

Southern Interior Basalt Vernal Pools

VEGETATION ASSOCIATION: SOUTHERN INTERIOR BASALT VERNAL POOLS

MAPPED SUBASSOCIATIONS: Southern Interior Basalt Vernal Pools

OTHER CLASSIFICATIONS: Southern Interior Basalt Flow Vernal Pool (Holland)
Santa Rosa Plateau Vernal Pools (Sawyer & Keeler-Wolf)
Interior Cismontane Vernal Pools (Cheatham & Haller)
Vernal Pool Ephemeral (Thorne)
Palustrine, non-persistent, seasonally flooded wetland (Cowardin)

DATA CHARACTERIZATION

The data set for southern interior basalt vernal pools within the Plan Area is fairly complete.

BIOGEOGRAPHY

The Santa Rosa Plateau vernal pools represent the only known locality of basalt flow vernal pools in southern California. Other basalt vernal pools can be found in northeastern California as part of a huge system found on the Modoc Plateau. The Modoc pools are classified as northern basalt flow vernal pools (Smith and Keeler-Wolf 1995) and also are underlain by basalt bedrock and basalt-derived clay soils.

RANGE AND DISTRIBUTION WITHIN WESTERN RIVERSIDE COUNTY

Southern interior basalt vernal pools are found only on the Santa Rosa Plateau in Western Riverside County. Approximately 31 acres of this Habitat type have been mapped within the Plan Area (PSBS 1995).

VEGETATION CHARACTERISTICS

The flora of vernal pools includes species that are restricted to vernal pools and other types of seasonal wetlands, and/or that are typical of upland Habitats but establish around pool margins or colonize pool basins during the summer or fall (Jones & Stokes 1990). Vegetation cover varies in response to the amount and distribution of rainfall and air temperatures and,



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consequently, the presence or absence of an individual species and its relative abundance varies from year to year. During drought years, a vernal pool flora may support an abundance of upland species and cover that is not characteristic of vernal pools under normal climatic conditions.

SPECIES COMPOSITION

Vernal pools are well-known for their high level of endemism (Stone 1989) and abundance of rare, threatened, or endangered species (Sawyer and Keeler-Wolf 1995). Many vernal pools are characterized by concentric rings of plants that flower sequentially as the pools dry. Vernal pools are dominated by native annual plants, with low to moderate levels of perennial herbaceous cover. Common vernal pool plant species in the pools on the Santa Rosa Plateau include annual hairgrass (*Deschampsia danthonioides*), waterfern (*Marsilea vestita*), pillwort (*Pilularia americana*), woolly marbles (*Psilocarphus brevissimus*, *P. tenellus*), water starwort (*Callitriche* spp.), downingia (*Downingia cuspidata*, *D. bella*), *Blennosperma nanum*, water crow-foot (*Ranunculus aquatilis*), spike-rush (*Eleocharis acicularis*), and toad rush (*Juncus bufonius*) (Rosario and Lathrop 1984). In addition, the following sensitive or listed plant species are found in one or more of these pools: California Orcutt grass (*Orcuttia californica*), Coulter's goldfields (*Lasthenia glabrata* ssp. *coulteri*), little mousetail (*Myosurus minimus* ssp. *apus*), spreading navarretia (*Navarretia fossalis*), low navarretia (*N. prostrata*), Orcutt's brodiaea (*Brodiaea orcuttii*), thread-leaved brodiaea (*Brodiaea filifolia*), Parish brittlescale (*Atriplex parishii*), Parish meadowfoam (*Limnanthes gracilis* ssp. *parishii*), San Diego button-celery (*Eryngium aristulatum* var. *parishii*), and Wright's trichocoronis (*Trichocoronis wrightii* var. *wrightii*) (Sawyer and Keeler-Wolf 1995). The Santa Rosa Plateau fairy shrimp (*Linderiella santarosae*) occurs only here as well as the southernmost record for the vernal pool fairy shrimp (*Branchinecta lynchi*) (Erikson and Belk 1999).

PHYSICAL ENVIRONMENT

Vernal pools are ephemeral wetlands that form in shallow depressions underlain by a substrate near the surface that restricts the downward percolation of water. Depressions in the landscape fill with rainwater and runoff from adjacent areas during the winter and may remain inundated until spring or early summer, sometimes drying more than once during the wet season. Smaller pools can fill, dry, and larger pools can hold water longer and may, in the deeper portions, support species which are more representative of those found in freshwater marshes.

The Santa Rosa Plateau lies at the southern end of the Santa Ana Mountains, topographically positioned at an elevation of approximately 730 m. The plateau is comprised of several mesas upon which 13 vernal pools exist in a landscape of native grassland (Holing 1988). The pools



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that are found on these mesas are unique in southern California as, instead of a clay or hardpan, the subsurface layer beneath is olivine basalt base rock from past volcanic flows. The basalt layer ranges in depth from 30-50 centimeters (cm), except under some vernal pools where it may be as shallow as 10 cm. The basalt breaks down to create an extremely expansive clay soil that allows very little water loss through seepage. Rainwater fills the low-lying basin areas creating pools which occur as a sequence of playa-like temporary lakes. Four vernal pools are found on Mesa de Colorado, one on Mesa de la Punta, and eight on Mesa de Burro. Basin areas range from 0.25 hectare (ha) for some of the smaller pools to approximately 10 ha for the largest one on Mesa de Colorado. The size of the pools is dependent upon the interaction of the amount of rainfall and air temperatures of any given year.

ECOSYSTEM PROCESSES

Vernal pools are seasonally flooded landscape depressions that support a distinctive biota adapted to periodic or continuous inundation during the wet season and the absence of either ponded water or wet soils during the dry season. Vernal pools that meet this definition are circumscribed by a framework of topographic, edaphic, hydrological, and biotic parameters. These parameters also distinguish vernal pools from other types of seasonal and perennial wetlands (Jones & Stokes 1990).

Vernal pools have a unique hydrology primarily because of soil/substrate properties and the Mediterranean climate of lowland California. In the case of the Santa Rosa Plateau vernal pools, pool substrate is either basalt or the highly impermeable clay soils which develop from this parent material. Pool basins are periodically or continuously flooded during late fall, winter, and spring and are dry and desiccated through summer and early fall, undergoing a sequence of hydrologic phases reflected by the phenology and composition of the dominant biota that characterize each phase. As described in Zedler (1987), vernal pool development during a year can be broken down into four phases: wetting, aquatic, drying, and drought. Fall rains initiate the “wetting” stage and stimulate the germination of dormant seeds and the resprouting of perennials that eventually form an herbaceous turf before and during the transition to the “aquatic” phase. This phase begins after soils reach field capacity (*i.e.*, the soil profile is saturated) and water either is exposed where pool depressions intercept a seasonally perched water table or accumulates from surface runoff. The subsequent “drying” phase begins as water levels recede during spring and is characterized by partially flooded pool basins and/or wet or saturated soil. The final “drought” phase occurs when the pool basin and soils are dry and nearly all of the biota that previously was actively growing dies or becomes dormant. Vernal pools derive water from direct precipitation, overland runoff, and groundwater in seasonal perched water tables. Although direct precipitation appears to be the primary water



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source for the pools on the Santa Rosa Plateau, the contribution from other sources may be important or crucial to maintaining their natural hydrology.

The alteration of very wet and very dry conditions creates an unusual ecological situation that supports a unique biota. To survive in a vernal pool, species must be able to either tolerate a wide range of conditions, or to grow and reproduce in the short time that there is a favorable environment.

THREATS

The Santa Rosa Plateau pools are largely protected in the Santa Rosa Plateau Ecological Reserve managed by The Nature Conservancy (TNC). Over 7,300 acres of the Santa Rosa Plateau have been made available as a wilderness ecological preserve through a cooperative management project of the Nature Conservancy, the Riverside County Regional Park and Open Space District, the California Department of Fish and Game, the U.S. Fish and Wildlife Service, and the Metropolitan Water District of Southern California.

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