

Freshwater Wetlands

VEGETATION ASSOCIATION: FRESHWATER WETLANDS

MAPPED SUBASSOCIATIONS: Coastal and Valley Freshwater Marsh, Cismontane Alkali Marsh, Marsh (undifferentiated), Wet Montane Meadow and Open Water.

STATUS: State: California Fish and Game Wetlands
Federal: U.S. Army Corps of Engineers Jurisdictional Waters of the United States

DATA CHARACTERIZATION

Much of the information provided in this section was obtained from published papers written by Holland and Keil (1995), Barbour and Major (1977), Sawyer and Keeler-Wolf (1995), Kramer (1988) and Grenfell (1988). Distribution data for the vegetation association and subassociations was obtained primarily from the University of California, Riverside GIS database.

Because of the regional scale of the mapping and the small size of most marsh and wet meadow Habitats, many areas supporting marsh and wet meadow Habitats probably were overlooked. Most of the potential wet montane meadow Habitat is located within National Forest Service lands that have not been extensively surveyed and mapped; therefore, the distribution of wet montane meadow may be greater than indicated by the current data. In addition, marsh Habitat develops quickly in freshwater areas and the occurrence of many small marsh areas associated with urban and agricultural land uses, as well as small patches within native riparian Habitats, may be more frequent than indicated in this study.

BIOGEOGRAPHY

Marsh Habitats typically occur at elevations ranging from sea level to 2,000 meters in association with stream channels, ponds and reservoirs (Sawyer and Keeler-Wolf 1995; Holland and Keil 1995). Montane meadows typically occur at elevations above 1,000 meters (Stephenson and Calcarone 1999) within the montane North Coast Ranges; montane Central Coast Ranges; montane Klamath Ranges; montane Cascade Range; montane Sierra Nevada; montane Transverse Ranges; montane Peninsular Ranges; montane Warner Range; and montane White, Inyo and Sweetwater Ranges (Sawyer and Keeler-Wolf 1995).



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RANGE AND DISTRIBUTION WITHIN WESTERN RIVERSIDE COUNTY

Marsh (coastal and Valley, cismontane alkali and undifferentiated) Habitat is scattered sparsely over the western Riverside region, occupying approximately 0.1 percent (1,732 acres) of the Plan Area. Cismontane alkali marsh was mapped in two general localities along Cahuilla Creek south of Anza and upstream from Lake Mathews along the Colorado River aqueduct. The mapped locations of coastal and Valley freshwater marsh are more widely distributed, with the largest acreage occurring in the Prado Basin in the Santa Ana River Valley. Smaller patches are located upstream on the Santa Ana River near Pedley, north of Lake Elsinore in Walker Canyon, near San Jacinto, along the shores of Lake Skinner and Vail Lake, and adjacent to the cismontane alkali marsh on Cahuilla Creek. Undifferentiated marsh was mapped in three locations including the shore of Lake Mathews, near Mystic Lake, and upstream from Vail Lake along Temecula Creek in the Aguanga Valley. Wet montane meadows were mapped only in the San Jacinto Mountains in the San Bernardino National Forest, primarily within the vicinity of Hemet Lake. Open water was mapped at Vail Lake, Lake Skinner, Eastside Reservoir, Lake Perris, Mystic Lake, Canyon Lake, Lake Elsinore, Lee Lake, Lake Mathews, Hemet Lake, portions of the San Jacinto River, and portions of the Santa Ana River as well as various small ponds, private reservoirs and portions of stream channels.

VEGETATION CHARACTERISTICS

Because all freshwater wetlands experience periodic flooding, the vegetation is adapted to an anaerobic environment (Kramer 1988). Many freshwater marsh and wet meadow species are able to reproduce through rhizomes (Barbour and Major 1977; Weller 1981). Vegetation heights can vary from a few millimeters to two meters (Kramer 1988).

SPECIES COMPOSITION

Coastal and Valley Freshwater Marsh (including undifferentiated Marsh). Coastal and Valley freshwater marsh typically is dominated by perennial monocots up to two meters in height (Kramer 1988). This Habitat type includes cattails (*Typha* spp.), bulrush (*Scirpus* spp.), sedges (*Carex* spp.), spike rushes (*Eleocharis* spp.), flatsedges (*Cyperus* spp.), smartweed (*Polygonum* spp.), watercress (*Rorippa* spp.) and yerba mansa (*Anemopsis californica*) (Barbour and Major 1977; Holland and Keil 1995; Sawyer and Keeler-Wolf 1995). Rooted aquatic plant species with floating stems and leaves also may be present, such as pennywort (*Hydrocotyle* spp.), water smartweed (*Polygonum amphibium*), pondweeds (*Potamogeton* spp.) and water-parsley (*Oenanthe sarmentosa*) (Holland and Keil 1995).



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Cismontane Alkali Marsh. Typical cismontane alkali marsh species include yerba mansa, saltgrass (*Distichlis spicata*), alkali-heath (*Frankenia salina*), cattails (*Typha* spp.), common pickleweed (*Salicornia virginica*), rushes (*Juncus* spp.), marsh flea-bane (*Pluchea odorata*) and sedges (*Carex* spp.) (Holland 1986).

Wet Montane Meadow. Montane meadows are dominated by sedges (*Carex* spp.), spike rushes (*Eleocharis* spp.), and bulrushes (*Scirpus* spp.), but also contain perennial and biennial herbs (e.g., *Oenothera* spp., *Polygonum* spp., *Lupinus* spp., *Potentilla* spp., and *Sidalcea* spp.) and grasses (e.g., *Agrostis* spp., *Deschampsia* spp. and *Muhlenbergia* spp.) (Barbour and Major 1977; Sawyer and Keeler-Wolf 1995; Stephenson and Calcarone 1999). Wet montane meadows that dry out by mid-summer have a higher percentage of perennial grasses than meadows that remain moist during the entire growing season (Holland and Keil 1995).

Open Water. Open water Habitat typically is unvegetated due to a lack of light penetration. However, open water may contain suspended organisms such as filamentous green algae, phytoplankton (including diatoms) and desmids (Grenfell 1988). Floating plants such as duckweed (*Lemna* spp.), water buttercup (*Ranunculus aquatilis*) and mosquito fern (*Azolla filiculoides*) also may be present (Holland and Keil 1995).

PHYSICAL ENVIRONMENT

Herbaceous freshwater wetlands, including freshwater marsh and wet montane meadow, occur in both flowing and still water. The bodies of water range from lakes and reservoirs to small pools. Periods of hydrology can vary from perennial to seasonal. Variables that can affect herbaceous wetlands include rate of water flow, fluctuations in water level, water depth, water and air temperatures, pH and dissolved salts, depth and nature of bottom sediments, organic content of the water and past history of the body of water (Holland and Keil 1995).

Where freshwater marsh and wet montane meadow Habitats occur together, the water depth demarcates the boundary of the two Habitats (Ratliff 1988). Freshwater marsh typically has a water table at or above the soil surface and occurs along the margins of lakes, ponds, reservoirs and slow-flowing stream channels (Barbour and Major 1977). Following spring runoff, wet montane meadows typically have a water table at or near the soil surface during the growing season (Ratliff 1988).

Wet montane meadows generally occur at elevations above 5,900 feet (Ratliff 1988). Wet montane meadow Habitat can be characterized by two physical conditions: fine-textured (*i.e.*,



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clay) and richly organic surface soil; and a shallow water table (usually within two feet of the soil surface) during mid-summer. Meadows generally occur on gentle gradients and relatively impervious bedrock in combination with adequately-sized drainage areas (Stephenson and Calcarone 1999) as well as along the margins of stream channels (Barbour and Major 1977). The soils of wet montane meadows are typically more aerated than marsh soils (Holland and Keil 1995).

Wet montane meadows include three hydrologic types: lotic, sunken concave and hanging sites. Lotic sites have an input flow and a downstream flow and consist of topographic basins with a slight slope. Percolation is low to zero at lotic sites due to the saturated or impermeable substrate. Sunken concave sites receive an input flow but the primary outflow is limited to evapotranspiration. The hydrologic source for hanging sites (seeps and springs) consists of underground hydrostatic flows. Hanging sites frequently occur on steep slopes and the main outflow is surface runoff (Ratliff 1988). Many montane meadows are wet only during the spring and early summer, becoming dried-out by mid-summer (Holland and Keil 1995).

The boundary between open water Habitat and emergent wetlands is generally at a depth of two meters (6.6 feet) (Kramer 1988). Open water Habitat includes inland depressions and stream channels containing standing water. Depth may vary from hundreds of meters to a few centimeters. This Habitat includes ponds, lakes and reservoirs. Within the relatively calm waters of ponds and lakes, temperatures vary by depth and by season, and light penetration depends on water turbidity. The oxygen content of ponded water is relatively low due to the small proportion of water that is in contact with the air and because decomposition of organic materials is occurring on the substrate below (Grenfell 1988).

ECOSYSTEM PROCESSES

Bottom sediments and runoff are the major sources of inorganic and organic nutrients. The decomposition of organic sediments may be the most important source of nutrients in still or slowly-flowing water; however, the decomposition of organic materials can be inhibited by acidic pH conditions or low temperatures, resulting in low nutrient availability (Holland and Keil 1995).

The presence of organic materials promotes the growth of microorganisms, including bacteria. The respiration of these decomposers substantially reduces the oxygen supply. Thus, the decomposition of organic matter can deplete the supply of oxygen and the bottom sediments of a nutrient-rich lake or pond may be completely anaerobic. As oxygen is a requirement for root growth, many plant species are unable to grow in anaerobic conditions (Holland and Keil 1995).



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COMMUNITY RELATIONSHIPS

Freshwater herbaceous wetlands and open water Habitats often occur in conjunction with riparian Habitats and upland Habitats. Freshwater herbaceous wetlands and open water areas provide food, water, cover and reproduction Habitat for mammals, birds, reptiles and amphibians (Weller 1981; Grenfell 1988; Kramer 1988). Within open water, zooplankton or animal organisms (including copepods, cladocerans and rotifers) may graze upon the minute plants (Grenfell 1988). (The reader should refer to the species accounts for specific information about sensitive wildlife and plant species and riparian Habitats.)

THREATS

Threats to herbaceous freshwater wetlands and open water include pollution, grazing, and conversion to other land uses, including agriculture. Pollution in the form of fertilizer, pesticides and untreated sewage can increase the amount of organics entering an aquatic ecosystem. This can increase the turbidity of the water and reduce the oxygen levels in the water, which can kill the vegetation (Holland and Keil 1995).

Grazing of freshwater marshes by domestic animals can result in trampling of the soil, invasion by exotic plant species and erosion. Grazing of wet montane meadows by domestic animals (particularly sheep) can severely disturb the soils, resulting in bare patches that are invaded by exotic plant species. Moreover, grazing can result in population shifts of the palatable and unpalatable plant species (Holland and Keil 1995).

LITERATURE CITED

Barbour, M.J. and J. Major. 1977. Terrestrial Vegetation of California. Wiley Press. New York, New York. 1002 pp.

Grenfell, W.E., 1988 Lacustrine *in* A Guide to Wildlife Habitats of California. California Department of Forestry and Fire Protection. 166 pp.

Holland R.F. 1986. Preliminary Descriptions of the Terrestrial Natural Communities of California. State of California Department of Fish and Game, Nongame-Heritage Program, Sacramento, California.



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- Holland, V.L. and D.J. Keil. 1995. California Vegetation. Kendall/Hunt Publishing Company, Dubuque, Iowa. 516 pp.
- Kramer, G. 1988. Fresh Emergent Wetland *in* A Guide to Wildlife Habitats of California. California Department of Forestry and Fire Protection. 166 pp.
- Ratliff, R.D. 1988. Wet Meadow *in* A Guide to Wildlife Habitats of California. California Department of Forestry and Fire Protection. 166 pp.
- Sawyer, J.O. and T. Keeler-Wolf. 1995. A Manual of California Vegetation. California Native Plant Society, Sacramento, California. 471 pp.
- Stephenson, J.R. and G.M. Calcarone. 1999. Southern California Mountains and Foothills Assessment: Habitat and Species Conservation Issues. General Technical Report GTR-PSW-172. Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, Albany, California. 402 pp.
- Weller, M.W. 1981. Freshwater Marshes: Ecology and Wildlife Management. University of Minnesota Press, Minneapolis, Minnesota. 146 pp.

