

**AN ILLUSTRATED GUIDE TO THE SEA GRASSES
OF THE INDIAN RIVER REGION OF FLORIDA**

by

N. J. Eiseman



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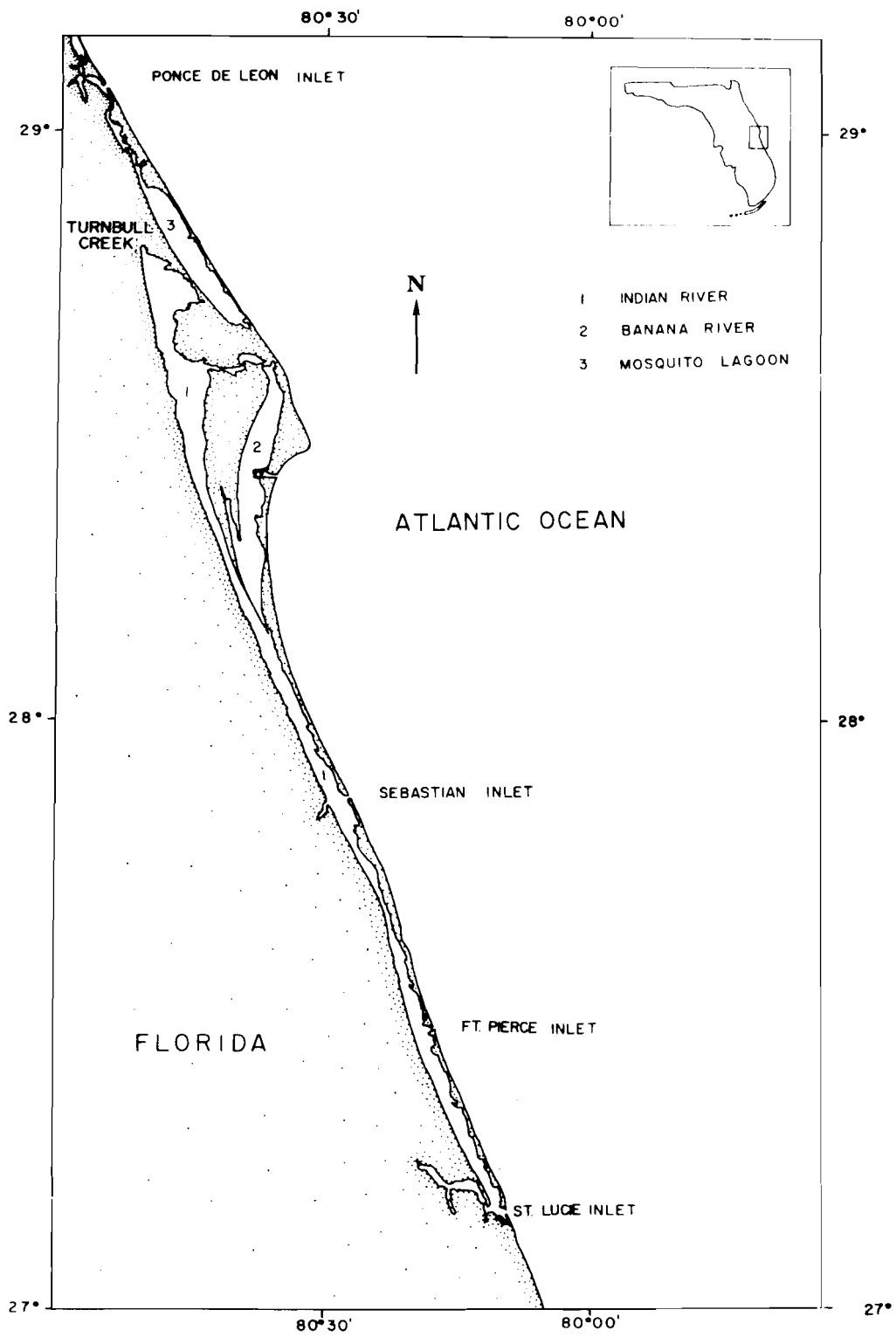


Fig. 1. Map of the Indian River Region of Florida

An Illustrated Guide to the Seagrasses of the
Indian River Region of Florida

N.J. Eiseman

ABSTRACT

Six species of seagrasses are reported for the Indian River lagoon, including Thalassia testudinum, Halodule wrightii, Syringodium filiforme, Ruppia maritima, Halophila engelmannii, and Halophila johnsonii. Halophila decipiens occurs on the adjacent continental shelf at about 20 m depth. Previous reports of Halophila bailloni from the Indian River are found to be in error. The systematic position of Halodule and Halophila species in this area is discussed.

The Indian River is a lagoon on the east coast of Florida, separated from the Atlantic Ocean by a series of long sandy barrier islands. The lagoon extends from St. Lucie Inlet in Martin County (27°10'N, 80°10'W) in the south to the mouth of Turnbull Creek in Volusia County (28°48'N, 80°5'W) in the north, a distance of 182 km (Fig. 1). This is in a climatic and biogeographic transition zone which extends from Cape Canaveral to Palm Beach. There are three inlets from the ocean, St. Lucie Inlet, Ft. Pierce Inlet, and Sebastian Inlet. These inlets are essentially artificial, being kept open by dredging. North of Melbourne the lagoon divides into two arms, one of which is called the Banana River. These two arms are essentially dead-ended,

connected to other bodies of water only by the Haulover Canal at the north end of the Indian River and Canaveral Locks in the Banana River. Input from other water masses through these connections is probably only of local influence on plant growth.

Little attention has been given to the seagrasses of the Florida East Coast. Phillips (1960a) and Phillips and Ingle (1960) have described the seagrass species from a number of stations around St. Lucie Inlet. Moore (1963) collected in the Indian River in his study of the distribution of Thalassia testudinum. Den Hartog (1959) mentions a specimen of Halophila engelmannii from this region.

The seagrass species of the Indian River are well known to plant taxonomists, but apparently not to many ecologists who work in seagrass communities or to the general public. Moreover, there is considerable nomenclatural confusion in the recent literature. An "artificial" key to the species and descriptions, illustrations, and synonymy of all species found in the Indian River region are presented below. This key is probably applicable to all of Florida.

KEY TO THE SPECIES

1. Blades round or oval in cross-section
Syringodium filiforme.p. 17
1. Blades flat. 2
2. Blades usually over 5 cm long, of uniform width
or tapering to the tip 3
2. Blades less than 3 cm long, oval to spatulate. 5
3. Blades about 1 mm wide, tapering, tip pointed
Ruppia maritima. . . .p. 7
3. Blades 0.9-10 mm wide, of uniform width or only
slightly tapered 4
4. Blade 5-10 mm wide, tip rounded
Thalassia testudinum .p. 5
4. Blade 0.9-3.0 mm wide, tip notched or dentate
Halodule wrightii. . .p. 15
5. Petioles short, 1-2 mm, leaves borne in clusters of
at the tip of a determinant branch 4-10 cm tall
Halophila engelmannii.p. 9
5. Petioles long, 5 mm or longer leaves in pairs; erect
branches rarely over 2 mm tall, or indeterminate . . . 6
6. Margin of the blade smooth, entire
Halophila johnsonii. .p. 13
6. Margin of the blade serrulate
Halophila decipiens. .p. 11

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ERRATA

Page 4, the first line in the fifth dichotomy should read:

"5. Petioles short, 1-2 mm, leaves borne in clusters of 4-8".

Thalassia testudinum Banks ex König, TURTLE GRASS. Fig. 2

Leaves strap-shaped, tip rounded, with a few minute teeth along the margin, especially near the tip, base sheathing, 2-5 in a group, from 0.5 to 1 cm in width, up to 30 cm in length, and 1-2 mm in thickness, may be distinctly curved in the plane of the blade; main stem a creeping, horizontal, underground rhizome, 0.5-1 cm diameter, divided into nodes, internodes about 1 cm long, covered by scale leaves. At intervals of usually 9-13 nodes, the rhizome bears short erect lateral branches which bear the foliage leaves; roots one at a node, unbranched.

The broad flat leaf readily distinguishes Thalassia from other Indian River seagrass species. The measurements of this species vary greatly with environmental conditions (Phillips 1960a). For a detailed account of the morphology and anatomy of Thalassia the reader is referred to the work of Tomlinson (1969a,b, 1972; Tomlinson and Bailey 1972; Tomlinson and Vargo, 1966).

OCCURRENCE: Thalassia testudinum is sparsely distributed in the Indian River. Small patches are found near St. Lucie Inlet. From Ft. Pierce Inlet to Vero Beach Thalassia is a significant part of the flora. From Vero Beach to Sebastian Inlet scattered beds and patches have been found.

DISTRIBUTION: Bermuda, from a few miles north of Sebastian Inlet, around the southern tip of Florida, essentially continuous around the Gulf of Mexico, the West Indies, Atlantic and Caribbean coasts of Central America and to Venezuela.

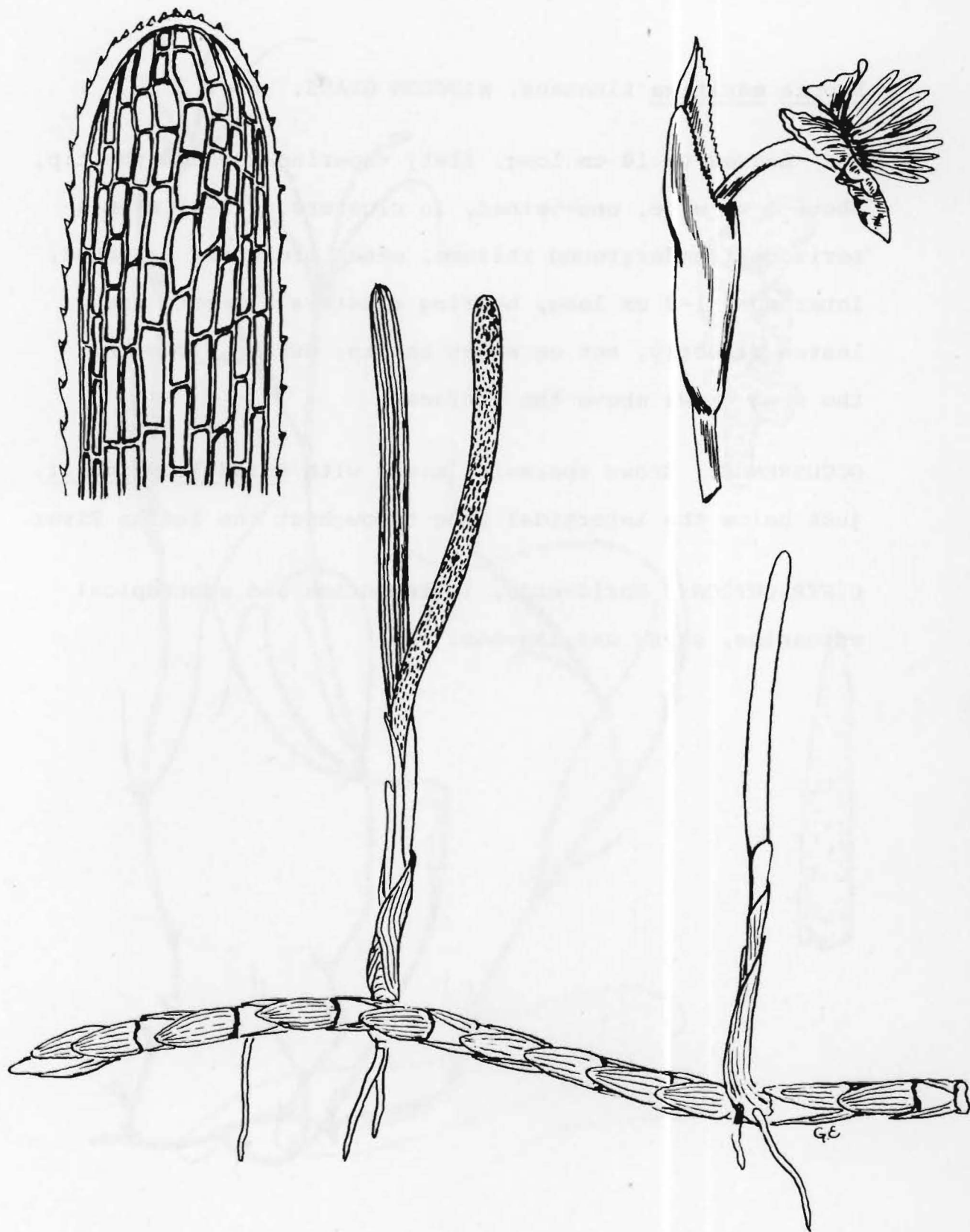


Figure 2. Thalassia testudinum. Upper left, a leaf tip; upper right, male flower; below, habit.

Ruppia maritima Linnaeus, WIDGEON GRASS. Fig. 3

Leaves to 10 cm long, flat, tapering towards the tip, about 1 mm wide, one-veined, in clusters of 2-4; stem a horizontal underground rhizome, often profusely branched, internodes 1-2 cm long, bearing clusters of roots and leaves directly, not on short shoots; during flowering, the stem grows above the surface.

OCCURRENCE: Grows sparsely, mixed with Halodule wrightii, just below the intertidal zone throughout the Indian River.

DISTRIBUTION: World-wide, in temperate and subtropical estuaries, bays, and lagoons.



Figure 3. *Ruppia maritima*. Left, habit; upper right, a flower; below right, a leaf tip.

Halophila engelmannii Ascherson Fig. 4

Stem a slender horizontal rhizome, 1-2 mm diameter, growing along the surface of the sediment or just beneath, bearing erect shoots at the nodes, usually 4-10 cm tall; one pair of scale leaves on the rhizome at the base of the erect shoots, a second pair about half-way up the erect shoot; foliage leaves oblong to linear-oblong, about 15-30 mm long and 2-5 mm wide, nearly sessile, margins serrate, petioles 4 mm long or less, borne in a cluster of 2-4 pairs at the tip of the erect shoot.

OCCURRENCE: This species has been found only in the northern part of the Indian River, near the Haulover Canal during the course of this study, where it grows under the cover of a mixed bed of Syringodium filiforme and Halodule wrightii. It is undoubtedly of more widespread occurrence in the Indian River.

DISTRIBUTION: Florida, Bahamas, Texas, West Indies.

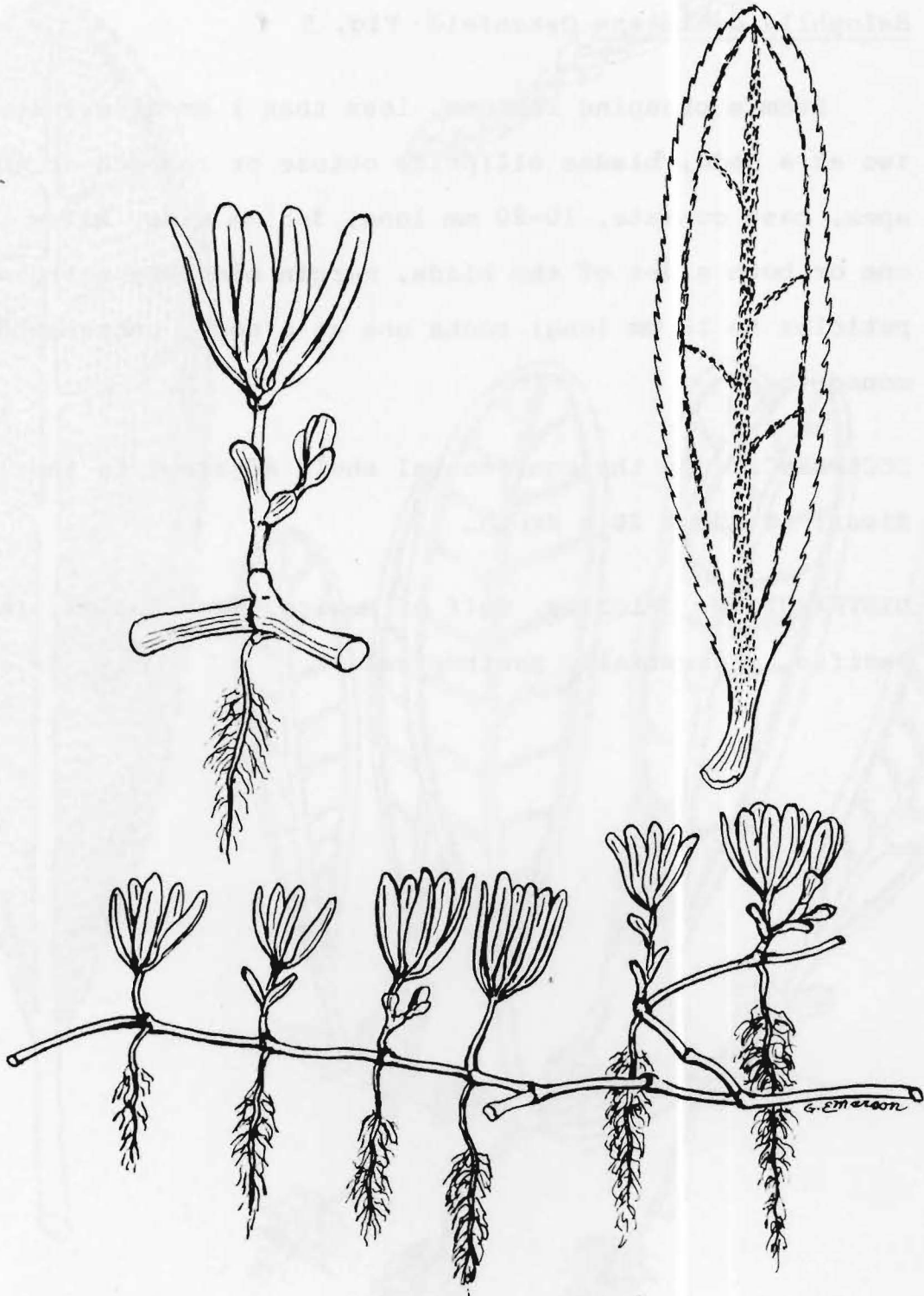


Figure 4. *Halophila engelmannii*. Upper left, habit of a short shoot with a young branch; upper right, detail of a leaf; below, habit.

Halophila decipiens Ostenfeld Fig. 5

Stem a creeping rhizome, less than 1 mm diam.; leaves two at a node, blades elliptic, obtuse or rounded at the apex, base cuneate, 10-20 mm long, 3-5 mm wide, hairs on one or both sides of the blade, margin minutely serrulate, petioles to 10 mm long; roots one at a node, unbranched; moneocious.

OCCURRENCE: On the continental shelf adjacent to the Indian River, at about 20 m depth.

DISTRIBUTION: Florida, Gulf of Mexico, West Indies, Indo-Pacific. Essentially pantropical.

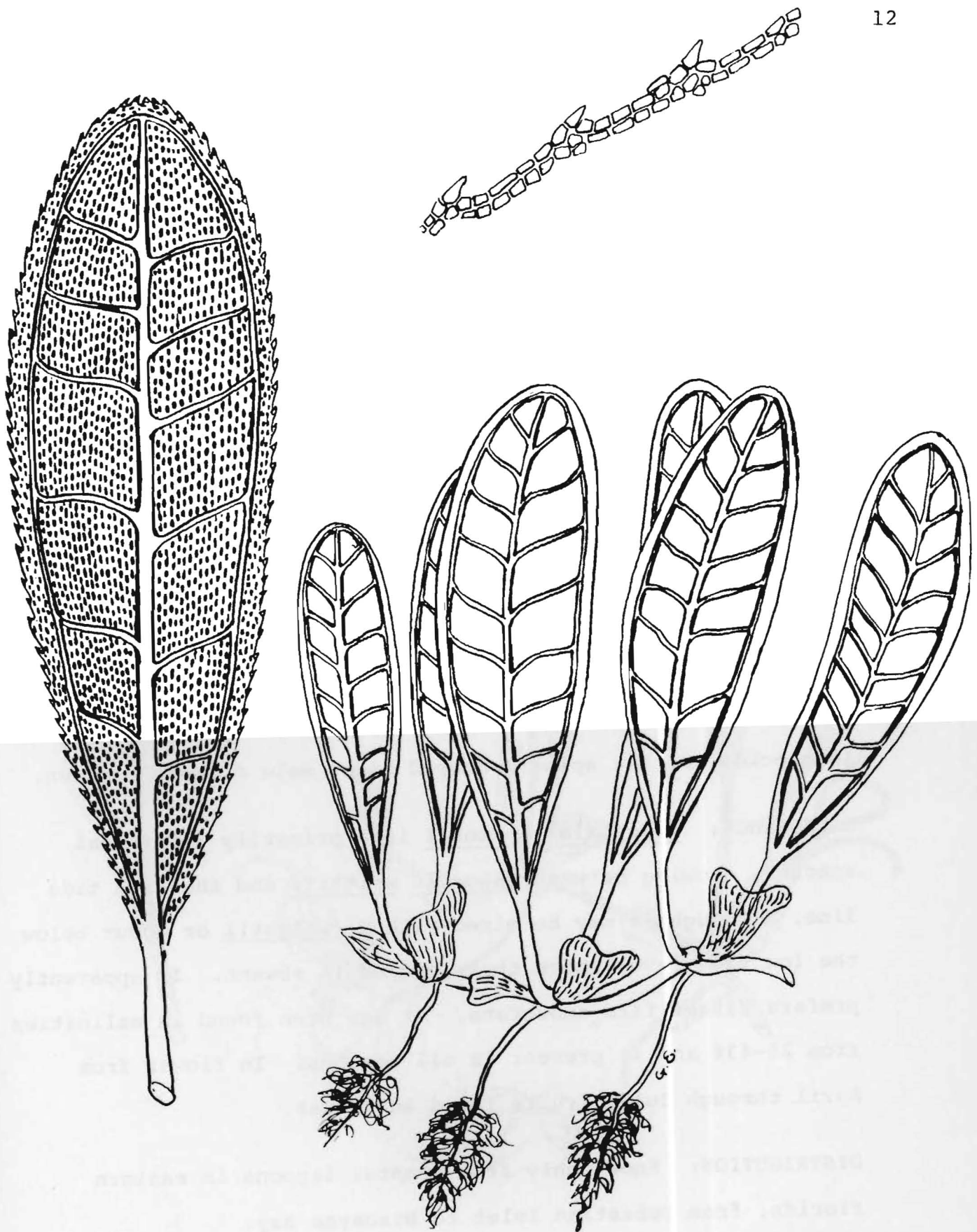


Figure 5. *Halophila decipiens*. Left, detail of a leaf; upper right, detail of a leaf margin; below right, habit.

Halophila johnsonii Eiseman Fig. 6

Foliage leaves two at a node, with long petioles, 5-10 mm when mature, blades linear with a very prominent midrib, slightly asymmetrical, 5-10 mm long, 2-4 mm wide, margin entire, not at all serrate, upper and lower surfaces glabrous, base elongate-cuneate, tapering gradually into the petiole, petiole not sheathing, secondary veins irregularly alternate to nearly opposite, occasionally anastomosing, in 5-10 pairs; stem a creeping rhizome, 1 mm diam., internodes 1-2 cm long, nodes bearing scale leaves on the upper and lower surfaces; scales keeled, tip slightly notched, surface glabrous, margin entire; roots unbranched, one at a node, arising from the base of the ventral scale leaf; flowers unisexual, female flowers sessile, enclosed in a two-leaved spathe, 5 mm long, fruits longnecked, with a spindle-shaped base, male flowers unknown.

OCCURRENCE: Halophila johnsonii is a primarily intertidal species, growing between Halodule wrightii and the high tide line, although it may be mixed with H. wrightii or occur below the low tide level where that species is absent. It apparently prefers rather firm substrata. It has been found in salinities from 25-43‰ and is present in all seasons. In flower from April through July, fruits found in August.

DISTRIBUTION: Known only from coastal lagoons in eastern Florida, from Sebastian Inlet to Biscayne Bay.



Figure 6. *Halophila johnsonii*. Left, detail of a leaf; upper right, a fruit enclosed in the spathe; below right, habit.

Halodule wrightii Ascherson, SHOAL GRASS Fig. 7

Leaves narrow, 0.5 to 3 mm wide, flat, the tips with 2-3 points representing extensions of the main and/or lateral veins, to 40 cm long, arising in groups of 2-5 from erect short shoots, base sheathing; stem a horizontal rhizome, 2-3 mm diam., internodes 2-3 cm long, bearing a short shoot and root group at each node. Syn. Diplanthera wrightii (Ascherson) Ascherson, Diplanthera beaudettii den Hartog, Halodule beaudettii (den Hartog) den Hartog.

Phillips (1960b, 1967) gave good accounts of the anatomy of Halodule wrightii, including the range of variability.

OCCURRENCE: Throughout the Indian River in stable sediments from the intertidal zone, where it usually grows in a pure stand but may rarely be mixed with Halophila johnsonii, to about 2 m depth. Between the intertidal zone and 1 m depth it is usually mixed with Ruppia maritima. Below 1 m it is usually mixed with Thalassia testudinum or Syringodium filiforme.

DISTRIBUTION: From North Carolina through the Caribbean to warm temperate South America, northwestern Africa, and perhaps some disjunct populations in the Indian Ocean, Pacific Coast of Mexico.

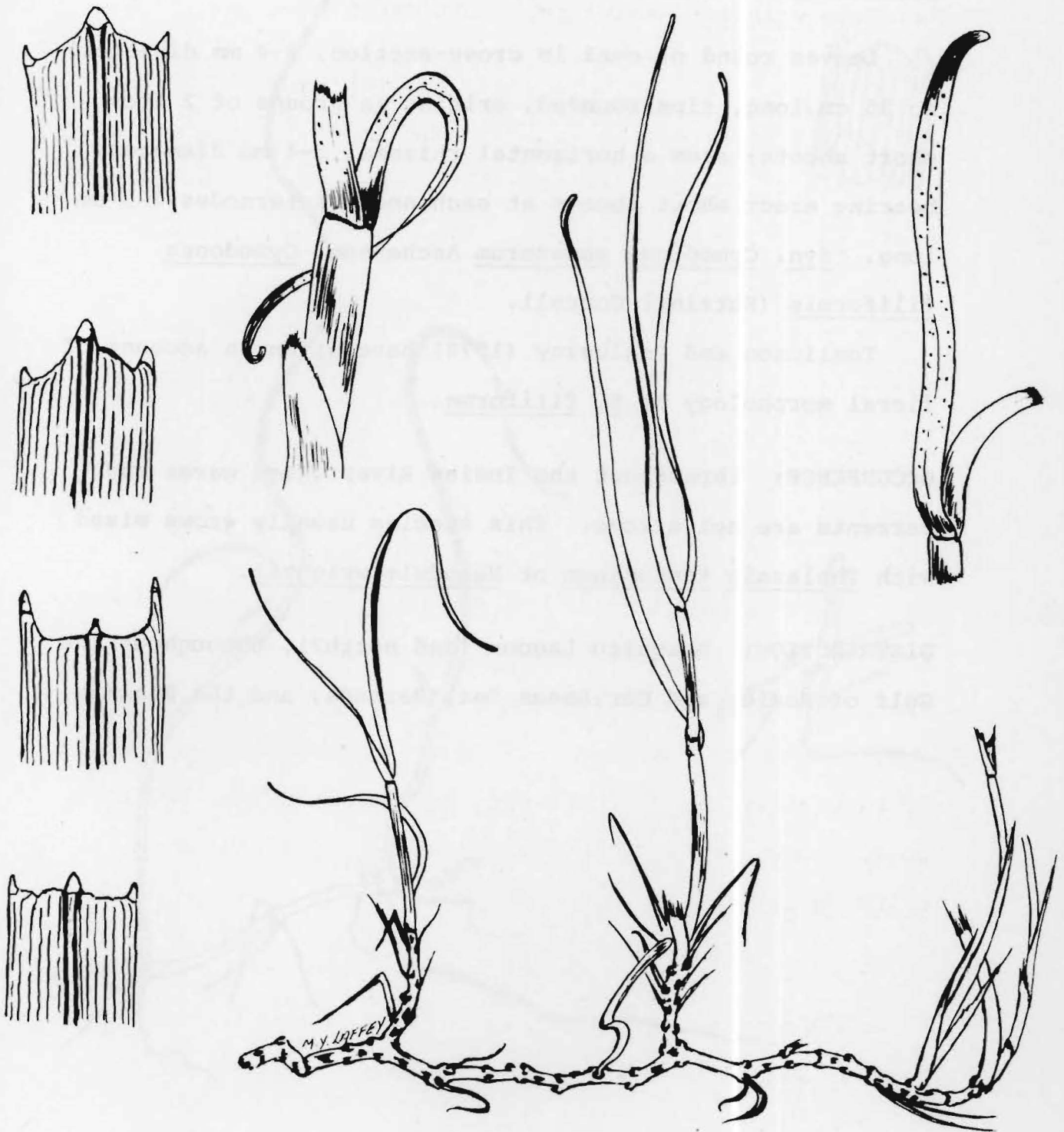


Figure 7. Halodule wrightii. Left, four leaf tips; above center and right, details of blade attachment; below, habit.

Syringodium filiforme Kützing, MANATEE GRASS Fig. 8

Leaves round or oval in cross-section, 2-4 mm diameter, to 35 cm long, tips rounded, arising in groups of 2 from short shoots; stem a horizontal rhizome, 3-4 mm diameter, bearing erect short shoots at each node, internodes 2-3 cm long. Syn. Cymodocea manatorum Ascherson, Cymodocea filiformis (Kützing) Correll.

Tomlinson and Posluszny (1978) have given an account of floral morphology of S. filiforme.

OCCURRENCE: Throughout the Indian River where waves and currents are not strong. This species usually grows mixed with Thalassia testudinum or Halodule wrightii.

DISTRIBUTION: Mosquito Lagoon (and north?), throughout the Gulf of Mexico and Caribbean Sea, Bermuda, and the Bahamas.

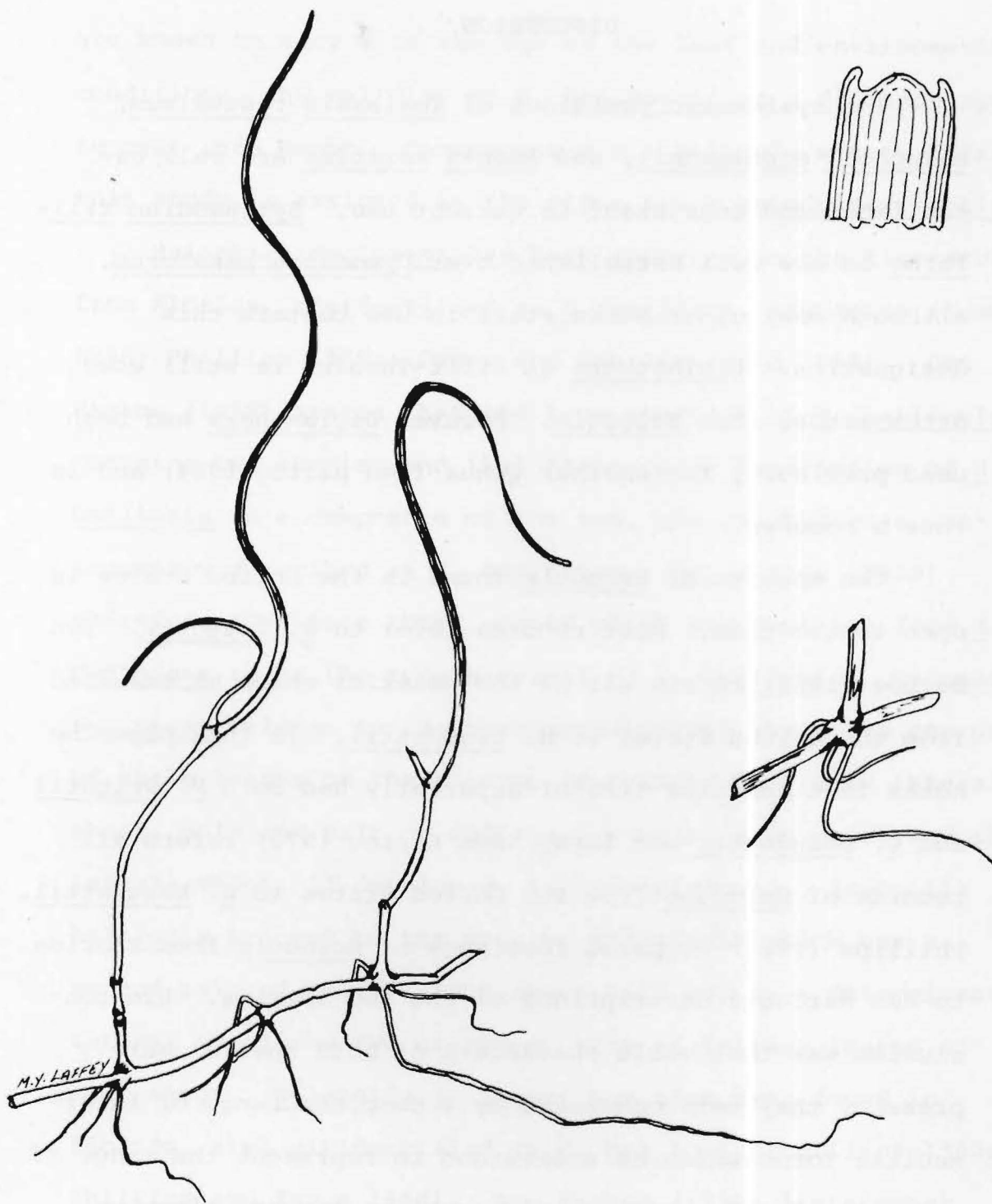


Figure 8. *Syringodium filiforme*. Left, habit; upper right, detail of a leaf tip; below right, detail of an erect branch and root group.

DISCUSSION

The systematic positions of Thalassia testudinum, Halophila engelmannii, and Ruppia maritima are well established and consistent in current use. Syringodium filiforme is now well established over Cymodocea manatorum, although many older works still in use contain this designation. Diplanthera du Petit-Thouars is still used often rather than Halodule. However Diplanthera had been used previously for another genus (den Hartog 1964) and is thus a homonym.

The species of Halodule found in the United States is open to question. Most records refer to H. wrightii. Den Hartog (1964) refers all of the material which he examined from the United States to H. beaudettii. In this paper he notes that Phillips (1960b) apparently had both H. wrightii and H. beaudettii but later (den Hartog 1970) refers all records of Halodule from the United States to H. beaudettii. Phillips (1967) compared specimens of Halodule from Florida to den Hartog's descriptions of the two species. His conclusion was that while characters of both species were present, they were connected by a complete range of intermediate forms which he understood to represent the range of variation for H. wrightii. Characters representing the extremes of both species have also been found on the same plant in the Indian River material. Phillips et al. (1974) found flowers as described for H. wrightii on such plants from Redfish Bay, Texas. Since Halodule wrightii and Halodule beaudettii are distinguished solely on leaf characters, which

are known to vary with the age of the leaf and environmental conditions, the validity of H. beaudettii as a distinct species is cast into doubt. Consequently all Halodule material from this study is assigned to the older taxon Halodule wrightii.

Halophila decipiens has been reported in the literature from Florida, misidentified as H. baillonis Ascherson (Humm 1956; Phillips 1960a; Dawes and van Breedveld 1969). Den Hartog (1959) states that the type material of H. baillonis contains two species and that Ascherson's description of H. baillonis is a composite of the two, one of which was subsequently described as H. decipiens. Den Hartog (1959) therefore considers those plants which are distinct from H. decipiens to be the type material of H. baillonis. Halophila decipiens belongs to the section HALOPHILA which has one pair of scale leaves on the rhizome associated with each lateral shoot, only one pair of foliage leaves at each node, and the lateral shoot, if developed, is indeterminant. Halophila baillonis belongs to the section AMERICANAE which has a second pair of scale leaves about half way up a determinant lateral shoot and two or three pairs of foliage leaves on each shoot. Halophila johnsonii has also been found in Florida, also misidentified as H. baillonis (Phillips 1960a; Phillips and Ingle 1960). Den Hartog (1970) lists other records of H. baillonis from Florida as H. decipiens but it is not clear whether he examined any of these specimens. As far as the writer is able to determine, Halophila baillonis is not found in Florida waters.

Halophila johnsonii is clearly related to a group of species, forms, and varieties which was termed "a collective species" or the "Halophila ovalis complex" by den Hartog (1970). He recognized two forms in this complex as distinct species, H. ovalis (with four subspecies) and H. ovata. Neither of these species has been found in the Atlantic Ocean. Both are common in the Indo-Pacific region. Halophila johnsonii differs from these species in the exclusively linear-lanceolate blade with an elongate-cuneate base and type of cross-venation.

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