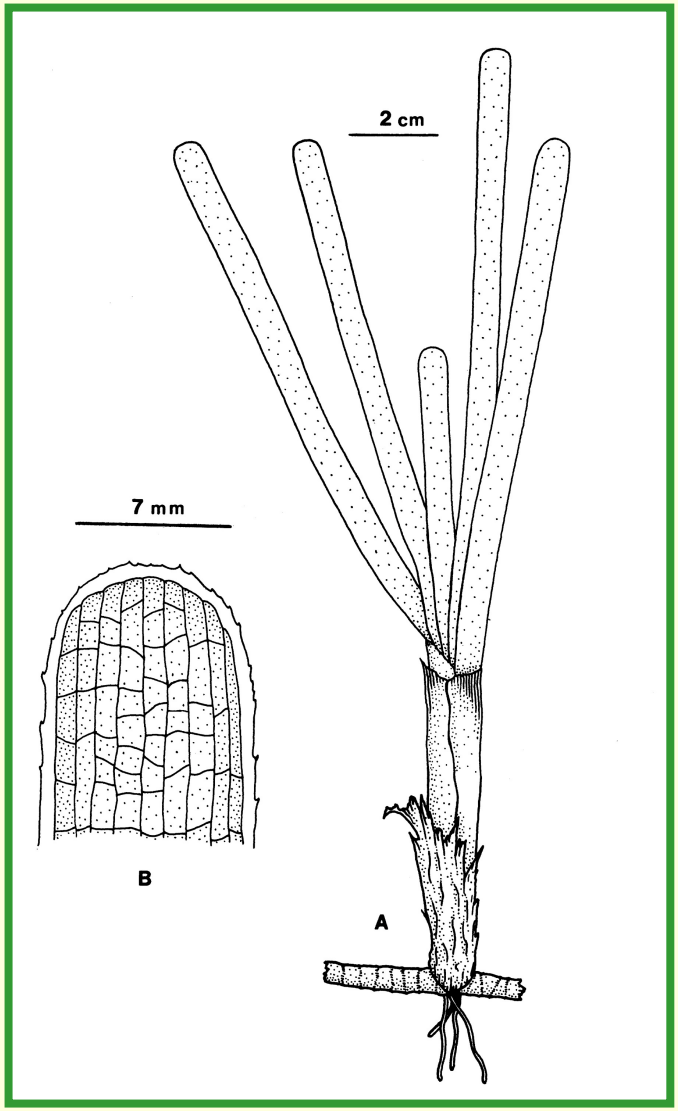


FIGURE 35.—*Syringodium filiforme*: A, habit of sterile plant; B, habit of fertile plant.

Thalassia testudinum
turtlegrass



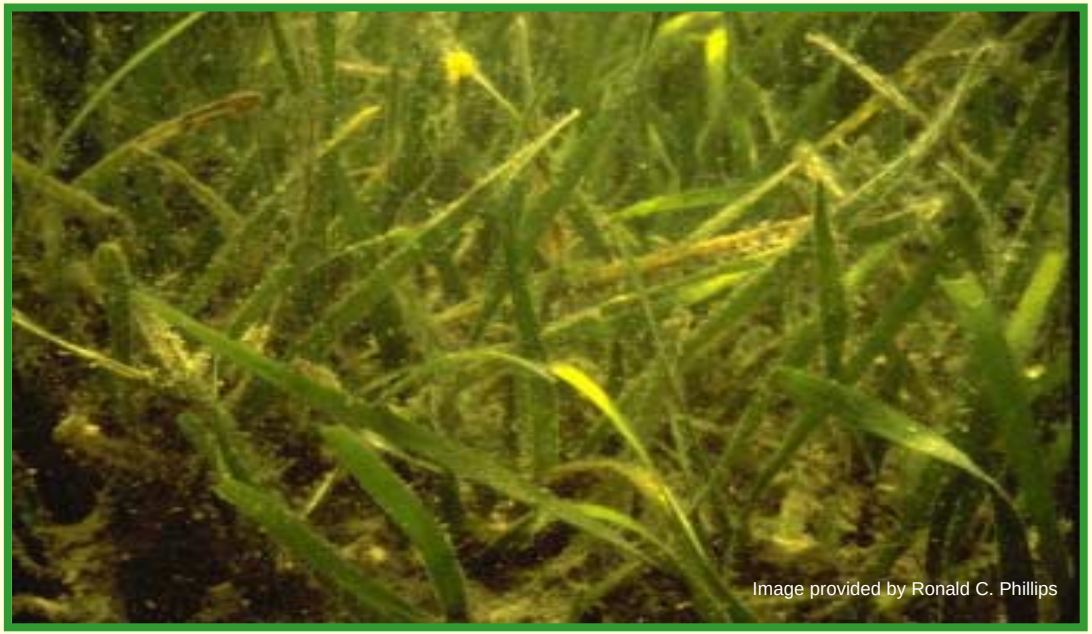


Image provided by Ronald C. Phillips

Physical Description

- Leaves are flat and linear (strap-like)
- **Leaf blades** are 10–12 mm long and 4.5–10 mm wide
- **Rhizomes** are scaly

Habitat

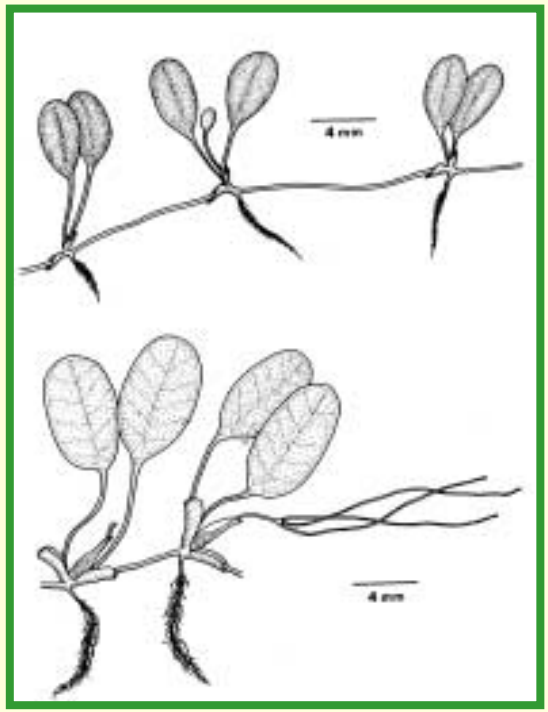
- Commonly occurs in **subtidal** waters from low tide to 10 m deep
- In clear water the species is found in water up to 30 m deep
- Prefers mud and/or mud substrates in relatively sheltered locations

Distribution

- Distributed in the tropical western Atlantic from Venezuela to eastern Florida and Bermuda

Halophila minor


Image provided by Japar Sidik Bujang–Malaysia



Physical Description

- *Halophila* is the only genus of seagrasses whose leaves do not have basal **sheaths**
- Leaves are **obtuse**; the leaf tip is **obtuse** or **cuneate**
- **Rhizomes** are thin and fragile
- **Leaf blades** are 0.7–1.4 cm long and 3–5 mm wide
- Leaves occur in pairs and the **leaf veins** are forked
- **Petiole** is 0.5–2 cm long
- The leaf margins are **entire**
- **Dioecious**
- **Perennial**

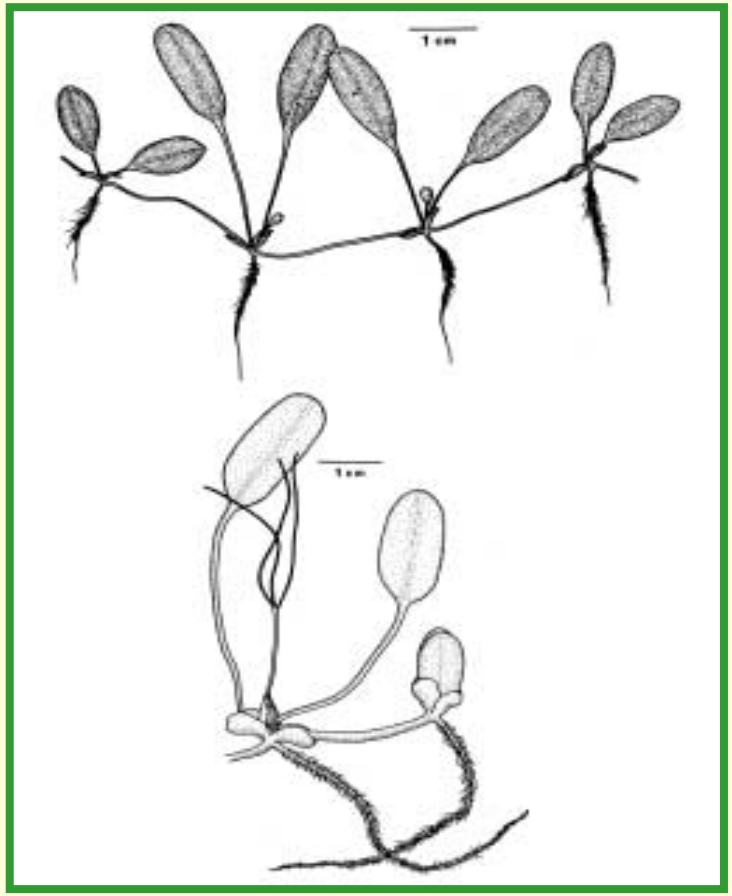
Habitat

- Prefers sheltered areas
- Grows in the lower **intertidal** and upper **subtidal** zones (up to 2 m deep)
- Found in sandy and muddy substrates

Distribution

- This species is found in the Hawaiian Islands (as well as in Australia, east Africa, and some of Asia)

Halophila ovalis



Physical Description

- *Halophila* is the only genus of seagrasses whose leaves do not have basal **sheaths**
- **Rhizomes** up to 2 mm wide
- **Leaf blades** are **ovate**
- **Leaf blades** are 1–4 cm long and 0.5–2 cm wide
- Base of the leaf may be rounded or **cuneate**
- Leaves occur in pairs
- The leaf **margins** are **entire** and the **leaf veins** are forked
- **Petiole** is 1–4.5 cm long
- **Dioecious**
- **Perennial**

Habitat

- Extends from the **intertidal** zone to 10–12 m deep
- Grows on soft mud to coarse coral rubble
- Tolerant of tropical to warm temperate climates

Distribution

- Found in the Hawaiian Islands (as well as in east Africa, the Indian Ocean, Japan, and Australia)

Halophila hawaiiana

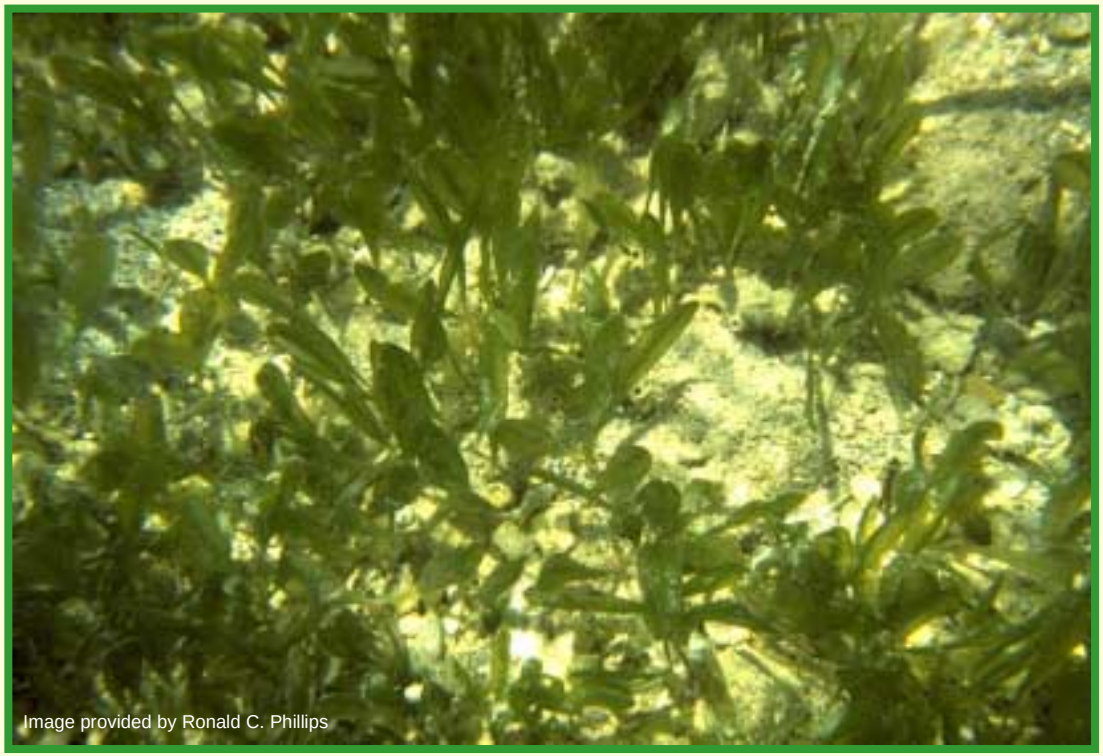
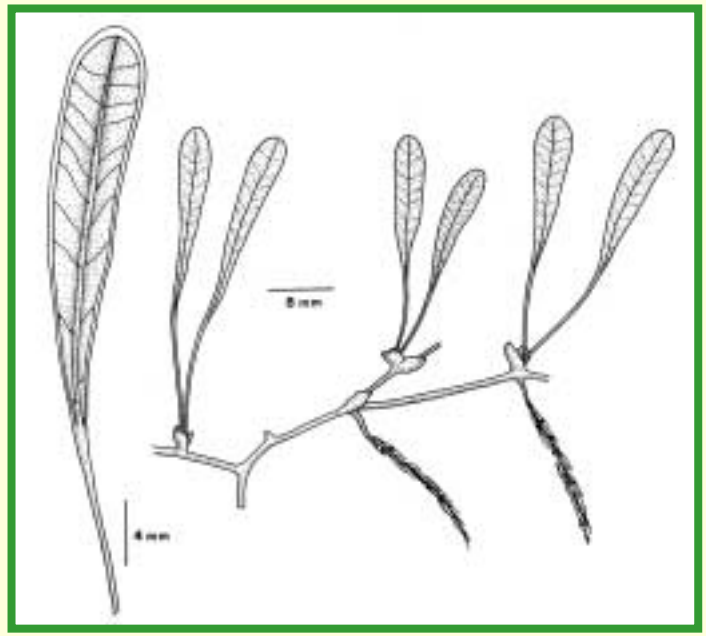


Image provided by Ronald C. Phillips



Physical Description

- *Halophila* is the only genus of seagrasses whose leaves do not have basal **sheaths**
- Leaves are elongate and very narrowly **cuneate**
- **Leaf blade**s are 2.0–3.0 cm long and 2.5–6 mm wide, and the **leaf veins** are forked
- Leaves occur in pairs
- **Petiole** may be up to 3.5 cm long
- The leaf margins are **entire**
- **Perennial**

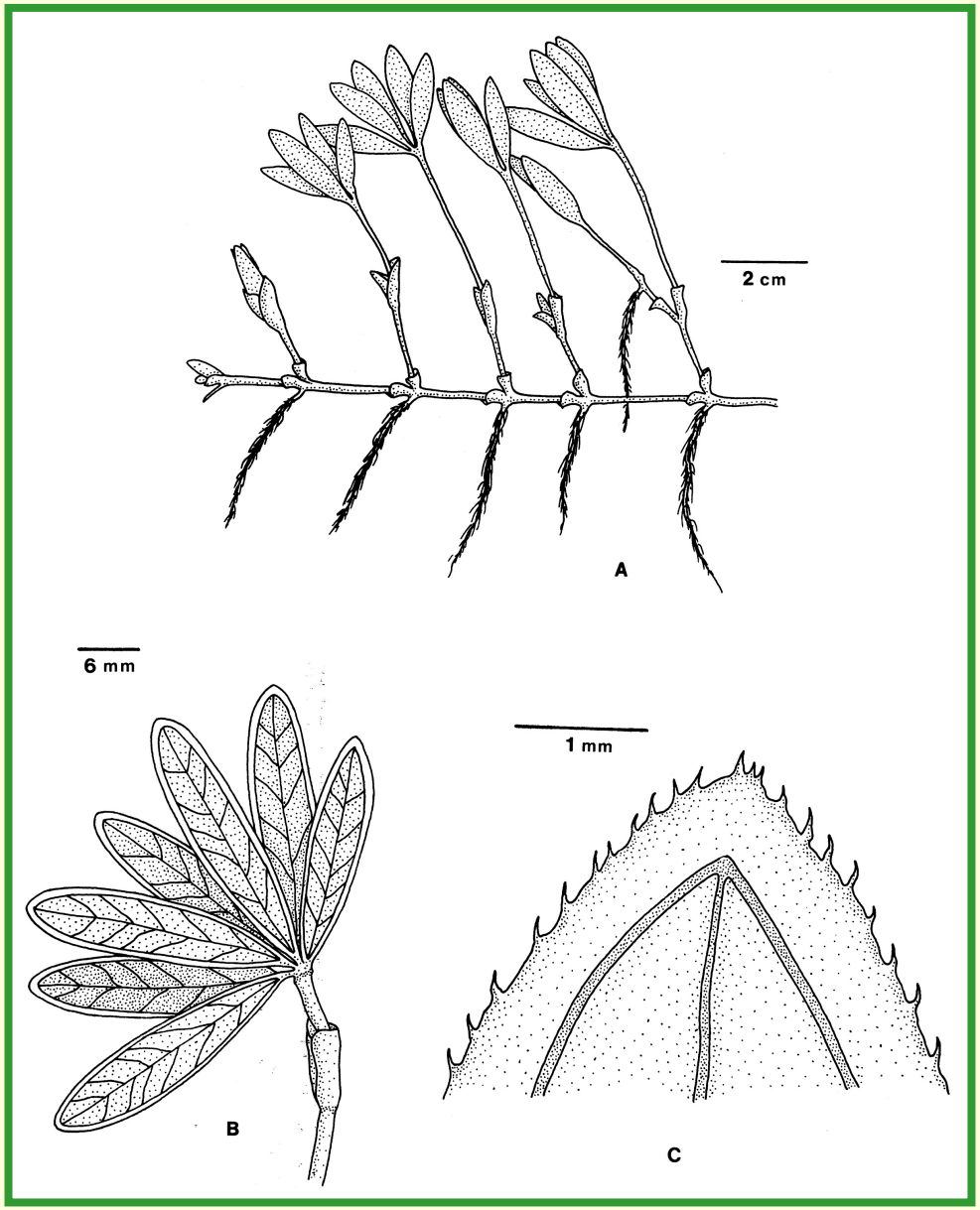
Habitat

- Grows in firm sand, muddy sand, or coral sand
- Grows from low tide to 5 m deep

Distribution

- This species only occurs in Kauai, Molokai, and Maui in the Hawaiian Islands

Halophila engelmannii
star grass



Physical Description

- *Halophila* is the only genus of seagrasses whose leaves do not have basal **sheaths**
- Leaves are long and **elliptical** and finely **serrulate**
- **Leaf blades** are 1–3 cm long and 3–6 mm wide
- At the base of the leaf there are 2 **scales** and 2 **scales** halfway up the leaf stem
- 6–8 pairs of **leaf veins**
- Leaves are in a **psuedowhorl** of 4–8 **leaf blades** with a small (2 mm) or no **petiole**
- **Dioecious**

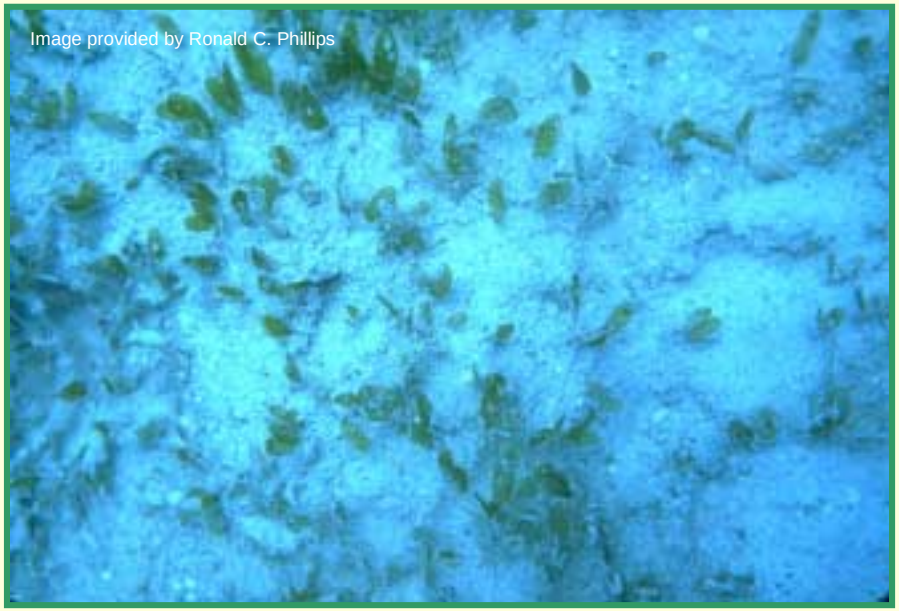
Habitat

- Grows in sheltered sites from the lowest tide level to 90 m deep
- Found on sandy and muddy substrates and may occur on shell-hash

Distribution

- Plants are widely distributed in the northern Gulf of Mexico, southern Florida, Cuba, and the Bahamas

Halophila decipiens
paddle grass

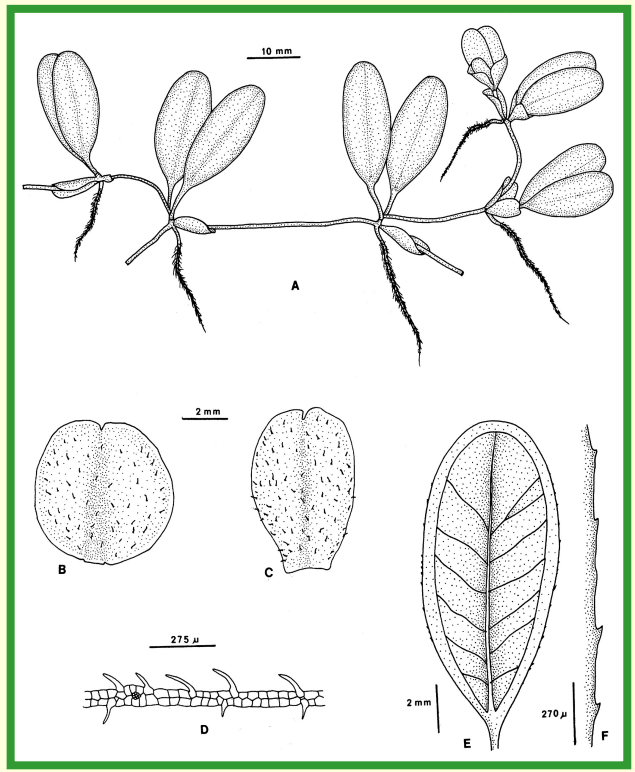


Habitat

- Grows in water 10–30 m deep but is found up to 85 m deep
- **Euryhaline**

Distribution

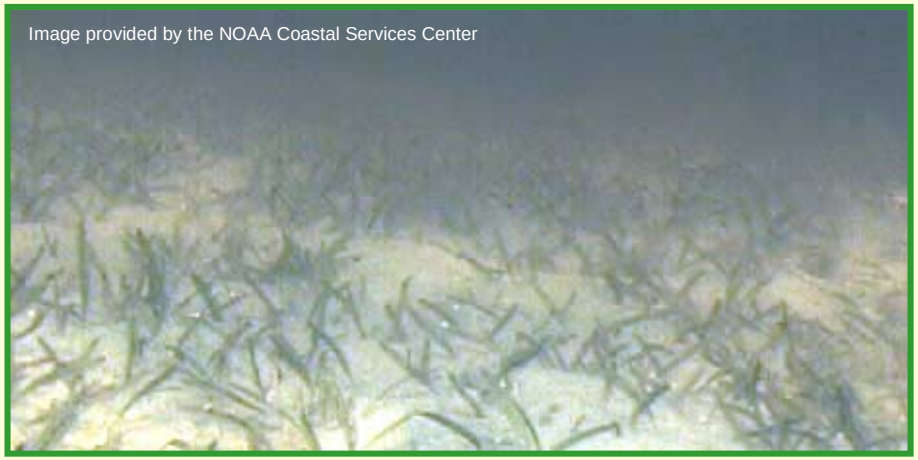
- Distributed in the Indian Ocean and tropical parts of the Pacific and western Atlantic Oceans

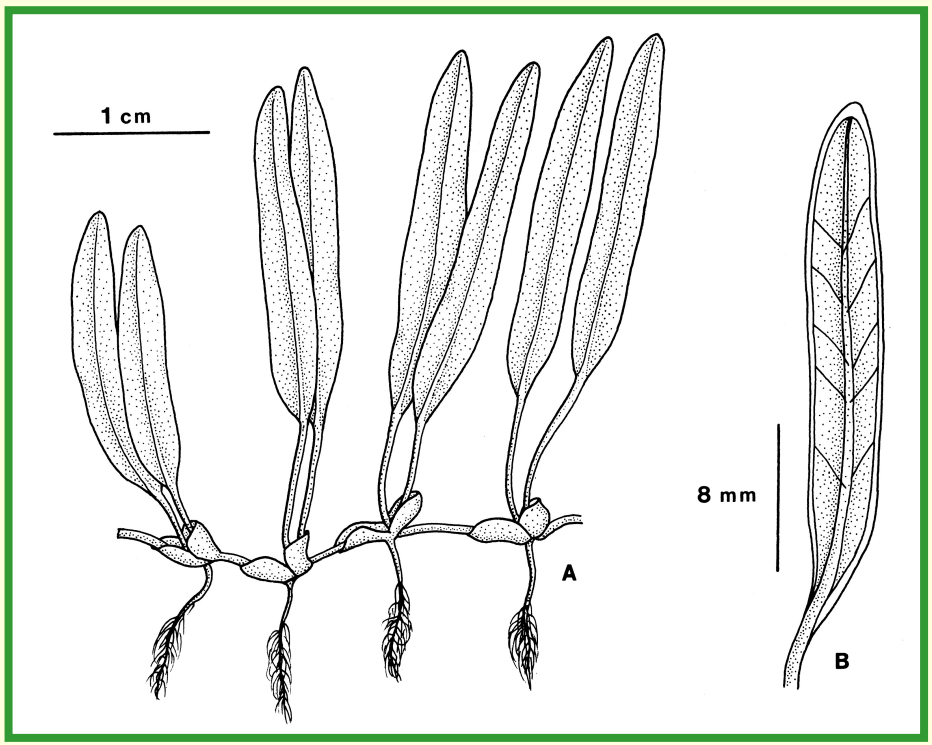


Physical Description

- *Halophila* is the only genus of seagrasses whose leaves do not have basal **sheaths**
- Leaves are roundish or **ovate** and commonly referred to as “paddle shaped”
- **Leaf blades** are 1–2.5 cm long and 3–6 mm wide
- Leaf margins are **serrulate**
- Thin **rhizome**
- At the base of the leaf there are 2 **scales**
- **Monoecious**
- **Annual**

Halophila johnsonii
Johnson's seagrass





Physical Description

- *Halophila* is the only genus of seagrasses whose leaves do not have basal **sheaths**
- Leaves are long and **elliptical**
- **Leaf blades** are 0.5–2.5 cm long and 1–4 mm wide with a point at the tip
- Leaves occur in pairs
- **Petiole** is 1–2 cm long
- The leaf margins are **entire**
- **Perennial**

Habitat

- Prefers coastal lagoons
- Grows in the **intertidal** zones
- Found in sandy substrates

Distribution

- This species only occurs in southeastern Florida from Sebastian Inlet to Biscayne Bay

REFERENCES AND SOURCE NOTES

Seagrass species descriptions are summarized from *Seagrasses* by R.C. Phillips and E.G. Meñez, published by the Smithsonian Institution Press, Washington D.C., 1998.*

Botanical seagrass drawings reprinted with copyright permissions from *Seagrasses* by R.C. Phillips and E.G. Meñez, published by the Smithsonian Institution Press, Washington D.C., 1998.

Plant definitions are adapted from *How to Identify Plants* by H.D.Harrington, published by the Swallow Press/Ohio University Press, Athens, Ohio, 1957. Additional definitions are from *Marine Biology: Environment, Diversity, and Ecology* by M. Lerman, published by the Benjamin/Cummings Publishing Company, Inc., California, 1986.

**Ruppia maritima* description is summarized from *Wigeon grass (Ruppia maritima L.): A Literature Review,* the online document by H.A. Kantrud HA., U.S. Fish and Wildlife Service, Fish and Wildlife Research, from the Northern Prairie Wildlife Research Center Home Page. www.npwrc.usgs.gov/resource/literatr/ruppia/ruppia.htm (Version 16JUL97).

The majority of seagrass photographs were provided by Ronald C. Phillips.

Additional photographs were provided by Fred Short, Ronald Thom, the Florida Marine Research Institute, Japar Sidik-Bujang, and J. Scott Bull. Cover photograph is by Paige Gill, Florida Keys NMS.

DEFINITIONS

Summarized from Harrington (1957) unless otherwise noted

Acute: Tapering to the tip of a leaf with straight (or nearly straight) sides

Alternate: Leaves grow individually from the stem and are not directly opposite each other

Annual: Plants die back completely each season and regrow from seeds

Bidendate: Used to describe leaf shape: two large teeth on the tip; one tooth on each side

Brackish: Saline (salt) water that has lower salinity than ocean water (often used to describe marsh waters or embayments; Lerman 1986)

Cuneate: Wedge-shaped

Deciduous: Not evergreen

Dioecious: Plants have one sex; each plant is either male or female

Ellipsoid/Elliptical: Widest at the middle and the two ends are equal (may be used to describe the shape of a seed or leaf)

Entire: No teeth on edges (margins) of leaf

Emarginate: Used to describe leaf shape; a shallow notch in the middle of the leaf tip

Euryhaline: Tolerates a wide range of salinities (Lerman 1986)

Internodes: Sections between two **nodes**

Intertidal: The region between the high and low tides, alternatively covered by water and exposed to the air (Lerman 1986)

Leaf Blades: Expanded flat part of the leaf rising from the leaf stem (with the exception of *Syringodium,* which is round)

Leaf Veins: Part of the vascular system of the plant that is involved in the transportation of water, gases, nutrients, and wastes in the leaf

DEFINITIONS, continued

Summarized from Harrington (1957) unless otherwise noted

Monoecious: Each flower is either male or female, but the different sexed flowers grow from the same plant

Node: The place on a stem or **rhizome** where leaves or branches originate

Obtuse: Rounded (often used to describe a leaf shape)

Ovate: Egg shaped with the widest end at the top of the leaf

Perennial: The plant does not die-back seasonally, and individual plants may live for many years becoming dormant **rhizomes** if environmental conditions become sub-optimal

Pericentral Veins: **Leaf veins** that run through the center of leaves (used to describe the **leaf veins** that run through the center of **terete** *Syringodium* leaves)

Petiole: The stalk to the **leaf blade; leaf blades** with distinctive **petioles** may be described as **"petiolate leaves"**

Psuedowhorl: Leaves are arranged in a circle, each leaf branching from the main leaf stem

Rhizome: A long stem growing partly or completely under the surface of the substrate, typically rooting at the **nodes**

Scales: A thin tissue on the leaf (resembles fish **scales**)

Serrate: Sharp forward pointing teeth (may be used to describe the edges of a leaf)

Serrulate: Serrate with small sharp forward pointing teeth (may be used to describe the edges of a leaf)

Subtidal: The zone below the intertidal zone, not exposed to the air at high tide (Lerman1986)

Sheath: Part of a leaf that envelopes the stem at the base of the leaves

Terete: Rolled up, cylindrical, roundish **leaf blades** (used to describe *Syringodium* leaves)

Truncate: Used to describe leaf shape: square shape at the tip