Spartina alterniflora Loisel. and hybrids; smooth cordgrass
Spartina anglica C.E. Hubbard; common cordgrass
Spartina densiflora Brongn.; dense-flowered cordgrass
Spartina patens (Aiton) Muhlenb.; salt-meadow cordgrass

Cordgrasses


Spartina alterniflora


Spartina densiflora

Family: Poaceae
Range: Coastal estuaries of California, Oregon and Washington. *Spartina anglica* is not reported from Oregon and *S. densiflora* is not reported from Washington.
Habitat: Restricted to marine salt marsh and mud flat habitats.
Origin: *S. alterniflora* was unintentionally introduced from the Atlantic coast. *S. anglica* is native to the United Kingdom. *S. densiflora* is native to southern South America and *S. patens* is native to the southeastern U.S.
Impacts: One plant can develop into a large, dense, circular clonal patch up to about 80 ft in diameter. Numerous individuals on barren mud flats can spread until no open space remains. This can significantly impact shorebird feeding habitat. Because smooth cordgrass can grow in deeper water, it can colonize open mud flats that are normally devoid of vegetation. Mud flats densely populated with smooth cordgrass do not provide suitable habitat for foraging shorebirds. Smooth cordgrass also displaces native vegetation higher on the shore in salt marshes.
Western states listed as Noxious Weed: All species are listed in Oregon and Washington
California Invasive Plant Council (Cal-IPC) Inventory: *S. alterniflora* and hybrids, *S. densiflora*, High Invasiveness (Alert); *S. anglica*, Moderate Invasiveness (Alert); *S. patens*, Limited Invasiveness

Cordgrasses are perennial grasses that can grow to 8 ft tall. Smooth cordgrass has extensive creeping rhizomes and spreads in a circular patch from the point of establishment. In contrast, the other cordgrasses are bunchgrasses. In the southern San Francisco Bay, smooth cordgrass readily hybridizes with California cordgrass (*S. foliosa*), and the hybrid is more fecund and invasive than the non-native parent plant. Cordgrass leaves are 8 to 20 inches long and generally lack hairs. The ligules consist of a fringe of hairs 0.5-2 mm long.

Inflorescences are panicles 4 to 16 inches long, consisting of 5 to 30 spike-like branches. Cordgrasses are primarily outcrossers. Plants reproduce by seed and vegetatively from creeping rhizomes and rhizome fragments. Both the seeds and rhizome fragments can disperse with water. The seeds typically do not survive for more than one year. Seedheads are generally susceptible to infection by an ergot fungus, which can limit viable seed production.

NON-CHEMICAL CONTROL

Mechanical (pulling, cutting, disking)	Bunchgrass type spartina species are easier to control using mechanical methods compared to the creeping forms (i.e., *S. alterniflora* and hybrids). Hand pulling of small patches can be effective. However, seedlings begin to tiller in the first season. For dense-flowered cordgrass one tool used was a metal-bladed brush cutter that cut into the shallow rhizomes in the top 4 inches of the marsh. Cutting alone can reduce populations and stem density, but will not give effective control. Combining

	cutting and smothering are reported to be highly effective against *S. anglica*, achieving around 98% control. Mechanical removal with heavy equipment has been used in various estuaries, although it is labor intensive and expensive. As with hand pulling, all rhizome fragments must be removed to prevent resprouting. Many other mechanical tools have been tried, including covering, digging, crushing, disking, tilling. Tillage and disking are best applied in winter and one study showed that it took 3 to 6 consecutive years of treatment to reach 99% control. Summer was the best time to apply crushing but this treatment required 9 to 10 years of application.
Cultural	Few cultural controls are available, although covering small patches with black plastic for a long period suppressed regrowth. Grazing and burning are not appropriate tools in the habitats where spartina invades.
Biological	*Prokelisia marginata* is a planthopper native to the Atlantic and Gulf coasts of North America. It has been shown to oviposit on spartina leaves and cause scars near the base of the plant. However, there does not appear to be any significant effect on the control of spartina by the insect.

CHEMICAL CONTROL

The following specific use information is based on published information or reports by researchers and land managers. Other trade names may be available, and other compounds also are labeled for this weed. Directions for use may vary between brands; see label before use. Herbicides are listed by mode of action and then alphabetically. The order of herbicide listing is not reflective of the order of efficacy or preference.

AROMATIC AMINO ACID INHIBITORS	
Glyphosate *Rodeo*, *Aquamaster*	**Rate:** Broadcast foliar treatment: 2 to 4 gal product *Rodeo* or *Aquamaster*/acre (8 to16 lb a.e./acre). Spot treatment: 2 to 5% v/v solution through hand-held spray equipment, or 33% solution with wiper applicators. **Timing:** Postemergence, to rapidly growing cordgrass any time from late June until first killing frost. **Remarks:** High rates of glyphosate are needed. Treat at least 6 hours before tidewater will cover plants. Glyphosate precipitates in water high in divalent and trivalent salts. Thus, applications to marine species can be inconsistent and not as effective as imazapyr. Debris and silt on cordgrass also reduce performance. Glyphosate can be used in combination with imazapyr.
BRANCHED-CHAIN AMINO ACID INHIBITORS	
Imazapyr *Habitat*	**Rate:** Broadcast foliar treatment: 4 to 6 pt product/acre (1 to 1.5 lb a.e./acre). Spot treatment: 2.5 to 7.5% v/v solution **Timing:** Postemergence mid-season from mid-June to mid-September was considered the best timing in a study in Washington. **Remarks:** Imazapyr is the preferred treatment and has shown the most consistent and effective results. Aerial applications are most often used when large infestations are being treated, but backpack sprayers can be used for smaller patches. Add suitable adjuvant to spray solution. A list of adjuvants can be found at http://www.spartina.org/rfq/RFQ-Att4_Products.pdf.

RECOMMENDED CITATION: DiTomaso, J.M., G.B. Kyser et al. 2013. *Weed Control in Natural Areas in the Western United States*. Weed Research and Information Center, University of California. 544 pp.