



VOL. 13 NO. 1

JAN / FEB 1990

CALENDAR OF EVENTS

- January 7**
Wednesday
Utah Native Plant Society Annual Board of Directors Dinner Meeting at The Italian Place, 754 E. So Temple, 7:00. Pam Poulsen conducting.
- January 25**
Thursday
7:00
Salt Lake Chapter Meeting, "Hummingbirds: Specialized Pollinators," a presentation on the coevolution of hummingbirds and the plants they pollinate, by Mark Stackhouse of the Tracy Avairy, held in conjunction with Red Butte Gardens and Arboretum, the first in a series of Garden Lectures the Arboretum is sponsoring. Free to all UNPS members and guests. Room 323, University of Utah Union Building. Note time, please. This series of lectures begins at 7:00.
- February 22**
Thursday
7:00
Salt Lake Chapter Meeting, "Pollination and Reproduction of Endangered Plant Species," by Dr. Vince Tepedino, entomologist with the Pollination Biology Laboratory, Utah State University, held in conjunction with Red Butte Gardens and Arboretum, the second in the series of Garden Lectures. Free to all UNPS members and guests. Room 323, University of Utah Union Building.
- LOOKING AHEAD**
- March 22**
Thursday
7:00
Salt Lake Chapter Meeting, "The Partnership Between Clark's Nutcracker and the White Bark Pine" by Dr. Ron Lanner, Professor, Department of Forestry, Utah State University, the last in the Arboretum's series of Garden Lectures.
- April 28**
Saturday
Pancake Breakfast and Nature Activities at Dimple Dell for the Community, sponsored by UNPS. This is our version of **Earth Day, 1990.** Many organizations will be involved to meet a broad range of interests. Please reserve this date. Your help is needed. Contact Dave Okelberry, 968-6190, to offer assistance. Details forthcoming.

The Sequoia Lily is published six times a year by the Utah Native Plant Society, Incorporated, as a non-profit organization under the laws of the State of Utah. Contributions to the newsletter are welcomed and should be sent to the editor, Janet Williams, 415 North Main, Salt Lake City, Utah 84103. Please state whether articles have been published elsewhere and require publisher's permission. The editor reserves the right to edit as needed and to select suitable articles for publication. Calendar items of interest to our membership are requested.

Membership in the Utah Native Plant Society includes The Sequoia Lily subscription. Please use the form provided in the newsletter for membership applications or change of address. Members and non-members are invited to participate in the activities of the Utah Native Plant Society.

1990 Officers and Committee Chairs

Pam Poulson, Chairman of Board O 583-3744
Bill Wagner, State President H 942-1295
Jo Stolhand, Vice Pres./Pres. Elect H 521-0069
Debbie Becher, Secretary O 581-5322
Andy Boyack, Treasurer H 278-8596
Kathy Anderson, SL Chapter Pres. H 277-4652
Swede Dahl, Logan Chapter Pres. H 563-5269
Susan Crook, Logan Vice Pres. H 753-3257
Dick Page, Seed & Propagation Chair H 255-7769

Duane Atwood, Rare Plant Co-Chair O 625-5599
Sherel Goodrich, Rare Plant Co-Chair O 789-0323
Dave Gardner, Conservation Chair H 649-3355
Debbie Noel, Education Chair H 322-0114
Dave Okelberry, Field Trip Chair H 968-6190
Brent Collett, Horticulture Chair H 298-7763
Photography Committee Chair Open
Janet Williams, Newsletter Chair H 364-4546
Dorothy Egan, Newsletter Circulation H 277-6988



UNPS BOARD BEGINS DECADE OF THE NINETIES

Andy Boyack

Outgoing Chairman of the Board

The UNPS Board of Directors met on January 10 for their annual meeting at The Italian Place, a charming restaurant on South Temple owned by Linda Kirkham. Guests included Larry England and Mary Part Mateson. We were pleased that Susan Srook, Leila Schultz and Wayne Padgett came from Logan and Kay Thorne and her husband from Provo to join the group.

The reports and discussions of the evening made evident that the UNPS will be sharing in the environmental decade of the nineties.

Mary Pat Matheson described the Arboretum plans for a regional symposium on threatened and endangered species set for April 14 tentatively, the 20th anniversary of Earth Day, that seminal event in 1970 which started or catalyzed environmental movements and concerns throughout the world. Various organizations will be participating including the Forest Service, The Nature Conservancy, The Center for Plant Conservation, the Audubon Society, and, by vote of the Board, the Utah Native Plant Society. The main purpose of the symposium is public education. Anyone interested in native wildlife is welcome to attend.

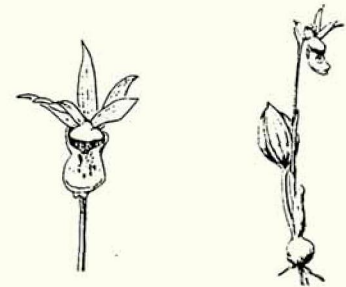
Later in April, a Field Day will be held in Dimple Dell Park to further public knowledge of this last remaining tract of wild land within the incorporated area of the Salt Lake Valley. This is being sponsored by UNPS with the cooperation of the Committee for the Preservation of Dimple Dell and several other groups.

Other issues were discussed by the Board. Included among them were the decision to go from an annual publication of nine issues of The Sego Lily newsletter to six bimonthly issues, and to re-print our native plant poster since the copies from the first printing are nearly gone.

Salt Lake Chapter Meeting

VIEW UFO'S

Andy Boyack
UNPS Treasurer



Calypso bulbosa

The UNPS Salt Lake Chapter met on November 30 with Michael Windham and Pam Poulson to identify slides of UFO's--Unidentified Flowering Objects, that is. Our members take lots of pictures of plants and we don't always remember to note the identification when we take our photos, or perhaps we didn't know what the plants were at the time. So this is our opportunity to bring our slides for the experts to decipher.

Michael Windham is curator of the University of Utah Garrett Herbarium. He has been a botanist in Kansas and Arizona and came to the U of U four months ago. His specialty is ferns. He told us that Utah ranks fourth for the number of diverse species of ferns in the state. Ferns in the desert climate of the Southwest adapt to the environment in many ways, which he illustrated with slides. Some are quite scaly or hairy to maximize the adjacent humidity and to reflect sunlight. The desert exerts strong selective pressures on species resulting in hybrids that require careful identification using the technique of chromosome count and electrophoresis.

Several members submitted slides for identification. Those of Marty and Frankie Harris were tough to identify. Andy Boyack had slides of recent field trips including the *Sisyrinchium inflatum* (purple-eyed grass) of Rush Valley and the *Parrya rydbergii* and *Calypso bulbosa* at Leidy Peak in the Uintas.

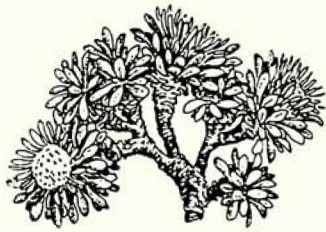
EDAPHIC ENDEMISM

Andy Boyack
UNPS Treasurer

What is "edaphic endemism," a term used by Alice Hreha in her talk to the Salt Lake Chapter on October 26 to describe certain studies she had been conducting? Alice is a professional botanist, a graduate of BYU and a doctoral candidate at the U of U. She came to Utah from New Jersey.

Alice told us that in Southern Utah a group of rare plant species grows on certain restricted hillsides and nowhere else. The substrate of these hills is Wasatch limestone. Thus it would seem these plants are endemic (restricted to a specific area) by edaphic (nature of the soil) conditions. These little communities pose many botanical questions. Why do they prefer Wasatch limestone and why do they grow only on steep, inhospitable slopes where the soil is thin and nutrient poor, water is scarce and erosion is a constant threat? The answers to these questions are important because the plants are rare and land managers need guides to provide protection for these plants.

To find answers, Alice started her studies along three basic lines. One was the soil, its texture, nutrient value, pH and chemistry. Second was the morphology of the plants themselves, their shapes, structures, living habits and likes and dislikes. Third was refuge. Have these plants found refuge from the stress of competition in their isolated habitat where little else grows? Alice's studies are still underway and she has not yet found answers to her questions.



Townsendia minima



Lesquerella rubicundula

Alice showed slides of the endemic areas in Red Canyon near Bryce, and some of the rarer plants in her studies. Among these were *Townsendia minima*, *Draba subalpina*, *Cymopterus minimus*, *Phlox reforma*, *Oxytropis jonesii*, *Lesquerella rubicundula*, *Silene petersonii*, and *Lomatium minima*. The area also contained various species of *Penstemon*, *Erigeron*, and *Astragalus* and other plants not necessarily endemic that appeared to be in the process of adapting to the steep slopes of the studied areas.

A LOOK AT 20TH CENTURY GRAZING PRACTICES

Pamela M. Poulson
Chairman of the Board
Utah Native Plant Society

Over the past 37 years I have traveled extensively in the western United States, with a particularly intensive increase since 1973. (Marvin and I once figured out that he and I had lived out of a tent almost 20% of our married life!) My interest in plants, of course, came from this exposure to the out-of-doors. It probably got started when my father, who had graduated in Forestry and Conservation from the AC at Logan, would point out the plants of forest and desert and would quiz us on the agricultural crops along the road (artichokes and avocados had to be the biggest surprises of all.)

Another thing my father introduced to me was the world of wildflowers (range plants) and the pressures they face due to poor grazing practices. He was born in 1914 in Fairview, Utah, on the western flank of the Wasatch Plateau, the site of one of the most abusive episodes of overgrazing between 1858 and 1915. His was one of the families that continued to graze that range, even with massive erosion underway, because of the naive idea that the range could stand the grazing and would recover by itself. It wasn't until great walls of mud flowed off the mountains and into Sanpete Valley that the realization came that something had to be done. In the early 1930s most of the sheep were pulled off the range. Miles of terraces were constructed by the CCC to hold the precious soil on the side of the mountain. (By the way, the same thing was happening on Mt. Nebo and Mt. Timpanogos.) A state that had once supported over 1,000,000 (yes, one million) sheep had to cut back. It was the realization that there might be a better way to manage grazing that sent my Father off to study at the AC.

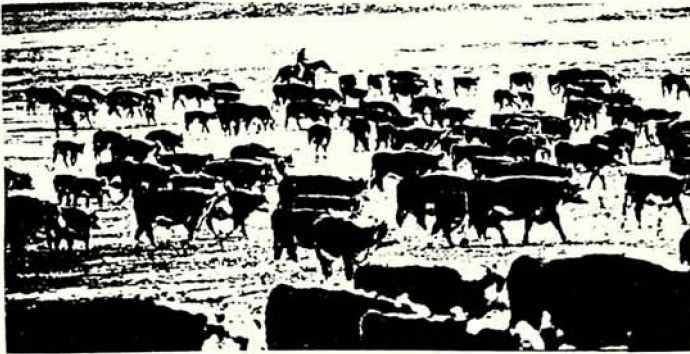
Today, thanks to improved grazing practices, the wonderful tall forb wildflower meadows of the Wasatch Plateau are returning. The sheep are still there, as are the cattle, but in fewer numbers, and each is kept at certain elevations and each is on sort of a "crop rotation" schedule.

It took me three years of graduate school to figure out a way to write a thesis about that unscientific topic of "wildflowers". It wasn't until just last spring that I realized that among my very roots were the seeds of my thesis topic: those darned tall forb meadows! Contained within those meadows are all the wildflowers that one could wish to study. I'd been looking at them for 37 years! (We've all been looking at them for quite a while. This is the association that occurs in Albion Basin....)

Needless to say, I spent the summers of 1988 and 1989 in search of the tall forb meadows. I traveled

through the state. I spent time with Sherel Goodrich on the Ashley Forest; Hank Mayland, Art Tiedemann, Monte Lewis, Jim Clemonson, Clyde Blauer, Gary Jorgenson and Bob Murray on the Wasatch Plateau; and I spent tons of time and miles of walking/driving on the Uinta, Wasatch, Manti LaSal and Ashley National Forests by myself. I took copious notes and about 500 photographs of tall forb meadows. I found the tall forbs. I know where they are and where they are not. Why they grow where they grow and why they do not where they do not is the topic of my thesis (which is a 41 page discussion in itself; if you have a couple of days to hear about it, give me a call.)

In all that study and talk and travel, I developed another skill. By the end of summer 1989, I could detect overgrazed range from a mile away! I could tell whether it had been overgrazed by sheep or cattle and how long ago it had happened. Generally, I was appalled. There is very little land in Utah that has not been overgrazed.



I was discussing this information with Janet Williams and she suggested that over the next few months I give you a taste of what I saw: a state with a history of overgrazing, and, in some places where environmentalists seldom hike, is still overgrazed. The north end of the San Pitch Mountains is blowing away under the feet of sheep; the upper reaches of Soapstone Basin are mowed to nubbins by sheep; Log Hollow of Farm Creek above Hanna is deplorably overgrazed by cattle (it's the only place I've ever been that I felt that I didn't have to bury my own people pies, because they blended right in with the cow pies; it was like being in a fenced pasture, not a blade of grass anywhere.)

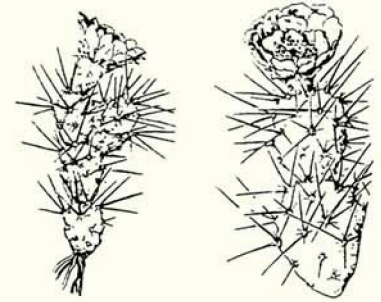
It really disturbs me to look at the Utah Travel Council Calendar. Every photo shows signs of overgrazing, especially the canyonlands and Capitol Reef photos. I also have a difficult time driving to Great Basin National Park across a grazing allotment that is not only overgrazed, but has not one edible/palatable plant in sight. Now those are poor grazing methods.

Surely, as my father believes, there is a better way. Knowledge of better grazing methods is available, and has been available for nearly 75 years. Sure, I'll write about what I saw, and maybe it will help us to bring our grazers and land managers into the 20th century.

(P.S.: I'm not really a fanatic, just a person that hurts when the land is needlessly hurt.)

RETURN OF THE NATIVES (Or, Off the Cow!)

Katey Palmer



We all know that cattle grazing has adversely affected the Western landscape. The presence of Prickly Pear, Cheatgrass, non-native annual species, and a seeming overabundance of sagebrush suggest overgrazing, as do degraded riparian habitats, arroyo cutting, and the lack of native wildlife species. But many of us do not understand how grazing has caused such dramatic changes in the Western landscape. To answer this question, it is essential to recognize what the pristine, pre-grazing vegetation in the West was, and to understand the ecology, morphology, and physiology of its component species.

Reviews by Vale (1975) and by Young and Sparks (1985) of the journals of trappers and of later adventurers, miners, and homesteaders, suggest that the pristine vegetation west of the Rocky Mountains was dominated by shrubs with an understory of perennial grasses. Young and Sparks describe the series of plant communities in the Intermountain West as the sagebrush/grasslands. According to historical accounts, Big Sagebrush was the dominant shrub species with Wormwood, Greasewood, Bitterbrush, Rabbitbrush, and Saltbush being locally dominant. Reynolds (1979) estimates that Big Sagebrush, *Artemisia tridentata*, once covered 100 million hectares (almost 250 million acres) of the Western United States. Travelers on the Oregon Trail first mention sagebrush at Fort Laramie, Wyoming, and they describe the Snake River Plains as being densely covered with sagebrush. Only the wet valley bottoms, moist canyons, and mountain slopes were dominated by grass stands.

Artemisia tridentata



The bunchgrass growth of many species in the Intermountain West increases soil heat flux which speeds spring thaw and results in resumption of growth early in spring when precipitation is still available. However, early spring growth raises a plant's apical meristems above the ground and makes them vulnerable to grazers when few other plant species are available as forage. Once a bunchgrass' apical meristems have been removed, the plant is unable to produce axillary buds and new leaves, and it may not survive. If it does survive, it is at a disadvantage in competing for resources with species which begin growth later, and with species whose underground parts, e.g. rhizomes, allow them to regenerate if their aboveground parts are trampled or grazed.

Historical accounts and ecological factors corroborate the morphological evidence supporting Mack and Thompson's theory that the vegetation of the Intermountain West did not coevolve with large grazing mammals. Historical accounts suggest that Bison were rare or missing altogether from the Intermountain West, while there may have been over 40 million Bison east of the Rockies by the time of European contact.

Mack and Thompson (1982) report that **in the Intermountain West, there are no native species of *Onthophagus*, a genus of dung beetle which occurs where large mammals occur.** In contrast, there are 34 native species of *Onthophagus* east of the Rocky Mountains where large grazing mammals are known to have occurred historically.



Young and Sparks (1985) report that after the post-Pleistocene extinctions of native species of mastodon, camel, horses, and bison ancestors on the Upper Snake River Plains, rabbits, rodents, and harvester ants became the primary consumers in the sagebrush/grasslands. The Pronghorn "antelope," an American native of the sagebrush/grasslands ecosystems, remained but was rare, according to professional hunters. The Pronghorn depends on Big Sagebrush for a major portion of its diet; its rumen microflora, essential to digestion, are not inhibited, as are the microflora of cattle rumen, by the volatile oils in Big Sagebrush.

The lack of phrases "sod-busting" and "sod houses" in the journals of pioneers in the Intermountain West suggests that there were no or few sod-forming, i.e. grazing resistant, grasses in that area.

Comparison of the cryptogamic cover east and west of the Rockies also suggests that there were few large grazers in the *A. spicatum* Province. In the arid Intermountain West, cryptogams, e.g., mosses and lichens, cover all undisturbed soil not occupied by grass tussocks. **Where large ungulates, even at low densities, trample vegetation, there is a permanent loss of the cryptogam cover.** In the *B. gracilis* Province, cryptogamic species are restricted by sods and grazing, and represent only a minor component of the vegetation.

THE EFFECTS OF THE GRAZING ASSAULT

In a review of studies on the effects of grazing on numerous grass species, Weaver (1930) concludes that the growth, vigor, and reproduction of grasses are directly related to the development of the underground plant parts. The success of seedlings depends on the ability of the plant to develop its root system before developing its aboveground parts. A plant's degree of tillering is an index of the extent of its root system and, therefore, of its growth rate.

In experiments on both native sod and bunchgrasses, Branson (1956) found that the intensity of clipping, i.e., simulated grazing, is inversely proportional to the growth of shoots, and of roots in particular. Weaver found that grazing has particularly negative effects on seedlings, which, as a result, extend their roots less and in turn are susceptible to drought and to trampling by grazers.

Studies (Cottam & Evans 1945, Gardner 1950, Rummell 1951, Blydenstein et al. 1957, Pickford 1960, Potter & Kremetsky 1967, Smith & Schmutz 1975, Chew 1982) which compare the effects of grazing to the effects of not grazing on different vegetation types throughout the West indicate the changes in species composition and community structure that grazing causes. **In general, grazing results in a decrease in native perennial grass species, particularly the bunchgrasses and tall grasses, an increase in shrub cover, and an overall decrease in the density of vegetation.** Once the native plants are weakened or removed and no longer provide competition, non-native species can become established. These include annual forbs, Eurasian grasses adapted to grazing, and, in general, less palatable and less nutritious species.

In a study of competition between the alien winter annual *Bromus tectorum* (Cheatgrass) and the native *A. spicatum* Harris (1967) found that Cheatgrass demonstrated more rapid root elongation and germination, and thus dominated in areas where it was able to invade.

In addition to the effects grazing has on plant morphology and community structure, it also has negative effects on soils, which in turn affect the vegetation. Daubenmire and Colwell (1942) found that **grazing resulted in decreased aeration of soils, water accumulation on soil surfaces, and increased runoff**, among other effects. Rauzi and Smith (1973) found that in two of three soil types in northeastern Colorado, heavy grazing reduced water infiltration rates. Based on historical accounts and photographs, both Bryan (1925) and Duce (1918) concluded that arroyo formation in the semi-arid West occurred at the time of livestock introduction and was not related to geomorphological processes.

As the species composition and the structure of the native vegetation change as a result of grazing, so do the resident native wildlife communities. Numerous researchers (Weller 1958, Gjersing 1975, Howard & Wolfe 1976, Reynolds 1979, Reynolds & Trost 1980,

Jones 1981) have **documented declines in species diversity** and in populations of Ferruginous Hawks, and numerous duck, small mammal, and lizard species, in response to grazing.



THE POSITIVE (?) EFFECTS OF GRAZING

Researchers who attest to the positive effects of grazing on grasslands have invariably studied sod-forming, rhizomatous, and/or bunchgrass species which have coevolved with grazing mammals. Bunchgrasses that have evolved with ungulates exhibit morphological and physiological adaptations to grazing. Caldwell (1981) found that the Eurasian wheatgrass *Agropyron desertorum* produced more tillers and leaves per bunch and contained less nitrogen and biomass per unit of photosynthetic tissue (i.e., it did not concentrate its resources) than native Western bunchgrasses. It also adopted a prostrate growth form in response to grazing. Detling (1982) found that *B. gracilis* and *Agrophron smithii* (Western Wheatgrass, a Eurasian introduction) had, among other responses, increased rates of photosynthesis when their tillers, leaves, or shoots were removed.

Based on a literature review and his study of heavy grazing by wildebeest, zebra, and gazelle on Tanzanian savannas, McNaughton (1979) concluded that compensatory growth after tissue damage is a major component of plant adaptation to herbivory. Detling suggested that the compensatory growth response is energetically less expensive than developing and maintaining morphological or biochemical deterrents to grazers.

IS THERE LIFE AFTER GRAZING?

According to classical succession theory, once a disturbance ceases, vegetational succession should occur in predictable stages until the single predictable climax is reached. Several researchers (Ellison 1960, Anderson & Holte 1981, Mack & Thompson 1982) suggest that **this model of succession does not apply to the arid and semi-arid grasslands of the Intermountain West, which once disturbed by heavy grazing do not revert back to their original climax communities.** Mack and Thompson report that Eurasian weeds dominate both successional and climax sites following grazing in the Intermountain West. On the other hand, disturbed sites in the *B. gracilis* Province are recolonized by native annual dicots or aliens that are eventually replaced by native sod-forming perennials.

Grazing in southern Idaho has changed that region's appearance perhaps "forever." Yensen (1981) reports that grazing there has removed the native perennial grasses and allowed the alien Cheatgrass to become

firmly established. According to Steward and Hull (1949) Cheatgrass accounts for 75-95% of southern Idaho's herbage production, and only mechanical means or fire can remove it from the range

Daubenmire (1940) discriminates between what he calls the climatic climax of an undisturbed *Agropyron* bunchgrass prairie and the biotic climax which results from changes in succession due to over-grazing. In southeastern Washington, the climatic climax consists primarily of *Agrophron spicatum*, and also of *Poa* and *Bromus* species. The biotic climax on the other hand, consists of small unpalatable annuals including many borage species, and the small wiry-leaved perennial *Poa secunda*, all of which can endure hot, sunny conditions and overgrazing.

SO?

A study of historical accounts and the ecological research indicates that the vegetation of the sagebrush/grassland communities of the Intermountain West is distinct from the grassland vegetation of the Great Plains. Based solely on morphological characteristics, it is apparent that the vegetation of those two geographic areas evolved in response to different environmental factors. **The vegetation of the Intermountain West did not coevolve with, and is therefore not adapted to, large grazing mammals.**

Once the native vegetation is destroyed by heavy grazing, alien disturbance-adapted species become established and prevent the native species from recolonizing. **In numerous areas in the Intermountain West, even 20 to 50 years after grazing has been stopped, the trend of vegetation changes due to grazing (and to climate) has continued.** In many cases, although there have been slow increases in native perennial grass cover, there has been little indication of recovery to the original pre-grazing climax vegetation. And, in the case of invasion by alien species such as *Bromus tectorum*, recovery of the native perennial vegetation may require mechanical and/or chemical removal of the entrenched alien species.

If one is satisfied with a vision for the West of alien weeds, severely depleted wildlife, degraded streams, and cows and humans as the dominant species, then this information is irrelevant. **If, however, one favors full rehabilitation and recovery of all native flora and fauna, it is clear that removal of cattle from public lands in the Intermountain West is the logical and necessary first step.**

Katey Palmer is a field biologist with a Master's Degree in plant physiology and genetics. For a copy of her bibliography which correlates to the citations in the text, contact UNPS newsletter editor, Janet Williams, 415 No. Main, SLC, UT 84103, phone 364-4546.

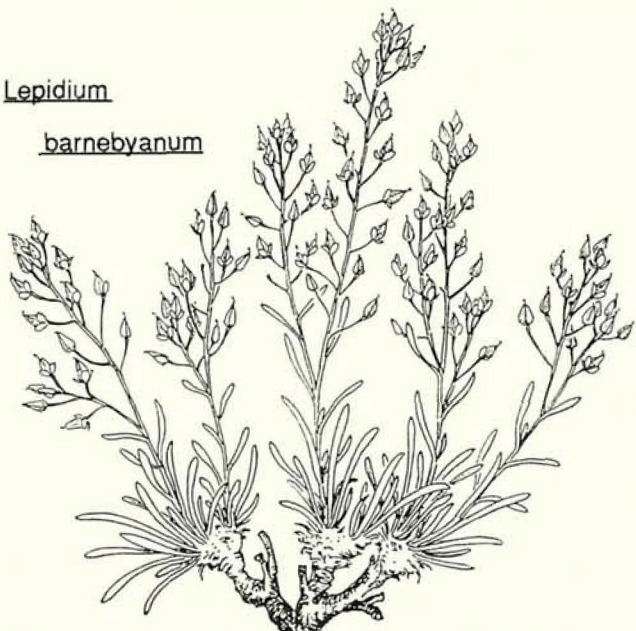
Reprinted with permission from Earth First! Journal, Dec. 21, 1988.

"Protecting something as wide as this planet is still an abstraction for many. Yet I see the day in our lifetime that reverence for the natural systems--the oceans, the rain forests, the soil, the grasslands, and all other living things--will be so strong that no narrow ideology based upon politics or economics will overcome it."

—Governor Jerry Brown of California

Lepidium

barnebyanum



RIDGE PLANT PROPOSED FOR ENDANGERED SPECIES LIST

A low-growing plant found only on three ridge tops in the Uinta Basin has been proposed for the endangered species list by the U.S. Fish and Wildlife Service.

Larry England, a botanist for the federal agency [and UNPS Board Member], said the Barneby ridge-crest, *Lepidium barnebyanum*, is threatened by off-road vehicles and the potential for oil and gas development.

"Designating the plant an endangered species wouldn't preclude oil and gas development, but it would call for consultation to avoid impacting the species. Intelligent designs would probably alleviate all problems," he said.

The ridge-crest is a perennial, herbaceous plant in the mustard family. It is approximately two to six inches high and usually forms raised clumps or cushions up to eight inches wide. It has tiny, cream-colored flowers which bloom in early May.

The species is restricted to three relatively level ridges near Indian Creek Canyon in Duchesne County, where it grows in a white-colored shale lens near the contact of the Green River and Uinta geologic formations. The particular soil conditions created by the surrounding bedrock appears necessary for the plant's survival. Approximately 5,000 individual plants are known from about 500 acres of appropriate habitat.

The plant was named for Rupert Barneby, who

The plant was named for Rupert Barneby, who discovered it in June 1947.

According to a notice published in the Federal Register, the plant is "being impacted by trampling from off-road vehicles such as motorcycles and four-wheeled all-terrain vehicles which concentrate on the sparsely vegetated ridge lines" on which the plant grows.

In addition, these ridges would be likely sites for roads and drill pads if oil and gas development were to occur in this area. Mr. England said an exploration proposal was submitted recently for a piece of land on which the plant grows.

Biologists decided not to recommend the designation of "critical habitat" for the plant because this would require the publication of a map showing the precise location all three populations. This would increase the risk of vandalism.

Written comments on the proposal to designate the ridge-crest as an endangered species will be accepted until Jan. 26, 1990. They should be sent to the State Supervisor, Fish and Wildlife Enhancement, U.S. Fish and Wildlife Service, 2078 Administration Building, 1745 W. 1700 South, Salt Lake City, Utah 84101.

Mr. England said Utah will have 16 plants on the federal list of threatened and endangered species if the ridge-crest is included. Information is being collected on other plants which could be recommended for the list in 1990.

Reprinted from The Deseret News, Dec. 18, 1989.

BOTANICAL LATIN NAMES

or old school teachers never give up!

Margaret Williams

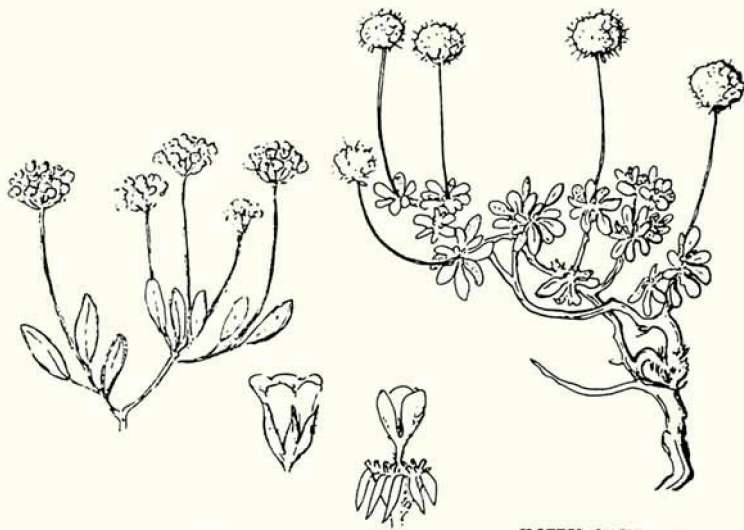
NNNPS Newsletter Editor

William T. Stearn described BOTANICAL LATIN, in his book of the same name, as "a modern Romance language of special technical application, derived from Renaissance Latin with much plundering of ancient Greek, which has evolved, mainly since 1700 and primarily through the work of Carl Linnaeus (1707-78), to serve as an international medium for the scientific naming of plants in their vast numbers and manifold diversity." However, many people have a mental block against using botanical names derived from Latin (or Greek), or other names which have been Latinized. Most of you use botanical Latin generic names such as *Chrysanthemum*. Is *Chrysothamnus* (rabbit-brush) any more difficult? Does this rhyme used by schoolboys in England express the way you feel?

Latin is a language, as dead as can be.

It killed the Ancient Romans and now it's killing me.

Eriogonum (meaning wooly knees--the stems of some are wooly at their joints) has the common name,



DESERT BUCKWHEAT

MATTED BUCKWHEAT

buckwheat. But which buckwheat do you mean? There are more than 20 different species on Peavine alone. So the plant has to have a generic name and a specific name so that others will know which buckwheat you are talking about. The same botanical Latin names are used by botanists and gardeners throughout the world. Common names are often very local and the same common name may be applied to different plants in other areas. In the newsletter we try to give both botanical Latin names and common names, hoping that by repetition some will become familiar to you, our reader. After all, how did you learn *Chrysanthemum* or *Penstemon* (another botanical name)? You may be using more botanical Latin names than you realize. And as you learn more botanical names you will be learning more about the plant, or where it grows, or about plant collectors. All of this can't help but enhance your enjoyment of the wonderful world of plants.

The following quotation from Mary Elizabeth Parson's book The Wildflowers of California, printed in 1897, (as quoted in the March 1987 Newsletter of CNPS Bristlecone Chapter) expressed this same sentiment: "Mr. Burroughs, that devout lover of nature says, 'Most young people find botany a dull study. So it is, as taught from the textbooks in the schools; but study it yourself in the fields and woods, and you will find it a source of perennial delight. Find your flower, and then name it by the aid of the botany. There is so much in a name. To find out what a thing is called is a great help. It is the beginning of knowledge; it is the first step. When we see a new person who interests us, we wish to know his or her name. A bird, a flower, a place--the first thing we wish to know about it is its name. Its name helps us to classify it; it gives us a handle to grasp it by; it sheds a ray of light where all before was darkness. As soon as we know the name of a thing, we seem to have established some sort of relation with it.'"

Reprinted with permission from Douglasia, Newsletter of the Washington Native Plant Society, Spring 1989.

AVENUES RESIDENTS TAKE ACTION TO RECYCLE

Avenues residents are spearheading recycling efforts in Salt Lake City. Recycling containers have been installed in back of **New Frontiers Market & Cafe at 1026 East Second Ave.** The drop site has containers for flexible plastic, glass, cardboard, aluminum cans and newspapers. Materials may be deposited any time. Money obtained from recycled goods will be returned to the Neighborhood Council for environmental projects in the neighborhood.

RECYCLING FACTS

Did you know...

Each recycled aluminum can saves the equivalent of 1 cup of gasoline?

Every recycled aluminum can saves enough energy to burn a 100 watt light bulb for 3.5 hours?

Every year Americans throw away enough aluminum to rebuild the entire American Airlines fleet 71 times?

Each ton of recycled high-grade paper used for paper making saves an estimated 4,200 kilowatt hours of electricity?

Each year U.S. residents throw away enough wood and paper to heat 5 million homes for 200 years?

Recycling a single printing of a Sunday edition of the New York Times could leave 75,000 trees standing?

We throw away enough aluminum to rebuild all the commercial airplanes in our country every 3 months?

Recycled paper reduces the air pollution involved in the paper making process by 95 percent?

Each ton of paper made from recycled pulp saves 17 trees, 42,000 kilowatts of electricity, and 7,000 gallons of water?

Two aluminum cans thrown away is a waste of more energy than is used daily by each of a billion people in poorer lands?

Americans will earn about \$700 million this year by recycling used aluminum beverage cans?

Reprinted from Energy Update, Tennessee Energy Education Network, a program of the Tennessee Dept. of Economic and Community Development, Energy Division.

UNPS Sego Lily
c/o Janet Williams
Utah Native Plant Society
P.O. Box 520041
Salt Lake City, Utah 84152-0041

Non-Profit Org.
U.S. Postage
PAID
Salt Lake City, Utah
PERMIT No. 327

Return postage guaranteed
Address correction requested

PUBLICATIONS

Intermountain Flora, Vol. 3, Part B, The FABALES by Rupert C. Barneby, recognized authority on the Leguminosae and recent recipient of the Asa Gray Award of the American Society of Plant Taxonomists. INTERMOUNTAIN FLORA is an authoritative series that provides keys, descriptions and illustrations of the vascular plants of the intermountain region of the United States and keys for this identification. The Intermountain Region, including all of Utah, most of Nevada, and portions of Idaho, Oregon, Arizona, and California, is the largest one in the United States as yet lacking comprehensive floristic coverage. Described as "a work of outstanding scholarship and...a major contribution to the taxonomic literature" INTERMOUNTAIN FLORA is of use to botanists, conservationists, land use planners, naturalists, ecologists, foresters, and range and wildlife managers.

Volume 3, Part B, chronologically the fourth volume to appear in the series, treats the Fabales. Following a format set in preceding volumes, it provides the nomenclatural synonymy, description, common names, chromosome counts, distribution, and a discussion of the relationships of each taxon treated. The volume includes a synoptical key to the families of the Fabales (Mimosaceae, Caesalpinaceae, and Fabaceae), illustrations for all the 286 species treated, and 27 nomenclatural innovations.

Dec 1989, clothbound, acid-free paper, x, 280 p. Price \$61.65, includes postage and handling. Order from The New York Botanical Garden, Bronx, New York 10458.

Membership Application

New Member Renewal Gift

Name _____

Street _____

City/State _____

Zip _____ Phone _____

If Gift, from: _____

Check membership category desired:

- Student/Senior\$ 5.00
- Individual\$ 10.00
- Family\$ 15.00
- Supporting\$ 30.00
- Corporate\$ 30.00 and up
- Life\$250.00

Please send a complimentary copy of the Sego Lily to the above individual.

Please enclose a check, payable to Utah Native Plant Society, and send it to:

Pam Poulsen, treasurer,
Utah Native Plant Society
P.O. Box 520041
Salt Lake City, Utah 84152-0041

(If you prefer not to cut this out of your Sego Lily, feel free to copy the membership form or simply write the information down and mail it with payment for the category of membership.)



VOL. 13 NO. 2

MARCH/APRIL 1990

CALENDAR OF EVENTS

- March 22**
Thursday
7:00
Salt Lake Chapter Meeting, "The Partnership Between Clark's Nutcracker and the White Bark Pine" by Dr. Ron Lanner, Professor, Department of Forestry, Utah State University, the last in the Arboretum's series of Garden Lectures. Please note the starting time of 7:00 rather than our regular meeting time of 7:30.
- Mar. 28-June 2**
Wednesdays
6:30-8:30 pm
Introduction to Utah Wildflowers, DCE class taught by Pam Poulson. No previous experience required. Weekly class work plus two Saturday field trips. Garfield School, 1838 So. 1500 East. \$81.00 non-credit, or can be taken for credit. To register for Recreation and Leisure 384, call U of U Division of Continuing Education at 581-5711.
- March 31**
Saturday
10:00-1:00
Gardening with Native Plants, taught by W. Richard Hildreth, Director, State Arboretum of Utah. Learn the maintenance and water conservation advantages of gardening with native plants. Study design, plant selection, planting and maintenance. Register with the Utah Museum of Natural History, 581-4887. Museum and Arboretum members, \$8.00. Others, \$10.00.
- April 1-Oct 31**
Wildflower Hotline (801) 581-4696. Receive current information on the best wildflower blooming displays reported from throughout the state. Call for a four-minute recorded message, updated weekly. Hear additional weekly wildflower information with Pam Poulson and Gene Pack on **KUER** public radio **FM 90.1** at 11:00 Friday mornings from April through October.
- April 6-7**
Fri. 6:00-9:00 pm
Sat. 8:30am-4:30 pm
Gymnosperms, taught by W. Richard Hildreth. Learn characteristics, habits and evolution of the gymnosperms. This is a hands-on workshop that is also available for University or Teacher Inservice credit. Call 581-4887 to register. Museum and Arboretum members non-credit fee, \$25.00. Others, \$28.00.
- April 8**
Sunday
1:30-6:30 pm
Want to be on TV? We need people to answer phones for the KUED Fund Raiser. This is the last day of the drive, so we will be busy with lots of calls coming in. UNPS is donating Utah Wildflower poster as donor incentives, and by helping KUED we can promote UNPS as they acknowledge our help and show our poster. 20 volunteers needed. Call Pam at 581-3744 weekdays or 466-8551 to volunteer. This would be a good time to wear UNPS T-shirts, too.
- April 21**
Saturday
8:00-1:00
Earth Day Project Day for Dimple Dell Park, beginning with an 8:00 am pancake breakfast at the Wrangler Trailhead with Dave Okelberry. Volunteers please call Paulina Flint at 571-5257 in advance for an assignment to a team and area in the park. Projects include wood chipping trails and treating picnic tables.

- April 22**
Sunday
Earth Day, 1990. What are you doing to celebrate? People from all over the country are taking time today to celebrate the Earth's natural resources and educate each other about how to take better care of our planet.
- April 26**
Thursday
7:30 pm
Salt Lake Chapter Meeting, "Basic Wildflower Identification II" with Pam Poulsen, featuring common plant families from the UNPS Wildflower Poster. Get ready for the wildflower season. Join us in the Den at the U of U Student Union Building.
- April 28**
Saturday
Pancake Breakfast and Nature Activities at Dimple Dell for the Community, sponsored by UNPS. This is our version of **Earth Day, 1990**. Many organizations will be involved to meet a broad range of interests. Please reserve this date. Your help is needed. Contact Dave Okelberry, 968-6190, to offer assistance. See information in this issue.

LOOKING AHEAD

- May 8-12**
Tuesday-Saturday
UNPS Annual TES (Threatened, Endangered, Sensitive) Plants 'Work Meeting', with base camp at Copper Canyon on the Navajo Indian Reservation. An orientation meeting will be held at Goulding Trading Post, Monument Valley. This is an area that has not been botanically explored. There is a high probability of discovering previously undescribed species. Three years ago, in a single afternoon, Duane discovered a new species of *Astragalus*. Attendance is not required for the entire period, but it is necessary to contact Duane Atwood, UNPS Rare Plant Co-chair, as soon as possible (625-5599 at the Forest Service in Ogden) to let him know your plans and to get directions and other useful information.
- May 12**
Saturday
11:00 am
"Native Plants in the Landscape" by W. Richard Hildreth, Arboretum of Utah, one event in the Gardening Series offered at Branch Libraries. Avenues Branch Library, 455 'F' Street, SLC.

The Segó Lily is published six times a year by the Utah Native Plant Society, Incorporated, as a non-profit organization under the laws of the State of Utah. Contributions to the newsletter are welcomed and should be sent to the editor, Janet Williams, 415 North Main, Salt Lake City, Utah 84103. Please state whether articles have been published elsewhere and require publisher's permission. The editor reserves the right to edit as needed and to select suitable articles for publication. Calendar items of interest to our membership are requested.

Membership in the Utah Native Plant Society includes The Segó Lily subscription. Please use the form provided in the newsletter for membership applications or change of address. Members and non-members are invited to participate in the activities of the Utah Native Plant Society.

1990 Officers and Committee Chairs

Pam Poulson, Chairman of Board	O 583-3744	Duane Atwood, Rare Plant Co-Chair	O 625-5599
Bill Wagner, State President	H 942-1295	Sherel Goodrich, Rare Plant Co-Chair	O 789-0323
Jo Stolhand, Vice Pres./Pres. Elect	H 521-0069	Dave Gardner, Conservation Chair	H 649-3355
Debbie Becher, Secretary	O 581-5322	Debbie Noel, Education Chair	H 322-0114
Andy Boyack, Treasurer	H 278-8596	Dave Okelberry, Field Trip Chair	H 968-6190
Kathy Anderson, SL Chapter Pres.	H 277-4652	Brent Collett, Horticulture Chair	H 298-7763
Swede Dahl, Logan Chapter Pres.	H 563-5269	Photography Committee Chair	Open
Susan Crook, Logan Vice Pres.	H 753-3257	Janet Williams, Newsletter Chair	H 364-4546
Dick Page, Seed & Propagation Chair	H 255-7769	Dorothy Egan, Newsletter Circulation	H 277-6988
Board members at large			
Jennifer Harrington	H 532-6726	Kay Thorne	O 378-4955
Alyce Hreha	H 484-2455	Leila Shultz	O 750-1576
Wayne Padgett	H 753-3854	Richard Hildreth	O 581-5322

A LOOK AT 20TH CENTURY GRAZING PRACTICES II

Pamela M. Poulson
Chairman of the Board
Utah Native Plant Society

The articles regarding overgrazing that were published in the last issue of the Sego Lily generated some interesting responses. I really must have hit some sensitive nerves. Frankly, I'm glad. Overgrazing is an issue that has been swept under the rug by both sides for far too long. Neither "side" advocates overgrazing, just as with the abortion issue, no one advocates murdering babies. The point on which the two opposing factions disagree is to what extent and intensity our PUBLIC LAND (which means that theoretically, the land is there for all of us) is utilized for grazing.

The evening that the Sego Lily hit the newsstands I received two high-blood-pressured telephone calls: one from a person that was livid at the suggestion that all commercial grazing be suspended on public lands and another that applauded the cause of vegetarians everywhere--who needs the damn cows anyway? I listened to each and realized that without both ends of the argumentative spectrum we would never be brought to attention, and might remain complacent on the grazing matter forever.

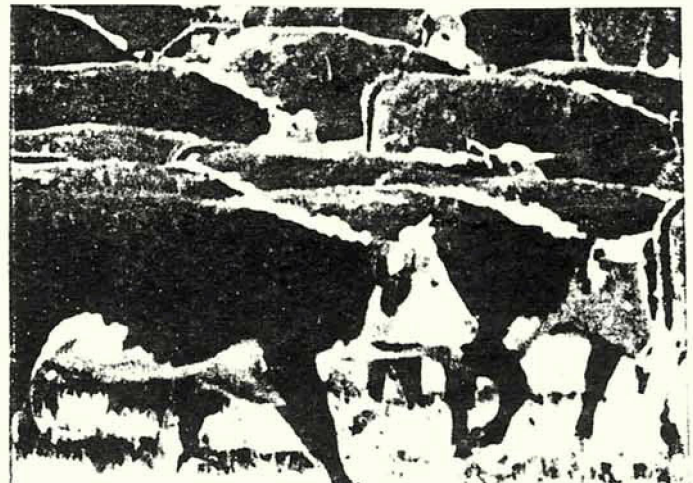
I guess my stand lies somewhere in the middle. I am a below-average consumer of cattle products, but I could never get along without my wool in winter, and thank the sheep who shared her warmth with me, albeit unwittingly. My view, and reality, is this: each parcel of land (public or not) is better suited for some of those multiple uses than others; and there are some lands that are absolutely not suited for commercial grazing at all.

When considering a parcel for grazing allotment, not only the standard considerations of acreage, water supply, potential AUMs, and "whose allotment is this and how did he use it last year?" should be considered. Ecology, including variables such as soil type, slope, precipitation, and health of the community should be considered. And what about the grazing critters themselves? Is there anything palatable there for them to eat? This should be a really important question for grazers. How many critters do they want to see fall over from selenium poisoning and how much money do they really want to donate to their local feed lot?

Both grazers and land managers know that cattle and sheep find certain species of plants tastier than others. Generally, cows prefer grasses, while sheep prefer "wildflowers". It really knocks me out to consider the west desert of Utah knowing these basic preferences. If you want to experience what I mean, sit up on the hill above Simpson Springs sometime. Looking to the west, align yourself with the east-west section line fence that divides public land (south side of fence) from Department of Defense land (north side of fence). What

do we see? As plain as we can see the Dugway Range on the horizon, we can see a vegetation of forbs and a fair selection of native perennial grasses that covers the ground to almost 50% coverage on the north side of the fence (protected by God's favorite Army). Sure, there are a bunch of other weedy species there, but the point is forbs and native perennial grasses are present. Meanwhile, on the south side of the fence, we see a lot of bare ground (about 75%) and the bare ground is surrounded by that wonderful, introduced annual grass genus Bromus. That's it. Now what can either a sheep or a cow, let alone a pronghorn antelope get out of that?

I asked a land manager that question once and he told me that Bromus is edible and palatable to cows during the winter months (it's a winter annual, germinating in the winter) when it is newly germinated and is tender and green. You may know that once the grass matures, goes to seed and hardens, it is totally inedible and actually can physically attack tender cowlips. Much to my chagrin, the manager went further to suggest that Bromus was originally possibly introduced intentionally, to provide an improved winter range. Gee thanks. One of my favorite summer sights is the maroon waves of imported Bromus on Utah's west desert.*



Another couple of facts are these: cows tend to yank plants up by the roots while sheep mow plants to the soil surface. With this in mind, guess where all the native perennial grasses went? Supposedly, the west used to be covered with the stuff--an excellent, natural, soil-holding group of plants best known for its role on the prairies of the Great Plains. Yep, you guessed it. Those perennial grasses were weeded out by years of grazing by those grass eating, yanking cows. Perennials just cannot recover from that sort of prolonged use. Unlike annuals that make an enormous effort to produce seeds that can remain in the soil, germinating annually, a perennial depends upon coming up from the root each year. One yank and all those years of plant development go right down that brown-eyed muncher's gullet.

Land managers understand these facts. They not only know their ranchers, they know their ecology and their grazing critters pretty well. The problem that

land managers face today is the repair of damage from all the reckless grazing that has gone on in the past. Some of the damage that was committed naively over 100 years ago is still being treated. Range restoration, whether it be natural and assisted, is a long process, and although overgrazing still continues in some places, we must consider that most of our problems are left-overs from our grandfathers.

Two days after the Sego Lily was delivered to homes and land manager's offices across the state, I was pleased to receive a concerned letter from A.J. Frandsen, Branch Chief of Range Watershed and Wildlife on the Manti-LaSal National Forest. The deplorable conditions I had observed on the Sanpitch Mountains were of great concern to him. He enclosed a map with his letter and asked if I would indicate where I had seen this problem and he would investigate. The problem at the north end of the Sanpitch Mountains (R 1 E; T 13 S; section 30) is that the mountains are made of large grained sandstone. This is a highly erosive material and breaks down into a coarse-grained, loose soil. The hundreds of sheep that were there had plenty to eat, but each footstep pulverized more soil into blowing dust. The Hispanic shepherd on site smiled and waved to me from the center of a particularly rosy cloud of the stuff. I hope that A.J. Frandsen is a thoughtful land manager who can see what's going on there.

In closing I'll just say one more time: when considering multiple use options, we can never overlook the ecology of the situation. It was here long before we ever tied on our leather hiking boots or buttoned up our plaid wool shirts. It's here to stay and we had better learn to live with it. And if we can understand it, we can be living with it for many more years to come.

*For more information on Bromus, see article "Invaders at Home on the Range" in the June 1989 issue of the Sego Lily

HOME ON THE RANGE

Gary Macfarlane

Prior to settlement and non-native livestock, bison were found in a now desolate Skull Valley, bighorn sheep grazed on the Wasatch Front's east bench and grizzlies roamed the Pine Valleys, Boulder Mountain and the High Uintas. Nothing has changed the ecology of Utah and the West more than livestock grazing. It is still the most extensive use of public lands. Almost every acre of our BLM land and national forests is found within livestock grazing allotments. Grazing even occurs within Capitol Reef National Park, Glen Canyon National Recreation Area and Dinosaur National Monument. Thus, livestock grazing affects every natural value in Utah--wildlife, watersheds, plant communities, recreation and wilderness.

Historically, ranges were severely abused by over-grazing. Livestock literally made Utah "blossom as the sagebrush," turning arid but nutritious bunch-grasses into desert scrublands. Since 1900, a steady stream of laws has helped reduce livestock numbers on public lands and better manage the range. However, more needs to be done.

A 1988 Government Accounting Office report showed significant acreages were overstocked, updated plans and information were lacking, and management by the Forest Service and BLM was poor. Some accounts still show 85% of the public lands in unsatisfactory range condition.

Only 2% of the nation's beef comes from public lands, 1% of the nation's beef comes from Utah and only 1/3 of Utah's cattle use public lands, though sheep use of public lands is much higher. The arid and harsh public lands in Utah are not of national importance for livestock. But obviously, public land grazing is important to individual ranchers and some local communities. This is precisely why these conflicts must be resolved equitably.

Although BLM and the Forest Service have talked a good line recently regarding grazing management, they are very slow to implement their new policies designed to bring livestock grazing into balance with other resources. UWA has used the resource expertise of our staff to collect data, prepare reports and begin to raise the issue to higher levels in an effort to prod the needed changes along.

There are some distinct concerns, problems and potential solutions to public land grazing. Here are some key elements of the public land grazing issue.

OTHER RESOURCES

Livestock grazing must not dominate every acre of the public lands in Utah, as it now does. Some areas should be closed to grazing. A diversity of life can only thrive if areas are protected. Balanced multiple-use dictates this be the case.

Wildlife: Certain large areas important for wildlife should be closed. (For example, bighorn sheep cannot co-exist on the same ranges with domestic sheep.) On grazed ranges, wildlife must be treated fairly when forage allocations are made. Impacts to non-game species from grazing must also be considered in land-use plans. Warfare on predators must not be tolerated.



Wilderness: The Wilderness Act allows grazing to continue where established. Since wilderness is designated to protect natural values and is the epitome of natural environments, livestock grazing must be conducted in a way that recognizes natural values.

Vegetation: Grazing must be kept at levels that don't harm the long-term productivity and biologic diversity of the land. Reductions must take place in areas which are over-allocated; abused ranges should be healed. Grazing should be severely reduced and/or controlled when the plants are in their critical growth stages. Critical habitat for threatened, endangered and sensitive plant species should be closed.

Riparian Areas: Riparian areas must be protected as they are the most diverse, sensitive and rare biological system in Utah. Grazing must be eliminated or maintained at levels which assure health of these river and wetland systems.

Forest Service and BLM must update grazing plans as many allotments are based on outdated information. Grazing fees must be increased to cover the cost of grazing management and grazing can no longer be considered a dominant use. If these changes are not promptly made, the public interest can no longer afford the price of public land grazing.

Reprinted with permission from Utah Wilderness Association Review, Vol. 9, No. 6, Nov/Dec 1989.



EARTH DAY CELEBRATION

The first Earth Day, April 22, 1970 was the largest organized demonstration in human history. More than twenty million people in virtually every community in the United States took part. Their demonstration of concern prompted Congress and the President to establish the Environmental Protection Agency and the Clean Air and Clean Water Acts. To launch the 1990s as the decade of the environment, many activities are being planned for Earth Day 1990.

Denis Hayes, Chair and CEO, Earth Day 1990 reports, "On Earth Day, we expect to have 100 million people around the world demanding the one basic right of all species: the right to a future...Fundamental societal change away from our current wasteful practices and toward a more sustainable future will only come about because of a commitment at the individual level to 'practice what we preach.' If we can adapt our own lives to reflect our concerns for the environment and hold our elected leaders accountable for their promises, then, perhaps, we truly can make the 1990s the "Decade of the Environment."

Earth Day 1990's Public Education Programs include: **Earth Day 1990 Green Pledge**, which challenges individuals to make environmental concerns an issue of paramount importance in their daily lives; **Earth Day 1990 Resolutions**, which signify concern for the environment at all levels of government and society; **Valdez Principles**, a corporate code of ethics; **K-12 Lesson Plan and Home Survey**, which takes parents and their children on an environmental exploration of the home; **Campus Environmental Audit**, giving students the tools to evaluate the environmental impact of their campus; and the **Global Cities Project**, providing cities with resources for environmentally sound programs.

A publication called EarthLine, a six part newsletter series, is available from Earth Day 1990's National Headquarters at PO Box AA, Stanford, CA 94309 for \$15.00. Make your check payable to Earth Day 1990.

An address for local contacts is Earth Day Utah, PO Box 520855, Salt Lake City, UT 84152-0855.

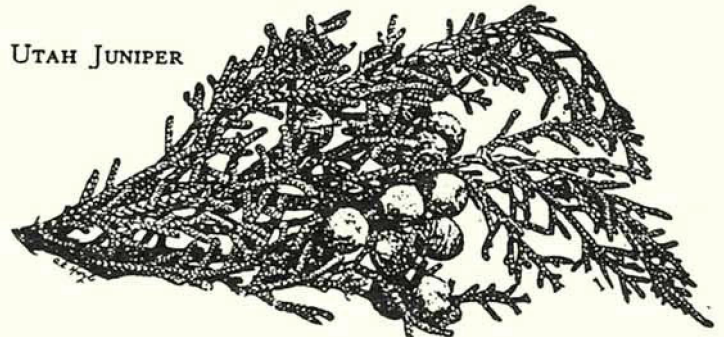
Your help needed

PLANT TREES for EARTH DAY

Vaughn Lovejoy

Ten thousand years ago there were 15 billion acres of forest on the planet. Now there are 10 billion. Approximately 1.25 billion acres of forest have been lost in the last ninety years alone. After observing how difficult it is to stop this rate of planetary deforestation, I have committed myself to restoring the forests along the Wasatch Front as a local response to a

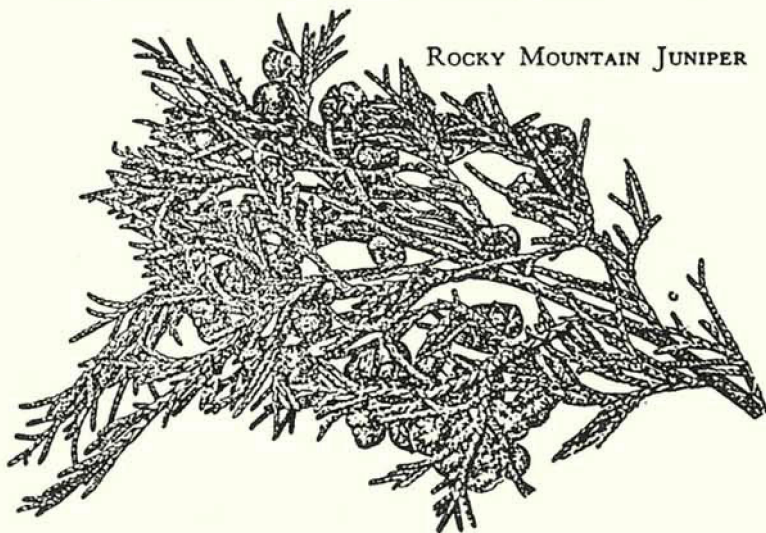
UTAH JUNIPER



global problem. In particular I am interested in increasing the forest cover along the lower elevations of the Wasatch Mountains.

This is actually assisting a natural process that has been occurring for the past few thousand years. With the drying climate during this time period, the montane forests migrated up the mountains and junipers, pinyon pi**nes and ponderosa pines began migrating north to fill the abandoned lower elevation niches. The process is still occurring today with the gradual spread of both Rocky Mountain and Utah junipers along the central Wasatch Front. The junipers preceed the pinyons and create the necessary microhabitats for them. We can help this process by planting both Rocky Mountain and Utah junipers all along the foothills and planting pinyon pines where juniper forests are currently established. At slightly higher elevations, 6,000 to 8,000 feet, there are some sites where Ponderosa pines could grow. These sites are currently inhabited by Gambel oak, a species that commonly occurs with ponderosa in southern Utah.

I contacted the Lone Peak State Nursery and found that they have 2,500 twelve-inch tall Rocky Mountain junipers left from a restoration project that can be purchased at their cost of \$1,500. I have met with the Salt Lake Watershed Management personnel and they are very enthusiastic about the project and we have found some sites around Mountain Dell Reservoir that have the appropriate habitat. They want to increase the already existing Rocky Mountain juniper population by planting more. They are also very excited by the prospect of a joint effort with the community to reforest a number of other watershed sites over the coming years.



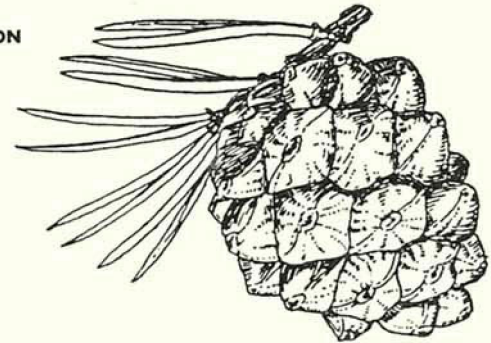
ROCKY MOUNTAIN JUNIPER

I am writing with the hope that you can help in two ways. First and most critical, I need donations to buy the trees. Each \$120 donation will buy 200 trees, and each \$30 donation will buy 50 trees. Needless to say, any size donation will be deeply appreciated. Please make your check payable to Lone Peak State Nursery and mail it to me at 2592 McClelland Street, Salt Lake City, Utah 84106. Any money collected in excess of the \$1,500 now needed will go for other planting projects in our watershed.

The second way help is needed is for planting the trees. We are hoping to plant them in conjunction with Earth Day, April 22, 1990, as our community's contribution to the Earth Day organization's international goal of planting one billion trees. We will need your willing hands and shovels to help plant. The State Lands and Forestry Office, the U.S. Forest Service, and the Salt Lake City Urban Forest Division have already agreed to provide their help and expertise. Call me at 466-4197 to volunteer your help.

Please help honor and continue the vision of the little-known, but extraordinary man, Richard St. Barbe Baker, who was responsible for the planting of more than 26 billion trees in his lifetime. In his words, "I have a vision of the Earth made green again through the efforts of children. I can see the children of all nations planting trees and holding hands around the globe in celebration of the Earth as their home and all children, all people as their family."

PINYON



What is the ALL SPECIES PROJECT?

There are times throughout the year, like Valentine's Day, Mother's Day, Father's Day and birthdays, when we tell people "You're special!" These are days of thanksgiving when we celebrate our relationship with others. However, we often forget to commemorate our most intimate relationship--that with the Earth and her plants, animals and elements.

The All Species Project is a vehicle for exploring the Earth, her elements, plants and animals, and our place within the Earth community of beings.

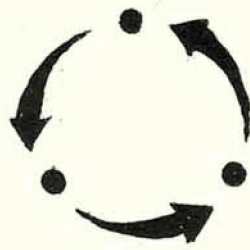
The All Species Project is an educational program working in schools and diverse communities, culminating in a yearly event--All Species Day. This annual celebration joins together many arts, disciplines and labors of the community so that by artfully and articulately recalling Earth values we will activate them and make space for Life.

The All Species Project has developed various materials--literature, audio cassettes, videos--which are available by writing to All Species Project, 804 Apodaca Hill, Santa Fe, NM 87501.

Reprinted from Pollen: Journal of Bioregional Education, Sunrock Farm, 103 Gibson Lane, Wilder, KY 41076.

THE "NEW" 3 R's

Mary Manning
Ecologist, U.S. Forest Service
Logan, Utah



Reject, reuse, recycle. Easy enough to remember. I'll start with the last, because it's the easiest. Recycling implies reusing, but what we're doing is sending that bottle or plastic container to some place where it will be broken up or melted down, hopefully to then be made into another useable form. Trash sorting is very simple. A container (box or grocery bag) for glass, hard plastics (shampoo, hand lotion containers, milk cartons, soft drink containers--no plastic bags yet), aluminum cans, and paper products (more about this later) can be arranged strategically for optimal tossing convenience. The glass and plastic containers should be rinsed, with lids removed (unless they're plastic), but luckily the labels CAN stay on!!

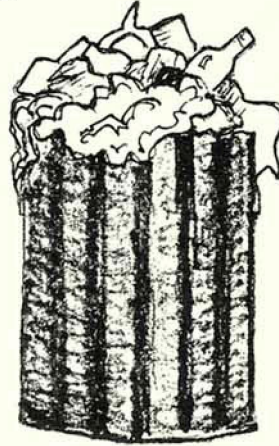
The Cache Recycling Coalition has a neighborhood recycling co-op in which members alternate trips to the Patagonia Outlet in SLC for drop-off of the glass, plastics and aluminum cans. The proceeds go to The Nature Conservancy for purchase of sensitive habitat in Utah.

The low-grade paper can go to Allsops (Mountain Fiber) which most of you know makes cellulose insulation. They can take essentially any paper product, including newspaper, magazines, cereal boxes, cardboard, envelopes, etc. (no carbon paper). You can drop these off at their place in Hyrum, or contact any of the Scout troops. High grade paper, such as computer and xerox (office ledger) paper, could go to the students on campus for their recycling program. Currently no steel cans are accepted at Patagonia, since there is no market. But by spring, Andy Peterson of Valley metals may be able to take cans, in addition to glass and plastic.

If we recycle, that's great, but there's the true "closed-loop" process (i.e. returnable glass bottles that are sterilized and used an infinite number of times) and then there's the plastics problem. There are a variety of polymers such as PET, PVC, PS, LDPE, etc. that must be melted down and made into secondary products. The refining process produces toxic chemicals, and new resins are introduced each time. Essentially, we're still making plastics, and there isn't a strong market yet for these secondary products (e.g. plastic logs for homes). The "biodegradable" plastic bag apparently is a misnomer. To learn more about this, the journals *Garbage*, *Resource Recovery*, *Waste Age*, and *Recycling Today* are available for more information. I suggest avoiding plastic bags and reusing the ones we've got.

The next step, then, is to reject products in over-packed, non-biodegradable, and/or non-recycleable containers. We need to be responsible consumers not only in terms of the contents, but packaging. A perfect

example is ketchup or jelly in the squeezable plastic bottles, which are multilayered plastic, and thus not easily recycled. Most of those products are still packaged in glass, and although they may be breakable and hazardous to children, I did fine growing up with glass containers. Single serving microwave meals, single package fruit juices, cookies and granola bars...the list goes on. We've been spoiled by convenience, but I bet we can adapt to the "old ways" again.



41% paper
18% yard waste
9% metals
8% glass
8% food waste
7% plastic
9% other

This brings us to the final, most effective and lasting step--reuse. Currently the real emphasis is on source reduction and waste minimization. Recycling can only deal with existing products. If we reject wasteful products and reuse what we already have, we reduce the initial problem. So what can we do? Buying in bulk can have very low impact, especially if we bring our own grocery bags, plastic bags and/or containers (for nut butters, oils, and spices). If you eat meat, go to a butcher shop where the meat is wrapped in paper; you avoid the polystyrene tray and the plastic wrap.

Watch also for recycled packaging, such as cereal and cake mix paperboard boxes. We should go back to the days of refillable milk, wine, and beer bottles. The White Owl has returnable beer bottles and doesn't use aluminum cans. Beer on tap is also a great idea. And of course we should always have our travel mug nearby for coffee breaks, and a container on hand in lieu of a styrofoam "doggie bag" at restaurants. Fast food take-out trash is a serious problem, but I read in *Newsweek* (Nov. 27, 1989) that McDonalds is trying to recycle its styrofoam containers, and they were first in eliminating the ozone-depleting CFC's (chlorofluorocarbons) from their styrofoam.

These are just a few suggestions of how we can adopt a lifestyle that reduces waste and also increases our awareness of the far-reaching implications of our purchases. I read articles about thousands of plastic tampon applicators washing up on the beaches on the east coast. We've all seen photos of seals and birds caught in the plastic six-pack holders (cut them up before you throw them away). Clearly the stuff doesn't just go away; it always come back to haunt us. We can stop all this at the source, and each of us can make a difference by example.

ARBORETUM AND UNPS STUDY HUMMINGBIRDS



Andy Boyack
UNPS Treasurer

On January 24th the Arboretum Garden Lecture Series and UNPS combined forces for Mark Stackhouse's lecture on hummingbirds. Mark is Director of Education for the Tracy Aviary. He has been a naturalist nearly all his life, starting with his boyhood in Ohio. He is a graduate of Utah State in biology and range science.

Mark raises hummingbirds at the aviary, one of which he brought with him in a cage, along with samples of hummingbird nests, eggs and feathers.

Hummingbirds are unique in a great many ways, according to Mark, but three characteristics are outstanding: their tiny size, 2 1/2 to 3 1/2 inches long, their hovering flight and whirring wings, and their brilliant coloring. The iridescent color has prompted such descriptive names for hummingbirds as amethyst-throated sun angel, blue-chinned sapphire, ruby topaz, purple-crowned fairy, and violet-capped woodnymph. Mark explained that the iridescence, particularly on the throat (the gorget) and the back is a result of refraction and reflection from tiny transparent globules in the feathers.

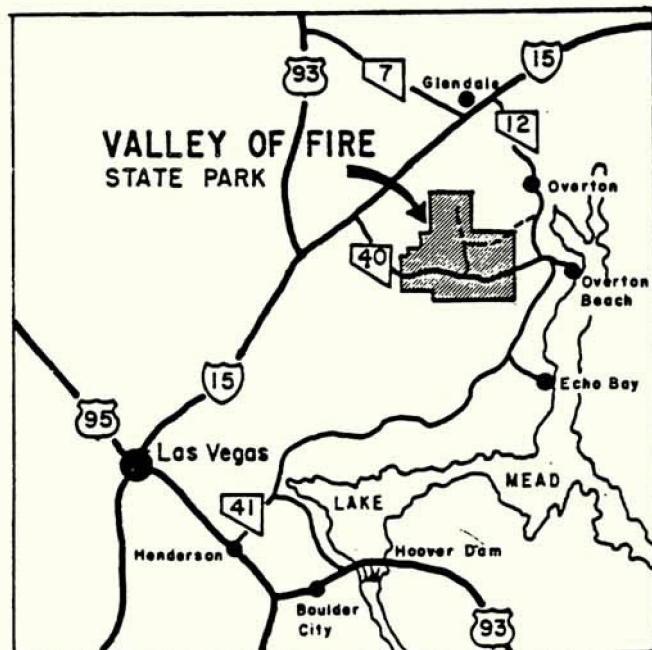
Hummingbirds are native to America, the greatest number of species being found in Central America and the Andes of South America. 17 species are found in North America. The most common in Utah are the black-chinned hummingbird, the broad-tailed hummingbird, the calliope, and the rufous hummingbird.

Hummingbirds obtain most of their sustenance from the nectar of flowers. They obtain nectar from flowers of all colors but prefer red, orange and yellow. They like inflorescences that extend above and beyond the foliage. Regular shaped and tubular flowers are their favorites. Some flowers may have become tubular in shape through evolutionary processes to attract hummingbirds to serve as pollinators. Paintbrush, honeysuckle and petunias are favorites.

A WILDFLOWER "DETOUR"

Barbara Halliday

If the sight of a Bur Buttercup in full bloom--all 3/8 inch of it--just doesn't satisfy your yearning for Spring Wildflower blossoms, the best solution this time of year may be to head south--even beyond Utah's borders. A trip down Interstate Highway 15 from the Utah/Arizona border to Las Vegas, Nevada in late March or April can take you to some rewarding, if less well-known wildflower displays.



Soon after leaving Utah, I-15 begins its descent of the Virgin River Canyon and the roadside flora reflects the lower elevation (2,200 feet)--Barrel Cactus (*Ferocactus acanthodes*) can be seen on the south facing ledges and Joshua Trees, (*Yucca brevifolia*) appear, perhaps already displaying their creamy white blossom spikes. Midway through the canyon, Arizona has provided a roadside rest (and BLM Campground) which is also easy access to this area from the freeway. By turning right onto a gravel road at this exit you can explore the side canyons (Cedar Wash)--we've found this to be a good area for early bloomers.

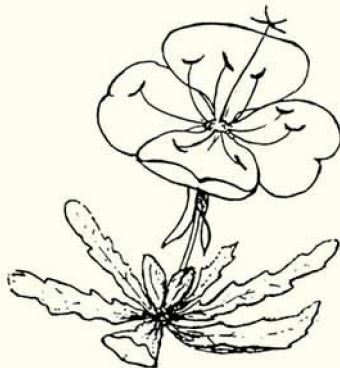
If weather conditions have conspired to create a good desert blooming year, the sandy roadsides just east of Littlefield, Arizona should provide a fine display of large white Evening Primroses (*Oenothera deltoides*) and Pink Sand Verbena (*Abronia villosa*) Don't miss the opportunity to stop and see Art Coombe's Cactus Gardens at the Desert Botanical Garden in Littlefield. Everyone welcome (whether there's anyone home or not)!

Near Mesquite we've found *Oenothera brevipes*, a small yellow Evening Primrose; the Desert Gold Poppy (*Eschscholtzia glyptosperma*) and a showy deep purple Phacelia (*Phacelia crenulata*).

Instead of following I-15 on to Las Vegas, you can find outstanding displays of early spring desert wildflowers by turning off on State Highway 12, making a detour through Overton, Nevada, the Valley of Fire State Park and the North Shore Road by Lake Mead. This route will bring you out at Henderson, Nevada, about 13 miles south of Las Vegas.

Overton is worth a stop to visit the "Lost City Museum" which houses a large collection of artifacts from two prehistoric groups who inhabited the Valley of Fire--the Basketmakers and later, the Anasazi Pueblo farmers. The Museum's exhibits will give you an appreciation of how these earlier people utilized the native plants of the area.

Valley of Fire State Park lies a few miles south of Overton and the protection it provides to plant and animal life is quite evident, for once within the park boundaries, wildflower blossoms become more and more prevalent. In mid-March to mid-April we've found showy displays of both the large White Dune Primrose (*Oenothera deltoides*) and the Yellow Desert Primrose (*Oenothera primiveris*). Dr. Edmund Jaeger in his Desert Wild Flowers says "primiveris" means "first-spring" and to winter-bound wildflowers seekers this is indeed a "first spring" worth traveling south to find!



DESERT EVENING PRIMROSE

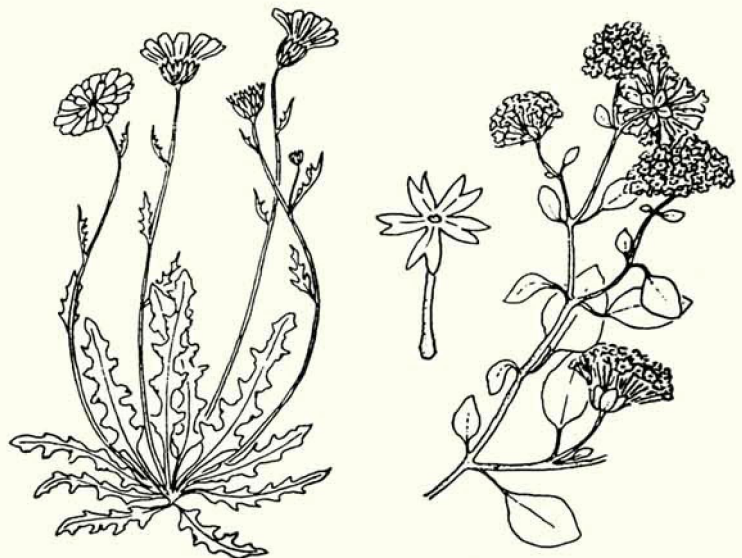
This park has several good paved roads leading to petroglyphs, a display of petrified wood logs and vivid eroded sandstone formations that give the park its name. *Phacelia fremontii*, a large blue "fiddleneck" *Phacelia*, various *Astragalus* species, Sand Verbena and splashes of magenta pink from the tiny but prolific Purple Mat (*Nama demissum*) should greet you along these roads.

At Valley of Fire Park you've descended to approximately 1200 feet elevation and are almost approaching the "low desert" zone. The plant community here is dominated by the widely spaced Creosote Bush (*Larrea divaricata*), Burro Bush (*Franseria dumosa*) and White Brittle Bush (*Encelia farinosea*). In summer, daily temperatures will usually exceed 100 degrees and can reach 130 degrees, but in March and April it's most apt to be 75. Beavertail and Cholla Cactus are common and by mid-April some Beavertail as well as the Brittle Bush should be in bloom.

You could return to I-15 from the Park by another state highway (40) but the far more scenic route is to follow the North Shore Road which parallels the northern edge of Lake Mead for about 40 miles. This area is within the Lake Mead National Recreation Area and along the road are several accesses to the lake as well as a lovely desert oasis where you can enjoy the sight (and feel!) of a warm spring-fed lake. Palm trees and Tamarix have taken advantage of the water source here. The lake used to shelter Desert Pupfish, but unfortunately vandals planted non-native tropical fish which took over the territory.

Most of the area along the North Shore Road sparkles from exposed gypsum deposits. We've found an unusual and very lovely low-growing Blazing Star (*Mentzelia tricuspidis*) in these gypsum washes. You can also find the stunning Yellow Desert Poppy (*Arctomecon californica*), a close relative of the endangered white Bearclaw Poppy found near St. George, Utah. Between early March and early May you should also find fine displays of Prince's Plum (*Stanleya pinnata*), Indigo Bush, an eye-popping giant Sunflower (*Enceliopsis argophylla*), Desert Larkspur (*Delphinium parishii*), and in good years, a carpet of yellow provided by the Desert Dandelion (*Malacothrix glabrata*).

Taking this "detour" enroute to Las Vegas would add about 32 miles to your trip, but I warn you that it could add hours to your travel time if you become intrigued by the attractions along the way. However, these will be hours well spent if you find Spring blossoming weeks before she will reach northern Utah!



Malacothrix

Abronia

Helpful guides to take along:

Desert Wildflowers, by Edmund C. Jaeger
Desert Plants of Utah, Berneice A. Andersen
Sunset Travel Guide to Nevada, Lane Publishers

Reprinted from The Sego Lily, March, 1985.

ANCIENT FORESTS

For the ancient forests of the Pacific Northwest, 1989 brought mixed signals. After a century of steady cutting, escalating in pace over the past couple decades, only ten percent remains of these unique and irreplaceable forests. Most of this remainder is on public lands--your National forests--ostensibly managed for the good of the public. Yet, unbeknownst to most of this public, **more than two square miles of these last ancient forests have been falling to the chainsaw every week in western Washington and Oregon alone!**



In the meantime, the U.S. Congress was caving in to timber interests. The resulting legislation not only set record high national forest logging levels for 1990, but restricted the public's ability to oppose the environmental damage in court. For all the destruction exposed, all the outrage expressed, and all the public demands made, the forests continue to fall.

Excerpted from *The Express*, Newsletter of the Ancient Forest Rescue Expedition, Number 2, February, 1990.

Forest Service Employees Distressed about Destruction

A profound change is beginning to take place within the Forest Service. Environmentalists are no longer alone in their criticism of agency policies. An increasing number of foresters are protesting the destruction they are being ordered to carry out, and they are fighting for change from within.

One such person is Jeff DeBonis, a timber planner in Oregon's Willamette National Forest. Alarmed by the accelerated cutting of the Northwest's ancient forests, DeBonis has taken his plea to the highest levels of the Forest Service. DeBonis has started a new organization, the Association of Forest Service Employees for Environmental Ethics (AFSEEE). AFSEEE publishes its own newsletter, *The Inner Voice*, a forum for employees of the agency who are distressed by its destructive policies.

But it is not only at the "lower" levels of the Forest Service at which protest is occurring. Recently, supervisors of the National Forests confronted Forest Service Chief F. Dale Robertson, voicing strong objection to their orders to cut more trees despite growing knowledge of the ecological costs. Many referred to recent studies by the Wilderness Society and others which show that the forests of the Northwest are being cut at twice the rate at which they can grow back. Ironically, the environmental havoc we justify with economics could eventually lead to overwhelming economic problems.

Clearly, foresters are beginning to respond to both the public's concern and the environmental loss they are witnessing themselves every day. It is anticipated that the rate of cut on national forests in the Northwest will be reduced by an average of 30 percent when final plans are released.

But where response is most needed is in Congress and the President's office. Congress and the President are the final decision-makers on the Forest Service's budget and timber cutting goals. No matter how loud are the voices of environmentalists and protesters with the agency itself, we can only change policy swiftly and effectively by taking our concerns to the place where policy is set.

Our hope lies in the concerted effort of environmentalists, concerned foresters, and citizens everywhere to let Congress and the President know that we care about our forests.

Excerpted from *The Express*, No. 2, February, 1990.

"A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community."

Aldo Leopold

INCREASED TIMBER CUTTING ON UTAH'S ASHLEY FOREST

George Nickas

It's hard to imagine in this age of "environmental enlightenment" the Forest Service would dramatically increase timber cutting, but that's precisely what's happening on the Ashley National Forest. The past three years have experienced unprecedented timber harvesting levels across the forest and for now there is no end in sight. Approximately 40 percent of all timber cut on Utah national forests annually is coming out of the Ashley.

To be sure, the Ashley is not productive timber land. Forest Service planning documents state that 90 percent of the commercial timber land is of "very poor" site quality and the remaining 10 percent rates "poor". Yet, despite these shortcomings, Ashley forest management is dominated by timber harvesting. What impacts on unroaded lands, recreation, watersheds, and sensitive species is the "timber absolutism" having?

An audit prepared by Cascade Holistic Economic Consultants (CHEC), a nonprofit forestry consulting firm and a leading critic of the Forest Service, has revealed that the Ashley is in fact harvesting too many trees. More timber is being cut than the forest's long term sustained yield. On timber sale after timber sale, the forest has harvested in areas not scheduled for cutting for decades into the future. The number of green trees being harvested is far greater than anticipated. These problems are the direct result of a desperate attempt to meet timber "targets" that are simply not sustainable. **At current harvesting levels, the CHEC audit estimates that all old growth and mature lodgepole stands on the forest will be liquidated within 30 years.**

While the Forest Service argues it is better to "salvage" dead trees than have them wasted, the impacts to other resources are not acceptable. The beetle is as natural to the forest as the sun is to the sky. It cannot be eliminated from the natural system and any attempt results in intolerable impacts to other resources.

Utah Wilderness Association is calling for a complete revision of the Ashley Forest Plan. The existing plan fails to meet planning requirements for using updated inventory data and addressing the below-cost nature of the timber sales. The plan revision must be accompanied by an updated timber inventory which takes into account loss of timber volume due to past harvesting and beetle infestations. Most importantly, it **must insure that adequate old growth will remain to protect those species dependent on this component.** The UWA is calling on the Forest Service to work in a cooperative spirit to resolve the myriad of serious management problems that exist.



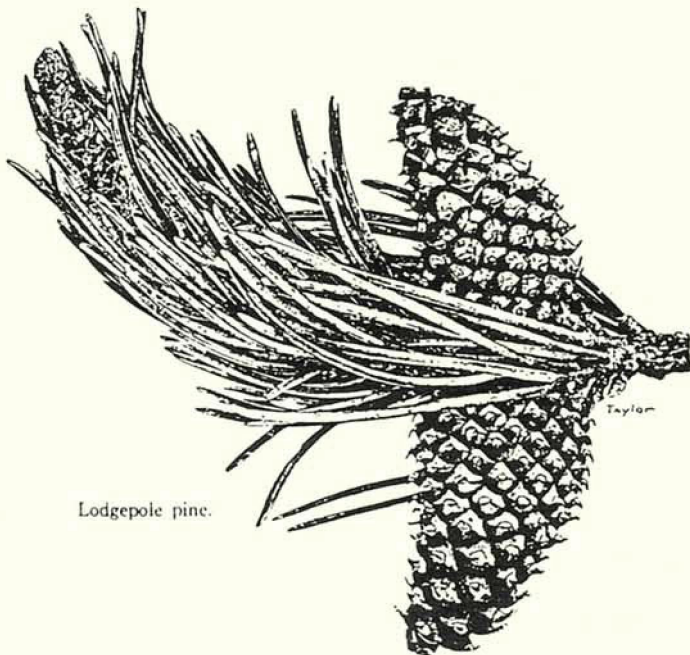
Excerpted by permission from "Timber Absolutism", Utah Wilderness Association Review, Vol. 10, No. 1, Jan/Feb 1990. Drawing by Margaret Pettis, UWA.

Rainforest Action Group of UTAH

This group believes that the widespread destruction of the world's rainforests must be ended. The main emphasis of the Utah group has been on education and the effort has been spearheaded by several teachers.

If you'd like to contribute time, talent or money to the Rainforest Action Group of Utah, contact Michelle Breinholt, 649-1146; Ann Ahlander, 322-2187; or Joanne Williams, 583-9238.

For a subscription to the quarterly World Rainforest Report, the monthly Rainforest Action Alert, and to receive current updates on rainforest issues and campaigns, send \$15.00 to Rainforest Action Network, 301 Broadway, Suite A, San Francisco, CA 94133.



Lodgepole pine.

Another in our series on ALIENS

CROWNVETCH: a possible problem weed in Utah

Leila M. Shultz
UNPS Board Member

Crownvetch is the new "miracle" ground cover that you find advertised in most current nursery and seed catalogs. Photographs show hillsides blanketed with a floral pink. Captions advertise an instantaneous solution to problem slopes, and a quick "cover-up" for the local eyesore. As is often the case in this age of aggressive advertising, you are given little factual information about this plant. What is this new wonder plant?

In fact, there is nothing new about crownvetch. It was given its scientific name, *Coronilla varia*, in 1753 by Carolus Linnaeus the "father" of scientific nomenclature. Its generic name is the Latin diminutive of *corona*, meaning crown, in allusion to the dense crown-like cluster of flowers. The plant is a member of the pea or legume family, Fabaceae, thus its similarity to clover as well as our common vetch is no mere coincidence. Its homeland is Europe, where it is widespread in the Mediterranean region.



What, then, is crownvetch doing in Utah? It has not arrived by natural means. All Utah records may be traced to plantings by man, either for ornament, fodder, or as revegetation for disturbed areas (roadsides, mines, dumps, etc.). Crownvetch was first reported from benches east of Provo in 1970, and has since been collected in Salt Lake, Cache, and Sevier Counties.

The first Cache County record was reported in the summer of 1983, when Alice Johnston of the Veterinary Science Department brought a plant to the

Intermountain Herbarium for identification. Returning to the mouth of Logan Canyon, where Alice had made her find, I discovered a number of plants growing along an irrigation canal as well as on dry hillsides of a new housing development. In all likelihood, the plants were seeded to stabilize slopes in the housing development. There is every indication, however, that the plants are spreading naturally onto surrounding hillsides.

Like many Eurasian plants, crownvetch has the potential to become a widespread and common weed in Utah. Climatically, Utah is very similar to the steppes of western Asia. When plants are introduced from that part of the world, they find an amenable habitat here, but do not have their natural predators or competitors to keep them under control. Dyer's woad (*Isatis tinctoria*) and Russian thistle (*Salsola* spp.) are just two examples of Eurasian plants that promise to be problem weeds forever in Utah.

Crownvetch is not only potentially an aggressive invader of rangelands and agricultural croplands, it may also be poisonous to livestock. M. Colburn Williams, Adjunct Professor of Biology and a researcher in the USDA Poisonous Plants Laboratory, (now Emeritus) reports 3-nitropropionic acid in samples of *Coronilla varia* (Williams, 1981). Dr. Williams has sampled crownvetch-infested fields in the Midwest and found toxic, aliphatic-nitro-compounds in all sampled specimens of crownvetch. Crownvetch has been used to experimentally induce nitro-poisoning in swine, meadow voles, and chicks (Shenk et al., 1976). Farmers and ranchers in the Midwest report, however, that cattle are attracted to the crownvetch and graze it without harmful consequence (M.C. Williams, pers. comm). An explanation might be that in the central plains states there is a good mix of grasses and forage available for grazing animals. In our drier western ranges, with less forage, the effect of toxic compounds may be amplified.

Records of crownvetch should be reported to your nearest herbarium. Records should be in the form of a pressed specimen accompanied by collection information. These specimens will then become a part of the public record when deposited in the Intermountain Herbarium of Utah State University. By way of this permanent record, we can trace the spread of this plant. A welcome accompaniment to the record would be a note stating that all the plants were eradicated with the collection. With an informed public, perhaps we will never need to add crownvetch to the growing list of Utah's noxious weeds.

Reprinted from *Utah Science*, Spring 1984.

Leila M. Shultz, PhD, is Curator of the Intermountain Herbarium, the major research collection of plants of the Intermountain Region. She is an author of Atlas of Utah Plants, Taxon Editor of the forthcoming Flora of North America, and a specialist on the taxonomy of Sagebrushes.

THANKS, BURPEE

W. Atlee Burpee, one of the country's largest mail-order plant suppliers, has decided not to sell woodland wildflowers and native ferns through their catalog because they could not be certain these plants were not wild-collected. In the future Burpee will offer native plant seeds only from commercially propagated plants, and ferns from suppliers who propagate ferns from spores.

Reprinted from New England Wildflower Society Newsletter, Fall/Winter 1989.

A Challenge to the Misleading Use of 'Nursery Grown'

As spring plant catalogues begin to arrive, be alert for those that say the native plants offered are "nursery grown."

Use of this term appears to be increasing, perhaps in response to widely-expressed concern about wild collection. Whatever implications it may carry, however, "nursery grown" is not the equivalent of "nursery propagated."

"Nursery grown" means simply that plants have spent some part of their lives--as little as a few weeks--in a nursery bed or container. Plants propagated in a nursery from seed or cuttings or through tissue culture are nursery grown. But so are plants that have been dug from the wild and held in a nursery until they can be sold. For those who want to avoid buying wild collected plants, the term "nursery grown" is irrelevant.

Moreover, it can be misleading, even deceptive, when it is applied to plants that cannot be commercially propagated.

In response to misleading usage, the Eastern Native Plant Alliance, in which VNPS participates, is urging that concerned individuals ask nurseries to apply the terms "nursery grown" and "not wild collected" only to plants that are propagated and subsequently grown to saleable size in the nursery. Please join in this effort!

Wild collection of native plants for commercial sale is a complicated issue. At the local level, unscrupulous and damaging collection of native plants is known to occur, but the effect of commercial collection over the entire range of common species has yet to be established. Until questions about the true impact of wild collection for the commercial trade are resolved...conservation organizations recommend that gardeners buy only nursery propagated plants. Following this recommendation requires that catalogue descriptions be accurate.

Reprinted from the Bulletin of the Virginia Native Plant Society, Winter 1989.

PUBLICATIONS

How to Get your Lawn and Garden Off Drugs by Carole Rubin. Friends of the Earth. 701-251 Laurier Ave. W., Ottawa, Canada K1P 5J6. 1989 98 p. \$13.00.

North American Terrestrial Vegetation edited by M.G. Barbour and W.D. Billings. Cambridge Press, MA. 1988. 432 p. \$50.00.

Photographing Wildflowers: techniques for the advanced amateur and professional by Craig and Nadine Blacklock. Western Producer Prairie Books, Saskatoon, Saskatchewan. 1988. 64 p. \$10.00.

Environmental Perspective to the Year 2000 and Beyond is an intergovernmental strategy to cope with global ecological problems. United Nations Environment Programme. 34 p. \$25.00.

Nature Guide published by the Tacoma Audubon Society. This book is a listing of individuals who have volunteered to share their knowledge of their local areas' natural habitats, native plants and animals with interested travelers.

Addresses and phone numbers are listed by city within each state or province of the U.S. and Canada, along with a list of nature centers. There is also a generous listing of volunteers or organizations in other countries to help travelers on every continent. 9th Edition. \$8.00 (\$10.00 by mail). Available from Nature Guide, PO Box 1015, Tacoma, WA 98401-1015.

Rehabilitating Damaged Ecosystems edited by Dr. J. Cairns. CRC Press. Boca Raton, Florida. 1989. Vol. 1, 192 p., Vol. 2, 224 p. \$110.00 each volume.

Whatever Happened to Ecology? by Stephani Mills. Sierra Club. 224 p. \$27.00.

50 Simple Things YOU Can Do to Save the Earth, by the Earth Works Group, Earthworks Press, Berkeley, CA. 96 p. \$4.95. If you want to take an active role in saving our planet, but don't know where to begin, start with *50 Simple Things*. It's a practical, entertaining, and informative guide to the things you can do to help protect the Earth.

Complete Trash: The best way to get rid of practically everything around the house by Norm Crampton. Thinking of throwing out dead batteries, old furniture polish and leftover gasoline? Don't. Not until you read Complete Trash--just in time for the 20th anniversary of Earth Day. Ecologically sound, it is the ultimate guide to disposing of all varieties of common household trash, including broken appliances, hangers, plastic bottles and more. Paperback \$8.95.

UNPS Sego Lily
c/o Janet Williams
Utah Native Plant Society
P.O. Box 520041
Salt Lake City, Utah 84152-0041

Non-Profit Org.
U.S. Postage
PAID
Salt Lake City, Utah
PERMIT No. 327

Return postage guaranteed
Address correction requested

DUES NOW DUE

UNPS dues for most of us come due this month, March. The due date is shown on your address label. Send your checks and renewal form (see next column) to Pam Poulson, P.O. Box 520041, Salt Lake City UT 84152-0041 or give them to Pam, Jo Stolhand or Andy Boyack at the March meeting. Thanks for responding promptly!

New Source for Native Seed

Wild & Crazy Seed Company offers seed from native wildflowers, grasses and shrubs of the Four Corner States Region. Their seed selection varies from plants of alpine ridges through lush mountain meadows, aspen groves and dry pine forests to high desert plains. Wildflower and grass mixes are available to suit a range of elevations, sun exposure and water availability. In addition, they offer 55 individual species. They collect seed responsibly, and are working toward growing most of their own seed, with wild collections only on species of great abundance. For more information, plant descriptions and individual selections, their catalog is available for \$1.00 from Wild & Crazy Seed Co., PO Box 895, Durango, CO 81302.

Membership Application

New Member Renewal Gift

Name _____

Street _____

City/State _____

Zip _____ Phone _____

If Gift, from: _____

Check membership category desired:

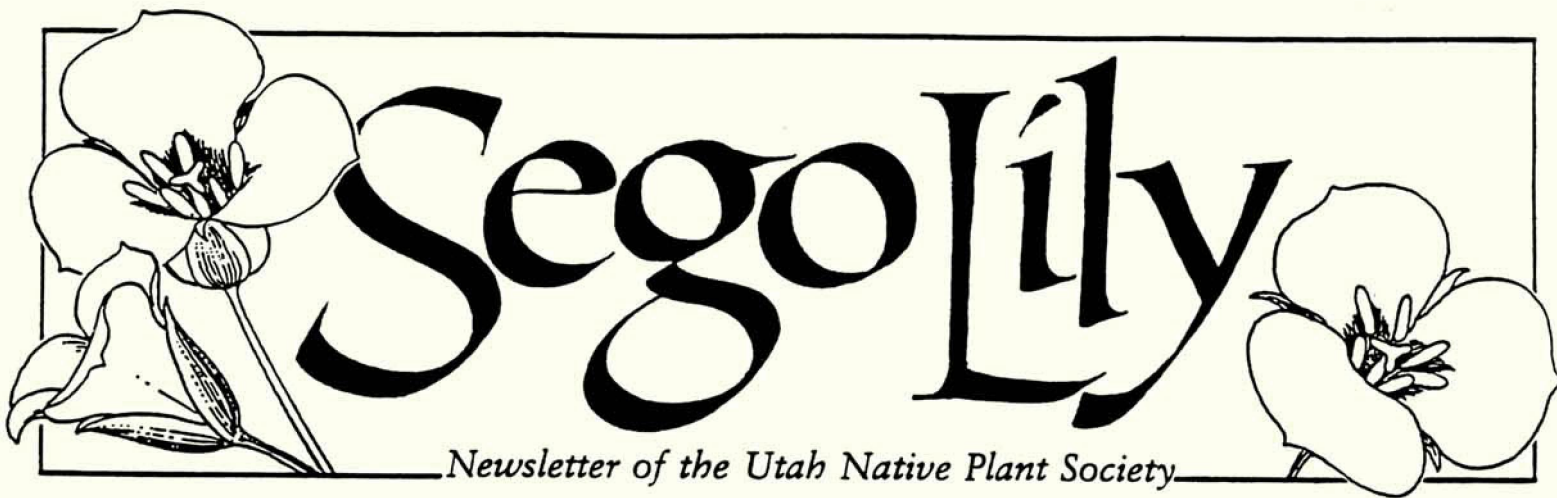
- Student/Senior\$ 5.00
- Individual\$ 10.00
- Family\$ 15.00
- Supporting\$ 30.00
- Corporate\$ 30.00 and up
- Life\$250.00

Please send a complimentary copy of the Sego Lily to the above individual.

Please enclose a check, payable to Utah Native Plant Society, and send it to:

Pam Poulson, treasurer,
Utah Native Plant Society
P.O. Box 520041
Salt Lake City, Utah 84152-0041

(If you prefer not to cut this out of your Sego Lily, feel free to copy the membership form or simply write the information down and mail it with payment for the category of membership.)



VOL. 13 NO. 3

MAY / JUNE 1990

CALENDAR OF EVENTS

May 8-12
Tuesday-Saturday

UNPS Annual TES (Threatened, Endangered, Sensitive) Plants Workshop/Field Trip in Southeastern Utah, co-sponsored by the Navajo Natural Heritage Program. Tuesday will be an indoor session at the Oljeto Chapter House west of Goulding Trading Post. A base camp will be set up in Copper Canyon Tuesday night, where participants will camp for the rest of the week. Come prepared to spend 8 hours or more each day in the field hiking, driving, collecting, and photographing plants. Attendance is not required for the entire period, but it is necessary to contact Duane Atwood, UNPS Rare Plant Co-chair, as soon as possible (625-5599 at the Forest Service in Ogden) to let him know your plans and to get directions and other useful information.

May 12
Saturday
11:00 am

"Native Plants in the Landscape" by W. Richard Hildreth, Arboretum of Utah, one event in the Gardening Series offered at Branch Libraries. Avenues Branch Library, 455 'F' Street, SLC.

May 24
Thursday 7:30 pm

Salt Lake Chapter Meeting, "Orchids in Utah" by Keith Wallentine. Join us in the Den at the U of U Student Union Building.

June 9
Saturday
9:00am-1:00 pm

"Trees and Shrubs of the Wasatch," one of a series of Saturday Walks in the Wasatch sponsored by Red Butte Gardens and Arboretum. Alyce Hreha, field botanist, leader. \$7.00 Register by calling 581-5322.

June 28
Thursday

Salt Lake Chapter Meeting. To be announced. Blue card mailing will have details.

April 1-Oct 31

Wildflower Hotline (801) 581-5322. Receive current information on the best wildflower blooming displays reported from throughout the state. Call for a four-minute recorded message, updated weekly. Hear additional weekly wildflower information with Pam Poulson and Gene Pack on **KUER** public radio **FM 90.1** at 11:00 Friday mornings from April through October.

LOOKING AHEAD

August 17 & 18
Friday, Saturday

UNPS Field Trip to Cedar Breaks. This overnight camping trip will focus on the mushrooms and vascular plants of Cedar Breaks National Monument. Leaders sharing their expertise with the group include Ardean Watts, mushroom expert, Brent Palmer, botany professor at SUSC and author of the vascular plant guide to the Monument, and Kent McKnight. Details forthcoming. Dave Okelberry Fieldtrip Chair, 968-6190.

The Segoe Lily is published six times a year by the Utah Native Plant Society, Incorporated, as a non-profit organization under the laws of the State of Utah. Contributions to the newsletter are welcomed and should be sent to the editor, Janet Williams, 415 North Main, Salt Lake City, Utah 84103. Please state whether articles have been published elsewhere and require publisher's permission. The editor reserves the right to edit as needed and to select suitable articles for publication. Calendar items of interest to our membership are requested.

Membership in the Utah Native Plant Society includes The Segoe Lily subscription. Please use the form provided in the newsletter for membership applications or change of address. Members and non-members are invited to participate in the activities of the Utah Native Plant Society.

1990 Officers and Committee Chairs

Pam Poulson, Chairman of Board	O 583-3744	Duane Atwood, Rare Plant Co-Chair	O 625-5599
Bill Wagner, State President	H 942-1295	Sherel Goodrich, Rare Plant Co-Chair	O 789-0323
Jo Stolhand, Vice Pres./Pres. Elect	H 521-0069	Dave Gardner, Conservation Chair	H 649-3355
Debbie Becher, Secretary	O 581-5322	Debbie Noel, Education Chair	H 322-0114
Andy Boyack, Treasurer	H 278-8596	Dave Okelberry, Field Trip Chair	H 968-6190
Kathy Anderson, SL Chapter Pres.	H 277-4652	Brent Collett, Horticulture Chair	H 298-7763
Swede Dahl, Logan Chapter Pres.	H 563-5269	Photography Committee Chair	Open
Susan Crook, Logan Vice Pres.	H 753-3257	Janet Williams, Newsletter Chair	H 364-4546
Dick Page, Seed & Propagation Chair	H 255-7769	Dorothy Egan, Newsletter Circulation	H 277-6988
Board members at large			
Jennifer Harrington	H 532-6726	Kay Thorne	O 378-4955
Alyce Hreha	H 484-2455	Leila Shultz	O 750-1576
Wayne Padgett	H 753-3854	Richard Hildreth	O 581-5322

PUBLICATIONS

Intermountain Flora, Vol. 3, Part B, The FABALES by Rupert C. Barneby, recognized authority on the Leguminosae and recent recipient of the Asa Gray Award of the American Society of Plant Taxonomists. INTERMOUNTAIN FLORA is an authoritative series that provides keys, descriptions and illustrations of the vascular plants of the intermountain region of the United States and keys for this identification. The Intermountain Region, including all of Utah, most of Nevada, and portions of Idaho, Oregon, Arizona, and California, is the largest one in the United States as yet lacking comprehensive floristic coverage. Described as "a work of outstanding scholarship and...a major contribution to the taxonomic literature" INTERMOUNTAIN FLORA is of use to botanists, conservationists, land use planners, naturalists, ecologists, foresters, and range and wildlife managers.

Volume 3, Part B, chronologically the fourth volume to appear in the series, treats the Fabales. Following a format set in preceding volumes, it provides the nomenclatural synonymy, description, common names, chromosome counts, distribution, and a discussion of the relationships of each taxon treated. The volume includes a synoptical key to the families of the Fabales (Mimosaceae, Caesalpiaceae, and Fabaceae), illustrations for all the 286 species treated, and 27 nomenclatural innovations.

Dec 1989, clothbound, acid-free paper, x, 280 p. Price \$61.65, includes postage and handling. Order from The New York Botanical Garden, Bronx, New York 10458.

The Wildflower Gardener's Guide: California, Desert Southwest, and Northern Mexico Edition by Henry W. Art, illustrated by Hyla M. Skudder and Elayne Sears. Pownal, Vermont: Garden Way Publishing, 1990. \$12.95, paper.

Enjoying wildflowers in the Southwest may seem a bit like being a connoisseur of fine wines: some years produce vintages that are remembered long after the pleasure is gone, and other years produce merely hope for the future. While the climate that influences the showy wildflower displays may be variable from year to year, a real joy of gardening in the Southwest is turning environmental challenges into opportunities. The guide addresses the particular challenges of the southwestern quarter of North America. Native plants are well adapted to their natural environments and will thrive and blossom where exotics will not. How to grow 34 of the region's most popular species and how to combine them in different landscapes is the subject of this book. A thorough identification section includes botanical drawings, distribution maps, information on planting and propagation, light, temperature, and soil requirements, and recommended companion plantings. Tables compare species by color, height, flowering season, cultural requirements, and hardiness. Considerable attention is given to planning specific types of gardens such as urban gardens, hummingbird and butterfly gardens, meadows and rock gardens. Of particular interest are the sections on xeriscaping and "fire-resistant" landscaping in areas susceptible to periodic fires.

A LOOK AT 20TH CENTURY GRAZING PRACTICES III

Pamela M. Poulson
Chairman of the Board
Utah Native Plant Society

In an earlier tirade, I mentioned that the overgrazing spectacularly interpreted on the 1990 Utah Travel Council calendar bothered me a lot. It still does. In fact, I don't think I'll be able to turn to August, which shows a beautiful photograph of red, drifting sand near Capitol Reef National Park. Unfortunately, the sand is drifting into those marvelous dunes because it was kicked up by the spade-like hooves of range cattle earlier in this century.

There is a famous quote regarding the Colorado Plateau area of our state which the Park Rangers use in their campfire programs all the time. I don't remember who first uttered the oft repeated words: "Those canyons are a hell of a place to lose a cow." If those canyons are so maze-like, why was/is grazing undertaken there? Furthermore, from the look of the range depicted in the Travel Council calendar, there isn't a whole heck of a lot left for the cattle to eat.

Neither Utah nor the Colorado Plateau are alone in the desert realm of overgrazing. All but the most inaccessible areas of the deserts of western North America are overgrazed. Only the tops of cliff-rimmed mesas were/are immune. Cattle are amazingly sure-footed (sheep are even more so), and I've been quite surprised at the discovery of cow pies in some desert locales that I have believed to be pristine. In the American West, the only thing that can be confused with cow pies are buffalo pies, so if you think it's a cow pie, it probably is.

For a quick lesson on how to spot overgrazing in the desert, grab yourself a Utah Travel Council calendar--a Utah travel brochure will probably work just as well. Turn to any page that has a photograph that includes loose sand. It doesn't matter whether it's red sand or grey sand, this phenomenon occurs in any arid environment, but red sand is unusual and more popular with the tourists. Notice that the vegetation is dominated almost entirely by shrubs. This is because (as we discussed in the last issue) cows prefer to eat grasses. All the perennial grasses have been harvested by our brown and white friends in the production of T-bones and have had a difficult time becoming re-established in the constantly moving sand.

For the most part, the shrubs are either sagebrush or blackbrush. Notice two things about these shrubs: 1) they are slightly/a lot higher than their immediate surroundings (this is because they are perched on little

islands of self-protected soil/sod called pedestals); and 2) they are widely spaced, with nothing growing in between them--all other vegetation has been grazed or trampled away.

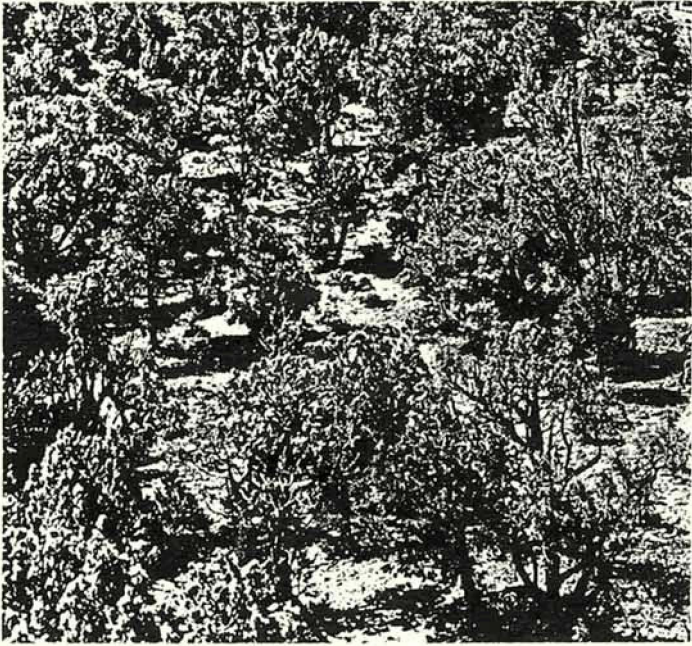
Let's examine that word "trample" a little more closely. In the desert, trampling is as damaging a function as "pulling the perennial grasses up by the roots." This is because in the desert there is a plant life form that we step on all the time, but often overlook--cryptogamic soil crust. It is quite fragile and highly susceptible to repeated trampling by any animal--including us.

Science is just beginning to truly understand the vital significance of this sod-like skin that holds and protects the soils of arid lands throughout the world. Cryptogamic soil crust is a living organism, made up of lichens, mosses, algae and fungi. The appearance of the soil crust varies according to the percentage of those constituents and whether it is wet or dry, but generally it is one to four centimeters thick and is textured like a miniature mountain landscape. Its color can range from black (lots of algae and dry) to green (lots of algae and wet) to white (lots of lichens).

Cryptogamic soil crust, which can get a start on any soil/sand that has at least some periods of non-movement, not only stabilizes the soil surface against wind and water erosion, but the algal constituent fixes nitrogen and the texture of the crust itself traps seeds and water, providing a nursery for the start of higher plants such as grasses and forbs. In a desert there is a lot of open, empty space between large plants because of competition for water. The cryptogams take up residence on the soil between and among the larger plants. Here, in their preferred habitat, they are very susceptible to trampling.

I have one friend that is so sensitive to this problem of the desert, that he boycotts mountain bikes and actually hikes by jumping from slickrock to slickrock and walks only on the shrubs! (I guess he feels shrubs can withstand trampling a lot better than the cryptogams can.) Needless to say, I've never seen a cow smart enough to care about stepping on anything, and those hooves (four of them on each 1,000+ pound animal) are as sharp as any farmer's harrow.

The destruction of cryptogamic crusts in high grazing areas is appalling, but even areas with "no grazing potential" are in jeopardy because of cattle driving. The main threat to our endangered Pediocactus winkleri when it was first federally listed was that cattle were driven through its habitat on their way between grazing allotments. The threat was not grazing, but trampling. If you have seen this quarter-sized cactus on the Oyster Shell Reef near Capitol Reef National Park you know that a few hundred cow hooves meandering by could wipe out the entire species.



Some folks submit that the sand has always been moving, that there never were well established cryptogam communities or grasslands in our deserts. I'm sorry folks, but I just can't buy that. A personal look at Chesler Park in Canyonlands National Park or a quick browse through Nick Van Pelt's thesis about the relict plant communities of mesas on the Colorado Plateau or hearing the reports on the vegetation inventory at Glen Canyon National Recreation Area prove to me that the natural state of the vegetation among the slickrock is one of communities evolving from captured pockets of windblown sand, through a state of cryptogamic stabilization to ultimate climaxes of park-like grasslands, shrublands, and pinyon/juniper forests.

No doubt about it, desert vegetation is fragile. Merely because a place is a desert (where potential evapo-transpiration exceeds precipitation--dry!) the vegetation cannot recover quickly enough to keep the "soil" from blowing around and developing those photogenic sand dunes.

I hate to end another article with an admonishment to great understanding of this environment, but we've got to get east coast environments off our minds. The settlers of Utah rolled west from a land of verdant landscape that needed no supplemental irrigation, and recovered more quickly from disturbance of the vegetation. I often wonder if grazing management policy was developed in the middle of an oak and hickory forest--certainly Utah's 19th century attitudes toward grazing were developed there--and like I've written before, many of our range problems today are leftovers of our grandfathers' misunderstandings. How many times do we have to look out the window or hear the weather report to know and understand that **we live in a desert!** Maybe we should take a real close look at current range management policies of desert lands and see if they were developed with thoughtful understanding of that basic premise.

HOME ON THE RANGE, part 2

Gary Macfarlane

On October 31, 1989, UWA met with Ray Hall, Region IV's Range and Watershed Director, and Bob Hamner, Region IV's Range Permit Compliance Officer, to discuss the progress on grazing management on Utah's six national forests. What we heard in the meeting confirmed our most sobering concerns.

Since the 1960s and 1970s, range monitoring and management had become lax and range budgets to monitor the health and productivity of the land had been reduced. The "Change on the Range" initiative instituted a couple of years ago directed that Forest Service rangeland be managed with multiple-use values in mind, not just livestock grazing. That initiative was spawned by the obvious need to improve livestock management on the national forests in light of past neglect.

Utah's national forests have over 630 livestock grazing allotments, approximately 110,000 cattle and a quarter of a million sheep. Livestock grazing allotments cover nearly every acre, although there are a few areas which are not grazed. Almost two-thirds of the range is in less than "good" condition and critical riparian areas are in even worse shape. Many of these allotments do not have the required allotment management plans (AMPs). Of the allotments which have AMPs, most are outdated, some by 30 years.

Since that time conditions have changed on the ground--many improvements like fences and water sources are in disrepair and the range itself is less productive due to poor management. Most of these AMPs are not in compliance with multiple-use standards in the forest plans developed to protect riparian areas, wildlife and watersheds. Originally, the goal was to revise every AMP so it was in compliance with the forest plan by the mid 1990s. However, it now seems that not even the easier goal of having an AMP for each allotment will be reached by the mid-90s.

Recently, the Ashley National Forest amended their forest plan and removed provisions that would have brought grazing management up to speed by the mid-1990s. They did this without public participation and UWA appealed that decision. It seems that environmentally positive management guidelines which seek to control grazing are not being emphasized or funded while timber harvesting takes place at an increasing rate. Fortunately, the Forest Supervisor concurred with our concern that the amendments should have been subject to public scrutiny before their approval and rescinded his decision to amend the plan. Given all of this, **what can be done and what can the agency do?**

First, the range program should be prioritized within the agency because it affects so many other resources and it must be carried out professionally. In Utah, timber ought not to dominate the national forest management picture. The budget, though a legitimate concern, cannot be the excuse for poor management. The agency must make necessary reductions due to drought or overstocking. Hoping for a wet year to correct poor management can't be tolerated.

Second, balanced multiple-use dictates that some areas not be allocated to livestock. Presently, the Forest Service does not allow sheep or cattle to graze on a tiny percentage of national forests--some of the Wasatch Front because of watershed concerns (Uinta and Wasatch National Forests), a small portion of the Uintas for recreation and wildlife (Ashley and Wasatch-Cache National Forests), a chunk of the Pine Valley Mountains (Dixie National Forest) and a few other small areas like municipal watersheds, inaccessible high terrain and Research Natural Areas. Such areas need to be expanded. For example, the high country of the Uintas (Bald Mountain to Leidy Peak) should not be grazed in order to protect bighorn habitat, all of the Wasatch Front should be closed because of watershed concerns, the lands recently acquired by the Uinta National Forest around Strawberry Reservoir should not be grazed to protect fisheries and very productive wildlife ranges. High elevation areas with short growing seasons (the 11,000 foot tops of Fishlake, Thousand Lake and Boulder Mountains) are unable to weather grazing, particularly by cattle. Also riparian corridors like the abused East Fork of the Sevier (Dixie National Forest) or popular fishers like Fish Creek (Manti-LaSal National Forest) should be protected from livestock.

Third, vacant allotments (allotments where the permittee turns the permit back to the Forest Service because he/she no longer uses it) should not be filled because the agency, as has been noted, can't manage the allotments that are being used. Scarce agency resources should not be spread so thin.

Finally, all public land users need to cooperate and aid the agency. Volunteer projects to restore riparian areas need to be implemented. Support for increasing range monitoring budgets so the Forest Service can study range conditions and trends is needed. UWA supported Congressman Owens' efforts this past year to increase range-wildlife funding.

Regardless of the good intentions of the Forest Service, necessary changes are very slow to occur. The agency must step up its management efforts with cooperation from livestock interests or concede national forest grazing is a failure that cannot be supported.

Reprinted with permission from Utah Wilderness Association Review, Volume 10, No. 1, Jan/Feb 1990.

T & E PLANT POLLINATORS THREATENED

Andy Boyack
UNPS Treasurer



Threatened and endangered plants will die if their pollinators die. Conversely, saving T&E plants means saving their pollinators, and in particular saving them from destruction by man and his insecticides. This was the theme of Dr. Vince Tepedino, entomologist with the Pollination Biology Laboratory at Utah State University in his lecture February 22 to a combined Arboretum and UNPS meeting.

Dr. Tepedino has been studying the pollination of T&E plants for the Department of Agriculture to determine the safeguards required to protect them from insecticide spraying, especially the spraying of grazing lands for grasshopper control.

Most of the flowering plants in the United States are pollinated by bees. There are well over a thousand species of bees in the United States of two major types, the honey bee and the non-honey bee. Many flowers can be pollinated by only one or a few species of bees. Some T&E flowers may be pollinated by a species of bee almost as rare as the flower itself.

In his studies of specific rare plants, Dr. Tepedino first determines what the pollinator is and who and when the plant is pollinated, or if it is self-pollinating. Then the range of the pollinator is estimated in order to establish buffer zones around T&E populations to exclude insecticide spraying.

Non-honey bees are frequently T&E pollinators. These do not form hives as honey bees do, but live in holes drilled in the ground or other places. They construct individual cells and lay an egg in each on top of a ball of pollen. The young hatch and feed on the pollen as larvae. Incidentally, the female non-honey bee has the power to choose the sex of her offspring.

Dr. Tepedino showed slides to illustrate his studies of three T&E plants, the Blowout Penstemon in Nebraska, The Gypsum Cactus (*Pediocactus sileri*) and the Dwarf Bearclaw Poppy (*Arctomecon humilis*) in Utah. The Bearclaw Poppy study included work by Deanna Nelson which was initiated and originally funded by UNPS.

State Funding Secured for Utah Natural Heritage Program

Taking a positive step for Utah's sensitive species, the Utah legislature voted this past session to provide funding for the Utah Natural Heritage Program. The Utah Department of Natural Resources has agreed to assume future responsibility for funding and managing this program, a Conservancy-initiated scientific inventory of Utah's rare plants and animals.

The Utah Natural Heritage Program was created one and a half years ago under a cooperative agreement signed by The Nature Conservancy, the Utah Department of Natural Resources and the State Arboretum of Utah. Under the agreement, the Conservancy raised private funds to hire and train three scientists, an ecologist, botanist and zoologist, and purchased computer equipment for the creation of a database contained the location and status of Utah's rarest plants, animals and ecosystems. The Department has provided office space and equipment, support staff services and critical help in obtaining federal funding during its first year of operation. The Arboretum provided additional financial support allowing the purchase of a complete set of Utah topographical maps and other necessary materials.

The Heritage Program provides planning information to the Conservancy, the public, numerous state agencies and private industry and business. It is modeled on successful Conservancy developed heritage programs in 49 other states. Thanks to this session's legislative action and the strong support of the Department, the future is now secure for the Utah Natural Heritage Program as it becomes an ongoing state natural resource database managed by the Utah Department of Natural Resources beginning July 1, 1990.

Protecting Natural Areas on Tribal Lands

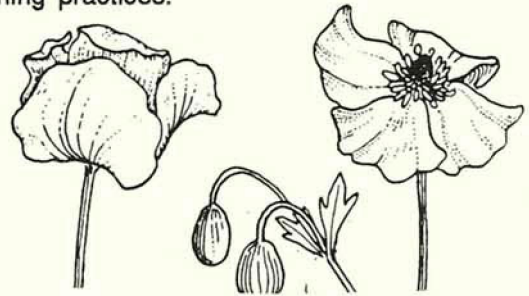


In 1984, The Nature Conservancy and the Navajo Nation established the Navajo Natural Heritage Program to survey and inventory lands of the Navajo Nation. This is the only private or public program which is actively inventorying rare species on Indian lands. All told, there are 41 federally listed species on Indian lands in the U.S., including several species that are found nowhere else on Earth. Indian tribes do not receive federal, state or private support to survey and protect rare species.

Last year the Conservancy initiated a Tribal Lands Protection effort by hiring Donna E. House as the Tribal Lands Protection Planner. She will focus on surveying and protecting high priority species on Indian lands in Utah, Arizona, New Mexico and Colorado. In Utah, seven Indian tribes own nearly 5% of the land base--land that has not been adequately surveyed for rare plants and animals. The Nature Conservancy moved to develop the prototype program to assist tribes with these types of activities. House has been the spearhead for these efforts with Indian tribes. Her philosophy is "Saving species is saving my culture."

Utah Public Lands Program

A new theme for the Utah Public Lands Program is endangered species habitat protection on lands with mixed private, state and federal ownership. For example, in Utah's southwestern corner (the only area of Mojave Desert in the state) work is being done with the Bureau of Land Management, through the development of a stewardship guide, to improve protection of the imperiled and lovely dwarf bearclaw poppy (*Arctomecon humilis*), which grows on the outskirts of St. George and is threatened by ORV use and mining practices.



In another area, as part of a cooperative agreement with the National Park Service's Rocky Mountain Region, Utah Public Lands Coordinator Nick Van Pelt is leading field crews which will finish surveying natural areas in southern Utah's and western Colorado's spectacularly scenic and biologically rich parks and monuments this spring and summer.

The Conservancy's work with the Park Service involves surveying 30 areas that have escaped postsettlement impacts or harbor plants and animals characteristic of past, cooler climates scattered within the wildest and most scenic of the Colorado Plateau parks and monuments including Bryce, Canyonlands, Capitol Reef, Cedar Breaks, Dinosaur, Zion and Mesa Verde. Once mapped and described, these areas can supply valuable information to park managers and will contribute to a growing system of officially dedicated and protected natural areas.

Reprinted from The Nature Conservancy Great Basin Newsletter, Spring 1990.

WHAT IS A WETLAND?

Paula Brooks

Oregon Native Plant Society

One of the hottest current environmental topics is wetland degradation and destruction. Although most people agree that wetlands need to be preserved, there is great discussion over exactly what constitutes a wetland.

The underlying factor that decides whether a site is a wetland or not is that the soil must be saturated for at least one week of the growing season. Many wetlands actually dry out considerably during the summer. Consequently, the presence or absence of standing water alone is not sufficient criterion to determine if a place is a wetland or not. Equally important are two other elements: soils and vegetation. Scientists have developed these three criteria to determine objectively whether a site is a wetland or not. These are related to the hydrology of the site (water levels and length of flooding), the soil types present, and the presence or absence of hydrophytic (water-loving) plants. The Army Corps of Engineers requires that all three criteria must be met to consider a site a wetland, while the U.S. Fish and Wildlife Service only requires one.

Hydrology:

Water is the controlling factor for the type of soils and plants that develop over time. Wetland hydrology means that the ground is saturated or flooded long enough during the year to develop hydric soil, create anaerobic soil conditions (no oxygen in the soil), and support water-loving plants. The hydrology is the most ambiguous criterion of wetland determination, because the site must be observed over time. The key concept here is that the soil is saturated during part of the growing season for the plants.

Hydric soils:

A hydric soil is one that is flooded long enough during the growing season to produce anaerobic conditions. Hydric soils are usually poorly drained and the water table is only one foot or less below the surface for at least one week during the growing season. All soils that contain 50% or greater organic matter are considered hydric. This includes sphagnum mats and peat soils. Organic matter builds up because the lack of oxygen in the soil prevents decomposition. For mineral soils to be considered hydric, they must be saturated long enough to produce characteristic chemical and physical changes.

Hydrophytic vegetation:

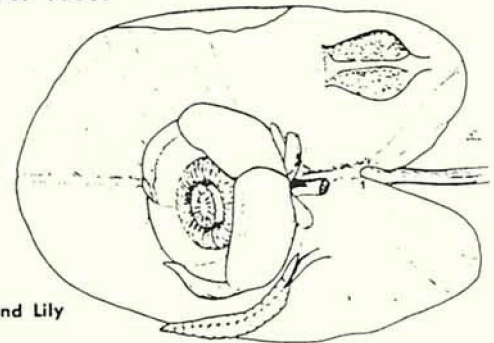
The presence or absence of hydrophytic vegetation is the easiest criterion to use for wetland determination (especially for a botanist). Hydrophytic plants have adapted to the saturated soil and anaerobic conditions

present in wetlands. Plants adapt by evolving special morphological characteristics such as floating leaves or thick stems to support the plant in the water. Pond lily, *Nuphar polysepalum*, and bulrushes, *Scirpus*, are good examples of this. Plants also evolve physically or chemically to help them out-compete other upland plants that invade wetlands. For example, sweet gale, *Myrica gale*, can actually transport oxygen from the stems and leaves down through the roots and into the soil. This helps it to more easily extract water and nutrients from the soil.

Plants also adapt by changing their reproductive strategy. For example, certain species produce seeds that will germinate only when exposed to oxygen. This way, when a wetland is in its drier season, seeds germinate under optimal conditions. Other species produce seeds that are adapted to germinate under low oxygen conditions, while still others can actually sprout under water. These types of adaptation give the plants a competitive head-start over non-hydric plants.

How do you know if a plant is hydrophytic or not? The U.S. Fish and Wildlife Service has created a list of all plants known to be found in wetland habitats. They have classified them into different categories based upon frequency of occurrence in wetland habitats. This list is then used to determine if the majority of the plants growing in a given site are hydric plants. This use of wetland indicator species is the most prevalent and easiest method to determine if a given site is a wetland or not.

Reprinted from the *Bulletin of the Oregon Native Plant Society*, Feb. 1989.



Yellow Pond Lily

Every day, 12,000 acres of wetlands are destroyed in the United States despite three decades of work by scientists, educators, public officials and private conservation groups to document the values of wetlands, inform the public of the need to protect them, and attempt to save them by acquisition and regulation.

Restoration, Creation, and Management of Wetland and Riparian Ecosystems in the American West : a symposium of the Rocky Mountain Chapter of the Society of Wetland Scientists, November 14-16, 1988, Denver, CO. Kathryn M. Mutz, et. al. Technical Coordinators. Available from K. Mutz, PIC Technologies, 1801 Broadway, Suite 920, Denver, CO 80202. \$10 includes postage.

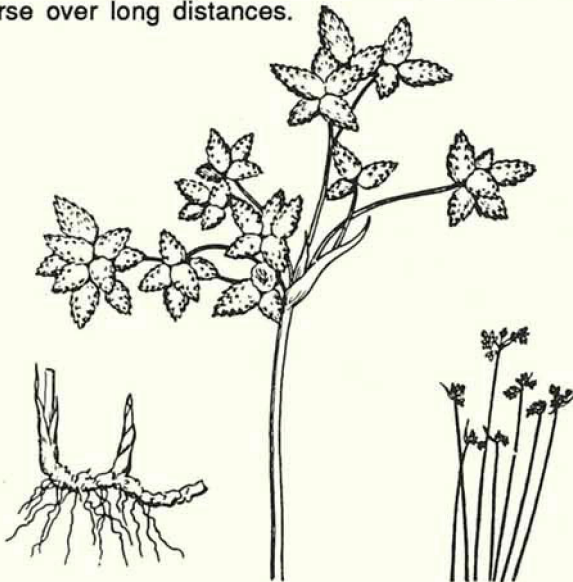
Effects of Flooding on Plants near the Great Salt Lake

Sally G. Jackson
John A. Kadlec
Dept. of Fisheries and Wildlife
Utah State University

The effect of Great Salt Lake's recent rise on marshes has been the focus of much research and speculation.

Emergent vegetation which was common in the Bear River marshes before flooding--saltgrass (*Distichlis spicata*), alkali bulrush (*Scirpus* spp.), cattail (*Typha* spp.), and phragmites (*Phragmites communis*)--was killed by inundations. Not only were these plants affected by salinity, but they also were uprooted by wind and wave action. In many flooded areas, vegetation was buried by as much as 20 cm of fine-particled organic sediment which may have come from the lake cottom. The fate of the seedbank is uncertain and varies between areas; wind and wave action have lifted and deposited seed-bearing sediments into new areas, burying former vegetation and redistributing seeds and tubers.

Since April 1987, drier weather in combination with pumping has resulted in a steady decline in the lake level. The dropping lake level has exposed thousands of acres of former emergent marsh, and regeneration is already in progress. Pickleweed (*Salicornia* sp.) will be the first to colonize relatively dry, hypersaline mudflats flushed by rainfall in the spring. Where there is a combination of freshwater inflow and surviving tuber or upstream seed sources, alkali bulrush will colonize rapidly. Salt cedar (*Tamarix* spp.) may also appear since it is tolerant of salinity and its seeds disperse over long distances.

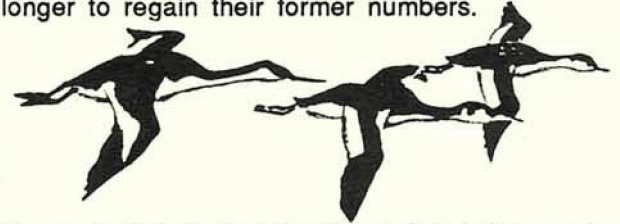


Bulrush (*Scirpus acutus* Muhl.)

Cattails and tule bulrushes will require fresher sediments and thus will be restricted to the margins of

fresh water inflows. Of the submersed aquatic macrophytes, widgeon-grass (*Ruppia maritima*) and horned pondweeds (*Zanichellia palustris*) seem to colonize rapidly. However, the dominant submersed plant in the Great Salt Lake marches before flooding was sago pondweed (*Potamogeton pectinatus*). It is already recolonizing some areas around river and creek mouths where it is protected from both wave action and hypersalinity. With the re-establish of macrophytes and the continued decline of the lake level, marshes will become increasingly isolated from physical factors such as wind and waves. Organic litter accumulation will provide habitat for increasing numbers of macroinvertebrates. Seed banks will increase and fish will re-enter areas as they are freshened.

Mud flats with sparse vegetation already provide suitable nesting habitat for birds such as American avocets and black-necked stilts. However, waterfowl, white-faced ibis, egrets and western and Clark's grebe which need dense emergent vegetation for nesting will take longer to regain their former numbers.



We are optimistic that the Great Salt Lake marshes will recover as the lake level drops and the facilities to maintain marshes are rebuilt. In fact, using knowledge accumulated from this recent flood, marsh managers will probably be able to design even better marshes in the future.

Excerpted from "Recent Flooding of Wetlands Around Great Salt Lake, Utah."

WETLAND LOSS

Of the 215 million acres of wetlands in the coterminous United States when the Pilgrims landed, only 99 million acres--about 46 percent--remained by the 1970s. Survey by the Fish and Wildlife Service's National Wetlands Inventory indicate that nearly half a million acres of wetlands in the U.S. continue to be lost each year. Once thought of as only swampy wastelands to be drained and filled, wetlands are now increasingly being recognized as a precious natural resource. They filter and clean polluted water, absorb flood waters, provide a variety of recreational opportunities, and are vital habitat for many species of wildlife. The Service estimates, for example, that about half of our nation's endangered animals and almost a third of our endangered plants depend on wetlands for their survival.

From the *Endangered Species Technical Bulletin*, Vol. XIV No. 4, U.S. Fish and Wildlife Service.

"CONSIDER THE LILIES OF THE FIELD..."

Dr. R.J. Shaw
Dr. M.C. Williams
Utah State University

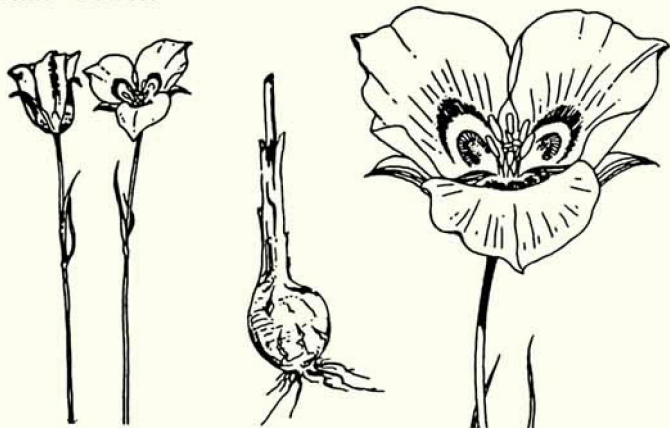
The lily family (Liliaceae) is one of the largest families of flowering plants, and is one of the most important groups of horticultural plants since it includes the true lilies and numerous cultivated lily-like genera. The onion is the lily of most economic importance.

Most of the Liliaceae are herbs, and a large percentage of these have swollen storage organs, such as bulbs, corms, rhizomes, or thick fleshy roots. In Utah, these storage organs have not only been a source of food but have poisoned livestock and humans. This article examines distribution of lilies in Utah, and will indicate whether their storage organs are edible or poisonous.

The flowers of lilies are regular and bisexual and usually have six perianth segments (sepals and petals). There are usually six stamens always arranged opposite the perianth segments. Many of the Liliaceae are pollinated by insects attracted by the nectar secreted by the ovary or nectar glands at the base of the petals.

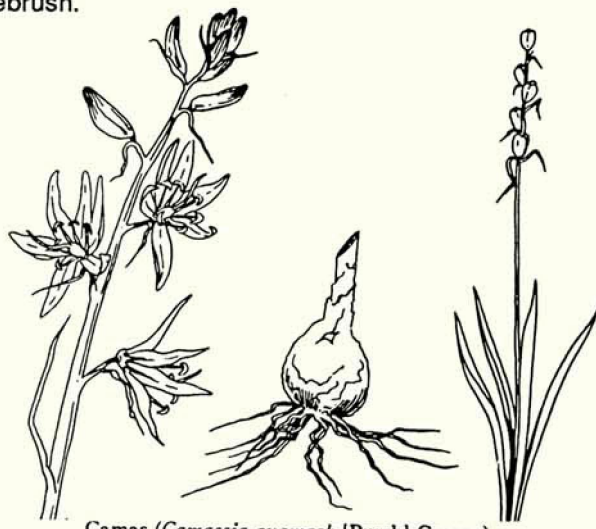
Within Utah's native flora there are 15 genera of lilies and at least nine other ornamental genera. An exciting array of bulbous and rhizomatous plants exist among the approximately 45 native and cultivated liliaceous species found in Utah.

Among the naturally occurring lilies, perhaps the sego lily (*Calochortus nuttalli*) has the most intriguing history and beauty. It was very important to the Indians who ate raw bulbs or roasted them in the embers of a fire. Some Indian tribes pounded the dried bulbs into a flour and used it in a porridge or mush. The bulbs could be stored for long periods of time. Mormon settlers also supplemented their meager food supply with these bulbous delicacies in the fall of 1848 when the crops were damaged by hordes of crickets (Harrington 1972). The State Legislature later recognized this species of the sagebrush foothills as the state flower.



Fewer sego lilies are found today than 138 years ago, mainly because of urban sprawl into foothill habitats. The species is not endangered, but is difficult to find. The plants and their habitats should be preserved whenever possible.

The bulbs of the common camass (*Camassia quamash*) also were an important food for Native Americans who fought many intertribal wars over rights to certain meadows where camass was abundant (Harrington 1972.) The Indians sometimes boiled the bulbs to form a syrup, but usually baked them in pits lined with stones. Camass bulbs seem to lack starch but are high in sugar content. We found the raw bulbs were crisp and palatable, but the boiled bulbs were somewhat gummy. The bulbs of the deathcamas are about the same size as common camass bulbs and apparently were mistakenly consumed, often with fatal results. It is possible to distinguish between the two species by their flowers and habitats. Common camass has blue to violet flowers and grows in mesic meadows, whereas the deathcamas has whitish to cream-colored flowers and occupies drier sites on the foothills, often with sagebrush.

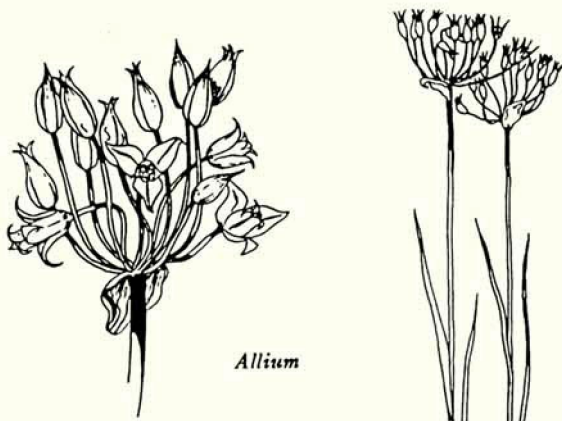


Camass (*Camassia quamash* [Pursh] Greene)

The glacier lilies (*Erythronium grandiflorum*) of canyons and subalpine regions served only as an occasional food for the Indian tribes of Utah, perhaps because the deep-seated bulbs were difficult to dig. The bulbs are eaten raw or boiled and even the leaves can be a potherb. These beautiful lilies can be abundant in some areas, but should not be indiscriminately gathered in order to protect the remaining wildflower habitats in Utah. These bulbs can be used in emergency and are eaten by bears and small mammals.

Fritillarias, also known as yellowbells and leopard lilies, are harbingers of spring found in areas ranging from valleys to subalpine regions. They were also eaten by natives. The two species, *Fritillaria pudica* and *Fritillaria atropurpurea*, reproduce asexually by bulblets that form around the main bulb. Both bulbs and fruiting capsules are edible, but should be eaten only in an emergency to protect these beautiful, scarce plants. Fritillarias can be found in grasslands, sagebrush deserts, and coniferous montane forests.

In terms of the number of species, the genus *Allium* is the most important. These wild onions and garlics have been eaten since ancient times in the Old World and the New World (Elias 1972.) Eleven indigenous species in Utah are found in areas ranging from desert locations to high mountain forests. Explorers and pioneers, like the Indians, ate various onions, either raw or cooked and with other foods for flavor. Wild mammals frequently dig these bulbs. Milk from cows that eat the foliage is onion-flavored.



Four groups or genera of the naturally occurring lilies arise from rhizomes (underground stems). The genera *Smilacina* (false solomon seal), *Disporum* (fairy bells), *Streptopus* (twisted stalk) and *Veratrum* (false-hellebore) all have large expanded leaves well distributed along the stems; the usually numerous flowers are white to greenish white. False solomon seal, fairy bells and twisted stalk are edible (Weiner 1972), but as will be explained later, false hellebore should not be eaten.

The aromatic rhizomes of the two false solomon seal species are starchy and slightly bitter. Some enthusiasts recommend soaking the rhizomes overnight in lye followed by parboiling to improve the flavor. The berries are edible but purgative if too many are eaten. Indians ate the sweet yellow or orange-red berries of fairy bells. The red juicy berries on the twisted stalk may be eaten raw or added to soups and stews, but consumption of too many berries can be cathartic. All of these rhizome-bearing lilies are found in rich, moist soil and wooded areas.

The distinctive indigenous lilies known as wild hyacinths bear flowers with perianth segments joined in a definite basal tube that is usually more than 1/2 inch long. The stems arise from corms. They are less common than wild onion and their edible storage organs can be eaten raw or boiled. The wild hyacinths belong to the genera *Triteleia*, *Dichelostemma* and *Androstephium*. *Triteleia* can be found in northern Utah while the latter two genera are limited to dry sites in southern Utah.

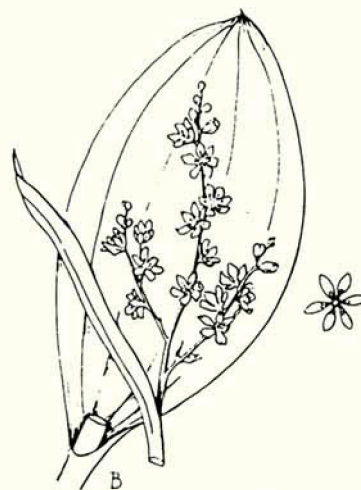
A series of European lilies have escaped cultivation and may show up in sanitary landfills, grassy meadows, and weedy lots in Utah. These species are grape hyacinths, star-of-Bethlehem, garden hyacinth, tulips, lily-of-the-valley and asparagus. Many are poisonous.

Poisonous Lilies

The delicate beauty of lilies often belies the fact that many are poisonous. Three members of the lily family found in Utah are highly toxic: star-of-Bethlehem or snowdrop (*Ornithogalum umbellatum*), California false hellebore (*Veratrum californicum*), and deathcamas (*Zigadenus* spp.) (Kingsbury 1964).

Star-of-Bethlehem, introduced from the Mediterranean area as a garden plant, escaped cultivation and has become naturalized in many parts of the country. The bulbs contain a highly toxic alkaloid that primarily affects cattle and sheep. More than 1,000 sheep in Maryland died after they ate the onion-like bulbs. Children in other countries have been poisoned by bulbs of related species.

California false hellebore is a large, erect plant that grows on moist, open meadows at elevations of 5,000 to 11,000 feet (James et al. 1980). The plant contains several toxic and teratogenic alkaloids. Sheep are poisoned after eating 6 to 12 ounces of the green plant. The most serious problem associated with *Veratrum* poisoning is the congenital malformations in lambs if the ewes eat the plant on the 14th day of gestation. The lambs are born with a variety of malformations ranging from the "monkey-face" deformity, in which the face resembles a monkey, to severe deformities resulting in missing or rudimentary eyes, brain, nose, or limbs. The lamb might be born clycopic with one large eye in the center of the head. These malformed lambs are unable to walk or nurse and die soon after birth. The ewe may also abort or fail to lamb at the end of the normal gestation period.



False Hellebore

Until the early 1960s, the malformation found in lambs was attributed to genetic problems in breeding stock or a toxic substance in the flora, soil, or water from affected areas. Workers at the U.S. Department of Agriculture's Poisonous Plant Research Laboratory at Logan, Utah, investigated the problem and established that ingestion of California false hellebore was the sole cause of monkey-face lamb disease (Keeler 1984). They further demonstrated that three steroidal

"CONSIDER THE LILIES OF THE FIELD..."

TABLE 1. Naturally occurring or naturalized Liliaceae of Utah (Cronquist, et al. 1977).

Binomial	Common Name	Distribution	Habitat	Blooming Period	Edible or Poisonous
<i>Allium accuminatum</i>	Tapertip Onion	Most counties	Dry hillsides and plains	May-July	Edible
<i>Allium bisceptrum</i>	Twincrest Onion	N. and S. Utah	Meadows and aspen groves	May-July	Edible
<i>Allium brandegei</i>	Brandegee Onion	N. and Cent. Utah	Sandy or rocky soils in the mountains	June-July	Edible
<i>Allium brevistylum</i>	Shortstyle Onion	Cent. and E. Utah	Swampy meadows and along streams	June-August	Edible
<i>Allium cernum</i>	Nodding Onion	Cent. and E. Utah	Moist soil in the mountains	June-July	Edible
<i>Allium geyeri</i>	Geyer Onion	N. and S. Utah	Wet meadows and streams in mountains	May-June	Edible
<i>Allium macropetalum</i>	Large-flowered Onion	S. Utah	Desert valleys and foothills	May-June	Edible
<i>Allium nevadense</i>	Nevada Onion	Cent. and S. Utah	Desert, sandy soils	April-July	Edible
<i>Allium parvum</i>	Small Onion	W. and Cent. Utah	Gravelly slopes	April-June	Edible
<i>Allium passeyi</i>	Passey Onion	Box Elder Co. only	Hilltops, shallow stony soils	June	Edible
<i>Allium textile</i>	Textile Onion	Northeastern Utah	Dry valleys and foothills	May-June	Edible
<i>Androstephium breviflorum</i>	Funnel Lily	E. and S. Utah	Dry, sandy to rocky soil	April-June	Unknown
<i>Calochortus ambiguus</i>	Doubting Lily	Washington Co. only	Dry slopes and hills	May-July	Edible
<i>Calochortus aureus</i>	Golden Lily	S. Utah	Dry sandy to clayey sites	May-June	Edible
<i>Calochortus bruneauensis</i>	Bruneau Segó Lily	N. and Cent. Utah	Sandy plains and hills	May-July	Edible
<i>Calochortus flexuosus</i>	Weakstem Lily	S. Utah	Dry stoney slopes and mesas	April-June	Edible
<i>Calochortus gunnisonii</i>	Gunnison Lily	Northeastern and Southeastern Utah	Dry to moist sites, midmontane	June-August	Edible
<i>Calochortus nuttallii</i>	Segó Lily	Most counties	Valleys and foothills, dry sites	June-July	Edible
<i>Camassia quamash</i>	Common Camass	N. Utah	Moist meadows, montane	May-July	Edible
<i>Dichelostemma pulchellum</i>	Beautiful Dichelostemma	Washington Co.	Sagebrush to coniferous woods	March-May	Unknown
<i>Disporum trachycarpum</i>	Fairy Bells	N. and Cent. Utah	Shady wooded sites near stream	May-June	Edible
<i>Eremocrinum albomarginatum</i>	Sand Lily	S. Utah	Sandy places, lower elevations	April-June	Unknown
<i>Erythronium grandiflorum</i>	Glacier Lily	N. Utah	Sagebrush to coniferous woods	May-July	Edible
<i>Fritillaria atropurpurea</i>	Leopard Lily	N. to S. Utah	Foothills to coniferous woods	May-July	Edible
<i>Fritillaria pudica</i>	Yellowbell	N. Utah	Sagebrush to coniferous woods	April-May	Edible
<i>Leucocrinum montanum</i>	Star Lily	S. Utah	Valleys to montane coniferous woods	April-June	Unknown
<i>Lloydia serotina</i>	Alp Lily	N. Utah	Rocky sites, subalpine to alpine	June-Sept.	Unknown
<i>Smilacina racemosa</i>	False Solomon Seal	N. to S. Utah	Shaded moist places	May-June	Edible
<i>Smilacina stellata</i>	Starry False Solomon Seal	Most counties	Shaded moist places	May-June	Edible
<i>Streptopus amplexifolius</i>	Twisted Stalk	E. and S. Utah	Moist sites, near streams	May-July	Edible
<i>Triteleia grandiflora</i>	Large Flower Triteleia	N. Utah	Sagebrush to coniferous woods	May-July	Unknown
<i>Veratrum californicum</i>	California Falsehellebore	N. Utah	Wet meadows and streams	June-August	Highly toxic
<i>Zigadenus elegans</i>	Mountain Deathcamas	N. Utah	Meadows or forest, montane to alpine	June-August	Highly toxic
<i>Zigadenus paniculatus</i>	Foothill Deathcamas	N. Utah	Sagebrush slopes to coniferous woods	April-June	Highly toxic
<i>Zigadenus venenosus</i>	Meadow Deathcamas	N. Utah	Sagebrush slopes and montane woods	May-July	Highly toxic
Naturalized Species					
<i>Asparagus officinalis</i>	Garden Asparagus	Most counties	Streambanks	June-July	Edible
<i>Convallaria majalis</i>	Lily-of-the-Valley	Some N. counties	Dump areas	May-June	Toxic
<i>Muscari botryoides</i>	Grape Hyacinth	Most counties	Grassy or weedy places	April-June	Toxic
<i>Ornithogalum umbellatum</i>	Star-of-Bethlehem	Some N. counties	disturbed sites, dump areas	May-June	Toxic

alkaloids extracted from the plant, jervine, cycloamine, and cycloposine, induced the disease.

This information provided a practical solution to the problem: keep the pregnant ewes away from the plant until at least two weeks after the rams are removed. Incidence of monkey-face lamb disease has dropped from 25-30% on false hellebore infested ranges to less than 1%, and incidence could be reduced to zero if proper management practices were always observed.

The entire deathcamas plant contains toxic alkaloids (Kingsbury 1964). The most troublesome species in Utah are meadow deathcamas (*Zigadenus venenosus*) and foothill deathcamas (*Z. paniculatus*). *Zigadenus elegans*, the third species found in Utah, is less toxic. Deathcamas grow in the spring and early summer and many livestock, particularly sheep, are poisoned ever year. Cattle are occasionally poisoned. Poisoned animals salivate excessively, develop nausea, tremble, become weak and usually are comatose before death.

Humans may mistake the plants for wild onions or the edible common camass. The Poison Control Center in Salt Lake City reported six cases of human poisoning from deathcamas in one year, one case involving consumption of "wild onion soup" made from deathcamas. The victims were saved by the quick action of the Poison Control Center and a family physician.

Five other members of the lily family found in Utah have been reported to be poisonous. Two of these lilies are edible and have poisoned animals only under unusual circumstances.

Lily-of-the-valley (*Convallaria majalis*) is a common cultivated ornamental flower that contains a cardiac glycoside and also acts as a purgative and emetic. All parts of the plants are poisonous.

Bulbs of the common garden hyacinth (*Hyacinthus orientalis*) and narcissus or daffodil (*Narcissus* spp.) caused purgation in cattle when fed as an emergency feed during World War II in the Netherlands. Humans have been poisoned by eating the bulbs of daffodils.

Cultivated onions (*Allium cepa*) and wild onion (*Allium canadense*) have also been poisonous, even though both are edible and the cultivated onion is a common food. Most common foods, including onions, can be toxic if too many are consumed. The threshold of toxicity is so high that it would be virtually impossible to eat enough to produce toxic signs. Cattle and horses on fields of culled onions or that consume very large amounts of wild onion have been poisoned. They become anemic and suffer severe gastroenteritis. The poisonous compound is thought to be an alkaloid.

Other cultivated and native lilies of Utah have not been classified as edible or poisonous. Never chew or swallow any part of a lily unless you can positively identify the plant as one known to be edible. Any other lily might cause poisoning and death.

MORMON LILIES

from letter dated "Salt Lake, July, 1877"

John Muir

Lilies are rare in Utah; so also are their companions the ferns and orchids, chiefly on account of the fiery saltness of the soil and climate. You may walk the deserts of the Great Basin in the bloom time of the year, all the way across from the snowy Sierra to the snowy Wahsatch, and your eyes will be filled with many a gay malva, and poppy, and abronia, and cactus, but you may not see a single true lily, and only a very few liliaceous plants of any kind. Not even in the cool, fresh glens of the mountains will you find these favorite flowers, though some of these desert ranges almost rival the Sierra in height. Nevertheless, in the building and planting of this grand Territory the lilies were not forgotten. Far back in the dim geologic ages, when the sediments of the old seas were being gathered and outspread in smooth sheets like leaves of a book, and when these sediments became dry land, and were baked and crumbled into the sky as mountain-ranges; when the lava-floods of the Fire Period were being lavishly poured forth from innumerable rifts and craters; when the ice of the Glacial Period was laid like a mantle over every mountain and valley--throughout all these immensely protracted periods, in the throng of these majestic operations, Nature kept her flower children in mind. She considered the lilies, and while planting the plains with sage and the hills with cedar, she has covered at least one mountain with golden erythroniums and fritillarias as its crowning glory, as if willing to show what she could do in the lily line even here.

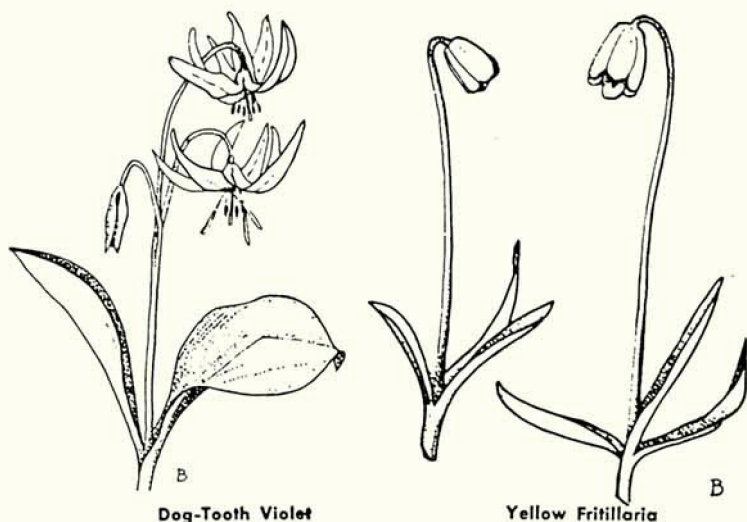
Looking southward from the south end of Salt Lake, the two northmost peaks of the Oquirrh Range are seen swelling calmly into the cool sky without any marked character, excepting only their snow crowns, and a few small weedy-looking patches of spruce and fir, the simplicity of their slopes preventing their real loftiness from being appreciated. Gray, sagey plains circle around their bases, and up to a height of a thousand feet or more their sides are tinged with purple, which I afterwards found is produced by a close growth of dwarf oak just coming into leaf. High you may detect faint tintings of green on a gray ground, from young grasses and sedges; then come the dark pine woods filling glacial hollows, and over all the smooth crown of snow.

While standing at their feet the other day, shortly after my memorable excursion among the salt waves of the lake, I said: "Now I shall have another baptism. I will bathe in the high sky, among cool wind-waves from the snow." From the more southerly of the two peaks a long ridge comes down, bent like a bow, one end in the hot plains, the other in the snow of the summit. After carefully scanning the jagged towers and battlements

with which it is roughened, I determined to make it my way, though it presented but a feeble advertisement of its floral wealth. This apparent barrenness, however, made no great objection just then, for I was scarce hoping for flowers, old or new, or even for fine scenery. I wanted in particular to learn what the Oquirrh rocks were made of, what trees composed the curious patches of forest; and, perhaps more than all, I was animated by a mountaineer's eagerness to get my feet into the snow once more, and my head into the clear sky, after lying dormant all winter at the level of the sea.

But in every walk with Nature one receives far more than he seeks. I had not gone more than a mile from Lake Point ere I found the way profusely decked with flowers, mostly compositae and purple leguminosae, a hundred corollas or more to the square yard, with a corresponding abundance of winged blossoms above them, moths and butterflies, the leguminosae of the insect kingdom. This floweriness is maintained with delightful variety all the way up through rocks and bushes to the snow--violets, lilies, gillias, oenotheras, wallflowers, ivesias, saxifrages, Smilax, and miles of blooming bushes, chiefly azalea, honeysuckle, brier rose, buckthorn, and eriogonum, all meeting and blending in divine accord.

Two liliaceous plants in particular, Erythronium grandiflorum and Fritillaria pudica, are marvelously beautiful and abundant.



Never before, in all my walks, have I met so glorious a throng of these fine showy liliaceous plants. The whole mountainside was aglow with them, from a height of fifty-five hundred feet to the very edge of the snow. Although remarkably fragile, both in form and in substance, they are endowed with plenty of deep-seated vitality, enabling them to grow in all kinds of places--down in leafy glens, in the lee of windbeaten ledges, and beneath the brushy tangles of azalea, and oak, and prickly roses--everywhere forming the crowning glory

of the flowers. If the neighboring mountains are as rich in lilies, then this may well be called the Lily Range.

After climbing about a thousand feet above the plain I came to a picturesque mass of rock, cropping up through the underbrush on one of the steepest slopes of the mountain. After examining some tufts of grass and saxifrage that were growing in its fissured surface, I was going to pass it by on the upper side, where the bushes were more open, but a company composed of the two lilies I have mentioned were blooming on the lower side, and though they were as yet out of sight, I suddenly changed my mind and went down to meet them, as if attracted by the ringing of their bells. They were growing in a small, nestlike opening between the rock and the bushes, and both the erythronium and the fritillaria were in full flower. These were the first of the species I had seen, and I need not try to tell the joy they made. They are both lowly plants--lowly as violets,--the tallest seldom exceeding six inches in height, so that the most searching winds that sweep the mountains scarce reach low enough to shake their bells.

The fritillaria has five or six linear, obtuse leaves, put on irregularly near the bottom of the stem, which is usually terminated by one large bell-shaped flower; but its more beautiful companion, the erythronium, has two radical leaves only, which are large and oval, and shine like glass. They extend horizontally in opposite directions, and form a beautiful glossy ground, over which the one large, down-looking flower is swung from a simple stem, the petals being strongly recurved. Occasionally a specimen is met which has from two to five flowers hung in a loose panicle. People oftentimes travel far to see curious plants like the carnivorous darlingtonia, the fly-catcher, the walking fern, etc. I hardly know how the little bells I have been describing would be regarded by seekers of this class, but every true flower-lover who comes to consider these Utah lilies will surely be well rewarded, however long the way.

Pushing on up the rugged slopes, I found many delightful seclusions--moist nooks, at the foot of cliffs, and lilies in every one of them, not growing close together like daisies, but well apart, with plenty of room for their bells to swing free and ring. I found hundreds of them in full bloom within two feet of the snow. In winter only the bulbs are alive, sleeping deep beneath the ground, like field mice in their nests; then the snow-flowers fall above them, lilies over lilies, until the spring winds blow, and these winter lilies wither in turn; then the hiding erythroniums and fritillarias rise again, responsive to the first touches of the sun.

I noticed the tracks of deer in many places among the lily gardens, and at the height of about seven thousand feet I came upon the fresh trail of a flock of wild sheep, showing that these fine mountaineers still

flourish here above the range of Mormon rifles. In the planting of her wild gardens, Nature takes the feet and teeth of her flocks into account, and makes use of them to trim and cultivate, and keep them in order, as the bark and buds of the tree are tended by woodpeckers and linnets.

The evergreen woods consist, as far as I observed, of two species, a spruce and a fir, standing close together, erect and arrowy in a thrifty, compact growth; but they are quite small, say from six to twelve or fourteen inches in diameter, and about forty feet in height. Among their giant relatives of the Sierra the very largest would seem mere saplings. A considerable portion of the south side of the mountain is planted with a species of aspen, called "quaking asp" by the wood-choppers. It seems to be quite abundant on many of the eastern mountains of the basin, and forms a marked feature of their upper forests.

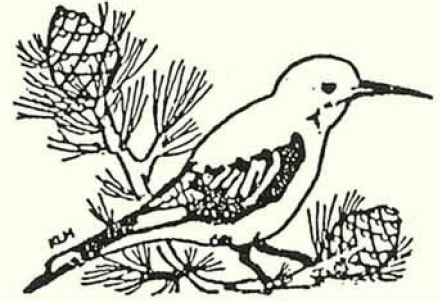
Wading up the curves of the summit was rather toilsome, for the snow, which was softened by the blazing sun, was from ten to twenty feet deep, but the view was one of the most impressively sublime I ever beheld. Snowy, ice-sculptured ranges bounded the horizon all around, while the great lake, eighty miles long and fifty miles wide, lay fully revealed beneath a lily sky. The shore-lines, marked by a ribbon of white sand, were seen sweeping around many a bay and promontory in elegant curves, and picturesque islands rising to mountain heights, and some of the capped with pearly cumuli. And the wide prairie of water glowing in the gold and purple of evening presented all the colors that tint the lips of shells and the petals of lilies--the most beautiful lake this side of the Rocky Mountains. Utah Lake, lying thirty-five miles to the south was in full sight also, and the river Jordan, which links the two together, may be traced in silvery gleams throughout its whole course.

Descending the mountain, I followed the windings of the main central glen on the north, gathering specimens of the cones and sprays of the evergreens, and most of the other new plants I had met, but the lilies formed the crowning glory of my bouquet--the grandest I had carried in many a day. I reached the hotel on the lake about dusk with all my fresh riches, and my first mountain ramble in Utah was accomplished. On my way back to the city the next day, I met a grave old Mormon with whom I had previously held some Latter-Day discussions. I shook my big handful of lilies in his face and shouted, "Here are the true saints, ancient and Latter-Day, enduring forever!" After he had recovered from his astonishment he said, "They are nice." ...Among my memories of this strange land, that Oquirrh mountain with its golden lilies, will ever rise in clear relief...

Excerpted from Steep Trails by John Muir, edited by Frederic Bade, Houghton Mifflin Publisher.

THE NUTCRACKER AND THE PINE TREE

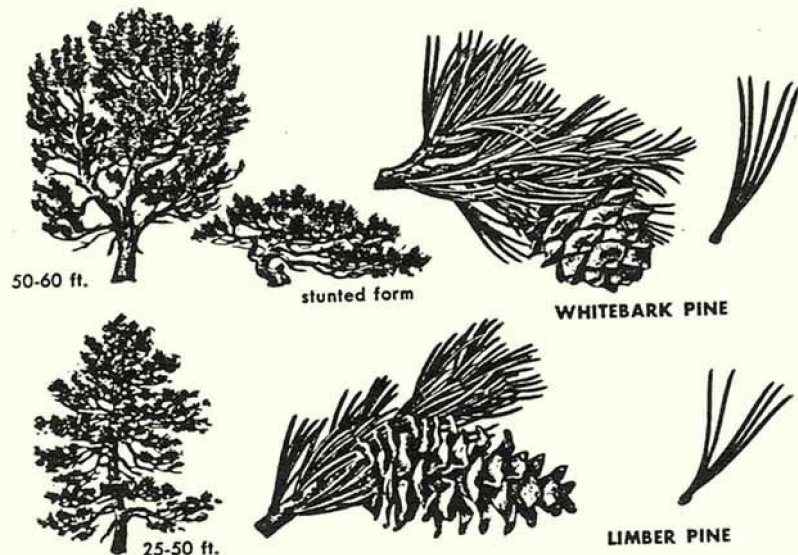
Andy Boyack
UNPS Treasurer



The members of UNPS were given a fine example of the interdependence of one life form on another by Dr. Ron Lanner from the Department of Forestry at Utah State University at the monthly meeting March 21st. This was the story of the nutcracker and the pine tree.

The seeds of most conifers are winged and depend on the wind for dispersal, but those of the Limber Pine and the White Bark Pine are not winged and must find a different means of seed dispersal. Enter the birds, the Stellar Jay, the Pinion Jay and particularly Clark's Nutcracker.

The pine trees with their cones turned upwards at the top and ends of their limbs provide easy access by these birds. The Clark's Nutcracker removes the seeds and carries them in a special pouch below its tongue to the ground, sometimes several miles away, where he buries them one at a time with his bill. This is his winter food supply which may consist of 25,000 to 30,000 seeds or more. The nutcracker remembers where he planted each seed and recovers them to eat as needed during the winter and spring. Those that he does not eat remain in the ground to grow into new trees. This is symbiosis in nature. Would that man could find more symbiotic ways of dwelling with nature.

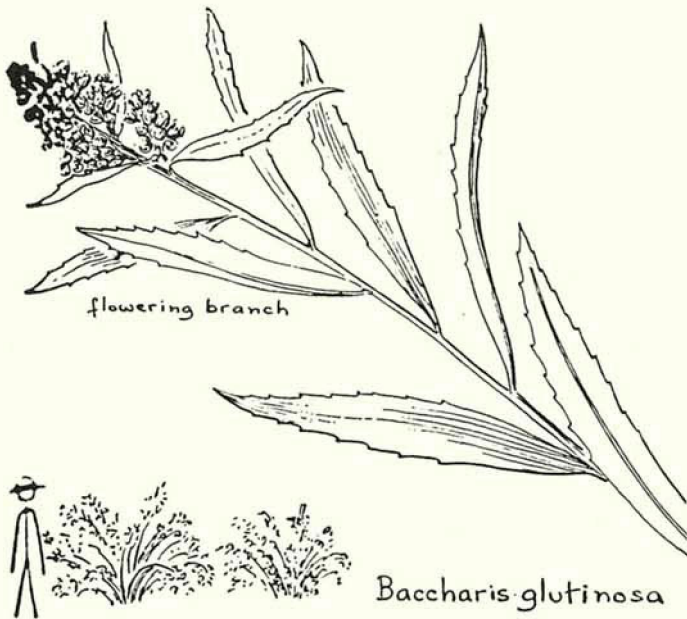


RED CLIFFS CAMPGROUND REVISITED

Kate Dwire

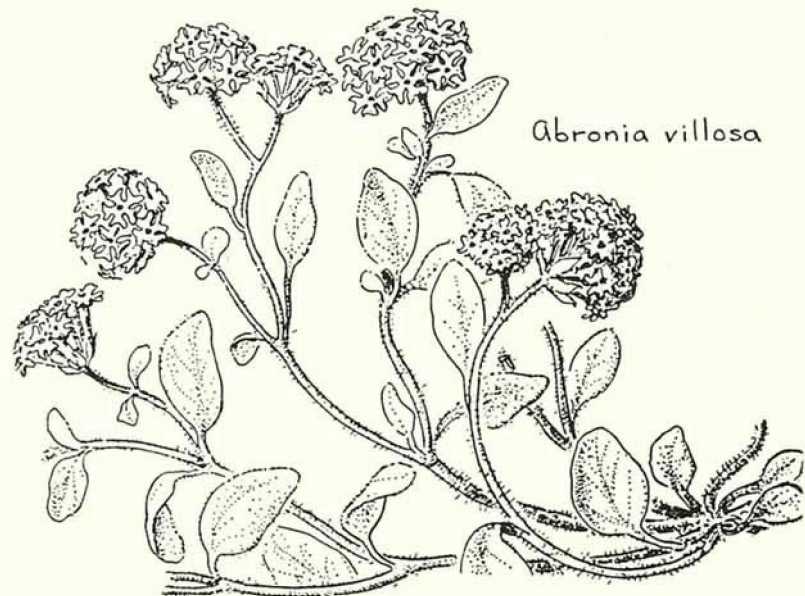
This is a belated tribute to Red Cliffs Recreation Site (BLM), a favored campground among UNPS members. Located about 10 miles northeast of St. George, Red Cliffs is an ideal place for camping and exploring the "Dixie Corridor" corner of southwestern Utah, as we found on the UNPS Bearclaw Poppy Fieldtrip in late April four years ago. This canyon-oasis surrounded by red sandstone cliffs is an excellent place to botanize and a scenic place to photograph.

Quail Creek, flowing through the center of the campground, supports a lush riparian community. Large Fremont cottonwoods, *Populus fremontii*, provide a shady canopy for the well-developed stands of waterwillow, *Baccharis* sp., and several species of willow, *Salix* sp., California redbud, *Cercis occidentalis*, and single-leaf ash, *Fraxinus anomala*, occur along the edge of the riparian area, as well as on more exposed sites.

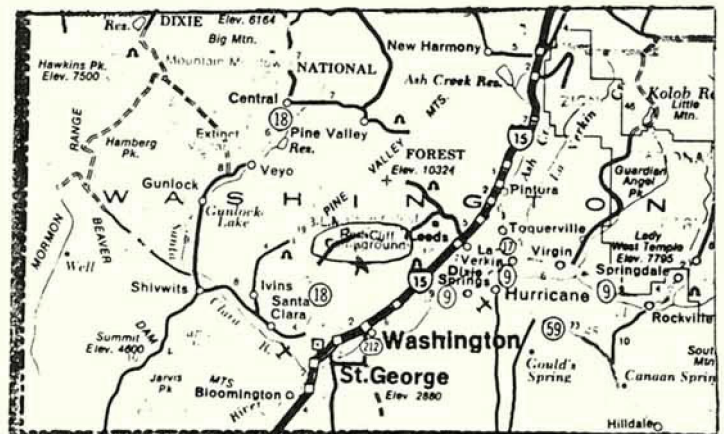


A diverse mixture of shrubs and herbaceous plants grow in the open areas, along the rocky cliffs and dry exposed sides of the canyons. The most common shrub is old man's sage, *Artemisia filifolia*, an attractive plant, names and distinguished by its light blue-green feathery foliage. Squawbush or lemonade-berry, *Rhus trilobata*, and a species of horsebrush, *Tetradymia* sp., grow on the canyon side slopes. The squawbush was loaded with berries covered in the sticky, tart lemon-flavored coatings and the horsebrush was topped with yellowish flowers. Gambel oak, *Quercus gambellii*, grows as a large shrub in most places, but attains true tree height in favorable locations.

Herbaceous plants in flower included sand verbena, *Abronia fragrans*, with its lovely smelling snowball flower clusters; twinpod, *Physaria* sp., bearing both yellow flowers and distinctive double-fruit "twinpod" capsules, princes plume, *Stanleya pinnata*, its tall inflorescence half covered with spreading yellow flowers (curiously, we watched a hummingbird sequentially visit several *Stanleya* plumes); Palmer penstemon, *Penstemon palmerii*, with tall erect stems bearing numerous fragrant pink-whitish flowers; and four-o'clock, *Mirabilis* sp., displaying only a few sweet-smelling purple flowers in the early morning. Desert marigolds, *Baileya* sp., and woolly daisy, *Eriophyllum wallacii*, formed localized bright yellow-gold mats, and filaree, *Erodium cicutarium*, flowered abundantly, especially along the roads. Grasses in flower included Indian rice grass, *Oryzopsis hymenoides*, and Galleta grass, *Hilaria jamesii*. Several unidentified members of the composite and mustard families were also present.



Choice camping and botanizing places are always a treat to learn about and knowledge of their whereabouts and features can enhance any trip, particularly a first-round, exploratory venture. Red Cliffs Recreation Site, located within striking distance of Zion National Park, Beaver Dam Wash, the Pine Valley Mountains, and Snow Canyon, scores high according to UNPS members.



UNPS Sego Lily
c/o Janet Williams
Utah Native Plant Society
P.O. Box 520041
Salt Lake City, Utah 84152-0041

Non-Profit Org.
U.S. Postage
PAID
Salt Lake City, Utah
PERMIT No. 327

Return postage guaranteed
Address correction requested

DUES NOW DUE

UNPS dues for most of us came due in March. You can check the due date on your address label to see if it's time for you to renew. Send your checks and renewal form (see next column) to Pam Poulson, P.O. Box 520041, Salt Lake City UT 84152-0041 or give them to Pam, Jo Stolhand or Andy Boyack at the next meeting. Thanks for responding promptly!

A Citizen's Guide to Protecting Wetlands.

Jan Goldman-Carter. Washington, D C : National Wildlife Federation, 1989. 64 pp., paper. \$10.25 from NWF, 1400 16th Street, NW, Washington, D.C. 20036-2266. Stock No. 79961, Source Key No. 188279.

Written in an easy-to-understand style, this glossy booklet provides important information to the citizen who is curious about how to protect a wetland area. It introduces the potential players in wetland degradation and preservation, the current laws and/or regulations that influence wetland use, and summarizes the various strategies available for ensuring the protection of these disappearing habitats. It also provides phone listings and maps of pertinent federal agencies throughout the country.

This review is from Restoration & Management Notes, Winter, 1989. Subscriptions available for \$15 for individuals from Journals Division, 114 N. Marray St., Madison, WI 53715.

Membership Application

New Member Renewal Gift

Name _____

Street _____

City/State _____

Zip _____ Phone _____

If Gift, from: _____

Check membership category desired:

- Student/Senior\$ 5.00
- Individual\$ 10.00
- Family\$ 15.00
- Supporting\$ 30.00
- Corporate\$ 30.00 and up
- Life\$250.00

Please send a complimentary copy of the Sego Lily to the above individual.

Please enclose a check, payable to Utah Native Plant Society, and send it to:

Pam Poulson, treasurer,
Utah Native Plant Society
P.O. Box 520041
Salt Lake City, Utah 84152-0041

(If you prefer not to cut this out of your Sego Lily, feel free to copy the membership form or simply write the information down and mail it with payment for the category of membership.)



Sego Lily

Newsletter of the Utah Native Plant Society

VOL. 13 NO. 4

JULY / AUG 1990

CALENDAR OF EVENTS

- July 7**
Saturday
9:00 am - 1:00 pm
Saturday Walks in the Wasatch, " Wildflowers of Big Cottonwood Canyon", led by Alyce Hreha, field botanist, University of Utah. Sponsored by the Arboretum. Meet at the geology sign at the mouth of Big Cottonwood Canyon. Friends of the Arboretum \$6.00, Non-members \$7.00. Advance registration required. 581-5322.
- July 14**
Saturday
9:00 am
UNPS Fieldtrip to Tony Grove in Logan Canyon, sponsored by the Logan Chapter, led by Leila Schultz, Curator of the Intermountain Herbarium, USU. Meet at Tony Grove on Saturday morning, or camp with some of the group Friday night at the Lewis M. Turner Campground nearby. Reservations with the Forest Service required. Call Dave Okelberry at 968-6190 for details. See article and plant list for Tony Grove in this issue.
- July 14**
Saturday
10:00 am - 12:00
A Mountain Man Looks at Plants with Bill Varga, Director, Utah Botanical Gardens. Experience historical uses of Utah plants as food, clothing, medicine and tools. All materials provided. Come prepared for walking in the rough. 19th century attire optional. Free, thanks to the Utah Arts Council and the State Arboretum. Meet on the Red Butte Gardens Stage Lawn.
- July 26**
Thursday
11:30 am - 1:00 pm
Xeriscape Gardening: Designs for Low Water Use by Fred Loligren. Thursday Garden Get-Together, sponsored by the State Arboretum. Bring your lunch, lemonade provided, to Red Butte Gardens for a shady retreat and a casual mid-day presentation. See article this issue on Xeriscaping.
- August 2**
Thursday
11:30 am - 1:00 pm
Poisonous Plants of the Intermountain West by Joseph Veltri, Director University of Utah Poison Control Center. Thursday Garden Get-Together, sponsored by the State Arboretum. See above.
- August 4**
Saturday
9:00 am - 1:00 pm
UNPS Field Trip to Albion Basin, led by Pam Poulsen. Meet at the parking lot above Alta for car pooling to the site. Bring a lunch, field guides, hand lenses, etc. This should be a spectacular wildflower show.
- August 17-18**
Friday-Saturday
12:00 noon--
Cedar Breaks Camping Field Trip led by expert mycologists Ardean Watts and Kent McKnight, and Brent Palmer, botany professor at SUSC and author of the vascular plant guide to Cedar Breaks National Monument. The trip will begin at Cedar Breaks Visitors Center (elevation about 10,000 feet) at noon on Friday. Camping available in the monument, or there are motel accommodations in nearby Cedar City. If you wish to join with the group for meals, \$10.00 will provide you Friday night supper, Saturday breakfast, a mid-day snack, and our famous late afternoon mushroom cook-off. Make reservations with Dave Okelberry.

August 23 **Salt Lake Chapter Meeting, "Photographing Wildflowers"** with Lisa McClanahan and Mark Wagner. Join us in the Den at the University of Utah Student Union Building.
 Thursday
 7:30 pm

August 25 **Nature Creeping** with Dorothy Webster, past president of Utah Nature Study Society. Nature creeping is a hike in slow motion--slow enough to closely investigate the wonderful plants and animals of Red Butte Gardens. Free, thanks to the Utah Arts Council and the State Arboretum. Meet on the Red Butte Gardens Stage Lawn.
 Saturday
 10:00 am - 12:00

April 1-Oct 31 **Wildflower Hotline (801) 581-4696.** Receive current information on the best wildflower blooming displays reported from throughout the state. Call for a four-minute recorded message, updated weekly. Hear additional weekly wildflower information with Pam Poulson and Gene Pack on KUER public radio **FM 90.1** at 11:00 Friday mornings from April through October.

The Segó Lily is published six times a year by the Utah Native Plant Society, Incorporated, as a non-profit organization under the laws of the State of Utah. Contributions to the newsletter are welcomed and should be sent to the editor, Janet Williams, 415 North Main, Salt Lake City, Utah 84103. Please state whether articles have been published elsewhere and require publisher's permission. The editor reserves the right to edit as needed and to select suitable articles for publication. Calendar items of interest to our membership are requested.

Membership in the Utah Native Plant Society includes The Segó Lily subscription. Please use the form provided in the newsletter for membership applications or change of address. Members and non-members are invited to participate in the activities of the Utah Native Plant Society.

1990 Officers and Committee Chairs

Pam Poulson, Chairman of Board	O 583-3744	Duane Atwood, Rare Plant Co-Chair	O 625-5599
Bill Wagner, State President	H 942-1295	Sherel Goodrich, Rare Plant Co-Chair	O 789-0323
Jo Stolhand, Vice Pres./Pres. Elect	H 521-0069	Dave Gardner, Conservation Chair	H 649-3355
Debbie Becher, Secretary	O 581-5322	Debbie Noel, Education Chair	H 322-0114
Andy Boyack, Treasurer	H 278-8596	Dave Okelberry, Field Trip Chair	H 968-6190
Kathy Anderson, SL Chapter Pres.	H 277-4652	Brent Collett, Horticulture Chair	H 298-7763
Swede Dahl, Logan Chapter Pres.	H 563-5269	Photography Committee Chair	Open
Susan Crook, Logan Vice Pres.	H 753-3257	Janet Williams, Newsletter Chair	H 364-4546
Dick Page, Seed & Propagation Chair	H 255-7769	Dorothy Egan, Newsletter Circulation	H 277-6988

Board members at large

Jennifer Harrington	H 532-6726	Kay Thorne	O 378-4955
Alyce Hreha	H 484-2455	Leila Shultz	O 750-1576
Wayne Padgett	H 753-3854	Richard Hildreth	O 581-5322

TONY GROVE PLANT LIST

<u>Family</u>	<u>Species</u>	<u>Common Name</u>
Apiaceae	Heracleum lanatum	Cow Parsnip
	Lomatium dissectum	Wild Carrot
	Lomatium grayi	Narrowleaf Biscuitroot
	Ozmorhiza occidentalis	Anise Sweetroot
	Apocynum sp.	Dogbane
Apocynaceae	Artemisia spiciformis	Osterhout Sagebrush
	Artemisia tridentata ssp. vaseyana	Vasey Sagebrush
Asteraceae	Aster chilensis	Everywhere Aster
	Balsamorhiza sagittata	Arrowleaf Balsamroot
	Chrysothamnus viscidiflorus	Douglas Rabbitbrush
	Erigeron speciosus	Showy Fleabane
	Viguiera multiflora	Showy Goldeneye

PAM POULSEN on FLOWER IDENTIFICATION

Andy Boyack
UNPS Treasurer

Identifying flowers is not for the prudish, Pam Poulson explained at our UNPS Chapter meeting April 26, in her flower identification lecture. Pam is Assistant to the Director of the State Arboretum.

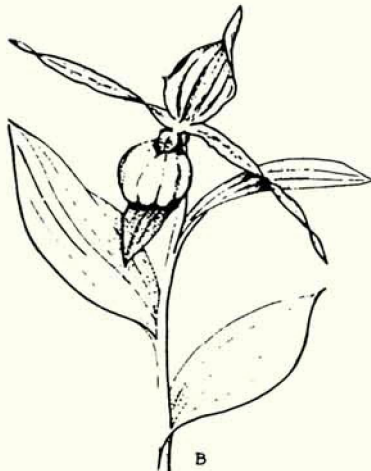
Pam's lectures are indeed little jewels of light in the thicket of botanical education, something we laypeople should never miss. In her inimitable way, Pam explained the sexuality of plants, pointing out that the sexual parts of a flower, pistils and stamens, must be minutely examined to discover a plant's family and name. Plants live for the over-riding purpose of reproduction. All of its flower parts and seeds are designed for that end, according to Pam.

Pam handed out a sheet containing quick clues to 15 Utah wildflower families. This sheet should be memorized by everyone who wants to know wildflowers, or, at the very least, it should be carried in your backpack along with your flower picture books such as The Mountain Plants of Northeastern Utah.

Editor's Note: See this issue for an expanded list of Pam's quick clues to 17 Utah wildflower families.

KEITH WALLENTINE on ORCHIDS

Andy Boyack
UNPS Treasurer



The Salt Lake Chapter was most fortunate to have Keith Wallentine speak of orchids at its May meeting. Keith and Kathy have long been known for their specialized knowledge of wild orchids.

In Utah eight or more genera of orchids are found. Keith described species from all of them, showed slides and told exactly where they could be found. Some are easy to get to, such as the Helleborine near the La Caille restaurant in Salt Lake County, and some more difficult, like the Twayblade on the cliffs above Lake Blanche on the Big Cottonwood watershed and a different Twayblade in the Weber River Gorge.

Among those Keith described were the Fairy Slipper (*Calypso*) found along the Kamas - Mirror Lake highway and the Lady's Slipper (*Cypripedium*) found near Lake Blanche. Incidentally, Keith and Kathy found both of these in full bloom, as well as the Spotted Coralroot (*Corallorhiza*) on our Leidy Peak field trip last summer in Lodgepole pine forests near the Lodgepole campground on Highway No. 191 north of Vernal. The date of that trip was June 10.

The species Keith showed and described were a wide variety indicating the many different kinds of orchids found in Utah. They included:

Lady's Slipper	<i>Cypripedium calceolus</i>
	<i>Cypripedium circulatum</i>
Fairy Slipper	<i>Calypso bulbosa</i>
Northern Twayblade	<i>Listera convalloroides</i>
Heart-leaved Twayblade	<i>Listera cordata</i>
Helleborine	<i>Epipactis gigantea</i>
Rattlesnake Plantain	<i>Goodyera oblongifolia</i>
Bog Orchid	<i>Habenaria dilatata</i>
	<i>Habenaria sparsiflora</i>

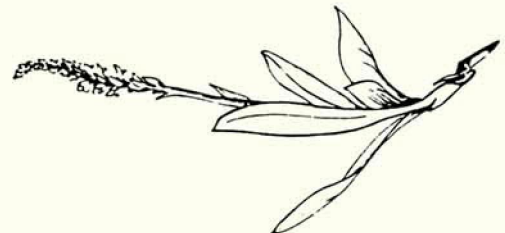
These are the most common orchids in Utah.

Lady's Tresses *Spiranthes romanzoffiana*
The spike of overlapping spiraled flowers resembles braids of hair.

Coralroot	<i>Corallorhiza maculata</i>
	<i>Corallorhiza striata</i>
	<i>Corallorhiza trifida</i>

These are saprophytic and do not have true roots.

Jim Coynee showed a number of slides of the *Spiranthes diluvialis* which has recently been considered a separate species from the *S. porrifolia*. It is found growing near seeps in riparian habitat in eastern Utah. It is rare and is being proposed for the endangered species list. Jim is planning an extensive survey in eastern Utah drainages this summer for this plant. He would welcome help from anyone in the Society who would be interested.



QUICK CLUES TO 17 UTAH WILDFLOWER FAMILIES

1. **LILIACEAE** - Lily Family - Perennials from bulbs, corms or rhizomes. Flower parts in threes: 3 sepals, 3 petals. Ovary superior.
2. **IRIDACEAE** - Iris Family - Annuals or perennials from bulbs, corms or rhizomes. Flower parts in threes: 3 sepals, 3 petals. Ovary inferior.
3. **ORCHIDACEAE** - Orchid Family - Flower parts in threes. Stigma and style united. Ovary inferior.
4. **RANUNCULACEAE** - Buttercup Family - Stamens many. Pistils (ovaries) many. Ovaries superior.
5. **VIOLACEAE** - Violet Family - Leaves basal or alternate. Flowers irregular. Petals 5, the lower one spurred. Stamens 5. Ovary superior.
6. **GERANIACEAE** - Geranium Family - Flowers regular. Sepals 5. Petals 5. Stamens 5 or 10.
7. **BRASSICACEAE** - Mustard Family - Four petals in a cross. Stamens 6 (2 short, 4 long.)
8. **POLYGONACEAE** - Buckwheat Family - Flowers in an involucre. No petals.
9. **POLEMONIACEAE** - Phlox Family - Flowers funnel shaped, regular. Petals 5, united. Stamens 5. Ovary superior, not lobed.
10. **BORAGINACEAE** - Borage Family - Leaves alternate. Flowers in scorpioid cymes. Petals 5, united and crested. Stamens 5. Ovary superior and 4 lobed.
11. **SCROPHULARIACEAE** - Snapdragon Family - Leaves opposite. Sepals 5, united. Petals 5, united. Stamens 2, 4, or 5 (one of the 5 is a staminode).
12. **LAMIACEAE** - Mint Family - Leaves opposite. Stems square. Sepals 5, united. Petals 5, united. Stamens 2 or 4.
13. **ROSACEAE** - Rose Family - Leaves alternate. Sepals 5. Petals 0 or 5. Flower parts arising from a hypanthium.
14. **FABACEAE** - Pea Family - Flowers papilionaceous. Fruit a legume.
15. **APIACEAE** - Parsley Family - Leaves usually much divided. Flowers in umbels. Petals 5. Stamens 5. Ovary inferior.
16. **CACTACEAE** - Cactus Family - Succulent, spiny stems. No leaves.
17. **ASTERACEAE** - Aster Family - Flowers arranged in composite heads. Composite heads surrounded by many green bracts forming an involucre. Individual flowers: Petals 5, united. Ovary inferior.

TONY GROVE LAKE FIELDTRIP

July 12, 1986

Kate Dwire

Baneberry



When in full bloom, the area around Tony Grove Lake (Cache County, 8050 ft.) provides one of the most spectacular wildflower displays in the Wasatch mountains. At the "right time", the area resembles an impressionistic landscape in its rich mixture of bright and varied floral colors. Leila Shultz of the Intermountain Herbarium (USU) led a walk around Tony Grove Lake, and shared her knowledge of the ecology, taxonomy, pollination mechanisms, and medicinal or poisonous properties of the plant species encountered.

We were close to the "right time", and saw many plants in flower, but the snow had just melted over part of the area and some species were either still in bud or just beginning to flower. Starting at the trailhead to the north of the parking lot, we walked through a dry meadow dominated by sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and rabbitbrush (*Chrysothamnus viscidiflorus*) and colored by red Indian paintbrush (*Castilleja* sp.), blue lupine (*Lupinus argenteus*), yellow balsamroot (*Balsamorhiza sagittata*), and other flowers.

We continued on through a wet, boggy area, and crossed an inlet stream bordered by willows (*Salix* sp.), horsetail (*Equisetum* sp.), and mesic plants. We then started around Tony Grove Lake, a cirque lake situated in a basin, along the layered walls of quartzite and dolomitic limestone that surround it. Tall shrubs, including elderberry (*Sambucus racemosa*) and baneberry (*Actaea rubra*), grasses and forbs [We saw stands of *Epilobium* sp.--not yet in flower] grow in the exposed places on this northwest side of the lake.

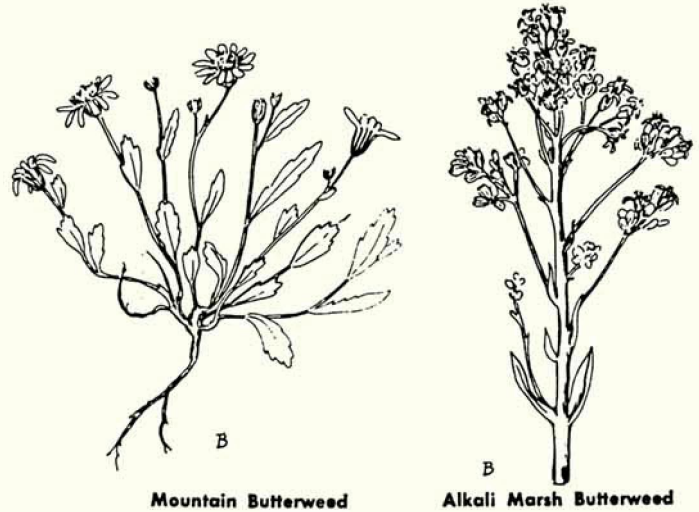
The trail continues south, circling the lake. Along this stretch, the cirque walls reach close to the southwest shoreline, and at the southern end of the lake, form a protected north-facing slope. Here, we entered a dense forest of Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*) with little growing in the understory. Circling back up towards the parking lot, we walked around the glacial moraine on the east side of the lake and over the small dam constructed by the Forest Service in the late 30s. This area is well-drained and exposed, supporting such plants as cinquefoil (*Potentilla* sp.), stickseed (*Hackelia* sp.), several penstemons and horse mint (*Agastache urtifolia*).

Our short walk around the lake was quite diverse floristically, and due to Leila's expertise, very informative--an area highly recommended for flower-watching. Botanizing is good from mid to late summer; several trips from early July through August might each be quite different as new buds and flowers appear and other plants go to fruit and seed. Included in this newsletter is a partial list of what we saw (although mostly in flower, some of the species were in bud or fruit).

POISONOUS PLANTS STUDIED AS CANCER TREATMENTS

The toxic compounds in some poisonous range plants may someday be useful in the treatment of cancer, according to a USU toxicologist.

The compounds are pyrrolizidine alkaloids found in range plants such as groundsel and houndstongue. The ability to inhibit cell division may be useful in stemming the growth of tumors.



Mountain Butterweed

Alkali Marsh Butterweed

"Many anti-cancer agents are natural compounds," says toxicologist Roger Coulombe.

Coulombe found that these compounds can cross-link DNA, an important characteristic of both carcinogens and anti-tumor agents. Cross-linking occurs when a compound joins a protein and DNA. Cells exposed to these compounds become very large with an unusual morphology.

Some plants containing pyrrolizidine alkaloids are used in folk remedies and in herbal teas.

Range plants containing these alkaloids are especially toxic to liver cells, and cause symptoms similar to cirrhosis. The range plants are lethal to livestock when consumed in large amounts or when small amounts are ingested over a long period.

Coulombe's research is supported by the Experiment Station and the USU Biotechnology Center.

Reprinted from *Utah Science*, Winter, 1989.

TONY GROVE PLANT LIST, cont'd

<u>Family</u>	<u>Species</u>	<u>Common Name</u>
Berberidaceae	<i>Mahonia repens</i>	Oregon Grape
Boraginaceae	<i>Hackelia micrantha</i>	Stickseed
	<i>Mertensia ciliata</i>	Mountain Bluebells
Brassicaceae	<i>Cardamine cordifolia</i>	Heartleaf Bittercress
	<i>Erysimum asperum</i>	Western Wallflower
Caprifoliaceae	<i>Lonicera involucrata</i>	Twinberry
	<i>Sambucus racemosa</i>	Red Elderberry
Eleagnaceae	<i>Shepherdia canadensis</i>	Russet Buffaloberry
Fabaceae	<i>Lipinus argenteus</i>	Silvery Lupine
Geraniaceae	<i>Geranium richardsonii</i>	Richardson Geranium
	<i>Geranium viscosissimum</i>	Sticky Geranium
Grossulariaceae	<i>Ribes inerme</i>	Whitestem Gooseberry
	<i>Ribes wolfii</i>	Rothrock Currant
Hydrophyllaceae	<i>Phacelia heterophylla</i>	Spearleaf Scorpionweed
	<i>Phacelia sericea</i>	Sericea Phacelia
Lamiaceae	<i>Agastache urtifolia</i>	Horse Mint
Lilaceae	<i>Erthronium grandiflorum</i>	Glacier Lily
	<i>Smilacina stellate</i>	Starry Solomon Seal
	<i>Veratrum californicum</i>	False Helebores
Onagraceae	<i>Epilobium angustifolium</i>	Fireweed
	<i>Epilobium cilatum</i>	Northern Willowherb
Orchidaceae	<i>Habenaria dilatata</i>	White Bog Orchid
Polemoniaceae	<i>Polemonium foliosissimum</i>	Jacob's Ladder
Polygonaceae	<i>Polygonum bistortoides</i>	Western Bistort
Ranunculaceae	<i>Actaea rubra</i>	Baneberry
	<i>Anemone tetonensis</i>	Globeflower
	<i>Aquilegia caerulea</i>	Colorado Columbine
	<i>Clematis occidentalis</i>	Blue Clematis
	<i>Ranunculus glaberrimus</i>	Sagebrush Buttercup
	<i>Thalictrum fendleri</i>	Meadow Rue
Rosaceae	<i>Amelanchier alnifolia</i>	Saskatoon Serviceberry
	<i>Potentilla gracilis</i>	Cinquefoil
	<i>Rosa nutkana</i>	Bristly Nootka Rose
	<i>Rosa woodsii</i>	Wood's Rose
Saxifragaceae	<i>Mitella pentandra</i>	Bishop's Cap
	<i>Parnassia fimbriata</i>	Rocky Mtn. Parnassia
Scrophulariaceae	<i>Castilleja applegatei</i>	Sticky Indian Paintbrush
	<i>Castilleja miniata</i>	Common Indian Paintbrush
	<i>Orthocarpus tolmiei</i>	Tolmie Owlclover
	<i>Pedicularis groenlandica</i>	Elephant Head
	<i>Penstemon humilis</i>	Low Penstemon
	<i>Penstemon subglaber</i>	Smooth Penstemon
	<i>Penstemon whippleanus</i>	Whipple Penstemon
	<i>Veronica anagallis-aquatica</i>	Speedwell
Valerianaceae	<i>Valeriana occidentalis</i>	Wild Heliotrope
Violaceae	<i>Viola</i> spp.	Violet

THOSE WERE THE DAYS

John D. Carlson

I put my left foot against the canvas covered pannier and pulled on the rope with all my might. The sorrel mare swayed against me as the knot on the top of the pack parted and a kind of lopsided diamond hitch appeared.

"Dammit, Josephine, stand still," I muttered, tucking the remaining rope between the hitch and the pack. I walked over to Jack, my saddle horse, swung into the saddle, and the three of us were on our way. We made our way up a low ridge away from the cottonwoods and birch lining the creek, through big sage and mountain mahogany.

"Looks like it's gonna be a nice day," I grinned, and I yanked my hat down over my eyes against the glare of the morning sun.

My assignment on that occasion thirty years ago, and one of my first as a range professional, was to do the range allotment analysis (RAA) on the Sweetgrass grazing allotment on the Fishlake National Forest. An RAA is a range survey, and range surveys are the basis for the establishment of sound management practices on rangelands. They are the gathering of all the vital information that tells us the state of health of the range.

The sagebrush brushed against my stirrups, and thickets of mahogany and an occasional juniper deposited leaves and twigs down the collar of my shirt. Beneath the big sage, grasses were all but absent, a typical phenomenon of ranges long grazed by cattle, particularly those portions of cattle allotments closer to water.

Cattle, it seems, have a strong preference for grasses. They will seek out grasses and graze them before they will graze browse or many species of forbs. Over a period of years and decades grasses will decrease in the composition along with the desirable species of forbs, leaving behind the browse. The browse species will gradually increase, particularly the least desirable present in the plant community, until little else remains.

In a situation such as this, plant density may decline only slightly, if at all, even though soil protection has been compromised.

Without warning, Jack lunged forward over a large sagebrush, pulling the lead rope to Josephine taut. I whirled around in the saddle just in time to see Josephine drop her head and start to buck. I frantically pulled Jack up short and jerked Josephine's head up, barely in time to avert a major catastrophe. It's no fun spending an hour or two gathering up pots and pans, beans, aerial photos, range survey forms, books of flora, and what was left of my clean clothes after they've been spread all over the hillside by a bucking packhorse.

"Josephine," I yelled at the top of my voice, "I'm

gonna come down on you like the wrath of God!"

She just stood there looking at me with the pack tilted to the left, switching her tail with agitation at flies now beginning to swarm in the warming sun and settling dust.

"Man alive," I murmured, "I'm not gonna tie the lead rope to Jack's tail anymore.

I pitched my tent that evening on the upper side of a little valley under aspen's dancing leaves. It was a friendly place with a nice view of the lower stretches of this part of the allotment. Cattle had been on this range for about a month, cow pies were abundant, and the small, undeveloped spring 1/4 mile away was a mess. I hadn't camped closer to the spring for that reason, and also because my presence there would have prevented the cattle and wildlife from making full use of the water.

Livestock distribution, especially on mountain summer ranges, is always a problem. Cattle particularly, have a strong tendency to stay right on the water and graze those plants close to the water. They will go no further than is absolutely necessary to get a belly full of grass. Obviously the plants around springs, creeks, and other water sources are depleted immediately, and remain depleted throughout the grazing season, year after year.

This situation is complicated further by the fact that cattle hate to climb mountainsides. They will climb only as far as they must to feed. They will stay until they get thirsty, then it's back to the water again.

If the estimated carrying capacity of the range is based upon the forage production of the entire allotment, under any selective system of grazing, about 1/4 of the allotment will be entirely wiped out (those areas less precipitous adjacent to water), another 1/4 will be seriously impaired for future production, another 1/4 will be very lightly grazed, and the final 1/4 will be quite literally untouched.

If livestock numbers are reduced the radius of the circle around the water is shortened, but the range near the water is still destroyed. If only 25 cows are placed on the allotment, or if only 5 cows are allowed, the same grazing pattern will occur. Thus the term "sacrifice area" was coined. I hate the term.

Placing salt a mile or so away from the water source has a tendency to draw cattle away from the water and to achieve wider utilization of the forage. However, it is still necessary for the cattle to return to water daily and deep ruts develop in the soil in the cattle trails.

Dawn came too soon the next morning, and I was up and going soon after. I brought rolled oats for the horses, and while they were munching on their rations I took mine from the same sack. I boiled two cups of water and threw in one cup of oats and a handful of raisins. In about five minutes my pot of oats was ready and I was munching, too. I'd seen how oats powered horses. Today I could also use some of that power.

The little valley was to be the key area for the big sage-mountain brush type. The topography was fairly

level--water close enough but not too close--and the soil was deep and productive. I left the horses hobbled and let them graze while I took off on foot to run my 100 pace transect.

Walking down through Little Valley--I'd named the place already--I selected my line, took a bead on a high peak miles away, and began my pace. Looking at the peak and not at the ground, I stepped forward: left, right. Not until my right foot hit the ground did I look down. "Zero." Nothing but bare soil lay beneath the notch nicked into my boot, with no overstory.

Without pause I marched on. Left, right. "Zero" again, but this time my foot landed beneath the cover of a Big Sage. In the upper corner the second square on the form I noted AR TR, the abbreviation for *Artemisia tridentata*, in the overstory. Left, Right. "Zero" once more, but a branch of *Amerlanchier Utahensis* extended out over the notch, AM UT was noted and on I went.

Pacing through tall brush is quite difficult. You must pace without looking where you're going in order to be entirely impartial, and you must place your foot where it would land naturally without being brushed aside by the rank vegetation.

Left, right. Finally a strike. Directly beneath the notch was the crown of a small grass plant, but only a few leaves remained after a hungry cow had mowed it off. I pulled a small hand lens out of my pocket and gazed at the leaf. Two parallel tracks down the center of the blade with a keel shaped tip. "*Poa*"--and by the size of the plant and by it's being present in this plant community, I continued--"*secunda*." In the center of the 23rd square I noted PO SE.

My transect angled slightly upward and on a bias to the slope, in a generally northern direction. This, too, was noted on the form, as well as the soil type, amount of erosion, approximate soil depth, aspect of the transect, and all other information pertinent to the ultimate evaluation.

Litter, or dead and decaying organic matter, was also noted on the form in the appropriate square, whenever it appeared above or below the notch in my boot.

The sun was high overhead and the day very warm by the time I completed the transect. I felt good about the selection of this key area. It did, indeed, meet all the criteria, and the transect was a good one.

The transect is all important. It gives us, in the most impartial way possible, the composition of the vegetative type we are sampling. **Composition is the very essence, that indispensable property upon which all management decisions are based.** It is the actual state of the range. We call this "range condition" and we class range condition into five categories: bad, poor, fair, good and excellent.

Composition is determined by the relative number of those species present in any given vegetative type. The species are tallied at the end of the transect and each assigned its place in the composition by percent. The total composition always equals 100%, and each

species is expressed as a portion of 100%.

I could hear the comforting sound of the bell I'd tied around Josephine's neck as she and Jack made their way, hobbled, through the tall sage looking for those tasty grasses the cattle may have missed. There were few, so the two horses had to make the best of it on the browse and the less desirable forbs and grasses which remained.

Dropping the completed forms into my packback I headed back to camp for a late lunch. I was anxious to tally the transect, though by now I could predict pretty well the result. As I walked along I kept a sharp eye out for any species I may have missed in the transect. Sometimes species occur in the vegetative type that do not find their way into or over the notch in my boot. It is up to me, then to note the presence of these species in the final evaluation. Most often, these species are a small percentage of the composition.

Arriving at camp, I took a long drink of water and smeared a thick coating of peanut butter on a slice of rather stale bread. Apricot jam topped off my sandwich, and I bit eagerly before I began the tally in the pleasant shade. A soft breeze played through the quaking leaves.

It took a couple of hours to complete the tally and arrive at the plant composition of the Sweetgrass cattle allotment. This is what I found:

GRASSES

		<u>26%</u>
<i>Bromus tectorum</i>	INV	7%
<i>Aristida longiseta</i>	INC	6%
<i>Hordeum jabatum</i>	INV	6%
<i>Sitanion hystrix</i>	INC	4%
<i>Poa fendleriana</i>	DEC	1%
<i>Agrophron spicatum</i>	DEC	TR
<i>Festuca ovina</i>	INC	1%
<i>Koeleria cristata</i>	DEC	TR
<i>Stipa comata</i>	DEC	TR
<i>Elymus cinereus</i>	INC	TR
<i>Poa secunda</i>	DEC	1%

FORBS

		<u>21%</u>
<i>Rudbeckia occidentalis</i>	INV	4%
<i>Salsola kali</i>	INV	3%
<i>Sysimbrium altissimum</i>	INV	2%
<i>Wyethia amplexicaulis</i>	INC	3%
<i>Zygadenus elegans</i>	P	1%
<i>Artemisia ludoviciana</i>	INC	2%
<i>Cirsium arvense</i>	INC	2%
<i>Delphinium nelsonii</i>	P	1%
<i>Calochortus nuttallii</i>	DEC	TR
<i>Helenium hoopesii</i>	P	TR
<i>Lepidium perfoliatum</i>	INV	2%
<i>Heleanthus annuus</i>	INV	1%

BROWSE

		<u>53%</u>
<i>Artemisia tridentata</i>	INC	16%
<i>Chrysothamnus nauseosus</i>	INC	12%
<i>Quercus gambelii</i>	INC	8%
<i>Chrysothamnus</i>		

<i>viscidiflorus</i>	INC	7%
<i>Gutierrezia sarothrae</i>	INC	6%
<i>Ribes aureum</i>	DEC	1%
<i>Purshia tridentata</i>	DEC	1%
<i>Ceanothus velutinus</i>	DEC	1%
<i>Amelanchier utahensis</i>	DEC	1%
<i>Prunus virginianum</i>	DEC	TR
<i>Ephedra viridis</i>	DEC	TR

Decreasers	6%
Increasesers	68%
Invaders	24%
Poisonous	2%

It was immediately apparent that browse plants dominated the type. What was much more significant, however, is that 68% of the plant composition were increasesers, only 6% were decreaseers, and 24% were invaders. 2% were poisonous.

Under grazing pressure a plant community changes. Prior to grazing by domestic animals, when only native species of ungulates, rodents, and reptiles occupied the site the community is in what we refer to as a climax seral stage. This is the ultimate, or the best and generally the most productive a piece of range can be. As selective grazing is introduced the more desirable species are grazed first, the least desirable are grazed last or are perhaps never grazed. This system of grazing simply allows the livestock total freedom to select and eat whatever species they prefer.

Many of the less tasty species are just as nutritious. The cattle or sheep simply like the taste of some more than others, and go out of their way to find these particular species. We refer to these species as ice cream plants.

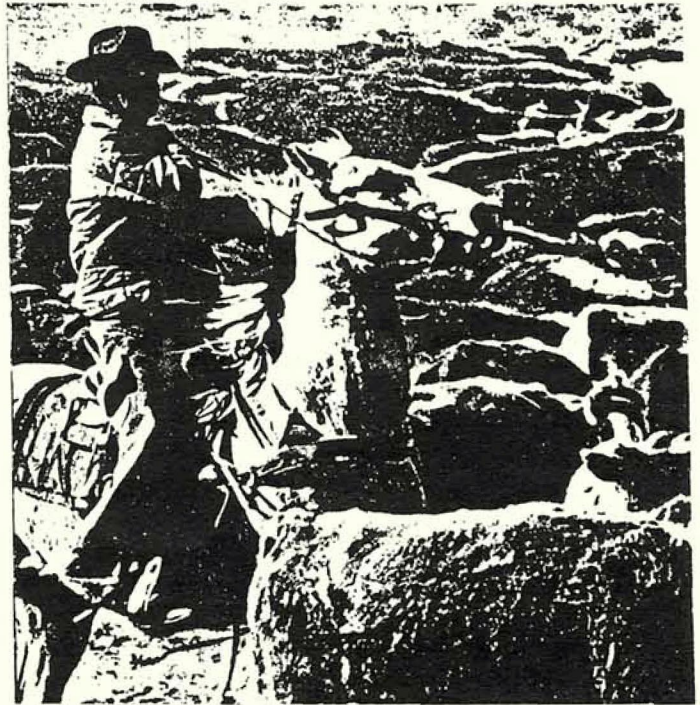
I smiled. How I would have enjoyed a large ice cream cone at that moment. I could well understand a cow's desire to find a delicious *Agropyron inerme* to savor, instead of having to chew the wirey, three-awned spikelets of *Aristida longiseta*. It was very apparent why there was a considerable abundance of AR LO and absolutely no sign of AG IN. In fact, about the only place I found any grass species at all was when they were growing under the protective crown of a sagebrush or a rabbitbrush well out of the reach of the foraging cattle.

Gazing out across Little Valley the words of Parley P. Pratt, an early pioneer in the region, came to mind. He described a rich profusion of bunch grasses interspersed with Big Sage and other browse species much favored by deer. We know today that the bunch grasses Pratt so astutely recognized were such species as AG SP, AG IN, EL GL, EL Cl, *Hesperochoa kingii*, KO CR, OR HY, ST CO, ST *columbiana*, ST LE, FE *Idahoensis*, SP *cryptandrus*, and undoubtedly many others now all but gone from the available portions of the grazing allotment.

There is ample evidence in relict areas of the type and in adjacent areas unavailable to grazing cattle because of an absence of water or because of natural

barriers such as cliffs, that these species were once here, too.

Squinting into the sun I could well imagine the climax seral stage Pratt had described 120 years before. But what I actually saw on that day was a browse range dominated by increaseer and invader species with no grasses or forbs evident from my vantage point. It was as if some unseen hand had wiped from the face of the land that rich abundance of vegetation and replaced it with the altered landscape that lay before me.



I felt a sense of loss. I was looking at a perfect example of seral stage retrogression; that subtle, yet persistent, destruction of a vegetative resource nature had taken thousands of years to create. Bit by bit, one bite at a time, this plant community had declined. Yes, nature itself had reacted to the silent holocaust by replacing those succulent species so desirable to hungry cattle with species less desirable, to protect that even more valuable resource, the soil.

"Not bad," I thought aloud. It was beginning to occur to me that plant species I had held in disdain were actually now the guardians of the soil. *Gutierrezia sarothrae*, *Chrysothamnus nauseosus*, *Chrysothamnus viscidiflorus*, worthless--nothing would eat them. Even worse, they were consuming moisture which would much better support more important species. Yet here they were, covering and protecting, anchoring the all important soil with their tenacious root systems.

They were just waiting, it seemed to me, for someone to find a better way to graze these mountain rangelands. I was glad I was there. I was glad I was part of it all.

A sharp chill went through my body and I was suddenly aware that the sun had disappeared. A blaze

of orange-gold behind a darkening ridge was all that was left of the day. I was stiff and cold and very hungry.

Morning birds chattering and twittering through the aspen welcomed me to a new day. I wondered where I was until the sound of the bell around Josephine's neck and the thud of hooves close to my tent informed me that there were two hungry horses to feed.

It was time to move camp to a location higher in the mountains to sample the range in the aspen type. Before getting on with it, however, I saddled Jack and rode through the entire big sage-mountain brush vegetative type. I carefully noted on the aerial photos which parts of the allotment were being grazed the heaviest, which parts were being grazed moderately, and which parts were not being grazed at all. It was immediately apparent that water, or the lack of it, was the key to achieving proper livestock grazing distribution. A full 1/3 of the vegetative type was grazed only lightly or not at all. Based upon the composition information, the range was in poor (overgrazed) condition where it was being used. Composition is the determining factor. You must know the composition before you can determine the condition of a piece of rangeland.

With panniers loaded and Josephine in tow I set out for higher country. The allotment was enticing as we made our way through thickets of Ponderosa pine and aspen, but I was haunted by the idea that there had to be a better way to graze an allotment than simply allowing a selective grazing system. Years later I was to learn that a range scientist by the name of Gus Hormay was researching a rotation system of grazing management during the very summer I was doing the RAA on the Sweetgrass allotment. His very careful research spanned many years and proved to be a successful alternative to selective grazing.

Under the Hormay system this allotment would be divided into about three pastures and fenced. Water would have to be provided in each pasture by spring development, guzzler construction, pond construction or whatever means possible. The cool season grasses such as AG SP, AG IN, FE ID and KO CR would be selected as the key species, and the dates of seed ripe would be determined.

The first year cattle would enter the first pasture in the spring, and all of them would remain in that pasture until seed ripe of the key species in the second pasture. This would force the cattle to consume all palatable species more or less equally, not just the ice cream plants.

Grazing pressure would be heavy and the pasture would look pretty bad to the uninformed. After seed ripe in the second pasture, the gates would be thrown back and the cattle allowed to enter. They would enter gladly to consume the as yet ungrazed vegetation, and the newly dispersed seed would be trampled into the soil, to await the snows of winter and the rains of spring, to germinate and provide regeneration of the key species. The third pasture would be rested year

long.

During the second grazing season the pastures would be rotated so that the first pasture would be grazed after seed ripe, the second pasture rested year long for seedling establishment, and the third pasture grazed year long.

The third and final rotation would occur on the third year when the first pasture would be rested year long following the trampling of the second year, the second pasture would be grazed year long, and the third pasture would be grazed after seed ripe, and trampled.

The three year rotation sequence begins again on the fourth year and follows the same 3 year rotation pattern indefinitely thereafter.

The rest rotation grazing system was designed to provide for the regeneration and continuing production of the key bunch grass species in any grazing allotment. Range scientists have for years pondered the same problems I had encountered those first weeks of my career when I was doing the RAA in the Sweetgrass allotment. It has become obvious over the years that selective grazing is detrimental to the range. We believe that rest rotation grazing, prescribed specifically for each grazing allotment, is the key to successful grazing on the mountain and desert allotments in the Intermountain region.

Rest rotation grazing allows time and rest for the production of seed, trampling to set the seed, rest for the establishment of new grass plants, and intense grazing pressure during the least damaging months to force the equal utilization of all species in the plant community.

There are difficulties involved. Stockmen don't like their cattle forced to eat less than the most desirable species. They believe their cattle come off the range in poorer condition. Secondly, breaking allotments into more or less equal parts or pastures, particularly in mountainous terrain is essential. Thirdly, all pastures must be tightly fenced even in the most difficult terrain. And finally, adequate water must be provided. One more problem--perhaps the most difficult of all--faces the range manager in implementing the rest rotation grazing system. He must have the full cooperation of the stockmen. All too often the stockmen refuse to cooperate.

I believe the future of cattle grazing in the Great Basin and adjoining Colorado Plateau, and other areas of the West as well, depends upon the successful implementation of rest rotation grazing, and/or specifically modified versions thereof.

I also believe that cattle use must give way to grazing by sheep in a good many places in the Intermountain West. Sheep readily consume browse species, and just as ranges long grazed by cattle become browse dominated, ranges long grazed by sheep become grasslands. I have seen many mountain sheep allotments that retain a broad composition of species year after year. This is assuming, of course, that proper stocking rates are maintained.

Sheep are also very capable of grazing high on the

mountain slopes and ridges. In fact, sheep often prefer to bed down on broad ridges instead of laying around creeks and springs like cattle do.

Many stockmen prefer to graze cattle because sheep require constant care. They must have shepherders with the herd at all times on the open range, they must move the herds to lambing grounds in the spring, and they must shear annually as well. The result is that cattle production is more profitable than sheep production. Not many people savor a lamb chop like they do a beefsteak.

Jack's pace quickened and his nostrils flared long before I caught the scent and sound of the creek along the upper reaches of the allotment. We had just topped the ridge coming out of an old stand of aspen half filled with an understory of white fir, and started down thru a thick stand of mountain brush when I finally caught the sound of the creek.

"Easy, Jack," I called out. "We'll get there soon enough." I pulled in the reins.

Josephine pushed hard up alongside and I had to raise my leg to avoid the loaded pannier she crowded into me.

Jack stumbled.

"Stay back, Josephine," I shouted, and I tried to pull her halter back. We were going faster and faster, and suddenly we were out of control. Dust, rocks, branches, and leaves were flying everywhere as we crashed down the mountainside through oak, mahogany, chokecherry, snowberry, and buckbrush.

"My gawd, you're gonna kill us, Josephine," I screamed, half in and half out of the saddle. "Whoa! Whoa!"

Finally I got hold of the rein and pulled Jack's head hard to the left, and with the lead rope dallied to the saddle horn, I turned the whole stampede uphill to a standstill.

My face was scratched and my shirt was torn. My teeth were gritty and my ears were full of dirt. I found my hat where one of the horses had tromped it into the dirt upslope, and you know how particular a cowboy is about his hat. Josephine stamped her foot and snorted with disgust. Her switching tail betrayed her continuing agitation, and her pack was leaning hard to the right.

"Josephine...", I said softly. Words failed me.

"Well, if you guys can be a little patient we'll be on our way."

I found myself talking to the horses more and more as the week progressed. "Must be about Thursday," I said aloud as we turned downslope again. My hand on the rein still trembled.

In 20 minutes we were at the small stream. Josephine thrust her muzzle into the cool water immediately, and I slipped out of the saddle and pulled the bridle loose so that Jack could do the same. I walked upstream a few yards, laid on my belly on the rocky bank, stuck my dusty face deep into the creek and drank.

Boy, that water sure tasted good!

THE WILDIEST WILDFLOWER IN THE WEST

Ken N. Palge



Scarlet Gilia

Of all the wildflowers of the western United States, scarlet gilia is perhaps the most striking, emblazoning mountain slopes and meadows alike with flared, red tubular flowers commonly known as skyrocket. On Fern Mountain, in the San Francisco Peaks region of north-central Arizona, scarlet gilia stands out amid the bunchgrass, bracken fern, woolly mullein, and wild lupine, displaying a range of shades from red to pink to white. The plant is a favorite food of mule deer and elk in spring, and in the summer its color attracts a variety of pollinators. In 1982 I became interested in this diverse array of color, initially wondering what the significance of such variation might be and how scarlet gilia managed to survive the extensive browsing of these ungulate herbivores. What I found over the next year was that scarlet gilia was no passive beauty, but a chameleonlike strategist that took advantage even of being eaten.

Fern Mountain is but a hilly remnant of past volcanic activity, rising about 400 feet above the surrounding montane meadows. One of 400 dormant volcanoes, it sits in the shadows of the towering San Francisco Peaks, which loom to a height of more than 12,000 feet above sea level. The peaks themselves are the spectacular remains of a dormant crater. Today, the lush vegetation is supported by a shallow layer of cinders that form a water-conserving mulch. Some 5,000 scarlet gilia plants grow on five and a half acres of Fern Mountain's southern slopes, and in late summer each plant produces some 170 tiny seeds. In spring the seeds germinate and develop into small leafy rosettes that thrive during the heavy summer rains. A single rosette, however, may take up to eight years before it produces its single flowering stalk.

When the stalk is growing, but before it flowers, scarlet gilia is most susceptible to grazing. As the snows recede in early spring, the mule deer and elk begin their yearly migration to the high mountain meadows. By mid-May, these large ungulates have reached their destination and begin their trek across

Fern Mountain in search of succulent shoots. They browse many of the plants to the ground.

By early July, the scarlet gilia begin to flower. Although the flowering season lasts about two months, individual plants bloom for about three weeks. Early in the season, red flowers are most common. But red flowers are rare by late August, when the new-flowering plants produce predominantly light pinks and whites.

At times, I even found different-colored flowers on the same plant. By checking back repeatedly I found that flowers produced later in the season on the same cluster were often lighter in color than earlier ones. Over a two-week period, plants shifted from one shade to the next lighter shade, from pink, for example, to light pink. Some even shifted as much as two shades, from pink to white. Late-flowering plants were more likely to change color than plants that flowered early. Over a two-week period at the beginning of the flowering season, only 2 percent of all plants shifted colors, while among plants that flowered one and a half months later, 26 percent showed a change. What these color changes meant was at that point still unclear to me.

By the end of the flowering season, following pollination and fertilization, the ovules of scarlet gilia swell and form large green fruits. The fruits dry, turn brown, and then split, exposing their seeds to the brisk fall winds. Without any structures to catch the wind, most seeds fall close to the parent plant. Seeds do best that fall into gaps created in the vegetation by the footprints of passing ungulates or that fall on the mounds of discarded soil left by burrowing gophers. Most, but not all, parent plants, having reproduced once, die. But I found that some plants produced another rosette at the base of the flowering stalk, so that even though the flowering rosette died, the second rosette survived to flower in a subsequent year.

I wondered whether any of these plants could possibly survive the grazing of the deer and elk and still flower. From mid-May through the end of August, the ungulates browsed up to 80 percent of all plants and three-quarters of these were chewed nearly to the ground, with only a small portion of stalk left behind.

To find out how browsing affected scarlet gilia, I selected forty uneaten, single-stalked plants of similar size and height early in the season after stems had fully elongated but not yet flowered. To simulate high levels of natural herbivory by mule deer and elk, I clipped twenty of the plants nearly to the ground. The remaining twenty plants served as a control group. The response of the clipped plants was rapid; within approximately four weeks they were as tall as the controls. Not only that, the plants flowered at approximately the same time and, in a few cases, even before the others, usually sprouting multiple flowering stalks from lateral buds at the base of the stem. Browsed plants produced an average of four new flowering stalks, and the plants with multiple stalks then produced approximately two and a half times as many flowers and fruits as unbrowsed plants. The experiment

showed that being eaten by mule deer and elk increases flower and fruit production--in the same flowering season. Interestingly, natural and simulated herbivory resulted in plants with larger roots; therefore above ground growth did not come at the expense of the roots.

Although plants that were naturally browsed or experimentally clipped produced more fruits than uneaten individuals, I wondered whether the fruits were of poorer quality, producing fewer seeds or seeds of poor quality. But as comparisons proved, there were no differences in the number of seeds produced per fruit, seed weight (a measure of seed quality and the level of stored food reserved), germination success, or seedling survival in all three groups. The clipped and browsed plants were simply two and a half times more fit than the others, and as later studies showed, their offspring are also more fit and more likely to survive.

These results surprised me. In the evolutionary battle between plants and their consumers, most plants suffer when chewed or browsed--the resources put into restoring stems and leaves usually diminishing the size of roots, the number of fruits, and the number and quality of seeds. But the scarlet gilia on Fern Mountain have adapted to the grazing of the elk and deer, and now mammalian herbivores play a role in the plant's survival and reproductive success. I soon found that much of the rest of the plant's success comes from its ability to change flower colors.

In early summer, broad-tailed hummingbirds, which have been breeding on Fern Mountain since early spring, begin to skirt the tops of scarlet gilia in anticipation of their flowering. When the gilia flower, the rufous hummingbird arrives at Fern Mountain on its way from its breeding grounds in Canada to winter feeding grounds in Mexico. These two birds, along with the white-line sphinx, a species of hawkmoth, all begin moving pollen from flower to flower, enticed and repaid by the gilia's sugary nectar. During the early part of the season as many as forty hummingbirds vie for territories on the slopes of Fern Mountain.

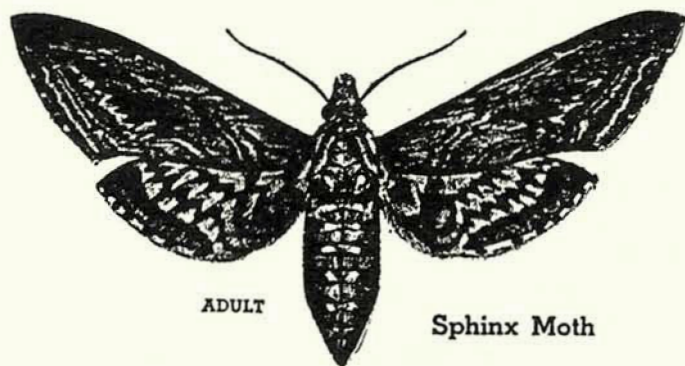


The domineering rufous hummingbirds inevitably hold the best of all territories, made up of large numbers of scarlet gilia, goldenbeard penstemon, and Indian paintbrush (all hummingbird pollinated). Each territory is actively defended against nectar-robbing intruders, primarily broad-tailed and juvenile rufous hummingbirds, which perch along the periphery of a territory awaiting an opportunity to steal across its well-defined borders to obtain a meal. If spotted, the intruder is met with angry buzzing and chased back over the boundary.

I soon found that hummingbirds had clear preferences. They preferred the red blooms of penstemon, Indian paintbrush, and scarlet gilia to the lighter-colored flowers of gilia. One other important pattern emerged. The hummingbird population remained relatively stable through July, but declined steadily until no birds remained by early September. Shifts to lighter color coincided with hummingbird emigration. When the hummingbirds left, hawkmoths became the sole pollinators, and their numbers remained relatively stable to the end of the flowering season.

At sunset I saw as many as forty-six hawkmoths foraging primarily on red flowers of scarlet gilia. But as darkness fell the moths began to visit lighter and lighter colored flowers until by dark, hawkmoths were visiting white flowers almost exclusively. They continued to forage for at least two hours after dark, mostly on lighter-colored plants.

All of this led me to hypothesize that the shift to lighter flower color was an adaptation for taking advantage of hawkmoths when hummingbirds emigrate. But to confirm this theory I had to determine the relative importance of hawkmoth and hummingbird pollination on each of the color variants of scarlet gilia to see if there was any advantage to the shift in flower color when only the hawkmoths were present. To accomplish this I placed nylon tricot covered wire cages over plants to exclude one of the two pollinators. I covered thirty plants (six per color variant) only at night to exclude hawkmoths and thirty during the day to exclude hummingbirds. As a control, I exposed ten plants (two plants per color variant) to both pollinators. At the end of the flowering season, I compared the amounts of fruit and seed.



When both pollinators were still feeding there were no differences in fruit set among the color variants. When the plants were exposed to only one type of

pollinator, however, different color variants had a selective advantage. With only hummingbirds available, red flowers were twice as likely to set fruit as white flowers. Just the opposite was true when only hawkmoths were present: lighter-colored flowers produced nearly twice as much fruit as red. Further, plants with flowers only one shade lighter set as much as 22 percent more fruit than plants whose colors remained unchanged.

Although scarlet gilia recovers a proportion of its reproductive loss by shifting flower color when there are only half as many pollinators, not all plants are guaranteed good pollination. So scarlet gilia has yet another option that helps insure its reproductive success.

What I found was that plants that flowered early in the season were likely to die after flowering, white late-flowering plants more often formed a new rosette and survived. More rosettes formed as hummingbirds began to leave and fruit set declined. When unpollinated plants failed to fruit, they apparently formed rosettes instead. To test whether this was so, I caged some plants early in the growing season to exclude pollinators. These plants were five times more likely to form a new rosette than were uncaged plants. I then removed the buds of some plants so they couldn't form fruits. These plants were seven times more likely to form a new rosette than were the controls. Scarlet gilia is somehow able to reallocate resources to form rosettes that may offer it another chance to flower in a year when there are more pollinators.

Is scarlet gilia's behavioral repertoire unique? Its abilities to change color in response to the change in pollinators and circumvent the damage done by herbivores are adaptations that give it a great advantage on Fern Mountain. And I suspect other plants have similarly dynamic ways of assuring their survival.

Reprinted with permission from NATURAL HISTORY, Vol. 97, No. 6; Copyright the American Museum of Natural History, 1988.

AN INNER VOICE

Roger Rosentreter

Agency personnel often see a lack of compliance with environmental laws and an over-utilization, rather than sustained yield, of resources. Many people get frustrated and some are troubled by an inner voice. We know how to cut forests ecologically and how best to graze cows, but sometimes these best management practices are far removed from the practices of one's own organization. What should we do? Should we be loyal to the organization which is usually very good to us, or should we be loyal to the public? Listen some more to the "inner voice". Subscribe to the new *Inner Voice*, an association of Forest Service employees for environmental ethics, PO Box 11615, Eugene, OR 97440.

OLD-GROWTH FORESTS: BOON TO CARBON BALANCE

Replacing old-growth forests with young forests will not decrease atmospheric carbon dioxide even though a young tree absorbs more carbon than its 250-year-old counterpart on an annual basis. The critical factor is not the annual carbon uptake of individual trees but the amount of carbon that is stored in old-growth forests compared to young forests, according to Jerry Franklin University of Washington Professor of Forestry.

Franklin is co-author of a report on the subject published Feb. 9 in Science. "We conducted this research because logging old-growth forests and replacing them with younger, intensively managed forests is being touted as an important way to tip the global balance in our favor," he said. Trees absorb carbon dioxide, one of the greenhouse gases that may cause global warming. A living tree--as well as wood from a tree that is made into buildings--keeps the carbon safely locked up. Wood that is burned or decays, on the other hand, releases carbon back to the atmosphere.

When considering forest landscapes, the researchers determined that a typical old-growth stand stores 612 metric tons of carbon per hectare. A 50-year-old forest stores only 38 percent as much carbon as an old-growth forest; a 75-year-old forest only 44 percent as much; and a 100-year-old forest only 51 percent as much. After harvesting old-growth timber, it would be at least 250 years before a forest regains its carbon storage capability and equilibrium.

It is crucial to consider the entire landscape when making comparisons, Franklin said. Previous estimates overlooked the carbon stored in roots, woody debris and soils of woodlands. Ignored were such things as standing dead trees, snags and downed timber which accounts for about 25 percent of the organic matter found above ground in an old-growth forest. Lest alone, that debris decays and releases its carbon back to the atmosphere over several decades. Following a logging job, however, the debris is usually burned at the site or made into paper, quickly unleashing virtually all the carbon.

Logging impacts the storage capacity of forests in other ways. For example, any disturbance hastens decomposition, and logging is no exception.

One hundred years ago old-growth forests covered over 7 million hectares of Washington and Oregon. But since then, at least 5 million hectares have been converted to younger forests or other uses. The researchers estimate that the conversion of the forests returned between 1.5 billion and 1.8 billion metric tons of carbon to the atmosphere. That is two percent of the carbon released world-wide to the atmosphere in the last 100 years as man has turned old-growth forest lands to other purposes.

Reprinted with permission from Douglasia, newsletter of the Washington Native Plant Society, Vol. XIV, No. 2.

CORRECTIONS & CREDITS

From Vincent J. Tepedino, Research Entomologist, Bee Biology & Systematics Lab, comes the following corrections to the newsletter account of his presentation on the biology and natural history of native bees and the work being done on the pollination of Threatened and Endangered plants:

"First, my affiliation is not with Utah State University, but with the Agricultural Research Service of the United States Department of Agriculture. I am merely stationed at Utah State University.

"Second, Deanna Nelson was not involved in this research. She conducted a separate study, partially funded by UNPS, with Dr. Kim Harper of BYU on habitat requirements, demography and seed bank biology of Dwarf Bear-claw Poppy. Our work received no UNPS support.

"Third, the people who actually conducted most of the field work on the pollination of Dwarf Bear-claw Poppy were mentioned in my talk but not in the article. They are Bonnie Snow or Provo and Susan Geer, a graduate student at Utah State University. Both deserve much credit for a job well done.

"Finally, I still sense some confusion about what kind of bees native bees are. The article states that there are two major types of bees: The honey bee and the non-honey bee. This is not a reasonable dichotomy. The honey bee is a single species, and it is not native. It is Eurasian in origin. There are more than 3000 species of bees, mostly non-social, which are native to the United States. It is these natives that are important to the pollination of T & E plants."

Our apologies for the inaccuracies. We hope to print an article about native bees from Vincent in the near future to clarify the situation.

Credit for the Illustrations in Vol. 13, No. 3 of The Sego Lily goes to:

Jeanne R. Janish, Flowers of the Southwest Deserts, for Baccharis glutinosa and Abronia villosa.

Berniece A. Andersen, Mountain Plants of North-eastern Utah, for False Hellebore, Yellow Pond Lily, Dog-Tooth Violet and Yellow Fritillaria.

Kay Thorne, Illustrated Manual of Proposed Endangered and Threatened Plants of Utah, for Dwarf Bear-Claw Poppy.

Grant O. Hagen and Eduardo Salgado, A Field Guide to Rocky Mountain Wildflowers for Camassia quamash, Scirpus acutus, and Calchortus nuttalli.

Rebecca Merrilless, Trees of North America, for Whitebark Pine and Limber Pine.

Kathryn Mutz for Clark's Nutcracker in Whitebark Pine.

Credit for the Illustrations in this issue, Vol. 13, No. 4, goes to:

Berniece A. Andersen, Mountain Plants of North-eastern Utah.

Arthur Singer, Birds of North America.

SuZan N. Swain, The Insect Guide.

Flora of North America

A vast amount of information about the diversity of plant life in North America--morphology, distribution, ecology, chemistry, genetics--is being gathered by researchers. Until now it has been scattered in hundreds of different publications, accessible only to the most tireless researcher.

The Flora of North American project will fill the longstanding need for a synoptic Flora of the vascular plants of North America from the Mexican border north through Canada, Alaska, Greenland, and St. Pierre and Miquelon Islands by consolidating this information and making it available to any interested user.

The project will result in a 12-volume Flora as well as a computerized database that will allow a large amount of information to be stored, sorted, and compared.

DESCRIPTION OF THE PROJECT

The Flora of North America project will synthesize our current knowledge about plants in the area: their relationships, characteristics, and distributions. In essence, the Flora will be a catalogue of the plant biological diversity in North America north of Mexico. It also will be a resource for identification of our plants. Such a standard reference is needed for wildlife management, forestry, range management, and horticulture as much as it is for theoretical and applied research. The Flora will highlight the many taxa and geographical areas that are still poorly known, and thus stimulate further research.

Some 17,000 species will be covered, about 7% of the world's total species of vascular plants. The treatments of species will be written and reviewed by experts from throughout the systematic botanical community and will be based on original observations of herbarium specimens supplemented by a critical review of the literature.

The Flora of North America will be published in twelve volumes issued over a ten-year period beginning in 1990. It will include scientific and vernacular names, taxonomic placement, identification keys, summaries of habitat and geographic ranges, pertinent synonymies, descriptions, chromosome numbers, phenological information and other significant biological observations. The final volume will contain a comprehensive bibliography and complete index.

Most importantly, all of the data contained in the treatments will be recorded and maintained in a computerized database. The database will also include information not published in the Flora, such as more detailed morphological descriptions and geographical ranges, and notes on uses. Sources of all data will be documented. Information will be continually added to the database after the Flora itself has been completed, and the database will be maintained as a permanent resource, made available to users through printed copy, magnetic, and other media.

Furthermore, the database can be easily searched and manipulated, making it possible to provide floristic information in ways never before available or even considered, such as ordered by characteristic or habitat, or correlated with physical parameters.

Partial funding for the project has been provided by the National Science Foundation, the Pew Charitable Trusts, and the Robert and Lucile Packard Foundation. The project staff is grateful to the many individuals and institutions who, through their contributions of time and effort, are helping to keep the monetary cost of this project to a minimum.

FLORA PROJECT STAFF

The project staff consists of an Editorial Committee, which functions as its governing body, an Advisory Panel, and the Convening Editor. Leila Schultz, UNPS Board Member and Director of the Intermountain Herbarium, is serving as Taxon Editor. The Organizational Center is located at Missouri Botanical Garden, P.O. Box 299, St. Louis, MO 63166-0299. For more information or to put your name on the mailing list for the Flora of North America Newsletter, contact Dr. Nancy R. Morin, Convening Editor, at that address.

"Whatever befalls the earth befalls the sons of the earth. Man did not weave the web of life; he is merely a strand in it. Whatever he does to the web, he does to himself..."

Chief Seattle

UN GENERAL ASSEMBLY "ENVIRONMENTALLY ORIENTED"

The United Nations Secretary-General says this session of the General Assembly "may be the most environmentally oriented ever." The 44th session began September 19th. **"It is generally agreed that the environment has moved to the top of the world's political agenda,"** Javier Perez de Cuellar said, "and that the international community must do more to ensure the viability of the earth's natural systems." Non-governmental organizations will play a critical role. "I am pleased that the UNEP Governing Council is recommending to the General Assembly that concerned non-governmental organizations should be systematically involved in the planning for the **1992 UN Conference on Environment and Development**. The Secretary-General said the 1992 conference "must be a launching pad for a new, well-defined, practical and comprehensive program for environmental action and cooperation in the 1990s."

from UNEP North American News, Oct. 1989.

XERISCAPING: An Alternative to Thirsty Landscapes

Kurt W. Gutknecht
Editor, Utah Science

We can't keep subsidizing our thirsty landscapes. Most of the plants popular in Utah landscapes survive only because we add prodigious amounts of water. In some arid western states, landscape irrigation accounts for 40 percent of residential water use.

Water shortages may signal an end to this vegetative largesse, but that doesn't mean cacti and rocks will be used to replace Kentucky bluegrass.

Welcome to Xeriscaping--water-efficient landscaping.

The term Xeriscape, derived from the Greek work Xeros, meaning dry, was coined in 1978. The concept has become extremely popular in areas of southern California, Nevada, and Arizona.

It doesn't mean eliminating irrigation or using only plants that survive on natural precipitation. It does mean zoning the landscape according to differences in moisture, sun, shade, air movement, and heat, and practice which could lop hundreds of gallons from a homeowner's water bill every growing season.

Save for a few adventuresome pioneers, Xeriscaping is not yet even a nascent trend in Utah. That could change if there's a water shortage.

Interest in Xeriscaping is increasing rapidly, although conventional landscapes still predominate, says Craig Johnson, professor of landscape architecture at USU. A major impediment to Xeriscaping is the limited availability of native xeric plants, particularly trees.

"Much of the research has concerned hot desert plants, not plants adapted to a cold desert climate like Utah's," says USU horticulturist Larry Rupp. "Many of the cacti used in Arizona wouldn't even grow in northern Utah and would be killed during the first winter."

Rupp says there are plenty of native plants that might be compatible in a Xeriscape, as well as non-native plants from cold desert regions around the world. A visit to old homesteads also indicates which plants have survived on their own, plants such as iris, honeysuckle and black locust.

Currently, however, there is a limited supply of native plants because nurseries order plants in demand

by customers, and customers tend to order plants that they see displayed at nurseries.

"Nurserymen are caught in the middle," says USU horticulturist Bill Varga. Those who have propagated native plants often found that the demand is smaller than anticipated. "There's still only a small segment of society that utilizes native plants," Varga adds. Homeowners looking for native plants either have to ferret out suppliers (there are several), or collect their own plants and seeds, a procedure that can involve considerable work and research. Don't collect specimens from public lands, however, and make sure not to harm the landscape when collecting on private lands.

Rupp says hundreds of thousands of Salt Lake City commuters will be exposed to the aesthetic and economic advantages of native plants and Xeriscaping in a few years when the shoulders of several miles of Interstate 215 are planted to native plants. The highly visible project may spur a dramatic turnaround in what's viewed as desirable in a landscape.

With Experiment Station support, Rupp is determining the optimal conditions for establishing native plants, including the role of mycorrhizal fungi. "Many native plants have mutualistic associations with microorganisms. These associations are often helpful in the establishment of plants," says range scientist Chris Call, who has studied the establishment of range plants. "Mycorrhizal fungi help plants take up water and insoluble nutrients such as phosphorus." Survivability also hinges on a variety of other factors, such as soil texture, pH, and type, slope and light.

"Plant selection has often been based on empirical observation. We need more information as to why a plant does well in a dry landscape, whether it is due to an extensive tap root, the ability to drop its leaves, or other adaptive mechanism," Rupp notes.

Another factor to consider in planning a Xeriscape is possible damage due to browsing by deer and other wildlife. [See Sego Lily, Nov/Dec 89 for "Minimizing Browsing Damage by Deer: Landscape Planting for Wildlife."]

"Xeriscaping is a workable concept. Most people think landscapes should equal those found in the East and Midwest. We really don't have a concept of a native Western landscape," Johnson adds.

Some homeowners worry that an unconventional Xeriscape will jeopardize the resale value of their homes. And some landscape architects worry that designing unconventional landscapes will jeopardize their reputations. A prolonged drought might make "unconventional" landscapes much more acceptable to everyone.

SELECTED HEAT-DROUGHT TOLERANT PLANTS

ANNUAL/PERENNIAL FLOWERS AND GROUNDCOVERS

Achillea millefolium (common yarrow*)
Catharanthus roseus (annual vinca)
Cerastium tomentosum (snow in summer)
Eriogonum umbellatum (sulphur flower*)
Festuca ovina glauca (sheep's fescue*)
Gaillardia aristata (blanket flower*)
Gazania species (gazania)
Hemerocallis species (daylillies)
Linaria vulgaris (common toadflax or butter-
and-eggs*)
Linum perenne (blue flax*)
Linum perenne Lewisii
Mahonia repens (Oregon grape*)
Penstemon species (beardtongue*)
Phlox species (creeping flox*)
Sedum species

TREES

Acer ginnala (amur maple)
Acer glabrum (Rocky Mountain maple*)
Acer grandidentatum (bigtooth maple*)
Celtis reticulata (netleaf hackberry)
Gleditsia triacanthos (thornless honeylocust)
Gymnocladus dioica (Kentucky coffeetree)
*Juniperus monosperma**
*Juniperus osteosperma**
Juniperus scopulorum 'Cologreen'*
Juniperus virginiana 'Skyrocket'
Pinus aristata (bristlecone pine)

Pinus edulis (pinyon pine)
Pinus flexilis (limber pine)
Quercus gambelli (gambel oak*)
Sophora japonica (Japanese pagoda tree)
Ulmus parvifolia (Chinese elm)

SHRUBS

Amorpha canescens (lead plant amorpha)
Arctostaphylos patula (green-leaf manzanita*)
Artemisia cana (silver sagebrush*)
Cercocarpus ledifolius (narrowleaf mountain
mahogany*)
Cercocarpus montanus (deciduous mountain
mahogany*)
Chrysothamnus nauseosus (rabbitbrush*)
Ephedra viridis (green Mormontea*)
Juniperus horizontalis (Prince of Wales juniper)
Juniperus sabina Calgary (carpet juniper)
Ligustrum vulgare (privet)
Rhus glabra (smooth sumac*)
Rhus trilobata (oakleaf sumac*)
Rhus trilobata (skunkbrush sumac*)
Rosa woodsii (wild rose*)

*Plant native to Utah

UNPS Sego Lily
c/o Janet Williams
Utah Native Plant Society
P.O. Box 520041
Salt Lake City, Utah 84152-0041

Non-Profit Org.
U.S. Postage
PAID
Salt Lake City, Utah
PERMIT No. 327

Return postage guaranteed
Address correction requested

A Xeriscape Primer

1. A good design is the foundation of any water-wise landscape.
2. Thorough soil preparation improves water absorption and water-holding capacity.
3. Limit irrigated shrub and lawn areas by using decks, patios and mulched areas. Locate turf only in areas where it provides benefits.
4. Use adapted, lower water demand plants to keep the landscape more in tune with the natural environment. Both native and exotic plants can be used in a Xeriscape.
5. Effective and efficient watering methods can reduce water bills by 10 to 30 percent. Rupp says major savings are possible by mowing lawns at a height of 1 1/2 inches, watering infrequently but thoroughly, and by placing an emitter at each shrub and tree instead of relying on spray-type irrigation.
6. Mulch flower and shrub beds, which increases water penetration and reduces evaporation.
7. Properly maintain the landscape to preserve its beauty and save water. Pruning, weeding, proper fertilization, pest control and irrigation system adjustments all conserve water.

Adapted from Landscape Water Conservation...Xeriscape publication B-1584, the Texas Agricultural Extension Service.

Membership Application

New Member Renewal Gift

Name _____

Street _____

City/State _____

Zip _____ Phone _____

If Gift, from: _____

Check membership category desired:

- Student/Senior\$ 5.00
 Individual\$ 10.00
 Family\$ 15.00
 Supporting\$ 30.00
 Corporate\$ 30.00 and up
 Life\$250.00

Please send a complimentary copy of the Sego Lily to the above individual.

Please enclose a check, payable to Utah Native Plant Society, and send it to:

Pam Poulsen, treasurer,
Utah Native Plant Society
P.O. Box 520041
Salt Lake City, Utah 84152-0041

(If you prefer not to cut this out of your Sego Lily, feel free to copy the membership form or simply write the information down and mail it with payment for the category of membership.)



VOL. 13 NO. 5

SEPT / OCT 1990

CALENDAR OF EVENTS

- Sept. 15** **Star Party at Red Butte Gardens** sponsored by the State Arboretum and the Salt Lake Astronomical Society. Telescopes will be provided for looking at the stars in a beautiful garden setting.
Saturday
8:00 pm
- Sept. 27** **Salt Lake Chapter Meeting.** Blue card mailing to follow will give details.
Thurs. 7:30 Join us in the Den at the University of Utah Student Union Building.
- Oct. 6** **Dyeing Wool with Native Plants** with Alene Avery, Navaho weaver and dye specialist, sponsored by the State Arboretum. \$10.00, all materials provided. Bring a lunch. Register in advance by calling 581-4969.
Saturday
9:00-2:00
- Oct. 25** **Salt Lake Chapter Meeting.** Blue card mailing to follow will give details.
Thurs. 7:30 Join us in the Den at the University of Utah Student Union Building.
- April 1-Oct 31** **Wildflower Hotline (801) 581-4696.** Receive current information on the best wildflower blooming displays reported from throughout the state. Call for a four-minute recorded message, updated weekly. Hear additional weekly wildflower information with Pam Poulson and Gene Pack on **KUER** public radio **FM 90.1** at 11:00 Friday mornings from April through October.

NOTICE: The Utah Native Plant Society is seeking a project in conservation, preservation, study or public education in regard to native plants. Funding is available for the selected project. Please contact Bill Wagner, UNPS State President, with your suggestions. P.O. Box 520041, Salt Lake City, UT 84152-0041.

The Sego Lily is published six times a year by the Utah Native Plant Society, Incorporated, as a non-profit organization under the laws of the State of Utah. Contributions to the newsletter are welcomed and should be sent to the editor, Janet Williams, 415 North Main, Salt Lake City, Utah 84103. Please state whether articles have been published elsewhere and require publisher's permission. The editor reserves the right to edit as needed and to select suitable articles for publication. Calendar items of interest to our membership are requested.

Membership in the Utah Native Plant Society includes The Sego Lily subscription. Please use the form provided in the newsletter for membership applications or change of address. Members and non-members are invited to participate in the activities of the Utah Native Plant Society.

CHAPTER BRIEFED ON POISON

Andy Boyack
UNPS Treasurer

Joe Veltries, Director of the Intermountain Regional Poison Control Center, spoke to the Salt Lake Chapter on June 21st on the topic of poisonous plants. Mr. Veltries is a toxicologist and a graduate of the University of Utah.

He told us a story to illustrate the risks that poisonous plants can cause. A little four year old girl suddenly became very sick while playing at home. The mother took her to the hospital where poison was suspected and the Poison Control was called in. In checking what the little girl had eaten or played with they found a necklace made from various seeds and beans which had been given as a gift. One of the seeds was a castor bean, a very potent poison, into which the little girl had apparently bitten.

The seeds or berries of many common plants are poisonous, such as the castor bean, nightshade, yew and morning glory. In others, the roots or the whole plant may be poisonous, such as the Deathcamas, Water hemlock, Dumbcane or *Dracaena*, and *Caladium*. The most frequent cases of plant poisoning are caused by young children eating berries or seeds of plants.

Symptoms of plant poisoning are flushing, stomach cramps, vomiting and diarrhea. Poisons affect the body in various ways.

Cardiac problems: Nightshade (*Solanum* spp.), Foxglove (*Digitalis purpurpea*), Oleander (*Nerium oleander*), Deathcamas (*Zigadenus* spp.).

Seizures: Water Hemlock (*Cicuta douglasii*), Poison Hemlock (*Conium maculatum*).

Hallucinogenic effects: Jimson Weed (*Datura wrightii*), Nightshade (*Solanum* spp.), Morning Glory (*Convolvulus arvensis*), Mushrooms.

Cell Damage: Castor Bean (*Ricinus communis*), Apricot pits, Mushrooms.

Skin Irritation: Spurge (*Euphorbia* spp.), Rhubarb leaves (*Rheum rhabarbarum*), Stinging Nettle (*Urtica dioica*), Buttercups (*Ranunculus* spp.) and Poison Ivy (*Toxicodendron rydbergii*) which causes and irritation and rash that may occur within 5 days of exposure. Application of Calamine (not Calydryl) is about all that will help. A first exposure is likely to cause an allergic sensitization that will make a person particularly sensitive to poison ivy of the rest of his/her life.

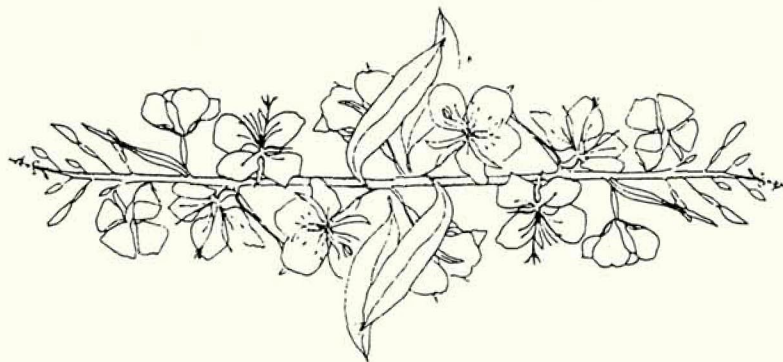
The Intermountain Regional Poison Control Center should be contacted whenever poisoning is suspected. In Salt Lake call 581-2151. Outside the area call 1-800-456-7707.

ALBION BASIN FIELDTRIP

Andy Boyack
UNPS Treasurer

On August 4th the Salt Lake Chapter visited Albion Basin. This is practically an annual mecca for us as we have now had a field trip there for nearly six years running. Albion Basin at the head of Little Cottonwood Creek above Alta is a wildflower paradise. This year the last half mile of road in was banked solid with wildflowers and the adjacent mountain slopes and meadows were covered with blooms of color--reds, blues and yellows predominating.

This year the 'field trippers' found, as usual, 70 to 80 species of flowers in bloom, which makes one wonder why this small area contains such a variety of plants. Pam Poulson, our leader, explained that Albion Basin is a glacial cirque containing both limestone and siliceous soils and a host of microclimates--dry rocky slopes, woodlands, meadows, running streams, and marshland--each of which favors certain plants.



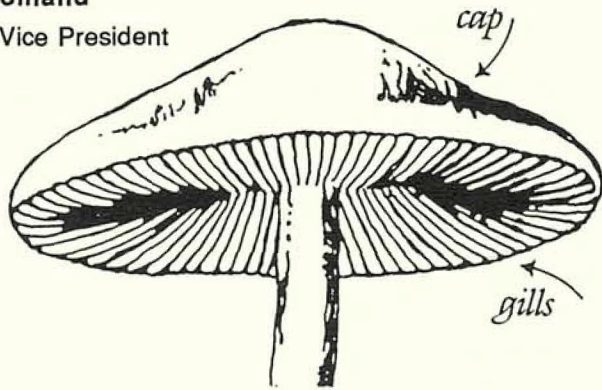
The most abundant plants were Fireweed (*Epilobium angustifolium*), Lupine (*Lupinus caudatus*) and Larkspur (*Delphinium occidentale*) in the meadows and Ivesia (*Ivesia gordonii*), Pennyroyal (*Monardella odoratissima*) and Golden Eye (*Viguiera multiflora*) on dry hillsides. The woodlands had *Geranium richardsonii* and *Polemonium foliosissimum*. Columbine (*Aquilegia caerulea*) and *Hackelia jessiae* were present but not as numerous as in previous years. Along the streams we found the beautiful *Mimulus lewisii* and *Mimulus guttatus* as well as Shooting Stars (*Dodecatheon pauciflorum*) and Miterwort (*Mitella stenopetala*). A few of the group hunted down the rather elusive Grass of Parnassus (*Parnassia fimbriata*) in a boggy area near a stream.

We are indebted to Pam Poulson for the wonderful interpretation of the Albion Basin flora on this field trip. Near the end of the hike we were joined by the Arboretum group which was having a field trip in the same general vicinity under the leadership of Alice Hreha. Thus we wound up with two of the best botanists in the University for our guides.

MUSHROOM FIELDTRIP

Jo Stolhand

UNPS Vice President



Professional, amateur, and novice mycologists gathered in the mountains east of Cedar City, August 17 and 18, for the annual UNPS mushroom hunt. Mycology is the study of fungi which includes mushrooms, toadstools, the yeasts that raise our bread and brew our beer, slime molds, and fuzzy things from the refrigerator. With this definition in mind, the first fungus we encountered was the one Dave Okelberry was stirring with a stick into a five gallon bucket to make his famous sourdough pancakes. Not wishing to delve into this too deeply the group of about 50 men, women, and children spread out from camp on the first official foray of the gathering.

Returning an hour or two later, each individual carried a paper bag of treasures individually wrapped in wax paper which were piled onto a picnic table. Four professionals sat down to assess the bounty. Ardean Watts, who collects mushrooms for his gourmet dishes, smiled in anticipation. Dr. Frank Anderson with his previous experience leading UNPS mushroom hunts was speculative. The eminent duo of Dr. Kent and Vera McKnight, author and artist respectively of the Peterson Fieldguide to Mushrooms, were quiet and serious. Slowly they worked their way through the pile on the table speciating the mushrooms with the vast majority being labeled not poisonous, but not delectable either. There were regular-looking mushrooms, puffballs, bracket fungi, lichens, and bright colored slime molds. Within the inner circle there was some disagreement and inability to speciate all the specimens. One of the few edible, *Lactarius deliciosus*, looked anything but delicious (the experts later reversed their speculation of this specimen).

The mood in the outer circle, which had been one of anticipation at the prospect of partaking of wonderful delicacies, had slowly changed to one of apprehension and then to downright fear that one of those "maybe" or "probables" would end up on their dinner plates. The cowardly were heard to mutter "dogs and children first." It was with some relief that, when the dinner bell rang, the novices noted that none of the specimens had been removed from the display table.

Our host and master chef of the dutch oven dinner was Dr. Brent Palmer, a botany professor at Southern

Utah State College. Many people pitched in to help with the meal preparations. Speculation had it that these helpers were guarding the dutch ovens from any errant mushrooms. Lorraine Palmer is credited with the wonderful fruit cobbler prepared in the dutch oven.

After dinner Kent McKnight answered questions from the group. He estimated conservatively that 50% of mushrooms have not been scientifically described and named. One of the reasons our pros were unable to assign more than a genus name to some of our finds was because they had no name. Other reasons for being hesitant about speciating some mushrooms was their condition, age, and the need for microscopic analysis, and biochemical tests.



Saturday morning after a hearty sourdough pancake breakfast we left in cars to continue our search. A couple of stops later, Ardean Watts was spotted shoving garbage bags of mushrooms into the trunk of his car, so the whole caravan pulled off the road to see what he had. A few feet into the woods we found Amanitas, and then corals and Russulas. The young children were having as much fun as an Easter Egg hunt and their enthusiasm must have been contagious because grownups were heartily joining in the game.

Back at camp, the Okelberry family, with help from the hungry hunters, prepared a steak and mushroom dinner. These mushrooms had been purchased at a mushroom factory in Fillmore and there was no hesitancy in eating them. The only complaint was of having eaten too much.

Late Saturday afternoon our panel of mycologists had finished their identification and all the mushrooms were laid out on a table with labels beneath them. Some of the mushrooms had been sliced or scratched to determine if they exhibited a characteristic called staining. Some did, and had actually turned blue or a shade of red. My count was 97 species--not all identified to species, but all different.

Brent Palmer has offered to host the mushroom hunt again next year at this same time at Boulder Mountain. So if you missed out this year mark your calendars now for the 1991 foray.

Note: Dave Okelberry is lining up a deal to buy dutch ovens. There will be more information in the next issue of the Sego Lily.

A LOOK AT 20TH CENTURY GRAZING PRACTICES IV

Pamela M. Poulson
Chair of the Board
Utah Native Plant Society

Well, I've confirmed the adage that it's the squeaky wheel that gets the grease. I've been in and out of the hot seat since January 1990 for writing this series of articles, but I'm glad I've stirred up some interest among those who are officially responsible for grazing management in this state.

I'm happy to say that both the Manti-LaSal and Wasatch-Cache National Forests have contacted me personally for my comments and suggestions. The Manti-LaSal sent me maps to mark and the Wasatch-Cache invited me to consult with them on-site on the revegetation of Millcreek Canyon and Snowbird ski resort.

On the other hand, the Society of Range Management wants me censured. Although they would not say that anything I have written is untrue, they believe that only members of their organization have the skills and authority to critique range management--which is untrue.

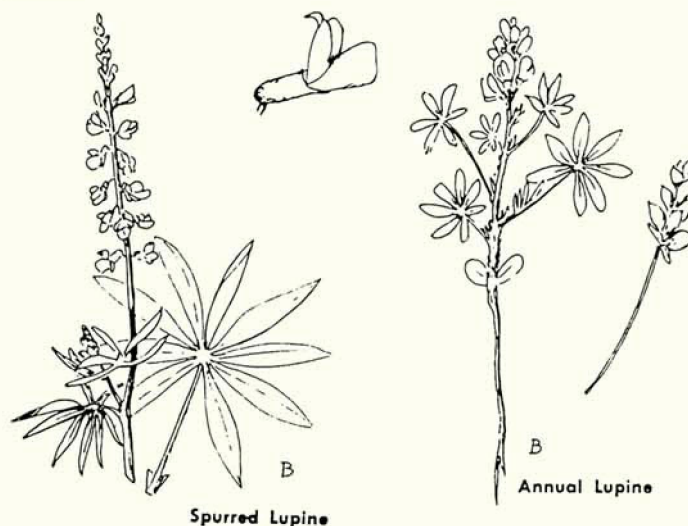
Probably the most disheartening result is a lack of response from the BLM--the most prolific propagator of bad grazing range management in the state. While the Forest Service is making a concerted effort to develop a true multiple use management policy and to improve both their range lands and their public relations with the majority of users (recreators--not grazers), the BLM still caters to grazing and mineral development. On behalf of the recreators I would like to thank the BLM for the development (take that how you will) of Little Sahara Sand Dunes Recreation Area. This was once a small natural area of sand dunes that has been eroded out of control by overgrazing sheep since 1858.

Also on behalf of the recreators, as the wildflower season passes its peak, I would like to thank the various federal land agencies for managing a spectacular 1990 mountain wildflower display. Mountain wildflowers, being mostly perennials, shouldn't have been able to produce so well this year, but in spite of four years of drought and a dry spring and summer, the display was the best it has been in years. Unfortunately, the species composition of the colorful spectrum of wildflowers presents a clear history of overgrazing. This is evidenced by the numbers of increaser species present in the wildflower communities.

An increaser species is one whose dominance within a community increases under grazing because the plant is either poisonous, unpalatable or otherwise inedible by grazing animals. Conversely, a decreaser is a species whose dominance within a community decreases under grazing because the plant is fantastic forage--edible--yummy--ice cream! A decreaser gets its top nibbled before seeds are dispersed, is annually eaten to

the ground (and consequently stressed to death) or is directly extirpated by being yanked up by the roots.

An extreme example of wonderful wildflower displays due to overgrazing by sheep is evident on the Skyline Drive of the Manti-LaSal National Forest above Fairview. (I must remind the reader here that overgrazing on this range happened mostly before 1930. The U.S.F.S. is making great strides in the restoration of this badly abused range). This year those high plateaus were gloriously decked out in shades of indigo and blue. The indigo is Western Mountain Larkspur (*Delphinium occidentale*), and the blue is Lupine (*Lupinus* spp.) and Leafy Jacob's Ladder (*Polemonium foliosissimum*) (yes, south of Spanish Fork Canyon, its color is blue!) Both Larkspur and Lupine are poisonous plants and all three are amazing increasers under both sheep and cattle. The Larkspur formed solid fields that could be seen for miles (especially on one section of private land). The Lupine and Leafy Jacob's Ladder formed stripes of blue on the steep hillsides, striped because their preferred habitats in this case are the horizontal portions of the terraces that were constructed to keep the soil on the mountain after having been ravaged by overgrazing for over 50 years.



Monte Cristo in the Wasatch-Cache National Forest above Pine View Reservoir provided another interesting study. I was looking for Fireweed (*Epilobium angustifolium*) which I had found so prevalent in Albion Basin above Alta Ski Resort. I found only some scrawny specimens within the confines of the campground. There were, however, copious quantities of Western Coneflowers (*Rudbeckia occidentalis*). O.K. Sherlock, what gives? Well, let's see... Fireweed prefers open sun--that's why it is one of the first wildflowers to grow in after a forest fire (hence the name). Is there less sun at Monte Cristo? There are a lot of open meadows and aspen trees (another indicator that the place was once ravaged by forest fire), so that probably isn't the problem. No, Fireweed is "undoubtedly one of the most important range forage plants..." (U.S.D.A. Range Plant Handbook). And guess what? It is one of lambikins' favorite foods! I'll give

THE WEST'S REAL CATTLE HERITAGE: Damaged land and political paralysis

Ed Marston

Publisher, High Country News

It has taken more than a century for livestock grazing on public lands in the West to reach maximum pain and minimum profit.

What could be one of the most benign and sustainable of all agricultural operations, because it is based in part on the consumption of natural growing, perennial plants, has become frozen into a system in which few win and many lose or must scramble frantically to stay even. Among those who lose are many ranchers, public land bureaucrats, the land itself and the public interest.

Public land grazing in the West consists of more than 30,000 rancher-permittees spread over 400,000 square miles of the nation's least inhabited land. Ranching is associated with wide open spaces. But public land grazing as a system is best compared to the gridlock that ties up Manhattan streets and Los Angeles freeways. Also like an urban traffic jam, there is a maximum of noise interspersed with obscene gestures and occasional violence.

In the classic case, a small amount of private, low-elevation, irrigated acreage is used to raise hay and provide a winter home for a herd that spends much of its time grazing on public lands. The public range is not a severable part of most ranches, but a vital component. Without the public range, the West's livestock industry would be a very different, much diminished, creature.

The public land grazing permits, although they must be renewed regularly, are assets a rancher can take to the bank and borrow on, or take to the real estate market and sell as if he or she owned them. Their value comes from one thing: A permit allows a rancher to graze animals on public land--land administered by the Bureau of Land Management, the Forest Service, the National Park Service, the U.S. Fish and Wildlife Service--at lower cost than on private land. This politically guaranteed subsidy is what the banks loan money on and what buyers buy.

That subsidy is in jeopardy because the politics are changing. As a result, the value of permits is being discounted, just as an oil company's assets in a Third World nation are discounted when the politics turn unstable.

There is a joke about Buffalo, N.Y., that goes: Buffalo is not the end of the world. (Pause) But you can see the end of the world from Buffalo. In the same way, grazing subsidies of a few dollars to \$10 per animal grazed per month are not about to be abolished. But it is possible to foresee their end.

What is impossible to foresee is the course that public land grazing will take over the next decade or two. There is no conventional wisdom in grazing. So many policy-makers, bureaucrats and scientists have been burned or frustrated by the issue over the past generation that few wish to touch it.

A bright young staffer in the Forest Service or BLM will specialize in recreation or wilderness, where initiative and change are seen as possible, rather than in the straightjacketed, aged world of grazing. A new Forest Service Chief or BLM head, understanding that to raise grazing fees to market value would require buckets of blood, prefers to make his or her reputation in some other aspect of land management.

Cowboy Clout

But it may be that public land grazing is not as immovable as it seems. Until a decade or so ago, the grazing battle was fought by bureaucrats and a few policy-makers and technical people versus ranchers. It was not much of a battle. The ranchers were and still are well-organized politically, easily able to work their will on the grazing bureaucrats.

For example, a Forest Service or BLM range person, --a range con--who drives out to a ranch house to deliver news of a reduction in a grazing allotment, might find, on return to his office, transfer orders awaiting him. In other cases it might take a few days for the transfer to come through.

The political clout is not confined to intimidating ground-level personnel. It has had a profound effect on policy, as illustrated by the just-ended eight-year reign of Robert Burford over the Bureau of Land Management. Burford, a public lands rancher from western Colorado, was in charge of this multiple use agency, which administers approximately 175 million publicly owned acres. That is 273,000 square miles, or almost the areas of Colorado, Wyoming and Idaho together.

Burford took command in the wake of a series of generally successful lawsuits brought by the Natural Resources Defense Council. NRDC's goal was to force the BLM to reexamine and change its grazing policy. In response to the suits and congressional pressure, the BLM completed environmental impact studies and then pleaded for time, saying it needed to study the land further.

Then during Burford's administration, BLM grazing budgets were cut so that the studies could not be done. When he left office, the BLM's grazing policies had been strongly criticized in a series of independent reports, but little had changed on the ground.

On the local level, ranchers often turn the range bureaucrats into objects of derision or contempt. Some have not hesitated to browbeat, pound on desks and even threaten violence. Talk to a BLM or Forest Service range-con long enough, and you will see a picture of public land ranching that does not resemble the courtly Marlboro Man. And talk to a rancher who holds public land permits, and you will likely be told that BLM and Forest Service bureaucrats are so dumb it's a wonder they remember to breathe.

Environmentalists, of course, are also scornful of the bureaucracies. But they might temper their scorn if they had a better feel for the exposed political positions many bureaucrats occupy and the battering they must take on occasion.

Land managers come to terms with their vulnerability in a variety of ways. Some sympathize with the ranchers and willingly comply with their demands. Some resent the politics, but cooperate. And some resist as much as they can without calling down a transfer or reprimand on their heads.

Perhaps most galling to the bureaucrats is the way the ranchers stick together. Ranchers are not a homogeneous group. Some love and protect the land, some do a middling job, and some approach the public range the way Attila the Hun approached his enemies.

The National Cattlemen's Association and other political arms of ranching do not distinguish between good and bad ranchers. There is no code of ethics, no standards of minimum performance. They protect all ranchers from bureaucratic oversight, regardless of the issue.

The present system also protects ranchers against having to recognize some painful historic truths. Throughout the West, the 19th-century pioneers are greatly respected. But many present ranchers eke out a living on private and public land their sturdy ancestors permanently damaged through overgrazing.

Breaking the stranglehold

For this reason and others, the system is stacked against progress and reform. Land managers who resent ranchers' political clout may respond by going by the book, and even resisting changes that would be good for the ranchers and for the land and wildlife. The system encourages time servers and chases away those who wish to see change.

Under the direction of attorney of Johanna Wald, the Natural Resources Defense Council tried to break this stranglehold on the public lands from the top. The NRDC went to court to force the BLM to treat grazing as one of several uses of the land, rather than as a privileged use. The NRDC won court victories but had trouble transferring those victories to the ground.

Attorney Joe Feller describes his efforts to affect public land grazing from the bottom [see the next issue of The Sego Lily for his report] by focusing on one grazing allotment. Feller is in the early stages of his effort, but it appears that if reformers could put someone onto each of the 20,000 BLM allotments, they could change national grazing policy. That makes sense. There is one rancher paying full-time attention to each allotment, and it will take a similar army to win the war on the ground.

This tactic, of course, is not practical. Ranchers earn at least part of their living from the permits; range environmentalists would have to work as volunteers. In addition, ranchers live near their allotments; many who care about the public land live far from that land, as in the case of Feller.

Moreover, mobilizing an army will not be easy. Public land grazing is not as emotional or straightforward an issue as the forest issues that have galvanized so many in the last few years. Clearcutting of an old-growth forest can be seen and felt in a way that the cropping of native grasses cannot. Come old-growth forests are still alive and thriving; they are there to protect and rally around.

Things are different on the range. The destruction, or at least the profound transformation, of the range took place in the late 19th century. With the exception of a few scattered, often hidden, relict areas, the original range is gone. Biological succession, pushed by herds of domestic cattle and sheep, has moved on. The native plants and the wildlife that depended on those plants cannot even be described as "history" because they have left no records. Desertification, gullying and other changes have obliterated what once was.

As in all public land issues, the producers have done more than capture or immobilize bureaucrats. They have also controlled academic research, turning most of the land grant scientists in this field into handmaidens of the industry rather than independent researchers. The result is that we know little about the past state of the range, or its potential for renewal.

...possibly the ranching community itself is ready for change. There are some admirable aspects to ranching and the small town that ranching created and still nurtures. But in terms of the larger America, it is an alienated community, hostile to or unaware of the forces and ideas that move other Americans.

Part of the reason for that failure can be seen in the pages of ranching journals, which are almost always hostile to the dietary and environmental concerns of urban Americans. To take one example, the recent reports that flatulence in cattle--cattle produce lots of methane--may aggravate global warming has sent these publications to new heights of outrage.

To the journals, concern over methane from livestock is just another example of the craziness of the environmental and consumer movements. That is, it is another example of the craziness of the people they must sell their product to.

Ranching could be sustainable

The tragedy is that so much is at stake, and the potential is so great. Livestock have damaged or destroyed riparian areas, fisheries and wildlife habitat and damaged the appearance of wonderful landscapes. They have not done this to a small part of the public land, but to the greater part of it.

This is especially unfortunate because ranching has the potential to step lightly on the land. Along with fruit growing, it is one of the few forms of agriculture that could be easily sustainable.

Instead, harsh grazing practices have degraded and eroded more than half of the public lands, and made a mockery of livestock ranching's potential for sustainability.

How will this paralyzed situation resolve itself? That depends on the answer to two questions: What capacity do the public land ranchers have for reforming their political and grazing practices? And what capacity does the land have for renewing itself biologically?

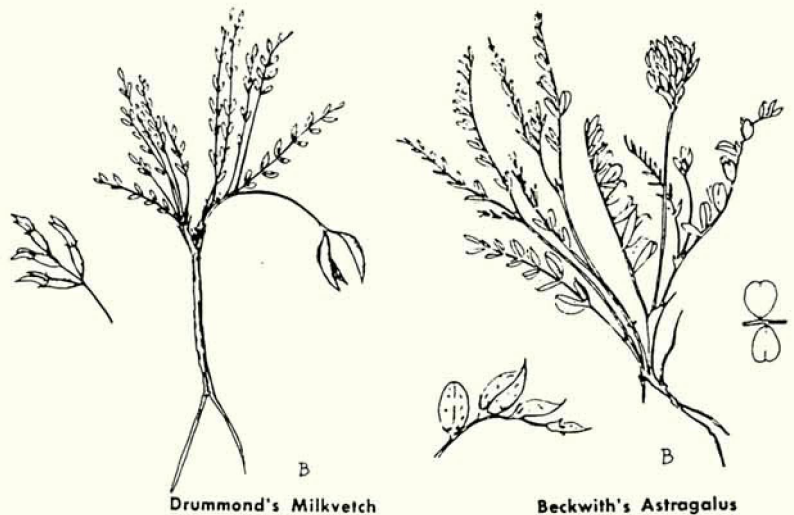
"Livestock free by '93" is an effective rallying cry, and it is part of the reason ranchers have begun to respond to outside pressures. But total eviction of the cattle and sheep would not be much of a victory. The real victory will be reform of public land ranching so that it becomes an asset to the West rather than its present liability. That reform will have to come from the ranchers and land managers, with strong pressure from environmentalists.

Reprinted with permission from High Country News: a paper for people who care about the West; Vol. 22, No. 5; published biweekly by the High Country Foundation, 124 Grand Avenue, Paonia, Colorado 81428. Subscriptions are \$24 per year.

Ed Marston has been publisher of High Country News since 1983.

WHEN A WEED IS NOT A WEED?

Typical of the attitude of many toward native plants is the tendency to give them common names as "weeds". The genus *Astragalus*, for instance has about 140 species in the Pacific Northwest that are mostly called rattleweeds or locoweeds. One cannot blame the stockman, whose cattle have been poisoned by eating the latter, for calling them weeds or worse names. But the fact is that many of these often beautiful (and often drab) plants are considered rare and are placed on lists of plants to be preserved or saved from extinction. The great tendency of this genus to vary widely in its expansions from one habitat range to another, and the tendency of botanists to name each variant he encounters, may account for much of the rarity exhibited in these small locally distributed species.



Such adaptivity is an attribute of common weeds. Nevertheless, each local variant represents an entity that could have special characteristics that may be discovered someday to have ecological or medicinal importance in breeding toward specific purposes. The very fact that this genus contains genetic systems that lead it to 'adapt' so readily may in itself contain the clue by which adaptive traits can more easily be bred into other plants. Until we have had a chance to check out all the useful possibilities inherent in our wild native species, let us call weeds only those that persist in crowding out our garden patches, but let their brothers in their own native vegetation grow in peace.

From the Harman Foundation Newsletter, 1989, as reprinted in Douglasi, newsletter of the Washington Native Plant Society.

THE POWER OF SMALL THINGS

Travelling off the beaten track used to sound romantic. That was before we heard about cryptogamic soil.

Maria Loe

Aspen Center for Environment Studies

You've probably seen it, if you've ever strolled along a sandy path in Southern Utah. It looks in its youth like small black sandcastles pitted by rare desert rains or, in maturity, a crusty dark moss.

It's cryptogamic soil (sometimes called cryptogam). Left to its own devices, this unobtrusive black crust makes the desert stay put.

Cryptogamic soil is the term used to describe a type of soil that has a high concentration of micro-organisms in it. It is primarily cyanobacteria (sometimes called blue-green algae), along with lichen, fungi and moss. It starts to form by covering the sand with what appears to be a dried mud crust. As it grows, it gets darker and thicker until it becomes about an inch thick. This process can take 50 to 100 years to complete.

Some scientists now think that life on our planet's land (as opposed to the water) began as far back as three billion years ago and that cyanobacteria were the world's first land dwellers. The theory maintains that these microbes were responsible for stabilizing loose rock and allowing the first wide-spread accumulations of soil.

Cryptogamic soil does many useful things. It:

- *keeps sand from blowing or washing away
- *provides a seed bed for new plants to sprout in
- *creates a mulch for the plants that grow in it
- *absorbs and holds water for plants
- *makes atmospheric nitrogen available to plants

Cryptogamic soil is a live plant itself. Pour water on it and it will turn green before your very eyes!

If you step on this plant, especially in hot weather, it breaks and crumbles easily. This leaves the area open to soil erosion by wind and water. Off road vehicles (ORVs) and range cattle are especially harmful to these soils; neither one was designed to stay on roads or trails.

Damage to this fragile desert soil by humans, animals or vehicles can take up to 100 years to repair itself. As the signs to many trailheads exclaim: Watch Your Step! Help keep cryptogamic soils alive by walking, riding bicycles and driving on existing trails and roads. Take a moment to examine it closely. Point it out to a child. It is one of the most ancient living forms on Earth. And let it continue to function as it has for hundreds of millions of years. Let it be.

Reference: "Supersoil," by Richard Monastersky. Science News, Vol. 136, 12/9/89, pp. 376-7.

Reprinted from Caralyst, July-August 1990.

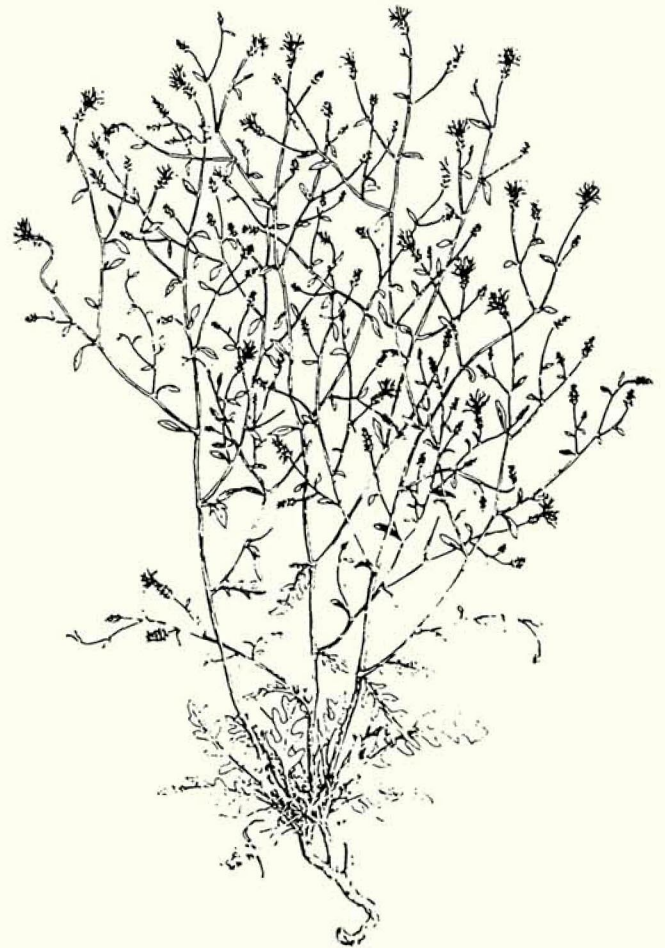
TURNING INSECTS AGAINST WEEDS

Kurt W. Gutknecht

Biocontrol may help USU researchers stamp out an aggressive weed before it acquires a larger foothold in Utah and neighboring states.

The weed is squarrose knapweed, a close relative of Russian, spotted, and diffuse knapweeds, and yellowstar thistle. All of these species are natives of the eastern Mediterranean region--and all pose serious threats to crops and rangelands in the Intermountain region.

So far, the only substantial (about 100,000 acres) infestation of squarrose knapweed in the country is confined to central Utah near Tintic. There are much smaller infestations in other western states.



"We can't allow this weed to become as widespread as spotted knapweed, which now infests more than 2 million acres in Montana, and threatens wildlife habitat, recreational areas, and is crowding out desirable forages on rangelands for livestock," says USU weed scientist Jack Evans.

USU researchers are determining if seed-destroying flies now being tested as a biocontrol agent against spotted knapweed will also be effective against squarrose knapweed.

The small flies lay eggs on the seed heads of knapweed. Once eggs hatch, larvae of the fly feed on and destroy the developing seeds.

"These flies have been quite effective against spotted knapweed, which is a perennial plant that depends on seed production for survival and distribution. We don't know if it will be a successful against squarrose knapweed, which is also a perennial," Evans says.

A major question concerns the effects of the region's hot, dry summers and cold winters on the fly's ability to survive. Researchers should know within a year whether the fly can slow the spread of squarrose knapweed. If it does, it might also be effective against Russian knapweed, which infests large areas in eastern Utah. The only effective control measures now are cultivation and a few herbicides.

The effectiveness of selected herbicides against squarrose knapweed is also being evaluated. Almost 40 years ago, USU weed scientist Delmar Tingey found a small infestation of squarrose knapweed in the state, which he classified as a separate species. Many taxonomists originally questioned his classification but most now agree with his assessment.

The mature deciduous heads of squarrose knapweed stay closed and retain the seeds. Spines of the seeds cling to animal wool, hair or fur like a cocklebur. Historically, spread of the weed was associated with sheep. Seeds might have been introduced by sheep or in woolen products.

The research also involves weed scientist Steve Dewey, plant pathologist Sherm Thomson, and entomologist Ted Evans.

A RUST TO STOP A WEED

Please don't pass the mustard.

The mustard in this case is dyers woad, a weedy member of the mustard family that also includes vegetables such as broccoli, cauliflower and turnips. USU researchers are trying to use a naturally occurring rust to prevent the spread of the nefarious weed, which now infests more than 150,000 acres in the state, much of it on inaccessible areas where conventional methods of control are difficult or prohibitively expensive.

"Dyers woad appears to be a favored host for the rust and effectively kills infected plants. We often find infected dyers woad plants in areas where other members of the mustard family are uninfected," says weed scientist Jack Evans.

Emulating mechanisms underlying natural spread of the rust appears to be a key to effective control. Inoculation has been only partially successful. In one experimental plot, the rust failed to infect artificially inoculated plants but infected uninoculated plants in an adjacent pathway.

Evans, plant pathologist Sherm Thomson and weed specialist Steve Dewey are conducting the study.

Reprinted from *Utah Science*, Vol. 51, No. 2, Summer 1990.

FOLIAGE FOR CLEAN AIR COUNCIL

Creative Plants Vice President Gary Mangum helped form the Foliage for Clean Air Council, an offshoot of the Associated Landscape Contractors of America, created to support NASA research on indoor plants that can remove toxic substances from the air.

Formaldehyde, benzene, carbon monoxide, and other harmful chemicals released from building materials, furniture, electronic equipment and personal grooming products, can accumulate in tightly sealed modern buildings. The presence of plants has been proven to reduce significantly the levels of these pollutants in enclosed environments.

NASA scientist Dr. Bill C. Wolverton, initially commissioned to research atmosphere regulation in spacecraft, introduced formaldehyde into a sealed, plexiglass chamber containing common household plants. Within 24 hours, the plants--Philodendron, Spider Plant and Golden Pothos--removed 80 percent of the formaldehyde from the chamber. Gerbera Daisies demonstrated a similar ability to "scrub" benzene from the air in a small, closed chamber.



Philodendron dubium

Recent information indicates that other plants, many native to tropical forests, are also quite effective air cleaners: Chrysanthemum, Spathiphyllum (Peace Lily), Dracaena warneckii and Dracaena marginata, among others. For more information on how plants reduce indoor pollution, contact: Foliage for Clean Air Council, 405 N. Washington St., Falls Church, VA 22046, Tel. 703-534-5268.

Reprinted from *Tropicus*, a quarterly report to the members of Conservation International, Vol. IV, #3, Summer 1990.

Vegetation Management EIS Shows Cost : Benefit of 320 : 1

In March, the Bureau of Land Management (BLM) released a draft environmental impact statement for its proposed vegetation treatment program in the thirteen western states. The BLM plans to "treat" almost 375,000 acres annually through chainings and rollerchoppings, burning, chemical application, and grazing. The BLM attempts to justify these activities by asserting they are needed to "modify desired plant communities" and "to remove undesirable plant species".

In May, SUWA submitted detailed comments about the program. We asserted that the program is without justification and merit, and that its adoption may result in violations of the National Environmental Policy Act (NEPA). The lack of site specific analyses affords the public no opportunity of knowing where these activities would take place, cumulative impacts were not analyzed, and there was no real "no action" alternative which is mandated by NEPA. The BLM failed to assess the incidental impacts of chemical treatment on nontarget species and did not address the potential human health impacts due to bioaccumulation in the food chain.

Perhaps the best characterization of the ridiculousness of the proposed program was revealed through SUWA's cost-benefit analysis which revealed \$320 of federal expenditures for every \$1 of return. **The primary purpose of the vegetation management program is to increase range capacity for grazing.** Our analysis confirms this program is yet another in the long line of federal taxpayer subsidies to the western livestock industry.

P-J CHAININGS DELAYED

Chaining pinyon-juniper forests involves dragging a heavy chain stretched between two bulldozers across the land and uprooting the trees. According to Dr. Ronald M. Lanner, professor of Forest Resources at Utah State University, the weight of published research does not support any of the reasons used to condone chaining. The recent public opposition to the practice has resulted in the BLM ordering a delay on chainings in Utah until case-by-case analyses can be conducted. Though BLM still claims that "chaining is a proven and valuable practice beneficial to livestock, wildlife, and watershed," we feel that the public's outrage at the practice has jarred BLM into reality. In time, they must recognize that this extraordinarily expensive measure, which has no scientific basis and which is primarily designed to put a few more cows on the land, is outdated. However, only with continued public pressure will BLM be able to separate itself from this entrenched habit.

Reprinted from Southern Utah Wilderness Alliance, Vol. VII, No. 2, Summer 1990.

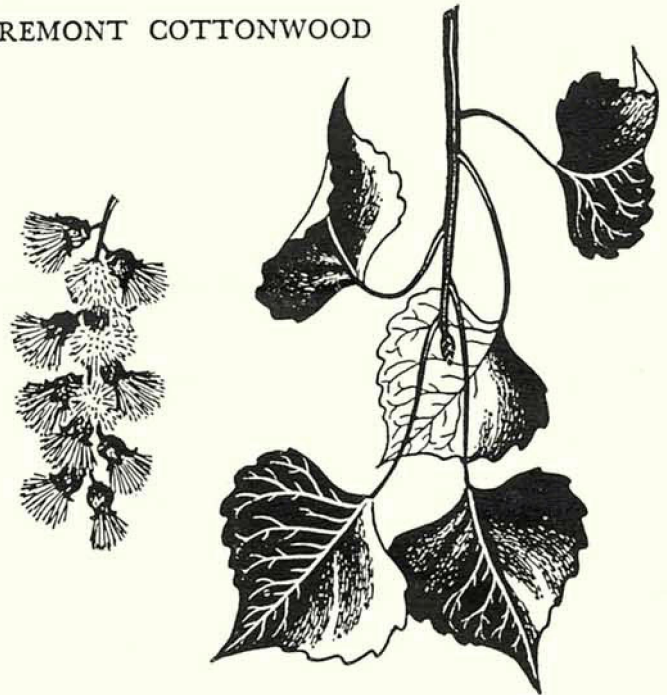
A VANISHING LIFE ZONE

Chester Anderson
Research Ecologist
Rocky Mountain Biological Laboratory

With a dam disappears a stream. Not just the fragment that is submerged, but all that is downstream of the diversions, too. For these reaches it's a slow, strangulating death.

There may be flowing water below a dam, but a wild stream is much more. It's an ecosystem that is based on change. It's a sanctuary for fish, insects, birds, and mammals, including people. It's the most diverse ecosystem in the arid southwest, and it is an essential component at least once in the lifetime of many species. But unless something changes soon, these ecosystems will become just flowing water.

FREMONT COTTONWOOD



More than 85% of the west's riparian zones are dying. The loss of cottonwood trees will be the most conspicuous. With them, sand-bar willow, boxelder, hawthorn, three-leaf sumac and wild rose will also dwindle. And when the plants go, beaver, bald eagles, fox squirrels, Bewick's wrens, bushtits, goshawks, gray catbirds, great blue herons, Lewis's woodpeckers, McGillray's warblers, plain titmice, red-headed woodpeckers, sharp-shinned hawks, warbling vireos, willow flycatchers, Wilson's warblers, yellow-bellied sapsuckers, yellow warblers, untold numbers of insects, and who knows how many mammals, all living in or depending on the riparian habitat, will also disappear. Native fish such as leatherside minnows, speckled dace, flannelmouth suckers, and bluehead suckers will also be affected. What will be left? Mostly tamarisk.

Cottonwoods employ, as germination beds, fresh

deposits of sand, silt, and stones. This alluvium exists because of unimpeded floods in the spring, the season when cottonwood seeds float to the ground. If the timing and the placement are right, the seeds germinate and quickly bore roots to the dropping water table, a chore that is made more strenuous when the tables in riparian valleys are depressed because of upstream diversions.

Tamarisks make seeds throughout the summer and thus are favored by synthetic flow schedules. They prefer fresh deposits of soil, but unlike the cottonwood, can do without them. Tamarisk is also more resistant to drought, whether a natural drought or one induced by the lowering of the water table because of a dam.

Study an unimpeded stream yourself. At the downstream side of a meander are the biggest cottonwoods, the mature, decadent, and dying. This is also the oldest riparian soil and all will soon be washed away by the swift flow of a spring flood. On the inside of the meander, the slow flow side, is freshly laid sediment. Here are found the cottonwood seedlings.

When a stream is dammed it becomes static and this dynamic cycle of deposit, birth, erosion, and death ceases. What are left are decadent cottonwoods, meanders that no longer migrate, and silt that no longer exists to be deposited on beaches that are no longer formed. What will eventually be gone is the delightful fascination of a complex web of life.

TORTOISE ON THE BRINK



"As an animal supremely adapted to its environment, a desert tortoise can survive on a mere 23 pounds of plants per year. But these must be plants that meet the tortoise's needs. The selective munching of a 1000 pound cow, which consumes about 100 pounds of plants per month, often seriously competes with the tortoise menu...The fact that a creature of such modest needs is in trouble over its entire habitat has profound implications for other forms of desert life with far greater demands. The desert tortoise may be a slow messenger, but it brings a message that must be heeded."

--Steve Johnson

Native Ecosystems, Tucson

Reprinted from PLAN, Public Lands Action Network, PO Box 5631, Santa Fe, NM 87502-5631

PUBLICATIONS

Annotated Checklist of Vascular Plants of Grand Canyon National Park by Barbara G. Phillips, Arthur M. Phillips, III, and Marilyn Ann Schmidt Bernzott. Monograph No. 7, Grand Canyon Natural History Association. 80 pp.

This publication includes an overview of vegetation and climate, annotated listings of 1400 taxa occurring in the park, an index, and a map. It is available through the Grand Canyon Natural History Association, P.O. Box 399, Grand Canyon, AZ 86023. Free by request on professional letterhead.

Enduring Seeds: Native American Agriculture and Wild Plant Conservation, by Gary Paul Nabhan, North Point Press, San Francisco, 1989. "In the wake of modern technological farming practices, many scientists have begun to sound the alarm on the crisis of genetic erosion that we face today, but few have offered solutions to the problem. Gary Nabhan provides us with examples of how wildness and genetic diversity must be reintegrated with cultivation for our crops to survive and offers us the hope of preserving not only our food source, but also our ecosystems."

A Handbook of Rare and Endemic Plants of New Mexico by the New Mexico Native Plant Protection Advisory Committee. University of New Mexico, 1984. 308 pp. 136 drawings. \$14.00.

Colorado Flora: Eastern Slope by W. A. Weber, University Press of Colorado. 1990. 530 pp. 110 line drawings; provides keys for 2560 types of vascular plants. This is a companion to **Colorado Flora: Western Slope**.

Desert Shrubs by Arizona Native Plant Society, P.O. Box 41206, Sun Station, Tucson, AZ 85717. 1989. 35 pp. \$2.00.

California Native Plant Society's Inventory of Rare and Endangered Vascular Plants. 1988. \$20.00

Arizona Flora by T.H. Kearney, R.H. Peebles, et. al. University of California Press. 1988 re-issue of 2nd ed. 1085 pp. \$60.00.

Weeds and Poisonous Plants of Wyoming and Utah describes and illustrates plants of concern in the area. It is available for \$13.50 from the USU Extension Service, as B-855-UW, Res. Rept. 116-USU.

Rare and Endangered Plants of Oregon by Donald C. Eastman. Beautiful America Publishing Co. 1990. 200 pp. Over 350 color photographs. \$29.95.

UNPS Sego Lily
c/o Janet Williams
Utah Native Plant Society
P.O. Box 520041
Salt Lake City, Utah 84152-0041

Non-Profit Org.
U.S. Postage
PAID
Salt Lake City, Utah
PERMIT No. 327

Return postage guaranteed
Address correction requested

Quotes from PLAN, Public Lands Action Network, PO Box 5631, Santa Fe, NM 87502-5631

"We'll pay to reseed this as crested wheatgrass because the ranchers love it. We'll pay for the seed. Then we'll get to pay for the Malathion to kill the grasshoppers. Then we'll get to pay in lost wildlife habitat and soil erosion and degraded riparian areas and polluted water. They'll pay \$1.35 a month per cow, less money than the average person spends feeding a cat for a week."

--Rose Strickland

Sierra Club Public Lands Committee Vice Chair

Ed. Note: In Utah, we also pay to re-imburse ranchers for depredation of stock by predators **on public lands**.

"Western public lands are the last chance for wildlife, in the broadest sense of the word. There is no other place where providing habitat for native plants and animals can be given top priority."

--Tony Povilitis

Humane Society of the U.S.

"We Americans unknowingly shell out about \$2 billion annually to support public land welfare ranching when all of the negative impacts are considered. Furthermore, even though these 30,000 livestock operators contribute less than 3% of the nation's beef, they have a political and social stranglehold on the West.

--Lynn Jacobs

Free Our Public Lands!

Membership Application

New Member Renewal Gift

Name _____

Street _____

City/State _____

Zip _____ Phone _____

If Gift, from: _____

Check membership category desired:

- Student/Senior\$ 5.00
- Individual\$ 10.00
- Family\$ 15.00
- Supporting\$ 30.00
- Corporate\$ 30.00 and up
- Life\$250.00

Please send a complimentary copy of the Sego Lily to the above individual.

Please enclose a check, payable to Utah Native Plant Society, and send it to:

Pam Poulsen, treasurer,
Utah Native Plant Society
P.O. Box 520041
Salt Lake City, Utah 84152-0041

(If you prefer not to cut this out of your **Sego Lily**, feel free to copy the membership form or simply write the information down and mail it with payment for the category of membership.)



VOL. 13 NO. 6

NOV / DEC 1990

CALENDAR OF EVENTS

- Nov. 5** **Utah Native Plant Society Annual New World Potluck.** Granite Park Junior High School, 450 East 3700 South, Salt Lake City. FAMILIES WELCOME! Bring a pot luck dish utilizing foods of new world origin. Call Pam Poulson at 581-3744 for ideas or check the Oct/Nov 1989 issue of The Sego Lily for a new world plant list. Join us for an evening of food and fun.
Monday
6:30-9:00
- Nov. 5** **Utah Native Plant Society Executive Board Meeting,** held in conjunction with the Annual Meeting (see above.) Granite Park Junior High, Room B17. RSPV regrets to Bill Wagner, 524-2980 days; 942-1295 evenings.
Monday
6:30 pm
- Nov. 29** **Utah Native Plant Society UFO Night--(Unidentified Flowering Objects, that is).** Please note this is the Thursday after Thanksgiving this year. Pam Poulson and other expert botanists will help you identify your pictures of plants that have remained unidentified since you took those great shots last year. Bring your slides, photos, and maps, too, if you want to show the sites involved. Projector and slide trays provided. Bring non-native-Utah plants at your own risk. The Den, University of Utah Union Bldg.
Thurs.
7:30 pm
- December** **Salt Lake Chapter.** No meeting this month. Seasons greetings to all.

The Sego Lily is published six times a year by the Utah Native Plant Society, Incorporated, as a non-profit organization under the laws of the State of Utah. Contributions to the newsletter are welcomed and should be sent to the editor, Janet Williams, 415 North Main, Salt Lake City, Utah 84103. Please state whether articles have been published elsewhere and require publisher's permission. The editor reserves the right to edit as needed and to select suitable articles for publication. Calendar items of interest to our membership are requested.

1990 Officers and Committee Chairs

Pam Poulson, Chairman of Board	O 583-3744	Duane Atwood, Rare Plant Co-Chair	O 625-5599
Bill Wagner, State President	H 942-1295	Sherel Goodrich, Rare Plant Co-Chair	O 789-0323
Jo Stolhand, Vice Pres./Pres. Elect	H 521-0069	Dave Gardner, Conservation Chair	H 649-3355
Debbie Becher, Secretary	O 581-5322	Debbie Noel, Education Chair	H 322-0114
Andy Boyack, Treasurer	H 278-8596	Dave Okelberry, Field Trip Chair	H 968-6190
Kathy Anderson, SL Chapter Pres.	H 277-4652	Brent Collett, Horticulture Chair	H 298-7763
Swede Dahl, Logan Chapter Pres.	H 563-5269	Photography Committee Chair	Open
Susan Crook, Logan Vice Pres.	H 753-3257	Janet Williams, Newsletter Editor	H 364-4546
Dick Page, Seed & Propagation Chair	H 255-7769	Dorothy Egan, Newsletter Circulation	H 277-6988

A LOOK AT 20th CENTURY GRAZING PRACTICES V

Pamela M. Poulson
Chair of the Board
Utah Native Plant Society

Fall is the time when livestock grazers take their sheep and cattle out of the mountains and transport them either to market, to a feedlot, or to their grazing allotments in the deserts. There are two reasons for this: 1) so their animals won't get mistaken for deer or elk, or the more important reason 2) to follow the forage and get the animals out of snow country. In the spring, April through May, the animals and their new offspring are rounded-up from the desert and taken to be branded, docked, sheared, dipped, thinned, sold, or another of the many various other ranch chores that must be taken care of in the spring. In most of the Forests in Utah, animals are allowed back onto the range no earlier than June 1. The snow is mostly gone by then but, unfortunately, mud still abounds. Compaction of the soil by animals mucking through mud further destroys the range, as does nibbling off of newly sprouted, inch high plants. How will the plants ever get a chance to reproduce?

For the past 10 months I've been blowing off steam about grazing practices in the West and I've mostly been talking of mountain grazing because that's what I understand the best. However, it's the deserts that are in greatest danger of destruction. Deserts, because of their very dryness, are extremely fragile and do not recover easily from disturbance. The fact that plants cannot quickly regrow to replace vegetation that is removed is what causes the soil to erode and makes desert grazing allotments very obviously overgrazed. Desert ranges are extremely difficult to manage and damage from grazing that occurred between 1858 and 1930 is almost impossible to repair.

Symptoms of overgrazed desert ranges are easy to spot. Look for:

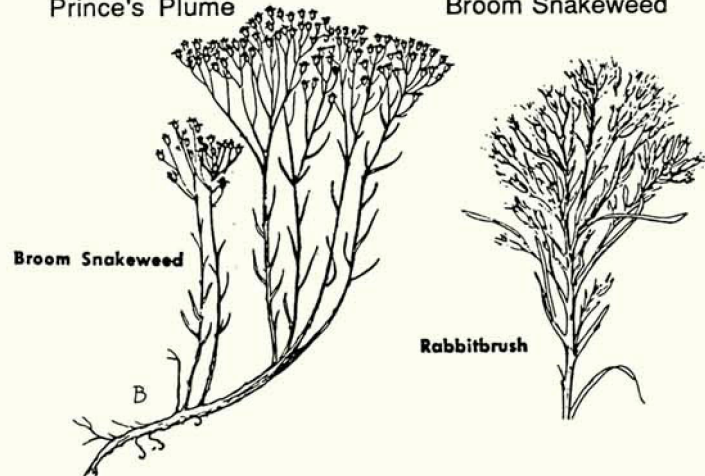
1) Loose sand - Some loose sand is to be expected in a land where the bedrock is easily eroded sandstone, but huge dunes such as those at Jerico and Coral Pink Sand Dunes weren't that massive before 1858. Canyonland hikers will recognize exorbitant extents of sand--that's the stuff of the open trail (not in wind catching nooks and crannies) that is difficult to walk up because of all the back-sliding. This stuff is common on the trails in the Redrock Country. Interestingly, it has also been kept freshly eroding by 20 years of hikers. If you don't believe me, compare the number of sandy trails in Arches National Park and the needles District of Canyonlands National Park with the lesser number of sandy trails in the Maze District of Canyonlands. (There is more cryptogam over there, too.)

2) Little or no cryptogam - We can all list the complexities of cryptogamic soil by heart, so I needn't go into them here. [Editor's note: See article, this issue, on microbiotic crusts and the report on Dr. Harper's presentation to the Society for an in-depth look at these complexities.] I would like to emphasize that cryptogams occur in all deserts, not just on the red soils where they are most easily seen. Look for them wherever you go in the southwest. Hikers, mountain bikers, and four wheelers can break them up just as devastatingly as cow or sheep hooves can.

3) Pedestalled plants - In overgrazed deserts, not only will there be few native perennial grasses growing between the shrubs, but because of erosion from the removal of those grasses, the shrubs will be elevated slightly above the surrounding apparent ground level. Actually, the ground level of the shrubs was the original ground level (perhaps a little elevated due to accumulation of blowing sand captured by the shrub.)

4) An abundance of increaser plants - As you wend your way along desert trails, remember those vast fields of dominant plants are increasers--they have increased because they are not delectable to our grazing friends:

- | | | |
|----------------|-------------|---------------------|
| Sagebrush | Rabbitbrush | Prickly Pear Cactus |
| Astragalus | Bromegrass | Cliffrose |
| Indigo Bush | Larkspur | Mormon Tea |
| Filaree | Halogeton | Sulfur Buckwheat |
| Sunflower | Juniper | Curlycup Gumweed |
| Pepperweed | Lupine | Creosote Bush |
| Greasewood | Globemallow | Pinyon Pine |
| Horsebrush | Mules Ear | Russian Thistle |
| Prince's Plume | | Broom Snakeweed |



5) Maroon/amber waves of Bromegrass - An abundance of this plant will continue to disturb me. One of those rumors circulating says that this plant was introduced on purpose as desert winter forage because it is a winter annual (germinating in fall or winter) and is yummy and delectable as a young plant. Most of the year it is a noxious weed (my designation.) It has taken over the niche that our desert perennial grasses should have if they ever come back.

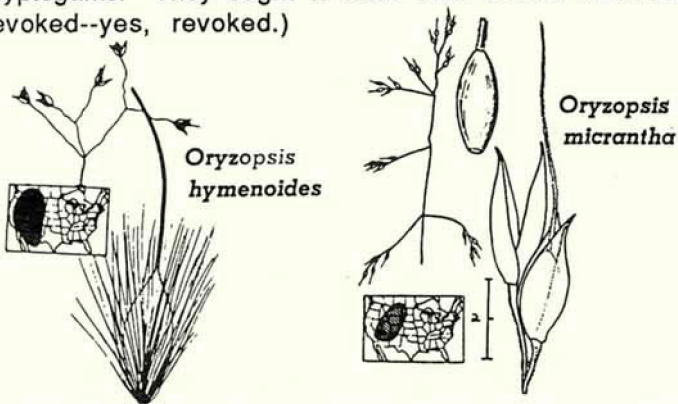
Hopefully, this year of R & R (ranting and raving) will cause some people to say to me, "OK, we have a problem. What can we do now?" Only a handful of us aspire to be synthetic fibre or plant fibre wearing vegetarians. So grazing on public lands will probably continue (even though it is a well-known fact that eating range fed beef is a bit like eating an insolite sleeping mat--I'll take a feed lot filet mignon any time!) What about that "multiple use" ethic that land managers are always holding up as an emblazoned flag? How about really practicing it? Multiple use doesn't mean that all uses have to take place on all lands. The following solutions were developed from my ecological prejudice. I think they're worth considering. Take them how you will.

1) Preserve some of the lands from grazing altogether.

2) Rotate allotments. Farmers do it. Why can't ranchers? Keep grazers totally off a given allotment for a few years. The results will be surprising. It will even develop better forage!

3) Rotate grazers. Cattle generally prefer grasses while sheep generally prefer "wildflowers." Let one forage recover while another is being devoured.

4) Make grazers fiscally responsible for the damage they cause on MY LAND. It wouldn't hurt to make all land users responsible for the damages they cause. (That would include four wheelers that destroy cryptogams. They ought to have their drivers licenses revoked--yes, revoked.)



5) Reseed and revegetate damaged range with native plants. I know that seed and plants are difficult to come by and that non-natives cover the ground faster, but come on, guys, these short term easy fixes will cause us problems later on. Like what? Like non-natives invading the niche of natives and extirpating them. How will 24th century field botanists unravel the mystery of the disjunct Asian species in the middle of the North American west?

I hope this series has been educational. Use these five articles as a tool to help promote or develop improved grazing practices. Until we meet again, keep your eyes open and keep loving those native plants!

10-4 Good Buddies. Over and Outside.

A DO-IT-YOURSELF GUIDE

Joseph M. Feller

Associate Professor of Law
Arizona State University

The BLM's regulations provide for public participation in the management of individual grazing allotments. Such participation may help to curb some of the worst abuses and to bring about some improvements in areas that are of particular concern because of their special value for scenery, recreation, wildlife habitat, etc.

If you are concerned about the impact of livestock grazing on a particular area of BLM land, write to the local BLM district manager or resource area manager and ask to be designated an "affected interest" with respect to the grazing allotment (or allotments) that includes that area. (If you don't know which district manager or resource area manager to write to, write to the state director.)

In your letter, explain why you are affected by livestock grazing in the particular area; for example, because you hike, camp, hunt or fish there, because it is habitat for wildlife or fish that you like to hunt, fish or observe, etc. It is also helpful if you can explain exactly how it is that the grazing affects your use or enjoyment of the area; for example, by dirtying the streams, by marring the scenery, by destroying wildlife habitat, etc. Make your letter as specific to the particular area as you can. Finally, state that you qualify as an "affected interest" under **43 C.F.R. S 4100.0-5**, which is the regulation that defines "affected interest." Keep a copy of your letter and of any related correspondence.

Once you are designated an "affected interest," the BLM must consult with you whenever it formulates or amends an allotment management plan, and whenever it makes an adjustment in the number of livestock on the allotment.

The BLM must also give you notice and an opportunity to protest whenever it issues or renews a grazing permit or license for the allotment.

The latter requirement is very important. Although BLM grazing permits are often issued for a term of 10 years, on some allotments the BLM issues a new permit each year or each season.

On many other allotments, the BLM issues annual or seasonal grazing licenses even though a 10-year permit is in effect; an annual or seasonal license may authorize a different number of livestock than does the 10-year permit, or may contain details that are not contained in the 10-year permit, such as which portions of the allotment are to be grazed and which rested, the exact dates of use of each pasture, etc.

In either case, an annual or seasonal license may determine whether, and how heavily, your area of interest is grazed each year. As an "affected interest," you have a right to be heard on such issues.

You may find that the BLM denies your request to be designated an "affected interest," or that, after granting your request, the BLM makes decisions about the allotment without consulting you.

If so, the BLM may have violated the law. The Natural Resources Defense Council is monitoring the BLM's implementation of its grazing regulations and would like to know when the agency denies affected citizens their right to participate in grazing management.

If your request to be designated an "affected interest" is denied, or if the BLM does not give you the opportunity to participate fully in its plans and decisions, send a copy of your correspondence with the BLM and any other relevant documents to: Johanna Wald, Director, Public Lands Program, Natural Resources Defense Council, 90 New Montgomery St., San Francisco, CA 94105.

Reprinted with permission of the author from High Country News, Vol. 22, No. 5, March 12, 1990.

The Utah State Office of the Bureau of Land Management is located at 324 So. State, Salt Lake City, UT 84111.

WESTERN UNIVERSITIES ACCUSED PROMOTING LIVESTOCK INDUSTRY ?

Conservationists assailed professors at two Western universities, claiming they published a booklet filled with misinformation about livestock grazing on public lands. The booklet says low federal grazing fees do not encourage excessive livestock grazing on public land, and that federal land managers determine grazing levels solely on the basis of what is environmentally acceptable. The 18 page booklet, "Seven Popular Myths About Livestock Grazing on Public Lands," was published in March by Jeffery Mosley of the University of Idaho and E. Lamar Smith and Phil Ogden of the University of Arizona. Conservationists said the claim that subsidized grazing on Federal lands doesn't lead to over-grazing and environmental damage is an indication of how natural resource departments in most of the West's public universities are controlled by the livestock industry.

Reprinted from Sage Notes, the Idaho Native Plant Society Newsletter, Vol. 13, #5, Sept/Oct 1990.

"It is precisely in its smallest and simplest structures that nature shows itself most perfect and accomplished."

Pliny the Elder

MICROBIOTIC CRUSTS: Their Role in Past and Present Ecosystems

Jayne Belnap

Biologist, Canyonland National Park

Microbiotic crusts are found throughout the world, from the hottest deserts to polar regions. Most of these crusts are dominated by cyanobacteria, and also include lichens, mosses, green algae, microfungi, and bacteria. The crusts are critical components of these ecosystems, significantly modifying the surfaces on which they occur. In the cold deserts of the Colorado Plateau region (parts of Utah, Arizona, Colorado, and New Mexico), these crusts are extraordinarily well-developed, and may represent 70-80 percent of the living ground cover.

Cyanobacteria, previously called blue-green algae, are the oldest form of life known. The earliest fossils found, called stromatolites and dating back more than 3.5 billion years, are extremely thick mats of these prokaryotic organisms. It has been suggested that it was these marine organisms that converted the earth's original carbon dioxide-rich atmosphere into the oxygen-rich atmosphere necessary for the evolution of life as we know it today. Stromatolites are still being formed along the coasts of Baja California, Africa, and Australia, where meters-thick mats of cyanobacteria such as *Microcoleus chthonoplastes* and *Lyngbya* can be found in various stages of fossilization.

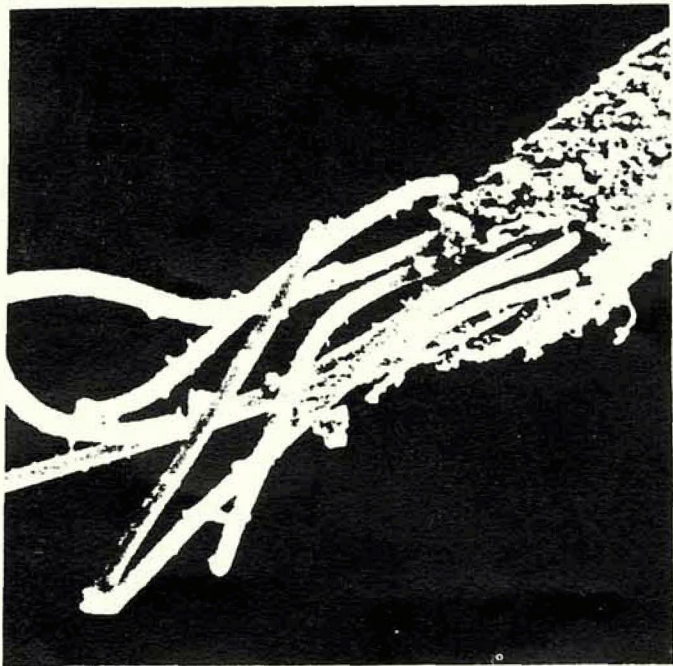
Cyanobacteria occur as single cells or as filaments. The most common form found in desert soils is the filamentous type. The cells, or filaments, are surrounded by a sticky mucilaginous sheath that is made of polysaccharides and other compounds that can be extremely persistent in these soils.

Their Soil Binding Role

One ubiquitous species, *Microcoleus vaginatus*, not only has sheaths around each filament, but has filaments occurring in bundles that are surrounded by a common sheath. When moistened, these cyanobacteria become active, moving through the soil and leaving a trail of sticky mucilage behind. The sheath material sticks to surfaces such as rock or soil particles with which it comes into contact. Since many of these cyanobacteria occur in long filaments, the result is an intricate webbing of fibers throughout the soil, joining soil particle to soil particle, like beads on a string.

As with fiberglass, this webbing gives the soil great stability and tensile strength, and enhances resistance to erosional forces such as wind and water. Of considerable significance is the fact that this binding action is not dependent on the presence of living filaments: layers of abandoned sheaths, built up over long periods of time, can still be found clinging tenaciously to soil particles at depths greater than 15

cm in sandy soils. These sheaths provide cohesion and stability, even at depth, to otherwise highly erodable soils.



Microcoleus vaginatus is a major constituent of soil crusts on the Colorado plateau. This 700 times enlargement shows the filaments clustered in their common sheath, like a bundle of optical fibers. When moistened, they move through soil and weave it together with their sticky, mucilaginous trails.

The sheaths have other functions as well. They are extremely hydrophilic, swelling up to as much as 10 times their dry size when moistened. Consequently, the sheaths become a way of intercepting and storing water, especially important in arid areas where rainfall is sporadic and intense. This enables the cyanobacteria, which are active only when wet, to remain active longer.

Their Nutrient Holding Role

Recent research also shows that vascular plants grown in crusted areas have much higher levels of essential nutrients than plants grown in areas without crusts. Electron micrographs of *Microcoleus* suggest a mechanism for this nutrient enriching property. Pictures show the outer sheath of cyanobacteria covered the fine clay particles. Both the sheaths themselves and the adhering clay particles are negatively charged; therefore, they attract and bind important positively-charged nutrients, keeping them from being leached out of the upper soil horizons or becoming bound in a form unavailable to plants.

This circumstance benefits the crustal organisms, since attached nutrients are thus readily available, and also the surrounding vascular plants. As with soil stability, this soil-enriching function is not dependent on the presence of living filaments, but only on the presence of sheath material.

Sheaths also offer protection to the organism from both abrasion and desiccation--especially important in dry, unstable soils. Perhaps equally important, the sheaths and the organisms they surround contribute a great deal of organic matter to soils in which they occur.

Their Nitrogen Fixing Role

Nitrogen fixation is another significant capability of many cyanobacteria. Vascular plants are unable to utilize nitrogen as it occurs in the atmosphere and are dependent on microbial organisms to reduce atmospheric nitrogen to a form they can use. This is especially important in desert ecosystems, where nitrogen levels are low and often limiting to the system's productivity. Cyanobacteria play an even more critical role in cold desert ecosystems, where symbiotic and heterotrophic bacterial fixers--often important contributors of fixed nitrogen--do not perform well.

Cyanobacteria, then are basically nutritionally independent organisms, needing only light, atmospheric nitrogen, a few minerals, and water to survive. This, along with sheaths that give them the ability to stick to surfaces, stabilize soil particles, capture nutrients, and hold water, enables them to colonize areas of bare rock and soil, such as newly-formed land masses.

Their Role As Colonizers

This capacity of cyanobacteria can be seen today in areas such as Iceland and Hawaii, where they are the first to colonize lava flows and cinder cones. For all the above reasons, it is thought that these organisms probably were the first colonizers of earth's early land masses and were integral in the formation and stabilization of earth's earliest soils.

Production of weak acids by the cyanobacteria, as well as the trapping and holding of water next to the rock, would have accelerated the weathering of the parent material and the production of soil particles. The binding of newly-formed particles by the cyanobacteria's sticky sheaths, greatly increasing resistance to water and wind erosion, would have aided the formation of small soil pockets. These small pockets of soil would further accelerate the weathering process, as more water would be trapped and more substrate would be available for colonization by more cyanobacteria.

Unfortunately, human activities are generally incompatible with the presence and well-being of cyanobacterial crusts, whether the disruption comes directly through construction and recreational activities, or indirectly through domesticated grazing animals or pollutants. The cyanobacterial fibers that confer such tensile strength to these crusts are no match for the compressional stress placed on them by footprints (cows or people) or by machinery, especially when the fibers are dry, and therefore brittle. Air pollutants, both from urban areas and from coal-fired power plants, significantly affect the physiological functioning of these crusts.

Human Needs Pose Threat

The arid West, where the crusts play such a critical role, is facing expanding human presence. With that comes ever-increasing pressure to provide energy resources (such as coal and oil shale) to provide locations for energy production (such as coal- and oil-fired power plants), and to provide locations for waste disposal (whether incinerators or landfills). These activities can be devastating to the microbiotic crusts which are, in essence, the topsoil of most of the West. No research has been done on recovery rates of crusts after physiological disturbances by pollutants and so this remains unknown.

There is information on recovery from mechanical disturbances, of which there are two types: trampling, like that from hoof or foot traffic, that breaks up the crust but leaves pieces in place that may re-establish themselves; and total removal, as in road construction.

Recovery from trampling depends on the extent of trampling and the time of year it occurs. When they are dry, crusts are very brittle and easily broken up; the problem is not that anything is killed, but that the impacted area is destabilized. Fiber connections are broken, both in sheaths containing living filaments and in those that are abandoned. For living filaments, repair and re-stabilization is possible only when moisture is present, so that if impacts occur just before or during dry times (of which there are plenty in the desert), re-establishment can be difficult.

Large Disturbances Hurt Most

All this is exacerbated when large areas are destabilized, as with grazing or wildfires, or when destabilization occurs as a continuous strip, such as vehicular or bicycle tracks. These situations leave areas highly susceptible to wind and water erosion. Wind not only blows pieces of the pulverized crust away, thereby preventing reattachment of pieces, but it also blows around the underlying loose soil, covering nearby crusts. Overland water flows carry loose material as well. Since crustal organisms need to photosynthesize, burial can mean death.

When large sandy areas are impacted in dry periods, previously stable areas can become a series of moving sand dunes in a matter of only a few years. Continuous strips, e.g. those left by bicycles and motor vehicles, are highly susceptible to water erosion and channels form quickly, especially on slopes. These areas may never recover fully.

In situations where crusts have been removed, reestablishment is very slow and depends on the size of the disturbance. In sandy areas, under the best of circumstances and where the disturbance areas are small, a thin veneer--2-4 mm thick--consisting of one or two species of cyanobacteria, may return in five to seven years. This compares to an undisturbed crust 50-100 mm or more thick, that may consist of 14-15 species of cyanobacteria, along with lichens, green algae, and other organisms. It is not known how resistant this thin layer is to erosion, especially those

tremendous overland water flows that can occur in the desert. Damage to abandoned sheath material beneath the surface cannot be repaired but must be rebuilt slowly through years of cyanobacterial growth.

Artificial inoculation can significantly increase recovery rates, and should be an integral part of recovery plans for these areas.

Impacts on crusts occur in all arid land parks. Crusts in some parks are affected directly by livestock grazing allowed in those parks. All parks are affected by people, foot traffic, and various types of construction. Most parks, if not currently threatened by air pollution problems, could be in the near future. It poses a real challenge for managers of these parks to find ways to protect these crusts, given the host of factors that affect them and the important contributions they make.

Reprinted with permission from Park Science, a Resource Management Bulletin, National Park Service, U.S. Department of the Interior, Vol. 10, No. 3, Summer 1990.

DR. HARPER AND DESERT CRYPTOGAMIA

Andy Boyack
UNPS Treasurer

Dr. Kimball Harper of Brigham Young University spoke to the UNPS Chapter meeting September 27 on the desert and cryptogamic soil.

The deserts and semi-deserts of Southern Utah have soils that look bare or very thinly covered with vegetation and are readily susceptible to water and wind erosion. They do not have the sod and brush and trees of areas where rainfall is more abundant. But these deserts do have a protection from erosion, fragile but efficient cryptogamic soil, so named because its components are algae, moss and lichens of the spore reproducing order of CRYPTOGAMIA. These plants are able to grow on desert sands forming a crust that protects the underlying soil and provides a bed for seedling plants. They absorb and retain water and fix nitrogen in the soil.

Dr. Harper and his staff are conducting ongoing studies of the characteristics of cryptogamic soil and the wide range of ecological effects. One of the ecological effects important to man is the stabilization of soil in the desert areas of the Colorado Basin which prevents or at least reduces soil erosion, soil which accumulates as sediment in the Colorado River and which in time, one or two hundred years, will fill the lakes behind the Colorado River dams making them virtually useless for water storage.

Cryptogamic soil is fragile. It can be destroyed

just by stepping on it. Off-road vehicles can and have destroyed the soil in many areas or laid them open to erosion. Ironically, cryptogamic soil can support or initiate the growth of enough grasses and forage plants to make grazing cattle and sheep in the desert economical, but uncontrolled grazing destroys the very agent that makes possible the grazing forage. Grazing is particularly harmful in the spring and summer during the rains of those seasons when the cryptogams can grow and repair the harm done to them during the year.

THE MYTHS OF KNAPWEED

Richard Tucker

Range Agrologist, British Columbia Forest Service

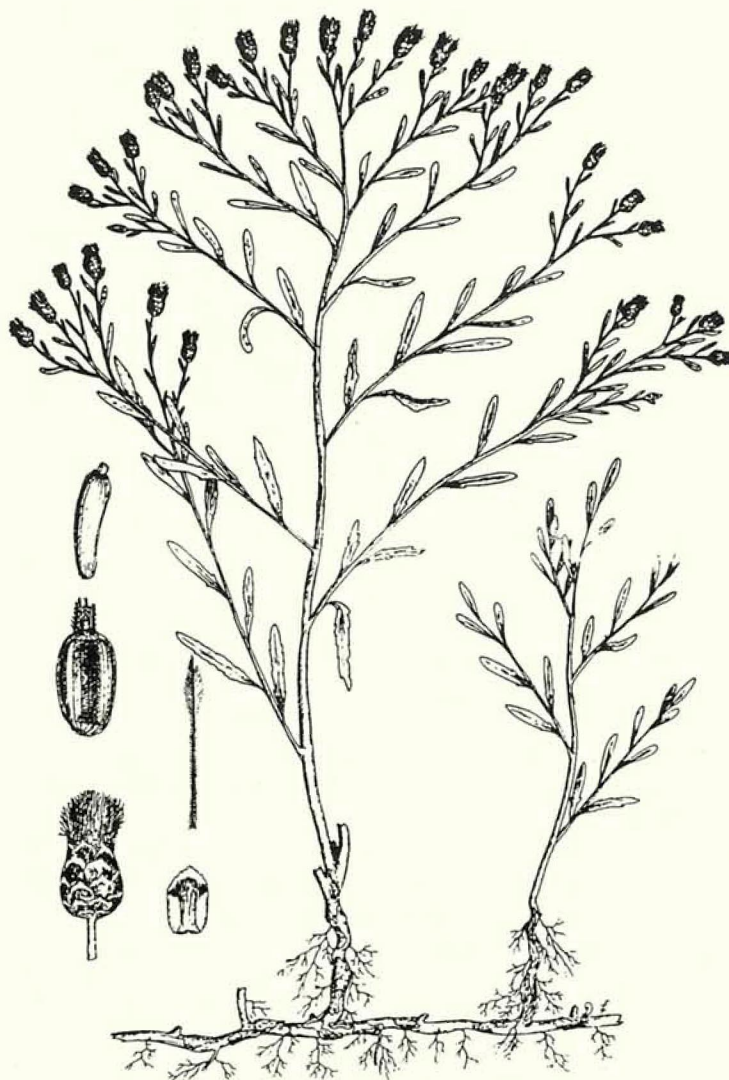
Primitive people used mythology to explain things they did not understand or were unable to control. Supernatural powers were attributed to natural phenomenon, which were then separated into clearly defined areas of good and evil, with the hope that good would prevail. Following this tradition, people of the late 20th century North American developed an intricate mythology around the invasion of knapweed into their rangelands. These myths, far less naive than earlier ones, were laced with pseudo-science to the point where they were seldom recognized as myths and often were supported by otherwise rational people.

The myths began a long time ago in the 1970's. Despite the best efforts of Range Managers, knapweed was defiling land at an ever increasing rate. The land was being desecrated, no longer would it produce forage; instead it became the breeding ground for hordes of evil seeds. Armed with the wisdom and science of range management, the Great Range Managers of the time fought a terrible battle, but failed to control knapweed. Gradually a belief developed that not only was knapweed bad, but it was actually possessed by an evil spirit. The spirit was called "allelopathy." Now Range Managers could sigh a collective sigh of relief; they were no longer at fault. Mere mortals could not be held responsible to control the awesome power of demonic plants. This was the first myth of knapweed that was espoused in many society gatherings

Since these early times much has been learned. Research has found that though there are toxic chemicals in knapweed, allelopathy is not an important ecological factor contributing to its successful invasion and survival in North America. But the myth persisted.

Another strategy to rid the land of knapweed was developed. It was suggested that the powers of knapweed could be controlled, at least partially, by a shielding spell placed around some lands that would block the entry of knapweed. The spell was invoked by a Range Manager standing over the land and intoning the phrase, "This area is in good to excellent range condition." The strength of the spell depended on the

status of the Range Manager, which in turn depended on age and occupation. Research scientists appeared to have more clout than agency people. The scarcity of good wizards and the distance between sites caused great weariness, and really good Range Managers found it was easier to invoke the spell by inserting the phrase on a small scale map with a colored pencil.



CENTAUREA REPENS L. Russian knapweed.

When the protected lands succumbed to low encroachment by knapweed, it was assumed that the wizardry of the Range Manager was not up to snuff. It became widely known that young Agrologists just did not measure up, and their spells were weak and ineffective. As a remedy it was suggested that the spell could be enhanced in power by having a touring group from "The Society" stand in a semi-circle, wave their arms and scuff the dirt, while one revered member intoned the phrase, "Knapweed cannot invade good to excellent condition range," into a P.A. system.

We now know that knapweed can invade all grasslands. The rate of spread and final density are dependent on range condition and current management.

Where good condition ranges thrive under proper use, invasion will be slower and the density will be lighter than on ill-treated lands.

Knapweed continued to spread and Range Managers were desperate for a way to stop it. Away to the south people worked long hours cloistered in a flat land to conjure up a Solution, namely a magic cow capable of grazing the land and cleansing it of knapweed. The magic cow on its own turned out to be powerless, it had to be turned out in conjunction with an enchanted grazing system. The goodness, focused by interconnectedness of all things, was then able to overcome the evil forces manifested in knapweed and rid the land of the menace.

This myth was often talked about but generally not accepted, partly because the sorcery required was far stronger than found in most Range Managers (most of the really good wizards went into wildlife management and did not dabble in the smaller problems), and partly because interconnecting the magic cow with the enchanted grazing system on the right range type was nearly impossible. For the few times it did work, the effect was over such a small piece of land and for such a short time that few people actually saw it.

Nevertheless, the myth persisted, and many of the people insisted that we could do away with herbicides and costly biocontrol if we would only believe in the magic cow.

Grazing systems do have an effect on knapweed, as they affect all plants within the grazed areas. Obviously, some systems will encourage and some will discourage knapweed invasion. It is, however, unlikely that a grazing system can be developed that on its own will accomplish satisfactory control.

The problem with myths is that they can divert a lot of energy away from the real problems. The best strategy with knapweed seems to be to contain its spread with judicious use of herbicides, to practice good range management, and to implement biological control. Efforts on these three fronts should eventually reduce knapweed to a manageable weed. Does that sound like a myth?

Reprinted from Douglasia, newsletter of the Washington Native Plant Society, Vol. XIV, No. 4, Fall 1990. Originally published in Knapweed, newsletter printed for the Washington Interagency Knapweed Council through the College of Agriculture and Home Economics, Washington State University, Pullman, WA 99164-6242.

RUSSIAN KNAPWEED

In Utah, Russian knapweed has become abundant in many areas, growing in a variety of habitats, meadows, cultivated and grain fields, ditchbanks, roadsides, and waste places. Because of its aggressiveness, abundance, and difficulty to control, it has become one of the most serious of Utah's weeds.

CATALOGING FOUR CORNER TREASURES

Nature Conservancy



Straddling the region called the "Four Corners," the Colorado Plateau encompasses semi-arid sweeps of southern Utah, western Colorado, northwestern New Mexico, and northern Arizona. This realm is a vast geological showcase, boasting an unparalleled collection of monumental buttes, sandstone spires, wind-scoured mesas, shale badlands, and rugged river canyons.

The plateau also is noteworthy for its staggering accumulation of biological treasures. Within the region's tens of millions of acres is a wealth of relict natural communities that have survived despite river damming, mining booms, and livestock grazing. These remnants help make up one of the West's major strongholds of endemic wildflowers, and they sustain such singular sights as canyon-wall "hanging gardens" and coniferous trees growing miles from accustomed mountain environs. Scientists estimate that the Northern Plateau supports 19 globally endangered species of plants and another six of animals. (Eight of these are now federally protected.)

Although much of the Colorado Plateau's scenic landscapes lie within National Park Service holdings (for example, Canyonlands, Zion, and Mesa Verde National Parks), the region's relict communities have, until recently, remained largely uncataloged. Working with the Park Service since 1986, our Great Basin Office has now completed surveys within 12 national parks, monuments, and recreational areas and has located 73 relict sites to date. Conservancy scientists have established dozens of permanent photo reference points --unprecedented benchmarks by which to measure changes in desert biotas. Fortified by the findings of these landmark studies, the Conservancy and the Park Service's Rocky Mountain Region will seek to safeguard the finest of the surveyed sites by nominating them for federal research natural area status.

Reprinted from The Nature Conservancy Magazine, Sept/Oct 1990.

UTAH

Final establishment records for three important Research Natural Areas (RNAs) have been completed by Utah Public Lands Coordinator, Nick Van Pelt. Two of the proposed RNAs, Timbered Cinder Cone and Table Cliff, are on southwestern Utah's vast, densely-timbered Dixie National Forest. The Cinder Cone site has a pristine lava field and a unique "island" of tall spruce-fir forest amidst it. The Table Cliff RNA will protect a striking variety of dry forest types, several rare plants and one of the most scenic escarpments along the high plateaus.

On the Ashley National Forest at the eastern end of the Uinta Mountains, the Sims Peak RNA encompasses an exceptional concentration of glacial potholes, wet meadows, sedges, rushes and aquatic insects. When these three RNAs are officially designated this year, they will join many others in a forthcoming directory of Utah natural areas.

FENCING PROJECTS AID TWO PRESERVES

Two of Utah's rarest and most beautiful wildflowers continue their strong recovery within the Conservancy's Soldier Summit and Sevier River Valley Preserves.

At Sevier River Valley, near Panguitch, an Ecological Society of America tour group discovered a new and flourishing group of autumn buttercup plants about 300 yards from the original population. Interns with the Conservancy and the U.S. Fish and Wildlife Service are quickly responding to this extraordinary development, while continuing "intensive care" at the buttercup's original location on the preserve. Fencing of the preserve and removal of grazing livestock is credited for the increase in the number of autumn buttercup plants.

A thorough inventory is underway to locate any other plants that have recovered during this past year that the fence has been in place. Seeds collected from the new plants will be of tremendous help in artificial propagation and thus with fulfilling our recovery goals for one of the rarest of all Utah plants.

NICK VAN PELT



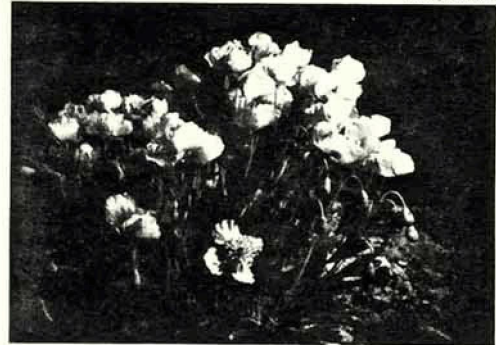
At Soldier Summit, Utah State Prison crews have completed a seven-foot fence around nearly all the surviving clay phacelia plants, stopping the grazing that has severely limited the phacelia's numbers since its rediscovery in the early 1970's. Dozens of seedlings have appeared since 1988, and the field office, together with the U.S. Fish and Wildlife Service and Brigham Young University, is working to ensure their survival and better understand this remarkable species' life history.

THREATENED BEAR CLAW POPPY RECEIVES HELP

Washington County's dwarf bear claw poppy (*Arctomecon humilis*) has for some time been at the top of Utah botanists 'worry list'. This spectacular flowering plant grows primarily on BLM and state lands near St. George, Utah. It is ranked as one of the most threatened plants in Utah because of the tremendous population growth, continued gypsum mining activity and expanded recreational use of public lands surrounding St. George.

St. George's rolling hills not only provide an appropriate home for the bear claw poppy, but are also attracting ORV users in ever-increasing numbers. This has resulted in a continued degradation and loss of critical poppy habitat. Though specific poppy areas have been officially 'closed' by the BLM and signs posted, small numbers of ORV and mountain bike users continue to ignore the closures and further damage the dwindling habitat.

GAIL JOHN GILL



dwarf bear claw poppy (*Arctomecon humilis*)

The Nature Conservancy and the BLM will carry out an experimental fencing project designed to protect the largest and most-studied poppy population located west of the Bloomington subdivision. Using privately-raised dollars, The Nature Conservancy will purchase materials and construct a two-mile, 4-strand barbed wire fence designed to "channel" ORV users away from the threatened poppies and onto an area open for ORV use.

The BLM will create new information and directional signs at the entrance to the area, supervise the construction of the fence and monitor its condition and effectiveness after completion. The State of Utah is also cooperating in the project by granting the Conservancy permission to fence across one mile of state land.

Targeted for completion in early November, the fence will get its toughest test during next spring holiday season. If the fence proves effective, it may become a management tool used to protect the dwarf bear claw poppy at other sites on public land.

Reprinted from The Nature Conservancy Great Basin Newsletter, Fall, 1990.

GOOD NEWS FOR UTAH RANGELANDS!

Gary Macfarlane

In July 1990 Uinta National Forest Supervisor Don Nebeker issued an excellent decision on nearly 57,000 acres of newly acquired Uinta National Forest land adjacent to Strawberry Reservoir. The final EIS and decision prohibit grazing, and will reconsider this decision only after recovery of the area (late 1994).

Strawberry Valley is one of Utah's most potentially productive wildlife regions. Current conditions are due to years of neglect and abuse while under private management. Riparian areas were denuded of willows and other vegetation that stabilize stream banks and provide good habitat for aquatic species.

LAKESHORE BASIN

Dick Carter

The Vernal Ranger District just announced that due, in part, to public concerns, the Lakeshore Basin, Whiterocks River and Chepeta Lake Sheep Allotments will not be filled with sheep until a complete environmental analysis utilizing an EIS is completed. The Forest Service agreed with many of the concerns raised by UWA and by many within the Forest Service as well that due to the alpine environment and unique plant and animal species, including bighorn sheep, a detailed review must be initiated before domestic sheep can be considered for grazing in the area. This represents the kind of professional decision making the Forest Service should always initiate. We commend the Vernal Ranger District!

Reprinted from Utah Wilderness Association Review, Vol. 10, No. 5, Sept/Oct 1990.

18 RARE ARIZONA PLANT SPECIES NEED YOUR HELP!

(Arizona Native Plant Society's Adopt-A-Species Program)

The Goodding onion, the Pima pineapple cactus, the Arizona willow and others are just three of the approximately 3000 species, subspecies, or varieties of plants native to the United States that are at risk of extinction in the wild. The Center for Plant Conservation estimates that 680 of these may become extinct within the next ten years. The majority of these plants are not protected under the Endangered Species Act (ESA) since their formal listings have been delayed improperly by the U.S. Fish and Wildlife Service (FWS).

A 1990 FWS report compiled by Sue Rutman identifies eighteen taxa for which the agency has sufficient information on vulnerability and threats to support proposing to list them as threatened or endangered (see list). Without Native Plant Society member support, these plants will remain among the hundreds of plant taxa which lack legal or physical protection.

People are needed to "adopt" each of these plants. An alternate approach would be to adopt one or more sites at which the plant occurs. Adopters will learn how to obtain protection for these plants under the ESA. For those plants which occur on public lands, adopters will find out how to get agencies to comply with existing conservation laws and policies for interim protection. You do not need to be a biologist or lawyer to help preserve biodiversity, so get involved! If you are interested in joining this effort, contact Julia Fonseca for information at (602) 792-2690, 315 E. Elm, Tucson, 85705.

Allium gooddingii....Goodding onion
Astragalus xiphoides....Gladiator milk vetch
Chrysothamnus molestus....Tusayan rabbitbrush
Cimicifuga arizonica....Arizona bugbane
Clematis hirsutissima var. arizonica....A. leatherflower
Coryphantha recurvata....Santa Cruz beehive cactus
Coryphantha scheeri var. robustispina....Pima pineapple cactus
Dalea tentaculoides....Gentry indigo bush
Echinomastus erectocentrus var. acunensis....Acuna cactus
Erigeron kuschei....Chiricahua fleabane
Flaveria macdougali
Pediocactus paradinei....Kaibab pincushion cactus
Pediocactus peeblesianus var. fickeiseniae....Fickeisen pincushion cactus
Penstemon discolor....Catalina beardtongue
Phaseolus supinus
Rumex orthoneurus....Blumer's dock
Salix arizonica....Arizona willow
Senecio huachuacanus...Huachuca fleabane

GENETIC CODE FOUND IN 17-MILLION-YEAR-OLD LEAF

The New York Times reported that scientists have extracted fragile strands of DNA, the genetic code of life, from a 17-million-year-old magnolia leaf that was still green when it was found embedded in sediment in an ancient lake near Moscow, ID. The site consists of layers of clay sediments that encase the remains of flowers, stems and leaves, insects and fish, that are exceptionally well-preserved because of the low oxygen content and cold temperatures of the water. Through the use of a new laboratory technique, polymerase chain reaction, (PCR), scientists were able to compare the gene sequence of the newly discovered leaf with that of a modern magnolia to see how it had changed over the years.

FACTSHEET

According to government and private sources, livestock ranching on our Western public lands:

1. Utilizes roughly **75%** of Western federal, state, and local publicly owned lands (**41 % of the West**).
2. Has destroyed more **native vegetation** than any other land use.
3. Has destroyed more wildlife and **wildlife habitat** than any other land use.
4. Has caused more **soil erosion and soil damage** than any other land use.
5. Has destroyed more **riparian area** than any other land use.
6. Has destroyed, depleted, and polluted more natural **water sources** than any other land use.
7. Has caused more ruinous **flooding** than any other land use.
8. Has caused more invasions of harmful animal "pests" and **non-native vegetation** than any other land use.
9. Has eliminated more beneficial **natural fire** than any other land use.
10. Has been responsible for more **developments** on public lands and environmental damage from developments thereon than any other land use.
11. **Produces only 3% of this country's beef.**
12. Includes roughly 30,000 permittees--only 16% of Western stockmen, only **2% of U.S. stockmen.**
13. Cost federal permittees only **\$1.86/AUM** (Animal Unit Month) in 1989 (a high year)--about 1/5th fair market value, causing, in effect, an annual loss of at least \$50 million to the U.S. Treasury.
14. Causes a total net federal, state, and local taxpayer **loss of roughly one billion dollars annually**, if all negative impacts from public lands ranching are considered.
15. Causes a total net private economic loss of roughly **one billion dollars annually.**
16. Produces an estimated \$550 million in livestock annually--far less than what taxpayers spend on the industry.
17. Rarely contributes more than **5% gross to rural economies** and actually *detracts* from many local economies if lost recreation opportunities, depleted natural resources, wasted local tax monies, damages to private property, etc., are considered.
18. **Detracts** more from **other uses** of public lands than any other land use.
19. Has caused more **political and social problems** associated with Western public lands than any other land use.

UNPS Sego Lily
c/o Janet Williams
Utah Native Plant Society
P.O. Box 520041
Salt Lake City, Utah 84152-0041

Non-Profit Org.
U.S. Postage
PAID
Salt Lake City, Utah
PERMIT No. 327

PUBLICATIONS

Desert Trees for Urban Landscapes by the Tucson Chapter of the Arizona Native Plant Society, 1989. This brochure, which doubles as a wall poster, provides detailed information about ten native trees which are suited for low-maintenance, low-water-use landscapes. \$1.00 plus a self-addressed, stamped business size envelope for the brochure or \$3.00 as a poster in a mailing tube. The Arizona Native Plant Society, P.O. Box 41206, Sun Station, Tucson, AZ 85717.

Desert Shrubs by the Arizona Native Plant Society, 1989. 35 pp. \$2.00. See address above.

The National Wildflower Research Center's Wildflower Handbook. Staff of the National Wildflower Research Center. Austin: Texas Monthly Press, 1989. 320 pp., paper, \$9.95.

The NWRC offers this book as their guide to landscaping with indigenous native plants. As such, it does provide information on a variety of related topics, including wildflower seed mixes, prairie re-creations, guidelines for collecting seed, and more. These chapters of the book are presented in a non-technical format and should prove "friendly" to a wide audience. The book's strengths, however, are its bibliographies, listings of conservation and restoration organizations, and sources for wildflower seeds and native plants.

Thanks to Lynn Jacobs, of Free Our Public Lands, P.O. Box 5784, Tucson, AZ 85703, for the information on the FACTSHEET on the previous page.

Membership Application

New Member Renewal Gift

Name _____

Street _____

City/State _____

Zip _____ Phone _____

If Gift, from: _____

Check membership category desired:

- Student/Senior\$ 5.00
- Individual\$ 10.00
- Family\$ 15.00
- Supporting\$ 30.00
- Corporate\$ 30.00 and up
- Life\$250.00

Please send a complimentary copy of the Sego Lily to the above individual.

Please enclose a check, payable to Utah Native Plant Society, and send it to:

Utah Native Plant Society
P.O. Box 520041
Salt Lake City, Utah 84152-0041

(If you prefer not to cut this out of your Sego Lily, feel free to copy the membership form or simply write the information down and mail it with payment for the category of membership.)