NATIVE AMERICAN USES OF VERNAL POOL PLANTS

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ABSTRACT

When the Spanish explorers and padres first came to California, they noted that the landscape was dotted with small lakes and ponds. Some of those were probably vernal pools. Often the Native American encampments they encountered were located near bodies of water. The vernal pools have a very specialized ecosystem containing small and now rare plants. Even with the wealth of ethnobotanical data, very little ethnobotanical research has been done in this specialized area. The purpose of this research is to investigate Native American uses of the flora of the vernal pools. My primary focus has been on the pools in San Diego County, California, especially those on Naval Air Station, Miramar, California.

Introduction

The environment's effect on culture and cultural adaptations to the environment are vital pieces to the contextual puzzles being solved by archaeologists in our search for past lifeways. The ecosystems of vernal pools are specialized and their associated species are small; nonetheless they are a potentially meaningful part of this broad picture. This paper deals with the ethnobotanical resources of the vernal pools in southern California, with a focus on the pools of San Diego County.

Many significant ethnobotanical studies have been conducted throughout the world; however, my research has revealed none that were focused on vernal pool plants. Among such studies from the United States are those by C.F. Saunders (1920), Virgil Vogel (1970), Frances Densmore (1974), Charlotte Erichsen-Brown (1979) and Walter Ebeling (1986). The following studies are more local: California was researched by George Mead in 1972. Lowell Bean and Katherine Saubel explored Cahuilla ethnobotanical resources in Southern California (1982) while Kat Anderson and Thomas C. Blackburn did so for the Chumash (1993). Constance du Bois (1908) and Philip Stedman Sparkman (1908), working separately with the Luiseño included ethnobotanical data. Ken Hedges compiled an ethnobotany for the Diegueño in 1967. Ruth Almstedt incorporated a discussion of plant use in her 1977 *Diegueño Curing Practices*.

Despite this wealth of data, none has specifically mentioned the cultural uses of plants of the vernal pool ecosystem. For that reason and because of the precarious position of the vernal pools in our landscape, this research is centered on these plants. Approximately 3 to 7 percent of prehistoric vernal pools in San Diego County remain today (Bauder and Weir 1991:2, Hull 1994). Their demise has been due mainly to agriculture and development as historically they have not been recognized as unique or special.

The pool research for this project was basically conducted on the vernal pools at Naval Air Station, Miramar in San Diego County, California. Approximately 80% of San Diego County's remaining vernal pools are located there (Bauder and Weir 1991:7). This research was funded in part through a Department of Defense Legacy Grant.

Native American consultants were contacted to aid in gathering the ethnobotanical data for this research. A Kumeyaay woman, Jane Dumas, who is the daughter of a medicine woman, and a Luiseño man, Richard Bugbee, consented to assist me in this work. They are both knowledgeable about Native American uses of plants. Mrs. Dumas and Mr. Bugbee are involved in San Diego area Native American activities and both work to maintain and enhance their cultural traditions. A literature review was also conducted, using material from across North America, but concentrating on California and local southern California/San Diego County information.

Vernal Pools

At a glance, vernal pools may simply appear to be winter and spring mud puddles. However, they are small, unique ecosystems dotting the landscape. Across California they are home to 69 different species of flora and fauna (Gutin 1993:8), many of which are endangered or threatened, such as the Orcuttia Californica found in San Diego County.

Vernal pools are small ephemeral pools that develop under specific conditions (Bauder and Weir 1991, Lathrop and Thorne 1985, Zedler and Ebert 1979, Zedler 1987). The surface soils may vary greatly from one pool area to another, but underlying layers of hardpan and clay are generally present. Vernal pools are usually found in mounded topography as illustrated by this slide; the mounds are often called mima mounds (Zedler 1987:17). Vernal pools are found world wide, in similar topography and climates. They have been called "islands of wetland in a sea of land" (Villasenor and Riggan 1979:5).

Vernal pools spend most of the year in dry or drought conditions. However as Zedler states, "The most striking feature of the vernal pools is their change from standing water in the winter to desert-like dryness in the summer..." (1987:11). The

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aquatic cycle of the pool begins with the winter rains. The rain water soaks into the ground where it is blocked by hardpan. The gathering water then causes the clay layer above that to expand, essentially sealing the ground, permitting the water to pond on the surface. The period of inundation, the aquatic phase, usually lasts about 2 to 3 months, through early spring. Through evaporation the vernal pool returns to the drought phase.

Not all temporary pools are vernal pools (Hull 1994). At least some of the specialized vernal pool species must be present to qualify an area as a vernal pool. These species have adapted to this unique ecosystem (Barbour et al 1994:82, Bauder and Weir 1991:1). They have developed the ability to live in the inundated condition; they have accelerated life cycles which allow them to grow, mature, and reproduce in a very limited time; and they have developed the capacity to remain dormant for up to several years.

Flora

The plants that have made the adaptations necessary for existence only in the vernal pools are considered vernal pool indicator species (Zedler 1987:40). *Pogogyne abramsii* and *Eryngium aristulatum var. Parishii* are among the indicator species. When several indicator species are found together, they essentially ensure that an area is a vernal pool.

Those plants that live in the pools during the aquatic phase have lost some of the supporting tissues usually found in stems since they now depend upon the buoyancy of the water to support them (Zedler 1987). Gas exchange and photosynthesis are reduced. As these are not basically aquatic plants they have had to adapt to the wet conditions. Large air spaces in roots and stems aid gas exchange. The leaves of these plants are thin and finely divided for greater surface area to increase photosynthesis. Combining these traits with the need to survive at least for a while after the pools have dried, qualifies them as amphibious plants. Another group of the pool plants are actually terrestrials that thrive in the pool basins after the pools dry. Some of these plants are native to California, and many of them are endemic, or restricted, to a specific area within the state.

One of the most fascinating aspects of this study was learning about an intriguing pattern of plant geology called amphitropic disjunction (Zedler 1987:37), the occurrence of the same or similar species in comparable latitudes in both the northern and southern hemispheres with no intervening species. This phenomenon of amphitropic disjunction is noted in some of the vernal pool species. It would be interesting to know if plant uses are also comparable in both areas.

Plants in this study have been divided into 4 groups according to their position in the pools as shown in Table 1.

Findings and Results

Native populations in general and most definitely the California Indians found uses for almost all the flora they encountered (Heizer and Elsasser 1980:128). Often a single species was used in several different ways (Erichsen-Brown 1979:241). Evidence of plant use can be acquired through excavation (Erichsen-Brown 1979:v, Joukowsky 1986:30). For many years archaeologists have obtained the microbotanical and macrobotanical data from their sites. Ethnobotanical information from research such as mine aid in the interpretation of this archaeo-botanical information. For this research the ethnobotanical data were divided into 4 primary categories: medicinal, subsistence, utilitarian, and ceremonial.

Table 1. Group Definitions.

Group	Definition (Zedler 1987 40-47)
Group A	Vernal pool indicator species. Plants found almost exclusively in pool basins.
Group B	Plants found in vernal pools, but more common in other wet areas.
Group C	Plants often found in vernal pool basins, but as common in terrestrial habitats.
Group D	Plants found near pools, but usually not in the pool basins.

With European settlement introduced species began to mingle with the native plants. This research demonstrates that the Native Americans used the introduced species if they found them to be beneficial (Densmore 1974, Dumas 1994). The letter "I" behind the group label on the charts indicates such introduced species.

Medicinal uses of vernal pool plants

Regarding the first category of use in this paper, which is medicinal, the early missionaries commented that the local southern California and Baja California Indians had little medical knowledge (Venegas 1757 as translated by Bancroft 1963 and Bolton 1927). That opinion, however, was countered by others citing the dietary habits, hygienic customs, and obstetric care as well as the number of contributions of plants and their uses by the Native Americans to the United States Pharmacopeia (Balls 1965:90, Vogel 1970:83 citing John W. Shuman 1938). *Grindelia robusta*, a Group C vernal pool plant that was used externally for sores and poison oak is one of those contributions (Balls 1965:90). The medicinal uses of vernal pool plants are listed in Table 2.

No Group A plants were listed with medicinal properties. However, several species related to the endangered *Eryngium aristulatum* var. *parishii*, or San Diego button celery which is an endangered vernal pool plant, were used medicinally for such problems as rheumatism, kidney problems, and snakebite (Hutchens 1973:119, Vogel 1970:371). *Pogogyne abramsii*, mesa mint which is also an endangered species, was not cited; however Mrs. Dumas, my consultant, talked about uses of mints for stomach ailments (1994). A tea made from the

whole plant of the Group B *Frankenia grandifolia* was used by the Luiseño for colic (Shipek 1991:90). *Rumex crispus*, an introduced species, was mentioned by Sparkman as having medicinal use for the Luiseño, although he did not expand on that (1908:233). In other parts of North America it was used for skin eruptions and combined with other herbs to be used as an astringent, a diuretic, and a tonic (Densmore 1974:292; Erichsen-Brown 1979:222; Hutchens 1973:36, 69, 218; Vogel 1970:397).

Table 2. Medicinal Pool Plants.

Plant	Group	
No Group A species used, however related species used.		
Frankenia grandifolia	Group B	
Rumex crispus	Group B	I
Grindelia robusta	Group C	
Holocarpha virgata	Group C	
Lepidium nitidum	Group C	
Eremocarpus setigerus	Group C	
Centaurium venustum	Group C	
Erodium cicutarium	Group C	I
Plantago lanceolata	Group C	I
Sisyrinchium bellum	Group D	
Anthemis cotula	Group D	I
Baccharis pilularis	Group D	
B. sarothroides	Group D	

"I" behind Group indicates introduced species.

Several of the Group C plants, those found in the pools, but also terrestrially, had medicinal uses. Mrs. Dumas spoke of the *Centaurium venustum*, which she called quinine plant (1994). She said the Kumeyaay used it as a cure for malaria, while the Luiseño used the same plant as a tea for fever (Almstedt 1977:27, Sparkman 1908:230). *Grindelia robusta*, *Holocarpha virgata*, and *Lepidium nitidum* were used externally for such things as poultices, bathing sores and rashes (Almstedt 1977:27; Hutchens 1973:147; Mead 1972:99, 105, 116; Vogel 1970:218). *Eremocarpus setigerus*, *Erodium cicutarium*, and *Plantago lanceolata* had both internal and external uses (Almstedt 1977:23, Hutchens 1973:219, Mead 1972:84). Internally, the plants treated fevers, stomach and respiratory problems, kidney ailments, and prevented infections. The Group D listed plants were used in the same ways (Sparkman 1908:233; Almstedt 1977:23,25; Bugbee n.d., Hutchens 1973:60, 80, 174; Mead 1972:16).

Subsistence uses of vernal pool plants

All parts of the plants were used at times for subsistence, but the seeds were used from nearly 70% of the vernal pools plants that were used. They were most often ground for flour or pinole (Densmore 1974, Erichsen-Brown 1979, Mead 1972, Vogel 1970, Yanovsky 1936). The leaves and shoots were mentioned as greens (Lee 1978, Mead 1972, Sparkman 1908, Yanovsky 1936). Tubers were eaten from the bulbous plants (Mead 1972, Sparkman 1908). In some cases several parts of the plants were used such as the *Lepidium nitidum*. The Luiseño ate the seeds and used the leaves as greens (Mead 1972, Sparkman 1908, Yanovsky 1936). They also ate the flowers; however, their preparation was not given. The vernal pool plants used for subsistence are in Table 3.

Table 3. Subsistence Pool Plants.

Plant	Group	
Blennospermum nanum	Group A	
Lasthenia glaberrima (L. glabrata)	Group A	
Distichlis spicata	Group B	
Elymus triticoides	Group B	
Hordeum brachyantherum	Group B	
Rumex crispus	Group B	I
Achyrachaena mollis	Group C	
Grindelia robusta	Group C	
Hemizonia fasciculata	Group C	
Madia sativa	Group C	
Lepidium nitidum	Group C	
Erodium cicutarium	Group C	I
E. moschatum	Group C	I
Bromus mollis	Group C	I
Elymus glacus (E. glaucus)	Group C	
Hordeum glaucum (H. californicum)	Group C	
H. leporinum	Group C	I
Polygonum aviculare	Group C	I
Ranunculus californicus	Group C	
Mimulus guttatus	Group C	
Chlorogalum parviflorum	Group D	
Avena barbata	Group D	
Bromus diandrus	Group D	I

"I" behind Group indicates introduced species.

The seeds from two of the Group A plants, which are the pool indicator species, *Lasthenia glabrata* and *Blennospermum nanum* were pounded into flour (Mead 1972:37,113; Yanovsky 1936:60,61). Soup was made from the parched seeds of the Group D *Avena barbata* (Mead 1972:32). One of the interesting uses was the extraction of oil for cooking from the seeds of the Group C *Madia sativa* (Mead 1972:129). The mesa mint, once again was not mentioned specifically, however the general use of mint as a flavoring was noted, specifically adding the seeds to pinole for flavor (Yanovsky 1936:55). Leaves and occasionally stems were used for greens as from the Group B *Distichlis spicata* and *Rumex crispus* as well as the Group C *Lepidium nitidum* and the *Erodium* species (Mead 1972:78, 89, 116; Sparkman 1908:232; and Yanovsky 1936:21). The entire plant of the Group C *Hemizonia fasciculata* was boiled to a tarry consistency to be used as famine food (Yanovsky 1936:61). The ashes of the leaves of the *Mimulus guttatus*, also a Group C plant were a source of salt (Mead 1972 134-35). The Luiseño ate the bulb of the *Chloro-*

galum parviflorum (Ebeling 1986:318, Mead 1972:60, Sparkman 1908:234). As noted with medicinal plants, introduced species were used.

Utilitarian uses of vernal pools

Utilitarian uses of vernal pool plants were limited. Bruised leaves of the *Eremocarpus setigerus*, a Group C plant, were used to poison fish (Mead 1972:84). The flowers of another Group C plant *Mimulus guttatus* decorated wreathes (Mead 1972:135). The fibers of the *Juncus* species, that grow in pools and other marshy areas, were woven into garments, baskets, and fish traps (Mead 1972:110). The Luiseño used the lower dark brown portions of the juncus for decorative purposes in the manufacture of baskets (Bugbee n.d.). The Group D plant *Baccharis pilularis* stems were used as arrow foreshafts (Mead 1972:33). These pool plants are listed in Table 4.

Table 4. Utilitarian Pool Plants.

Plant	Group
No Group A species used; however, related species used.	
No Group B species used; however, related species used.	
Eremocarpus setigerus	Group C
Mimulus guttatus	Group C
Baccharis pilularis	Group D

Ceremonial uses of vernal pool plants

Little was mentioned about ceremonial uses; however, species related to the *Eryngium* were listed as having ceremonial purposes with no further explanation (Vogel 1970:371). *Elymus glaucus*, a Group C plant, was used as a charm for settling quarrels (Mead 1972:80). Pool plants with ceremonial uses are listed in Table 5.

Table 5. Ceremonial Pool Plants.

Plant	Group
No Group A species used; however, related species used.	
No Group B species used.	
Elymus glacus (E. glaucus)	Group C

Conclusions

Although California represents only about 1 percent of the landmass of North America, 10 to 15 percent of the its native population lived here at the time of contact (Barbour et al 1994:164). The reasons must be many, but the abundance of natural resources is surely high on that list. As 93 to 97 percent of the vernal pools are gone (Bauder 1986, Hull 1994), they must have been abundant prehistorically. It seems likely that the resources of the vernal pools were utilized, yet there is little specific ethnobotanical data available on them. Perhaps the ephemeral nature of the pools and their plants did not allow sustained use of them. Conceivably the information is lost as the people who knew about them are dead. Possibly the vernal pool plants were simply not treated as separate resources.

Because the Native Americans who inhabited California prehistorically did utilize their environment efficiently, surely they also exploited the resources of the vernal pool system. The data collected for this paper provide evidence of that exploitation.

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