

Glossary

Accuminate - tapering to a sharp tip and having concave sides just before the tip.

Caespitose - growing in tufts.

Glabrous - having a smooth, shiny surface.

Internode - the region of a stem between adjacent nodes.

Ligule - a collar of tissue between the sheath and the stem of a grass.

Node - the point of origin on a stem of a leaf or branch.

Rank - arrangement of the leaves in vertical rows around the floral axis.

Rhizome - an underground stem, typically having small, scale-like leaves and rooting from the nodes.

Sheath - lowermost portion of the leaf which surrounds the stem. Sheaths may be open, i.e. not fused at the edges, as in grasses; or they may be closed, i.e. fused at the edges, as in sedges.

Terete - round in cross section.

Additional References

Harrington, H.D. 1987. *How to Identify Grasses and Grass-like Plants*. Swallow Press, Athens, OH.

Hickman, J.C. (ed.) 1993. *The Jepson Manual: Higher Plants of California*. University of California Press. Berkeley, CA.

Hitchcock, C.L., A. Cronquist, M. Ownbey and J.W. Thompson. 1969. *Vascular Plants of the Pacific Northwest. Part 1*. University of Washington Press, Seattle, WA.

Mobberley, D.G. 1956. *Taxonomy and distribution of the genus Spartina*. Iowa State College Journal of Science 30: 471-574.

Mumford, T.F., P. Peyton, J.R. Sayce, and S. Harbell (eds.). 1991. *Spartina Workshop Record*. Washington Sea Grant Program. University of Washington. 73 pg.

Pohl, R.W. 1968. *How to Know the Grasses*. W.C. Brown Co. Dubuque, IA.

For additional information visit the
Oregon Department of Agriculture Noxious Weed Profiles at:
<http://www.oregon.gov/ODA/PLANT/WEEDS/statelist2.shtml>

Call 1-866-INVADER to report possible sightings

Key to West Coast *Spartina* Species

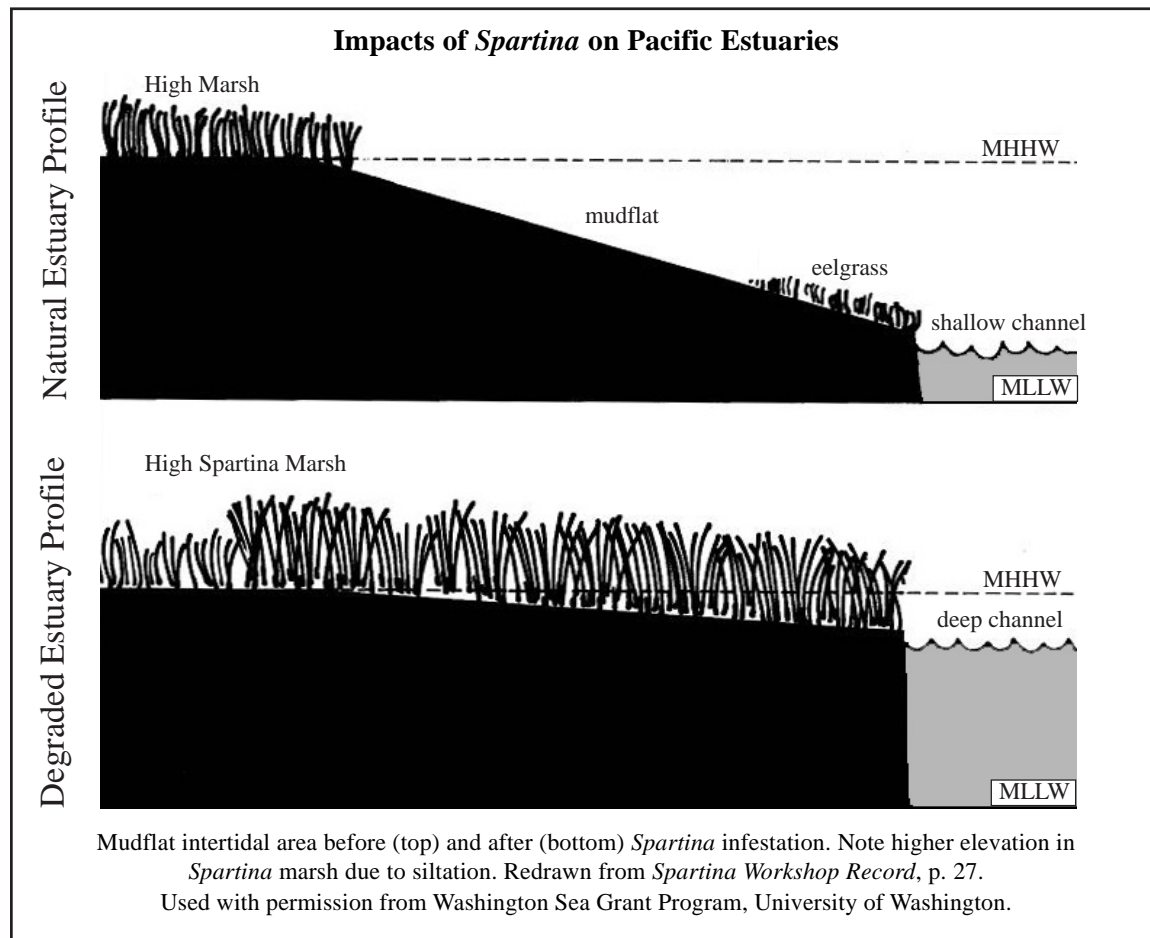
Based on Vegetative Characters



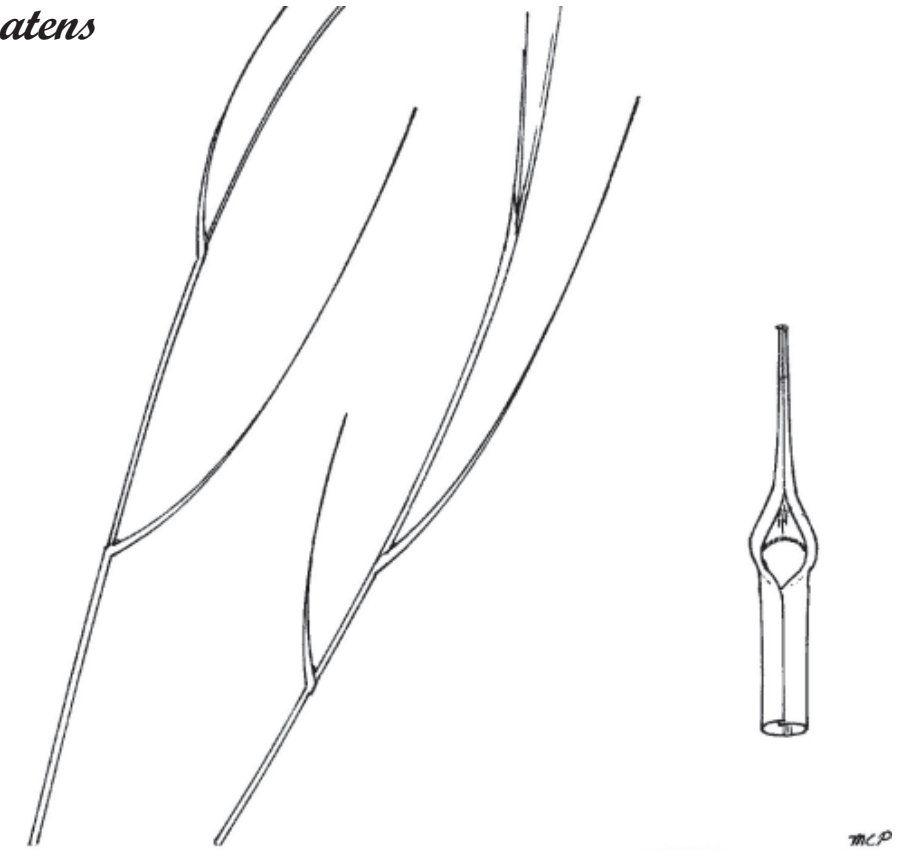
Spartina: A Threat to Pacific Estuaries

Acknowledgements

We thank those people who assisted in collecting specimens, especially Curtis Daehler (University of Hawai'i) who was a guide to *Spartina* sites in San Francisco Bay; to Lisa Lantz (WA State Noxious Weed Control Board), for a tour of sites in the Puget Sound area; and to Debbie Pickering (The Nature Conservancy) who sent specimens of *Spartina patens*. Thanks also to all who have made comments and suggestions on the key in its various stages, especially Curtis Daehler, Kathleen Sayce, and Dennis Isaacson. Funding for this project was provided by the Oregon Department of Agriculture and the State Weed Board. Cover illustration by V.M.J. Sytsma.



S. patens



Spartina patens (Aiton) Muhlenb.

Common name: saltmeadow cordgrass

Status: invasive *Spartina* species introduced from eastern U.S.

Stems: dia. at base 1.5-4 mm; up to 0.8 m tall; internodes firm; \pm 6 ridges per mm around stem; stems glabrous, terete. **Leaves:** generally inrolled when fresh; 1-4 mm wide at base; 10-50 cm long; \pm 3 nerves per mm on upper leaf surface; tips acuminate; leaf surfaces glabrous; ligule length 0.5 mm. **Rhizomes:** thin, wiry, whitish.

Growth habit: dense, matted perennial forming monospecific stands.

Habitat: mid to high salt marsh

S. foliosa



MCP

Spartina foliosa Trin.

Common name: California cordgrass

Status: native to coastal salt marshes, northernmost limit Bodega Bay, CA.

Stems: dia. at base 7-12 mm; up to 1.5 m tall; internodes fleshy; 3 ridges per mm around stem; stems glabrous, terete; young, healthy shoots always green or white all the way to base. **Leaves:** generally flat when fresh; 5-17 mm wide at base; 15-45 cm long; \pm 5 nerves per mm on upper leaf surface; tips acuminate; upper and lower leaf surfaces glabrous; ligule 1-2 mm long, angle between leaf and stem 15° - 18° . **Rhizomes:** fleshy, whitish.

Growth habit: spreading by rhizomes to form large dense stands, though not as dense as those of *S. alterniflora*.

Habitat: high intertidal to low saltmarsh.

Key to West Coast *Spartina* Species

Based on Vegetative Characters

Mary Pfauth and Mark Sytsma
Biology Department
Portland State University

January 1998
Revised May 2007

Introduction

In their natural condition, Pacific Coast estuaries have extensive open mudflats in the intertidal area that are important shorebird feeding habitat and are used for oystering and recreational fishing. Several non-native cordgrass species are invading Pacific estuaries and damaging these functions and uses. Early detection is critical to effective management of cordgrass invasion. This key is intended to provide an easy-to-use reference for quick identification of *Spartina* species on the West coast. Correct identification of these invaders is difficult because flowers are frequently not present when a population is found. Some clones never produce flowers. Since floral characters are often not available for use in the identification of *Spartina* species, a key using only vegetative characters was needed. This key includes use of vegetative characters noted by previous authors as well as some new characters.

Fresh plant material was collected for all species in this key except for *S. patens*. Specimens collected for development of this key were deposited at Portland State University Herbarium and Oregon State University Herbarium.

Determining Family and Genus

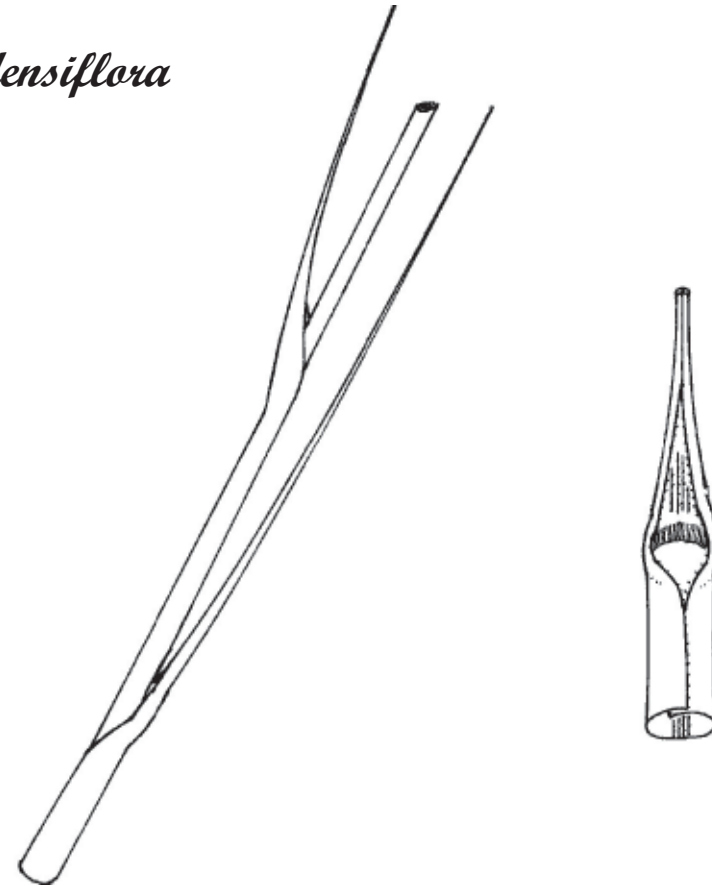
1. Is it a grass?

Three families of monocots are often mistaken for one another - the grasses (Poaceae), the sedges (Cyperaceae), and the rushes (Juncaceae). The table below summarizes several vegetative characters for these families. These characters are typical of most members of the families but are not without exceptions. A brief glossary can be found on the back cover.

<u>Character</u>	<u>Poaceae</u>	<u>Cyperaceae</u>	<u>Juncaceae</u>
Shape of stem in cross-section	Round	Triangular	Round
Jointed Stems	Yes	No	No
Center of stem (between nodes)	Hollow	Solid	Solid
Rank of leaves	Two	Three	Two or leafless
Leaf sheath	Open	Closed	Open or closed
Ligule	Present	Absent	Absent

Adapted from Harrington (1987) and Pohl (1968)

S. densiflora



Spartina densiflora Brongn

Common name: dense-flowered cordgrass

Status: invasive *Spartina* species introduced from South America.

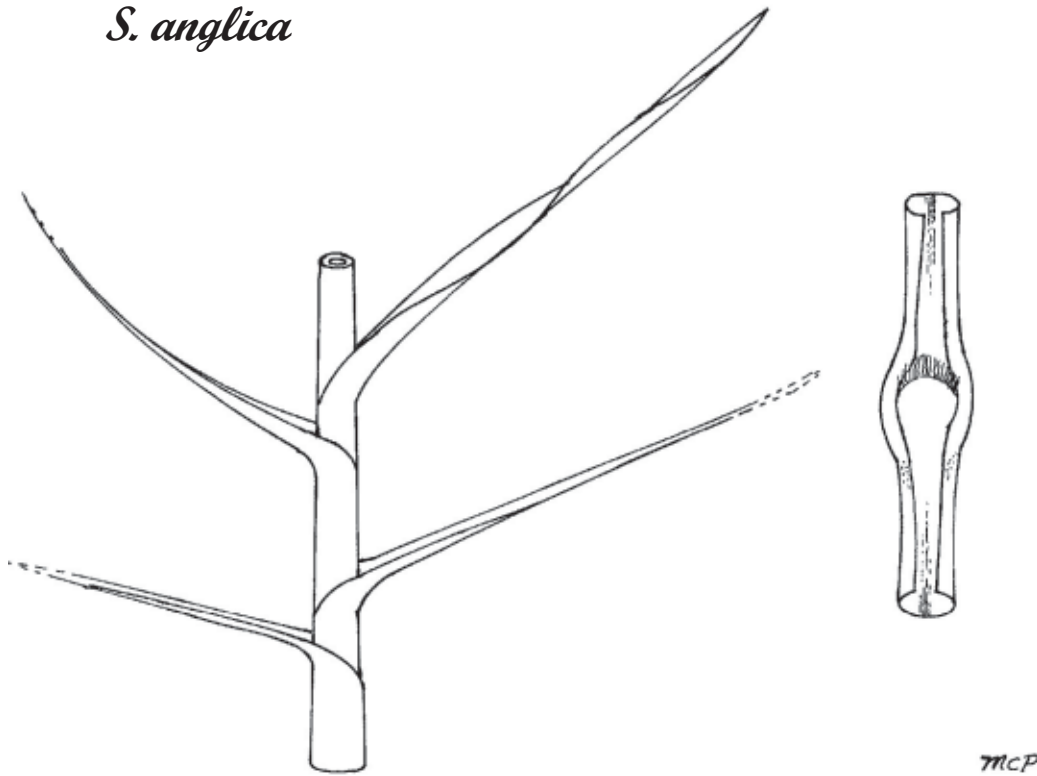
Stems: dia. at base 3-6 mm; up to 1.5 m tall; 2 ridges per mm around stem; internodes

firm; stems glabrous, terete. **Leaves:** inrolled when fresh; 4-8 mm wide at base; 12- 43 cm long; ± 2 ridges per mm on upper leaf surface; tips acuminate; upper and lower leaf surfaces glabrous; upper surface having pronounced nerves or ridges, the ridges (and the leaf margins) minutely ciliate; ligule 1-2 mm long. **Rhizomes:** thin, wiry.

Growth habit: typically caespitose, but sometimes forming dense meadows.

Habitat: low to high salt marsh.

S. anglica



Spartina anglica C.E. Hubbard

Common name: English cordgrass

Status: invasive species of *Spartina* introduced from Great Britain; originally introduced in Puget Sound, WA.

Stems: dia. at base 3-6 mm; height up to 1.3 m; 3 ridges per mm around stem; stems

glabrous, terete. **Leaves:** 11-13 mm wide at base; 36-46 cm long; ± 6 nerves per mm on upper leaf surface; tips acuminate; upper and lower leaf surfaces glabrous; ligule 2-3 mm long; angle between leaf and stem at least 30° , often almost 90° . **Rhizomes:** fleshy, whitish; rhizome scales also showing pronounced angle between leaf and stem.

Growth habit: forms dense monospecific stands, though isolated, small plants are clumpy and may appear caespitose.

Habitat: low intertidal mud flats to high salt marsh (grows in a range of substrates, including tidal mud flats, low & high salinity marshes, sand and cobble).

2. Is it a *Spartina*?

Once you have determined that the plant is a grass (family Poaceae), it is necessary to key it to genus. There are only a limited number of grasses which grow in the coastal salt marshes of the West coast of the U.S. Of those, *Spartina* is the only genus whose species have ligules consisting only of a row of hairs. Length of the ligule varies from ± 0.5 mm to 2-3 mm, depending on the species. Members of this genus do NOT have prominent midribs on their leaves.

3. Which species of *Spartina* is it?

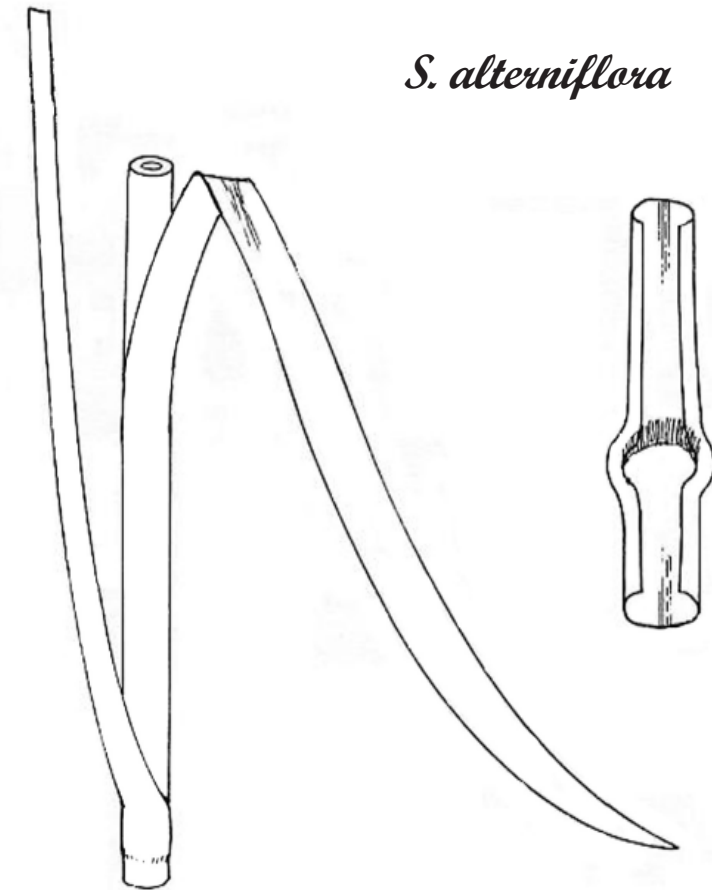
The following key uses vegetative characters to identify *Spartina* species. Confirmation of species identification based upon vegetative characters should be made by referencing herbarium specimens and by using other keys. When flowers are present, keys based upon floral characters provide the most definitive identification of *Spartina* species.

A KEY TO WEST COAST *SPARTINA* SPECIES BASED ON VEGETATIVE CHARACTERS

- 1a. Leaf blades flat when fresh..... 3
- 1b. Leaf blades inrolled when fresh 2
 - 2a. Leaf width < 4 mm, at base of blade; growing in dense patch..... *S. patens*
 - 2b. Leaf width 4-8 mm at base of blade; plants caespitose..... *S. densiflora*
 - 3a. Internodes firm..... *S. anglica*
 - 3b. Internodes fleshy 4
 - 4a. Leaf width at most 25 mm; reddish streaks or red pigment often present at base of young, healthy shoots.....*S. alterniflora*
 - 4b. Leaf width at most 17 mm; young, healthy shoots always green or white all the way to base of stem *S. foliosa*

COMPARATIVE TABLE OF VEGETATIVE CHARACTERS

		<i>S. alterniflora</i>	<i>S. anglica</i>	<i>S. densiflora</i>	<i>S. foliosa</i>	<i>S. patens</i>
Status		invasive, non-native	invasive, non-native	invasive, non-native	native to CA	invasive, non-native
Stems	Diameter at base	5-14 mm	3-6 mm	3-6 mm	7-12 mm	1.5-4 mm
	Height	up to 3 m	up to 1.3 m	up to 1.5 m	up to 1.5 m	up to 0.8 m
	Ridges around stem	2 per mm	3 per mm	2 per mm	3 per mm	6 per mm
	Internodes	fleshy	fleshy	firm	fleshy	firm
	Surface	glabrous	glabrous	glabrous	glabrous	glabrous
	Shape	terete	terete	terete	terete	terete
	Color	often red at base of young healthy shoots		young, healthy shoots always green or white all the way to base		
Leaves	Fresh condition	flat	flat	inrolled	flat	inrolled
	Width at base	4-25 mm	11-13 mm	4-8 mm	5-17 mm	1-4 mm
	Length	20-55 cm	36-46 cm	12-43 cm	15-45 cm	10-50 cm
	Nerves on upper surface	± 6 per mm	± 6 per mm	± 2 per mm	± 5 per mm	± 3 per mm
	Tip shape	acuminate	acuminate	acuminate	acuminate	acuminate
	Upper surface	glabrous	glabrous	glabrous, with pronounced ridges, ridges and leaf margins minutely ciliate	glabrous	glabrous
	Lower surface	glabrous	glabrous	glabrous	glabrous	glabrous
	Ligule length	0.7-2 mm	2-3 mm	1-2 mm	1-2 mm	0.5 mm
	Angle between leaf & stem	15° - 18°	30° - 90°		15° - 18°	
Rhizomes	Texture	fleshy	fleshy	thin, wiry	fleshy	thin, wiry
	Color	whitish	whitish	whitish	whitish	whitish
Growth Habit		dense stands	dense stands	caespitose	dense stands	dense stands
Habitat		low intertidal to high salt marsh	low intertidal to high salt marsh	low to high salt marsh	high intertidal to low marsh	mid to high salt marsh



mcp

Spartina alterniflora Loisel.

Common name: smooth cordgrass, Atlantic cordgrass

Status: Vigorous and invasive *Spartina* species introduced from the eastern coast of North America.

Stems: dia. at base 5-14 mm; up to 3 m tall; 2 ridges per mm around stem; stems glabrous, terete; reddish streaks or red pigment often present at base of young, healthy shoots. **Leaves:** 4-25 mm wide at base; 20-55 cm long; ±6 nerves per mm on upper leaf surface; tips acuminate; upper and lower leaf surfaces glabrous; ligule 0.7-2 mm long; angle between leaf and stem 15° -18°.

Rhizomes: fleshy, whitish.

Growth habit: dense monospecific stands, though isolated small plants are clumpy and may appear caespitose.

Habitat: low intertidal mud flats to high salt marsh.