

FINAL REPORT

**RARE PLANT HABITAT PROTECTION AT
THE SANTA ROSA PLATEAU
(RIVERSIDE COUNTY)**

Contract #FG-8589

Submitted to:

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Endangered Plant Program
Natural Heritage Division
Department of Fish and Game

Submitted by:

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Scope of Work: Protect and restore native vernal pool and associated habitats of preserve land owned and managed by The Nature Conservancy (TNC) that support State-listed plants, including thread-leaved brodiaea (Brodiaea filifolia), California orcutt grass (Orcuttia californica), and San Diego button-celery (Eryngium aristulatum var. parishii).

Task 1: Protect Mesa de Colorado vernal pools from cattle and off-highway vehicles by replacing 1.25 miles of barbed wire fence.

Status: A three-strand barbed wire fence on heavy gauge T-posts was constructed along the western margin of Mesa de Colorado (see Figures 1,2). Task 1 is now complete.

Task 2: Re-route nature trail to decrease trampling of vernal pool plants; build and install interpretive sign that describes vernal pool habitat and its rare plants.

Status: The trail re-routing was completed using hand-crews. Flexible, vandal-proof trail management signs (Carsonite) were purchased and installed with new Nature Conservancy logo decals and universal trail-management symbols. An interpretive kiosk was constructed on the Vernal Pool Trail near the largest vernal pool on Mesa de Colorado. The kiosk has a display outlining the ecology of vernal pools and discussions of the rare plants associated with the vernal pools of the plateau, with notes on conservation (see Figures 3-7). The complete text of the display is attached. Task 2 is now complete.

Task 3: Restore natural hydrology to damaged vernal pool (pool * C-2) by removal of artificial dike that restricts natural water flow processes.

Status: Project completed October 1989. A large backhoe was used to breach the dam and excess fill was removed from the inundation zone. Damaged areas were reseeded to minimize erosion into the vernal pool during winter rains. San Diego button celery (Eryngium aristulatum var. parishii) spread into new areas of the pool in the 1990 season. It will take several years for California orcutt grass (Orcuttia californica) to reseed naturally in the pool bottom and for thread-leaved brodiaea (Brodiaea filifolia) to re-establish itself in the old inundation zone. We may opt to reseed the pool with Orcuttia next year. See Figures 8-10.

Orcuttia next year. See Figures 8-10.

Task 4: Study species biology of three local Brodiaea species to determine best management practices; provide preliminary report on results.

Status: Graduate student Edna Rey conducted surveys of the distribution and abundance of the three Brodiaea species with observations on pollination ecology and hybridization (see Figures 8-14). The preliminary report on these findings is attached. Task 4 is now complete.

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Figure 1. New fence on Mesa de Colorado.



Figure 2. New fence on Mesa de Colorado



Figure 3. Carpenter John Cruzen at work on kiosk.



Figure 4. Vernal Pool Interpretive Kiosk (east side).



Figure 5. Vernal Pool Interpretive Kiosk (west side)
(Note vernal pool in background).

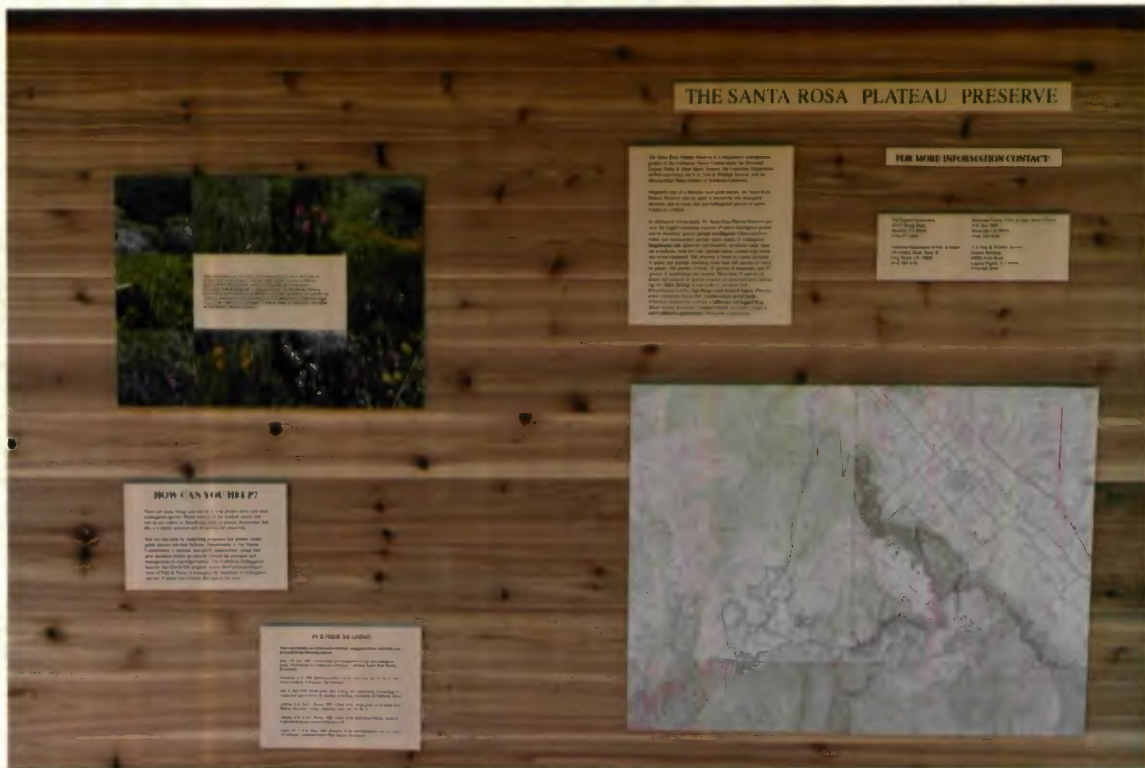


Figure 6. Vernal Pool Interpretive Display (east side).



Figure 7. Vernal Pool Interpretive Display (west side)



Figure 8. Large vernal pool, Mesa de Colorado.



Figure 9. Eryngium aristulatum var. parishii

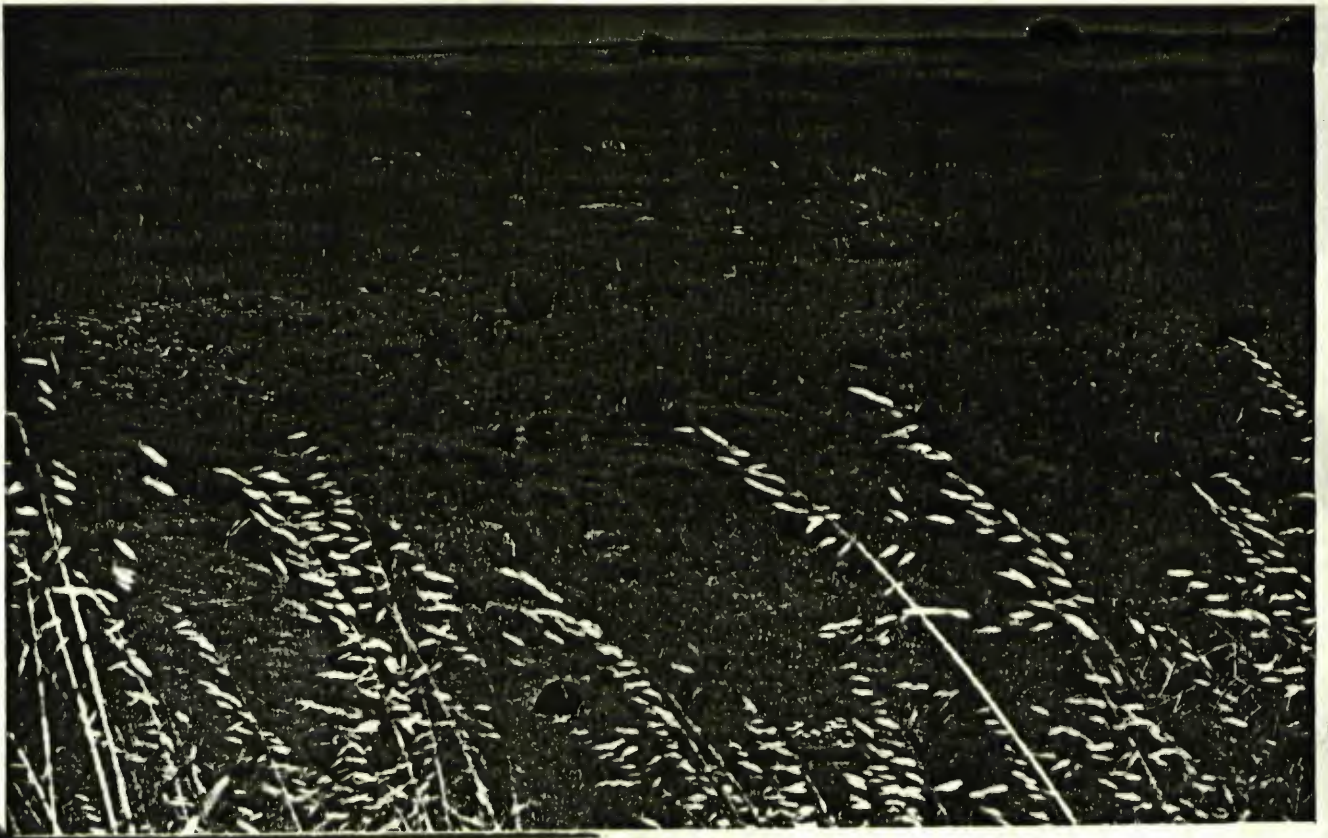


Figure 10. Orcuttia californica

VERNAL POOLS

California's Most

Endangered Wetlands



The parched appearance of a small vernal pool basin in September disguises the fact that these shallow depressions are important wetland habitat for part of the year. (Photograph by F. T. Griggs)

In January, after about eight inches of winter rains have fallen, the clay beds of the vernal pools on the Santa Rosa Plateau expand and seal the pool bottoms. Additional rains can now fill the pools. At this time fairy shrimp and aquatic plants begin to develop and the pools are a winter home to a variety of ducks and other waterfowl. (Photograph by G.P. Bell)



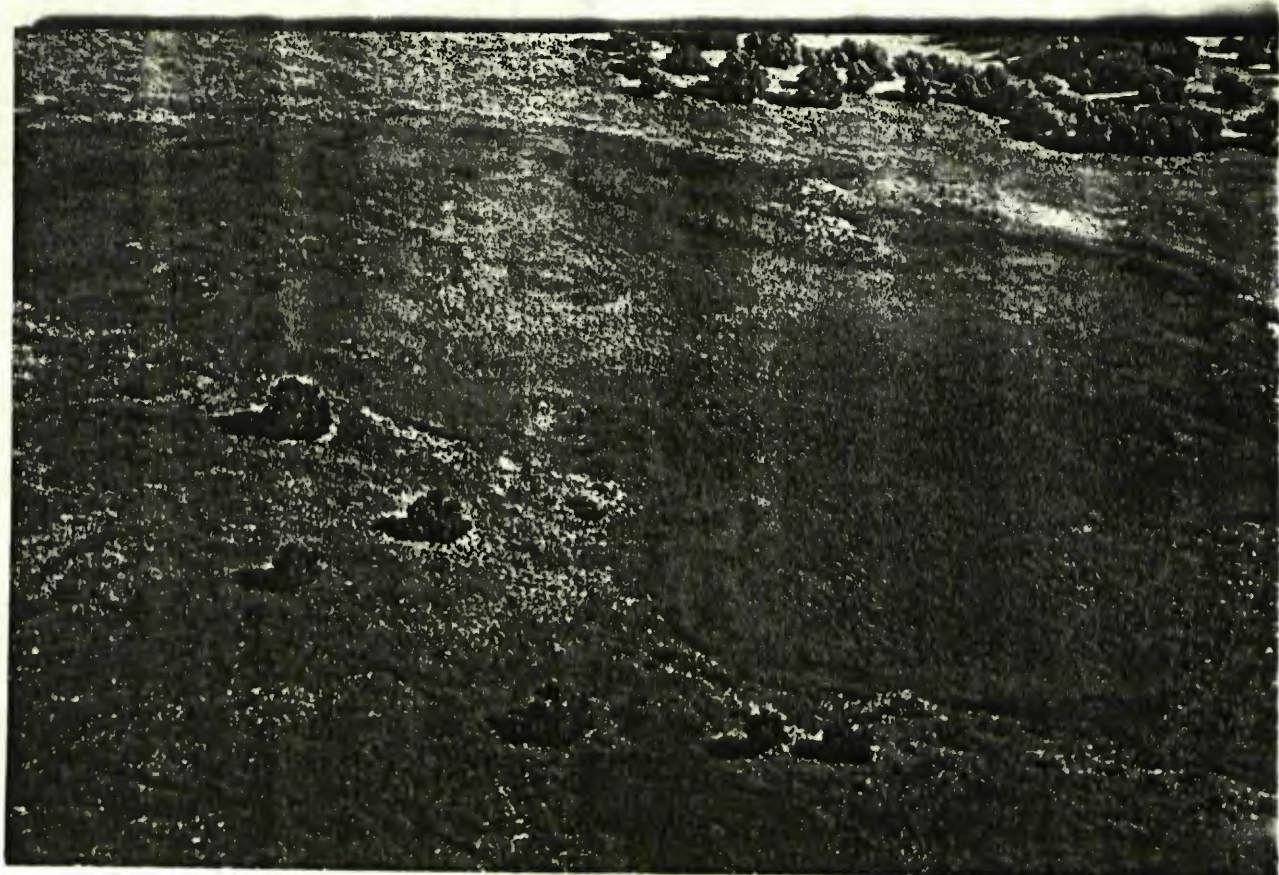
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(F.T. Griggs)





Top: The small annual Downingia is a member of the lobelia family. Below: Millions of tiny Downingia blooms combine to create a purple ring around the largest vernal pool on Mesa de Colorado. (Photographs by F.T. Griggs)



WHAT ARE VERNAL POOLS?

Vernal pools are shallow basins that fill with winter rainwater to form temporary, seasonal ponds. Home to a variety of aquatic organisms during the winter (including fairy shrimp, waterfowl, and aquatic plants), the pools gradually evaporate as the dry season develops and become a showcase of concentric rings of multi-colored wildflowers. The name vernal, meaning "of the spring", refers to the season during which these spectacular displays of color occur.

Vernal pools form where shallow depressions in the earth's surface are underlain by an impervious layer, usually of clay, which prevents water from percolating into the deeper soil layers.

California's unusual Mediterranean climate creates the unique conditions that make these ephemeral ponds possible. Cool rainy winters and hot dry summers ensure a seasonal cycle of wetland and desert, a harsh and demanding set of conditions which only a few specially adapted species of plants and animals can endure. Most vernal pool species are found nowhere else on earth.

Over 90% of California's vernal pools have been lost to agriculture and development. The majority of the state's remaining pools occur in the Great Central Valley and on raised marine terraces above San Diego. Most of Riverside County's pools occur on the Santa Rosa Plateau. Here on Mesa de Colorado you can see two of these vernal pools from the Vernal Pool Trail.

ENDANGERED VERNAL POOL PLANTS

The Santa Rosa Plateau Preserve protects more than 35 species of plants and animals that are of special concern. Five species of our vernal pool plants are critically endangered. Loss of habitat has reduced the distribution of these species to only a few scattered populations. The Santa Rosa Plateau Preserve is the only place on earth where some of these plants are protected.

HOW CAN YOU HELP?

There are many things you can do to help protect these and other endangered species. Please remain on the marked nature trail and do not collect or disturb any plant or animal. Remember that this is a nature preserve and all species are protected.

You can also help by supporting programs that protect endangered species and their habitats. Membership in The Nature Conservancy, a national, non-profit organization, means that your donation dollars go directly toward the purchase and management of important habitat. The California Endangered Species Tax Check-Off program assists the California Department of Fish & Game in managing the hundreds of endangered species of plants and animals throughout the state.



California Orcutt Grass (*Orcuttia californica*) is a member of a tribe of small annual grasses found only in California and Baja California. Orcutt grass grows in the beds of vernal pools where the seeds germinate under water. The early leaves of these plants may be up to a foot long and float on the surface of the pool. As the pools evaporate these aquatic leaves are replaced by stiff, bristly, erect leaves that stay green long into the dry summer months. Orcutt grass does not flower and set seed until the clay bed of the pool has dried and cracked, usually in late July. California orcutt grass grows in fewer than a dozen locations in Riverside and San Diego Counties and in Baja California.



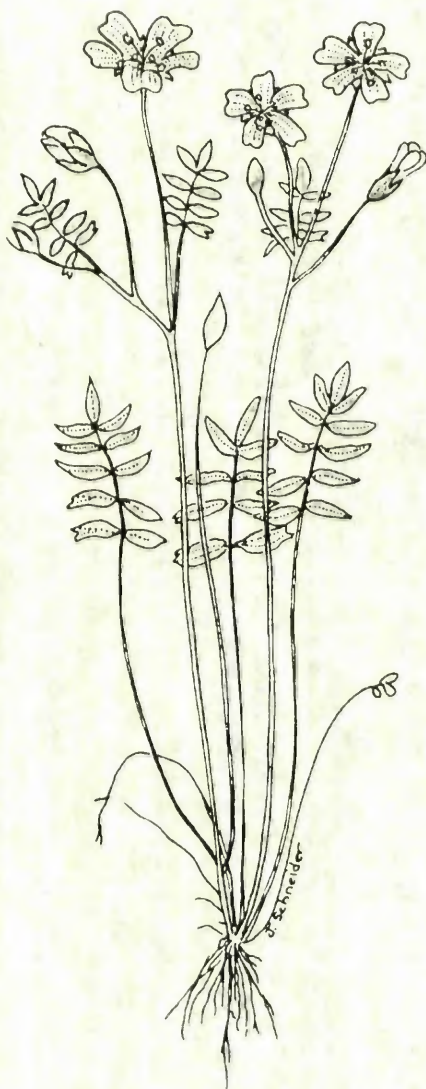
San Diego Button-Celery (*Eryngium aristulatum* var. *parishii*), also called coyote-thistle, is a low, spiny plant which does indeed resemble a thistle. Like orcutt grass, San Diego button-celery begins to grow when the pools are inundated, sending long, hollow leaves up to the surface. As the pools dry, button-celery forms shorter, spiny leaves. The thorny purple flowers bloom in late July and perfume the air with a scent not unlike that of bologna. Button-celery is a perennial; some older plants may grow up to 18 inches across. San Diego button-celery occurs in only about a dozen places in Riverside and San Diego Counties and in Baja California.



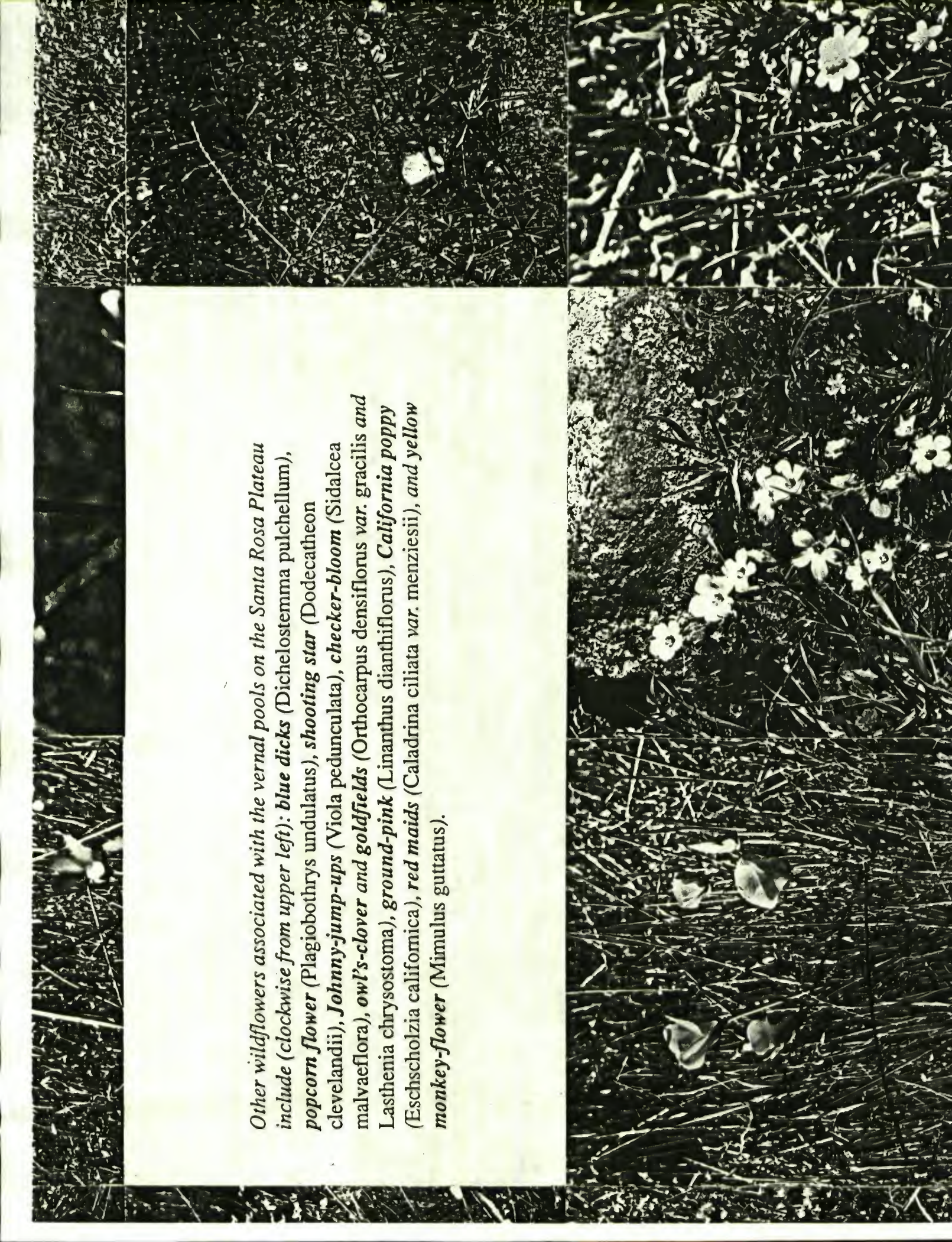
Thread-leaved Brodiaea (*Brodiaea filifolia*) is a purple-to-violet member of the amaryllis family. Looking like a diminutive "Lily of the Nile", thread-leaved brodiaea grows from a long-lived bulb which develops deep in the clay soils around the edges of vernal pools. This perennial plant may live many years, but each bulb may not produce a plant every year. Brodiaea begins to grow in the early fall and its first tender shoots emerge from the soil soon after the first rains of winter. The single stock bears between three and 30 flowers which bloom in April or May, long after the slender leaves have withered. Thread-leaved brodiaea is now found in fewer than ten localities on earth, in San Bernardino, Riverside, and San Diego Counties. Only the Santa Rosa Plateau population is protected.



Orcutt's Brodiaea (*Brodiaea orcuttii*) is very similar to its close relative the thread-leaved brodiaea, but is generally paler, taller and more graceful. It is found in moist grasslands on the edges of vernal pools in dense clay soils. The pale violet flowers, numbering from three to more than 30 on a single stalk, are usually in bloom in late May or early June. Fewer than a dozen populations of Orcutt's brodiaea are known in Riverside, San Bernardino, and San Diego Counties and in Baja California.



Parish's Meadowfoam (*Limnanthes gracilis* var. *parishii*) is a small annual wild-flower with pale green foliage that grows in the margins of vernal pools and streams shortly after they are filled by winter rains. In a typical year it appears in March. The small, white, four-petaled flower would be inconspicuous except for the fact that this species usually occurs in large populations. The showy display of thousands of meadowfoam blooms can turn a pool's edge into a carpet of white, giving the flower its name. Parish's meadowfoam occurs only on the Santa Rosa Plateau and in the Palomar, Laguna and Cuyamaca Mountains of San Diego County.



Other wildflowers associated with the vernal pools on the Santa Rosa Plateau include (clockwise from upper left): *blue dicks* (*Dichelostemma pulchellum*), *popcorn flower* (*Plagiobothrys undulatus*), *shooting star* (*Dodecatheon clevelandii*), *Johnny-jump-ups* (*Viola pedunculata*), *checker-bloom* (*Sidalcea malvaeflora*), *owl's-clover and goldfields* (*Orthocarpus densiflorus var. gracilis* and *Lasthenia chrysostoma*), *ground-pink* (*Linanthus dianthiflorus*), *California poppy* (*Eschscholzia californica*), *red maids* (*Calandrina ciliata var. menziesii*), and *yellow monkey-flower* (*Mimulus guttatus*).

THE SANTA ROSA
PLATEAU PRESERVE

The Santa Rosa Plateau Preserve is a cooperative management project of the California Nature Conservancy, the Riverside County Parks & Open Space District, the California Department of Fish and Game, the U.S. Fish & Wildlife Service, and the Metropolitan Water District of Southern California.

Originally part of a Mexican land grant rancho, the Santa Rosa Plateau Preserve was set aside to protect its rich biological diversity and its many rare and endangered species of native California wildlife.

In addition to vernal pools, the Santa Rosa Plateau Preserve protects the largest remaining expanse of native bunchgrass prairie and its dominant species **purple needlegrass** (*Stipa pulchra*). Other rare communities include dense stands of endangered **Engelmann oak** (*Quercus engelmannii*), sycamore-alder riparian woodland, coast live oak riparian forest, coastal sage scrub, and mixed chaparral. The preserve is home to a great diversity of plants and animals including more than 588 species of vascular plants, 180 species of birds, 35 species of mammals, and 27 species of amphibians and reptiles. More than 35 species of plants and animals of special concern are protected here, including two **fairy shrimp** (*Linderiella occidentalis* and *Branchinecta lynchi*), **San Diego coast horned lizard** (*Phrynosoma coronatum blainvillii*), **southwestern pond turtle** (*Clemmys marmorata pallida*), **California red-legged frog** (*Rana aurora draytonii*), **Cooper's hawk** (*Accipiter cooperi*), and **California gnatcatcher** (*Polioptila californica*).

FURTHER READING

More information on vernal pools and their endangered flora and fauna may be found in the following sources:

Elias, T.E. (ed.) 1987. Conservation and management of rare and endangered plants. Proceedings of a California conference. California Native Plant Society, Sacramento.

Gustafson, S. S. 1990. Ephemeral Edens. Pacific Discovery, Vol. 43, No. 2. California Academy of Sciences, San Francisco.

Jain, S. (ed.) 1976. Vernal pools: their ecology and conservation. Proceedings of a symposium sponsored by the Institute of Ecology, University of California, Davis.

Lathrop, E.W. & R.F. Thorne. 1983. A flora of the vernal pools on the Santa Rosa Plateau, Riverside County, California. Aliso, Vol. 10, No. 3.

Lathrop, E.W. & R.F. Thorne. 1985. A flora of the Santa Rosa Plateau. Southern California Botanists Special Publication No. 1.

Smith, J.P., Jr. & K. Berg. 1988. Inventory of rare and endangered vascular plants of California. California Native Plant Society, Sacramento.

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