



Springtown Alkali Sink Ecology, Botany, and Wildlife Notes

The Springtown Alkali Sink is located in the northeast portion of the Livermore Valley, north of Interstate 580, and comprises an assemblage of biotic and abiotic features that support an ecosystem unique to the East Bay while providing core habitat to some of California's rarest plants, animals, and birds. Below are some of the contributing factors to the area's complex setting.

Geology

- ◆ Quaternary Surficial deposits, undivided (Holocene and Pleistocene)¹.
- ◆ Cierbo Sandstone (late Miocene). Light - gray, massive sandstone with marine fossils. Contains sandstone and conglomerate near the base¹.
- ◆ Marine Shale and sandstone of the Altamont Hills provided the parent material and dissolved salts to the sink below².

Soils

- ◆ Two soil mapping units, as mapped by the Soil Conservation Service³, Pescadero Clay (Pd) and Solano Fine Sandy Loam (Sf), are recognized as saline-alkali soils with a pH of 7.9-9.0. Approximately 28% of these soil mapping units have been extirpated from Alameda County due to development.
- ◆ Pescadero Clay is an imperfectly drained and very slowly permeable saline-alkali soil of north Livermore located on nearly level basin rims and along the lower edge of terraces with a hog-walled (mima mound) microrelief. The alkalinity of this soil is considered moderate³.
- ◆ Solano Fine Sandy Loam is also an imperfectly drained and slowly permeable saline-alkali soil with a hog-walled (mima mound) microrelief. The alkalinity of this soil is considered slight to strong³.
- ◆ Mima mounds are small hillocks, up to 1 meter high and 30 meters in diameter. Commonly, the intermound area is internally drained, leading to the establishment of seasonal ponds, or vernal pools, which harbor a rare and visually impressive flora in California. Throughout much of the state Mima mounds are associated with soils possessing an impermeable layer (cemented hardpan, clay pan, bedrock, etc.) below a loam-to-sandy-loam surface layer⁴.

¹ Preliminary Geologic Map Emphasizing Bedrock Formations in Alameda County, California, Open - File Report 96-252

² The Springtown Alkali Sink: An Endangered Ecosystem. 1989. Fremontia 17(1): 20-23

³ Soil Survey, Alameda Area, California. 1961. USDA Soil Conservation Service

⁴ Amundson, R. 1998. Do Soils Need Our Protection? Geotimes. March.

Climate

- ◆ With mean annual precipitation is approximately 14 inches and mean annual potential evapotranspiration approximately 57 inches, soluble salts could be expected to accumulate in any closed or poorly drained basin.
- ◆ However, during years of low precipitation the water table is still near the surface. In June 1988, the second of two dry years, the water table was within two to four feet of the surface in the sink's lower areas².
- ◆ A high water table allows both moisture and salts to move upward by capillary action².

Hydrology²

- ◆ The hydrologic system of Springtown Alkali Sink can be divided into three zones; Altamont uplands, recharge zone, and the alkali sink.
- ◆ The Altamont uplands contribute surface and subsurface flow from direct precipitation through intermittent and ephemeral channels.
- ◆ The recharge zone, at the base of the hills, where the channels become poorly defined allows for infiltration of runoff while shallow groundwater reaches the sink through layers of sandy alluvium interbedded with clay and silt.
- ◆ The alkali sink receives direct surface runoff from Altamont Creek, located within the sink, when it occasionally crests its banks. However, segments of Altamont creek have been channelized which reduces the frequency of overbank flooding².

Vegetation

- ◆ Springtown Alkali Sink supports iodine bush scrub, alkali grassland, vernal pools, and annual grassland².
- ◆ Iodine bush scrub is mainly characterized by iodine bush (*Allenrolfea occidentalis*) which occurs along the braided channels of the sink. Other species within this community are seepweed (*Suaeda moquinii*), pickleweed (*Salicornia subterminalis*), and alkali heath (*Frankenia salina*)².
- ◆ Vernal pools occur within the swales and depressional areas between mima mounds and support species such as coyote thistle (*Eryngium aristulatum*), downingias (*Downingia pulchella* and *D. cuspidata*), goldfields (*Lasthenia* spp.), and mousetail (*Myosurus minimus* ssp. *minimus*), in part. Late summer annuals include alkali weed (*Cressa truxilensis*), spikeweed (*Centromadia pungens* ssp. *pungens*) and crownscale (*Atriplex coronata* var. *coronata*), in part².
- ◆ The alkali grassland intergrades into areas of iodine bush scrub and annual grassland and is dominated by saltgrass (*Distichlis spicata*).
- ◆ Annual grassland can be found in drier area comprising a more neutral ph and comprise non-native grasses such as soft chess (*Bromus hordeaceus*), Mediterranean barley (*Hordeum murinum* ssp. *leporinum*), wild oats (*Avena fatua*), and native species such as common fiddleneck (*Amsinckia menziesii* var. *intermedia*) and lupine (*Lupinus nanus*), in part².
- ◆ Two invasive exotic weeds have infiltrated Springtown Alkali Sink; stinkwort (*Dittrichia graveolens*) and broad-leaved peppergrass (*Lepidium latifolium*).

Sensitive Natural Communities and Special Status Plant Species

- ◆ Iodine bush scrub, also known as valley sink scrub, and vernal pools are considered sensitive natural communities.
- ◆ Much of the Springtown Alkali Sink intermittent and ephemeral drainages, Altamont Creek and vernal pools are also considered “Waters of the U.S. and the State of California” as defined by section 404 and 401 of the Clean Water Act.

State and Federally Listed Plants

- ◆ Palmate bracted bird's-beak (*Cordylanthus palmatus*) is State and Federally Endangered

California Native Plant Society Listed Plants

- ◆ Livermore tarplant (*Deinandra bacigalupii*) List 1B Highly Endangered
Only 3 known populations worldwide all within the Livermore Valley
- ◆ Brittlescale (*Atriplex depressa*) List 1B
- ◆ San Joaquin spearscale (*Atriplex joaquiniana*) List 1B
- ◆ Hispid bird's-beak (*Cordylanthus mollis* ssp. *hispidus*)

Unusual and Significant Plants Listed as A1 (Occur in Two or Less Regions in Alameda and Contra Costa Counties

- ◆ Prostate Hutchinsia (*Hutchinsia procumbens*)
- ◆ Boraxweed (*Nitrophila occidentalis*)
- ◆ Flax-flowered linanthus (*Linanthus liniflorus*)
- ◆ Dense-flowered sprangle-top (*Leptochloa uninervia*)
- ◆ Nuttall alkali grass (*Puccinellia nuttalliana*)
- ◆ Bull clover (*Trifolium gambelii*) (Included within *T. fucatum* in Jepson Manual)
- ◆ Gray's clover (*Trifolium barbigerum* var. *andrewsii*)

Sensitive Avian Species (species afforded protection through California and federal law)

- ◆ Burrowing owls (*Athene cunicularia*) are known to nest on site
- ◆ White-tailed kites (*Elanus leucurus*) are known to nest on site
- ◆ Loggerhead shrikes () are known to nest on site
- ◆ Swainson's Hawk (*Buteo swainsonii*), Ferruginous Hawk (*Buteo regalis*), and Golden Eagle (*Aquila chrysaetos*) have been observed in the area

Sensitive Species Associated with Vernal Pools and Temporary Drainages

- ◆ California tiger salamander (*Ambystoma californiense*) has been found on site – Federally Threatened Species

Friends of Springtown Preserve

- ◆ California red-legged frog (*Rana aurora draytonii*), has been observed in areas directly upland of the sink preserve – Federally Threatened Species
- ◆ Vernal pool fairy shrimp (*Branchinecta lynchi*) are known to occupy local vernal pools and ponds – Federally Threatened Species

Threats

- ◆ Invasive exotic species
- ◆ Hydrologic modification (diversion, channelization, water table alteration, etc.)
- ◆ Off-road vehicles
- ◆ Habitat Fragmentation and road construction