Smooth Cordgrass
Spartina alterniflora Loisel.
Grass family (Poaceae)

**NOTE: Smooth cordgrass is native to coastal states of eastern and southern U.S. It has been introduced by humans to wetlands in California, Oregon and Washington both accidentally and intentionally. Smooth cordgrass did not previously occur in western U.S. and would not likely be transported there by natural means. These western coastal habitats are novel environments well beyond the natural native range of smooth cordgrass and unfortunately, the plant has adapted well and become a serious environmental weed there. Within its native range, smooth cordgrass is an integral part of the tidal wetland ecosystem and does not need management.

NATIVE RANGE
Atlantic and Gulf Coasts of North America

DESCRIPTION
Smooth cordgrass is a tall clumping perennial grass with creeping rhizomes that grows up to 7 ft. in height. The leaves have flat blades 12 to 20 in. long that are sometimes rolled at the tip. Flowering occurs June to November. The flowers occur in erect wands (panicles) 4-16 in. long and about 1/3 to 1 in. wide, each composed of 5 to 30 individual flowering spikes. The branch axes are triangular, with two rows of sessile, overlapping spikelets on the lower side. Spikelets are strongly flattened, keeled, and lanceolate, 8-15 mm long, with one floret and a pair of straight, unequal glumes. Spikelets detach from below the glumes. Glume and lemma keels are glabrous to sparsely covered with long, soft hairs and the ligule is hairy.

ECOLOGICAL THREAT
Where it is introduced, smooth cordgrass fills in mudflat habitats, transforming them into a dense meadow. As recently as 2003 smooth cordgrass had invaded between about 20,000 acres of tideflats in Willapa Bay, Washington and many acres in San Francisco Bay. This extensive invasive and replacement of native wetland vegetation has resulted in the loss of habitat for salmon and oysters and additional economic losses to those who rely on these species. The spread of smooth cordgrass in estuaries and channels also poses threats to navigation and flood control objectives.

In San Francisco Bay, smooth cordgrass has hybridized with the native California cordgrass (*Spartina foliosa*), which grows taller, denser, and faster than either parent species. Mapping efforts by the San Francisco Estuary Invasive Spartina Project found that the acreage invaded by hybrid cordgrass increased 52% between 2001 and 2004. One impact of hybrid cordgrass is its ability to trap sediment floating in the water. As the sediment builds up, each patch of smooth cordgrass becomes a small island. In San Francisco Bay, hybrid cordgrass has created islands up to 1 foot higher than the surrounding mudflats. Hybrid cordgrass can live both higher and lower in the intertidal zone than California cordgrass, which means that it also competes with pickleweed that grows higher in the marsh. Hybridization with California cordgrass in San Francisco Bay threatens the existence of the native California species, as it cannot compete with the reproduction and growth of the hybrid. This is a concern for the small invertebrates that live within the marsh, because their numbers are reduced within the dense roots of hybrid cordgrass, compared to the much sparser root system of California cordgrass. In both California and Washington, it also reduces habitat for shorebirds migrating on the Pacific flyway, which need to feed on open mudflats and will not enter thick vegetation. Endangered California clapper rails (*Rallus longirostris obsoletus*) using marshes invaded by hybrid cordgrass may be impacted as a result of habitat loss from cordgrass invasion.

DISTRIBUTION IN THE UNITED STATES

Along the eastern seaboard and the Gulf coast, smooth cordgrass is the dominant native plant in salt marshes. However, it is introduced and considered invasive in Gray's Harbor, Puget Sound, and Willapa Bay, Washington; the Suislaw River estuary, Oregon; and San Francisco Bay, California. Most of the invasive cordgrass in California is actually the hybrid with California cordgrass; little pure smooth cordgrass exists in San Francisco Bay.

HABITAT IN THE UNITED STATES

Smooth cordgrass grows on estuarine mudflats, in salt marshes, and in marsh sloughs (channels) and tolerates a wide range of salinity. On the west coast it has not been found to grow in freshwater marshes or on beaches that receive heavy wave action.

BACKGROUND

In its native range, decomposed smooth cordgrass provides an important source of food for crabs and other invertebrates and cordgrass marshes are nursery grounds for juvenile fishes and blue crabs. However, these species do not occur on the west coast and smooth cordgrass does not appear to serve the same functions in its non-native invaded habitats. Smooth cordgrass was introduced to Washington State in the late 1800s, either in shipments of oysters from the east coast or as packing material in ships' cargo. It was introduced to San Francisco Bay in the 1970s as part of a project to stabilize the bay shoreline.

BIOLOGY AND SPREAD

Reproduction of smooth cordgrass is primarily vegetative but sexual reproduction that results in seed production also plays a role. Rhizomes from a single plant spread outward in all directions, creating circular clones that eventually coalesce to form large extensive patches or meadows. Clumps of cordgrass can break off in winter storms and wash across the bay or into other bays and root in new areas. Viable pieces of cordgrass can also be spread by dredging equipment. Smooth cordgrass is wind-pollinated and is a mostly outcrossing species meaning that fertilization of the ovules requires pollen from other smooth cordgrass plants. The seeds are dispersed primarily by water and can be spread long distances by floating on racks of dead Spartina stems in the fall. The seeds remain viable for only one year and cannot tolerate desiccation. Plants die back starting in October and dead plant material is carried off by the tides to pile up in other locations, where it may smother native plants.

MANAGEMENT OPTIONS

A variety of methods are available for controlling smooth cordgrass including manual (hand pulling), mechanical (tilling and plastic covers), and herbicides. And, in Washington state, the use of a biological control agent is being developed as a management tool.

Biological

A planthopper (*Prokelisia marginata*), was released in Washington State in 2000 as a biocontrol agent for smooth cordgrass and it has significantly reduced smooth cordgrass seed survival at some sites. More time is needed before the full effects of this insect on the plants are known. This insect is already present in San Francisco Bay as an accidental introduction, perhaps arriving with the planting of S. alterniflora. However, unlike smooth cordgrass in Washington, the plants in San Francisco Bay have proven to be very resistant to the insect. Biological control using other natural enemy species from the native range of smooth cordgrass is an unlikely option in California because of the presence of the native California cordgrass (*Spartina foliosa*) which would also be impacted.

Chemical

Chemical applications are effective for eradicating large and small infestations. For best results, herbicides must be applied under the right conditions such as a clean canopy and ample dry time prior to tidal inundation, before the plants set seed. Both glyphosate and imazapyr are registered for use on Spartina. The most effective control has been achieved using imazapyr. In 2004 and 2005, over 10,000 acres of Spartina in Willapa Bay has been controlled with imazapyr.

Manual and Mechanical

Small, isolated plants can be pulled by hand, as long as all pieces of roots are removed. Small fragments of rhizomes in left in the soil will regrow. All plant material should be carried above the high tide mark and allowed to dry out to prevent it from regrowing. Several mechanical methods have been used in Willapa Bay, including disking, winter tilling, and crushing but these methods were expensive, time-consuming, and not very effective. Covering with plastic may work for small patches a few yards in diameter. Stems are first mowed and then covered with geotextile fabric or black plastic that is at least one yard greater in diameter than the infestation and held in place by sandbags or stakes. To ensure mortality, plants should be covered in spring and remain covered for at least a year.

USE PESTICIDES WISELY: Always read the entire pesticide label carefully, follow all mixing and application instructions and wear all recommended personal protective gear and clothing. Contact your state department of agriculture for any additional pesticide use requirements, restrictions or recommendations.

NOTICE: mention of pesticide products on this page does not constitute endorsement of any material.

CONTACTS
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SUGGESTED ALTERNATIVE PLANTS
Where hybrid cordgrass has replaced California cordgrass or pickleweed, these species may be replanted for restoration. Where smooth cordgrass has invaded mudflats, other wetland species adapted to mudflat type conditions (e.g. eelgrass) should be considered.

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