

**California Wildlife Habitat Relationships System  
California Department of Fish and Game  
California Interagency Wildlife Task Group**

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## Saline Emergent Wetland

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### Vegetation

**Structure--** Saline Emergent Wetlands (SEW) are characterized as salt or brackish marshes consisting mostly of perennial graminoids and forbs, the latter often succulent and suffrutescent, ranging in height from 0.2 to 2 m (0.7-6.6 ft) or more (Munz and Keck 1973, Cheatham and Haller 1975, Küchler 1977), along with algal mats on moist soils and at the base of vascular plant stems (Küchler 1977, Zedler 1982). The component plants occur sometimes in zones but more often in patches or as a sequence of overlapping species along an elevational gradient (Vogl 1966, Macdonald 1977a, Zedler 1982). Vegetational coverage is complete or nearly so except where creeks and ponds are present or following disturbance (Pestrong 1972, Küchler 1977, Zedler 1982). Vertical stratification occurs in all but the lower, outer zone.

**Composition--** Characteristic or distinctive vascular plant species ranging from lower saline sites to higher or brackish sites are cordgrass, pickleweed, Humboldt cordgrass, glasswort, saltwort, jaumea, California seablite, seaside arrowgrass, alkali heath, seashore saltgrass, spearleaf saltweed, shoregrass, the endangered birdsbeak, common glasswort, sea-lavender, brass-buttons, saltmarsh dodder, gumweed, salt rush, tufted hairgrass, Pacific alkali bulrush, Olney bulrush, tule bulrush, California bulrush, common cattail, tropical cattail, cinquefoil, and coast carex (Macdonald and Barbour 1974, Cheatham and Haller 1975, Macdonald 1977a, Zedler 1982, U.S. Fish and Wildlife Service 1983a, Spicher and Josselyn 1985 (Spicher and Josselyn not in Habitat Lit Cite). Algae include greens, bluegreens, and diatoms (Zedler 1982).

**Other Classifications--** Other names for Saline Emergent Wetlands include coastal salt marsh (2-Munz and Keck 1973, 5.21-Cheatham and Haller 1975, 3-Thorne 1976, 38-Küchler 1977, Macdonald 1977a, Zedler 1982); tidal marsh-3a, salt-flat succulent-3b (Thorne 1976); saltwater marsh, saltwater coastal flat (U.S. Army Corps of Engineers 1978); pickleweed-cordgrass, pickleweed, cattail-sedge, sedge-rush (Parker and Matyas 1981); cordgrass, pickleweed, suaeda, saltgrass, bulrush (Paysen et al. 1980), estuarine intertidal emergent wetland (Cowardin et al. 1979, Jones and Stokes Assoc., Inc. 1981); intertidal estuarine zone-emergent vegetation-2.1.2 C, above tide estuarine wetland zone: diked marsh-2.1.3.A (Proctor et al. 1980); regularly folded saltmarshes-18, irregularly flooded salt marshes-17, salt meadows-16, salt flats-15 (Martin et al. 1953); salt marsh, brackish marsh (Mason 1957, Faber 1982); salt-water marsh, seasonally salt-water marsh (Mason 1957); coastal brackish marsh-5.22 (Cheatham and Haller 1975); tule marsh-37

(Küchler 1977).

## Habitat Stages

**Vegetation Changes--** 1-2;S-D. Saline Emergent Wetland becomes established as low marsh on intertidal flats and advances seaward as plant detritus and sediments accrete, gradually causing a change to high marsh (Macdonald 1977a). Conversely, high marsh can extend landward as sea level rises (Atwater et al. 1979, Krone 1982, Josselyn 1983). This habitat may exist as any of classes 1-2:S-D. Plant height is greater in the outer, lower zone, ranging from 1 to 1.5 m (3.3-4.9 ft) if cordgrass is present (Purer 1942, Zedler 1982). At higher elevations, height generally varies from 0.2 to 0.7 m (0.7-2.3 ft) (Purer 1942), but barren flats may occur in the south (Macdonald 1977a). In brackish marshes, height ranges up to 2 to 4 m (6.6-13.1 ft) (Cheatham and Haller 1975, Josselyn 1983).

**Duration of Stages--** Many parts of present day Pacific Coast salt marshes are believed to be of relatively recent (100 years) origin (Macdonald and Barbour 1974). However, high marsh has remained stable for periods of at least 770 years in Oregon, and comparable marshes existed along the coast during the Pleistocene (Macdonald 1977b). Influencing factors are sedimentation rates and coastal submergence or emergence rates (Macdonald 1977a,b, Zedler 1982). Sedimentation rates have increased from 0.1 cm (0.04 in) /yr before European settlement to 0.2 to 0.5 cm (0.08-0.2 in)/yr in the 1900's because of greater human-induced erosion of uplands (Macdonald 1977a, Zedler 1982). For the last several thousand years, submergence rates from the rise in sea level in the San Francisco Bay Area have averaged 0.1 to 0.2 cm (0-04-0.08 in)/yr (Josselyn 1983).

Other factors affecting wetland duration are diking, ditching, dredging, filling, hydraulic mining, and diversion or impoundment of water upstream, trampling, and pollution (U.S. Fish and Wildlife Service 1979, Atwater et al. 1979, Zedler 1982).

## Biological Setting

**Habitat--** Saline Emergent Wetlands occur above intertidal sand and mud flats (Küchler 1977) and below upland communities not subject to tidal action (Macdonald 1977a). The upper part of estuaries grade into brackish and freshwater marshes (Cheatham and Haller 1975, Macdonald 1977a, Josselyn 1983).

**Wildlife Considerations--** Saline Emergent Wetlands provide food, cover and nesting and roosting habitat for a variety of birds, mammals, reptiles, and amphibians (Macdonald 1977b, Zedler 1982). Endemic subspecies of birds include the endangered California and light-footed clapper rails, California black rail, salt marsh yellowthroat, Belding's Savannah sparrow and three subspecies of the song sparrow at San Francisco Bay (California Department of Fish and Game 1980, U.S. Fish and Wildlife Service

1983a, Josselyn 1983). Other bird species that feed or roost in these wetlands are herons, egrets, ducks, hawks (including the northern harrier), Virginia rail, American coot, shorebirds, swallows, and marsh wren. Some species are residents; others are migrants or winter visitants (Macdonald 1977b, Springer 1982, Zedler 1982, Josselyn 1983). Characteristic mammals are species of shrews, bats, and mice, including the endangered salt marsh harvest mouse endemic at San Francisco Bay, as well as the raccoon, mink, river otter, and harbor seal (Macdonald 1977b, Hall 1981, Springer 1982, Zedler 1982, Josselyn 1983). A number of species from adjacent uplands visit the wetlands to feed (Macdonald 1977b). Several species of lizards and snakes frequent the edge of the high marsh, whereas the Pacific tree frog and western toad occur in slightly brackish marsh or after heavy rains (Macdonald 1977b, Zedler 1982).

## Physical Setting

Saline Emergent Wetlands occur along the margins of bays, lagoons, and estuaries sheltered from excessive wave action (Macdonald and Barbour 1974). At their lower margin they are exposed once every 24 hours; whereas, at their upper margin, submergence is short and infrequent, followed by weeks or months of continuous exposure (Macdonald 1977a). Soil salinity varies from that of seawater (35 ppt) or greater (60 ppt up to 145 ppt) because of lagoon closure and evaporation, particularly in the south, to brackish (< 5 ppt) at sites influenced by heavy precipitation and run-off (Macdonald 1977a, Zedler 1982, Josselyn 1983). Soils consist of thin veneers (0.2 to 1.8 m, or 0.7-5.9 ft) of fine silts (<4 microns in diameter), clays, and scattered plant remains. Grain size increases at higher elevations in the south. Soil moisture decreases with increasing elevation; whereas soil organic content appears to increase in the north and decrease in the south (Macdonald 1977a, Zedler 1982). Average rainfall ranges from 20 cm (8 in) in the extreme south (Zedler 1982) to 200 cm (80 in) in the extreme north (Proctor et al. 1980). Seasonal and diurnal temperatures fluctuate little, with mean summer maxima of 16 to 22 C (61-72 F) and mean winter minima of 4 to 8 C (39-47 F). Frost-free days range from 330 to 365 (Munz and Keck 1973).

## Distribution

Saline Emergent Wetlands occur in the upper intertidal zone from about the level of mean lower high water to extreme high water (Macdonald 1977a). Maximum elevation is about 3.1 m (10.3 ft) above mean lower low water (Hinde 1954) or 1 m (3.3 ft) above mean high water (Harvey et al. 1978). Brackish marsh wetlands extend to below mean lower low water (Josselyn 1983). These wetlands are present in suitable locations along the entire coast, the largest stands occurring in San Francisco Bay.

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