WRITTEN FINDINGS OF THE
WASHINGTON STATE NOXIOUS WEED CONTROL BOARD
(October 1999)

Scientific Name: *Spartina patens* (Aiton) Muhl.

Common Name: Saltmeadow cordgrass

Family: Gramineae (Poaceae)

Legal Status: Class A

Description and Variation: Saltmeadow cordgrass is an erect, rhizomatous grass, 1 to 4 feet tall. The hairless leaf blades are 4 to 19 ½ inches long and 1/3 to 1½ inches wide at the base. When fresh, leaf blades are generally inrolled and have ridges on the upper surface. The ligules consist of a fringe of hairs, 0.02 inches long. Flowers occur in two to several spikes that are appressed to somewhat spreading. (Hitchcock 1971). The plant forms dense, single species stands (Pfauth and Sytsma 1998).

Spartina is a relatively small genus consisting of approximately 14 species, geographically centered along the east coast of North and South America, with outliers on the west coast of North America, Europe, and Tristan da Cunha. Members of the genus occur primarily in wetlands, especially estuaries (Partridge 1987). However, no *Spartina* species are native to the intertidal zone in Washington (Ebasco Environmental 1992a). *S. patens* is one of three introduced *Spartina* species on Washington's noxious weed list. (The other noxious species include *S. alterniflora* and *S. anglica*).

Economic Importance: *Beneficial:* In its native range, *Spartina patens* is used to vegetate and stabilize saline, brackish, and freshwater tidal streambanks. The species is well-adapted to sandy-clay soils and will tolerate occasional inundation by storm tides. In addition, it has the ability to trap and grow through layers of sand (Hamer et al. 1988).

Detrimental: Unlike its relatives, *Spartina alterniflora* and *S. anglica*, *S. patens* lacks the physiological adaptations to grow at lower tidal elevations. (See "Growth and Development" section). Therefore, this species would not have the same negative impacts on mudflat communities and hydrology as its relatives. However, the plant does have the potential to impact salt marshes throughout western Washington. These habitats are already damaged; more than half of the wetlands along the coasts and riverbanks of Puget Sound have been destroyed by human activity (Puget Sound Water Quality Action Team 1994). Anecdotal evidence indicates that *S. alterniflora* may displace native plants, such as *Salicornia virginica, Triglochin maritimum, Jaumea carnosa*, and *Fucus distichus* (Wiggins and Binney 1987; Simenstad and Thom 1995). In their native range, studies have indicated that *S. patens* can competitively displace *S. alterniflora* (Bertness 1991), suggesting that *S. patens* would be more competitive than *S. alterniflora* in Washington's salt marshes.

In addition to habitat impacts, *S. patens* may pose a small threat to the genetic integrity of a rare plant. *S. patens* is related to *S. pectinata*, a Washington native that is considered to be a sensitive species (Washington Department of Natural Resources 1999). The two plants can hybridize (Marchand 1970; McDonnell and Crow 1979). However, since they occur in very different habitats, the chances of interbreeding are slim.

<u>Geographical Distribution:</u> In its native range, *Spartina patens* occurs along the Atlantic coast from Canada to the Caribbean and Central America (Silander 1984). *S. patens* has been introduced to several areas, including the Mediterranean (Silander and Antonovics 1979), California, Oregon, British Columbia, and Washington. The species occurs in San Francisco Bay, California (Spicher and Josselyn 1985). In Oregon, *S. patens* is found on The Nature Conservancy's Cox Island Preserve in the Siuslaw Estuary, where the population is reportedly increasing exponentially (Frenkel 1987). One small infestation is known just north of Nanaimo on Vancouver Island (Aberle 1990). Washington's only known infestation of *S. patens* occurs near the mouth of the Dosewallips River (Dosewallips State Park) T25N, R2W, section 2, in Jefferson County. Eradication work has been underway on this site for several years.

<u>Habitat:</u> Near the center of its native distribution, *Spartina patens* dominates the upper salt marsh zone and also colonizes sand dunes, swale grasslands, sand flats, and coastal scrublands (Silander 1984). *S. patens* typically occurs from mean high water to approximately 0.5 m above mean high water (Raupp and Denno 1979). A study in Connecticut found that 72 percent of *S. patens* occurred above mean high water (Lefor et al. 1987). *S. patens* occurs in somewhat varying habitats in its native range. North of approximately 42° N, *S. patens* is restricted to the salt marsh community. South of approximately 25° N, *S. patens* is confined to beaches and low coastal dunes (Silander and Antonovics 1979).

<u>History:</u> It is not known how *Spartina patens* was introduced to Washington. However, the species may have been brought in through oyster culture.

<u>Growth and Development:</u> *Spartina patens* culms first appear in the spring, when they emerge through the thick, dead horizon of the previous year's growth (Denno 1980). The major production of roots, rhizomes, stolons, and upright culms occurs under the higher temperature and longer daylengths of the growing season. The highest standing crop occurs from July to October (Seneca 1974). The species can grow quite densely; in Rhode Island, culm density has been measured at 16,120 culms/m^2.

S. patens is limited to high salt marshes because of its inability to tolerate the lower oxygen conditions at lower tidal elevations. Along the Atlantic and Gulf coasts, *S. patens* and *S. alterniflora* often occupy the same tidal marshes. *S. alterniflora* dominates the regularly flooded seaward margins of the marshes, while *S. patens* inhabits higher, less flooded areas (Gleason and Zieman 1981). Studies have indicated that *S. patens* plants transplanted into low marsh areas were severely stunted, and the plant did not colonize bare patches. The species lacks aerenchyma tissue that would allow it to oxygenate its rhizosphere in anoxic soils (Bertness 1991). (The rhizosphere is the soil zone of increased microbial activity surrounding the roots). *S. alterniflora* has a large amount of internal gas spaces (aerenchyma) that extend from the leaves to the root tips. These spaces function as conduits for gas exchange between the plant and the rhizosphere. In oxygen-poor soils, rhizosphere oxidation is strongly influenced by aerenchyma size and number. *S. alterniflora* has extensive aerenchyma tissue, which allows it to oxygenate its roots, even during prolonged inundation (Gleason and Zieman 1981; Bertness 1991). Unlike *S. patens, S. alterniflora* can survive in either high or low salt marshes; however, it is restricted to low salt marshes by competitive displacement by *S. patens* (Bertness 1991).

Reproduction: *Spartina patens* flowers from June to September. The species is dichogamous (stamens and pistils mature at different times) and tends toward outcrossing (Silander 1984); however, selfing does occur among ramets of the same clone (Silander and Antonovics 1979). Most plants set seed in September (Seneca 1974; Denno 1980). Seedlings emerge in May, but they do not appear to flower during their first season and produce limited flowers during their second season (Seneca 1974). Seedlings often colonize low sand flats where moisture is adequate for germination and growth (Seneca 1974). Although *S. patens* does produce viable seed, it reproduces primarily via rhizomes (Seneca 1974).

Response to Mechanical Control Methods: Seedlings can be pulled out effectively. Care must be taken to remove both shoots and roots.

Covering small *Spartina* clones with woven geotextile fabric has been successful on *Spartina patens*. With this technique, clones are mown to ground level and covered out 3 to 4 feet beyond the edges of the clone. The covering must be anchored in place. To be effective, covering should be left in place for one to two growing seasons (Spartina Task Force 1994).

Mowing infestations can contain growth, limit seed set, and eventually kill the plants. To be effective, clones must be mowed repeatedly, beginning with initial spring green-up and continued until fall die-back. In some cases, repeated mowings will be required for three or four years (Spartina Task Force 1994).

Response to Cultural Control Methods: Diking can be used as a containment measure, since dikes confine the lateral spread of rhizomes. Dikes also remove tidal action, thereby inhibiting nutrient flow and oxygen exchange. In addition, dikes can be used to flood areas, which will eventually bring about *Spartina* death. However, this method will also kill other species that cannot tolerate prolonged flooding (Aberle 1990).

Response to Herbicides: Rodeo™ (glyphosate) is the only herbicide presently labeled for use on *Spartina* in Washington. Efficacy studies with Rodeo™ have been conducted with *S. alterniflora* rather than *S. patens.* Reports of control with Rodeo™ are varied, ranging from 100% (Crockett 1991) to 0% (Balthuis and Scott 1993). Differences in reported control results may be due to the use of different surfactants. *S. alterniflora* leaves have high levels of salt and sediment, which may prevent glyphosate absorption. Finding an adjuvant that overcomes the effects of these antagonistic ions is likely to increase Rodeo™ absorption (Norman and Patten 1994c). Additional research is needed on this front.

S. patens grows intermingled with native marsh plants. Since Rodeo™ is a non-selective herbicide, care must be taken to avoid damage to desirable vegetation.

Biocontrol Potentials: Several insects feed on *S. patens* in its native range. However, at present, the distribution of *S. patens* in Washington is too small to require the use of classical biological control. A leafhopper, *Prokelisia marginata* (Homoptera), is currently being studied as a biocontrol agent for *Spartina alterniflora*. This species does not feed on *S. patens* (D. Strong, pers. comm.)

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**Content about Spartina patens*

**References available from the Washington State Noxious Weed Control Board Office in Kent.*