Inventory of the Plants at the Nathaniel and Mary Whitney Preserve at Cascade Creek and Adjoining Properties

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Project Title:

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INVENTORY OF THE PLANTS AT THE NATHANIEL AND MARY WHITNEY PRESERVE AT CASCADE CREEK AND ADJOINING CASCADE CREEK PROPERTIES.

INTRODUCTION

A baseline inventory of the plants at the Nathaniel and Mary Whitney Preserve at Cascade Creek, Cascade Springs, and Cascade Falls was completed during the 2000 field season. Plants specimens were collected and pressed. These will be mounted and labeled to include in a permanent species collection for the Preserve. Slide photography was completed, and these slides will be stored at The Nature Conservancy's Black Hills Program office. Mounted specimens of four regionally-rare species have been prepared for the Black Hills State University Herbarium, Spearfish, SD. Fungal specimens collected during the summers 1998, 1999, and 2000 are included in this inventory list, and the exsiccatae are now in the Black Hills State University Fungal Collection.

PROCEDURE

During the 2000 field season, survey work was completed weekly in April, May, and June. Biweekly surveys were completed in July, August, and September. Two of the surveys were combined with the fungal survey trips.

The survey routes that were chosen represent different plant communities of the 3,451-acre Whitney Preserve. Transects were not used for this baseline study. The enclosed map depicts the general areas that were surveyed throughout the field season, but the inventory was not restricted to those routes. Plant species were identified, photographed, and collected in other areas of the Preserve as time permitted.

Survey areas included Alabaugh Canyon, Roundtop Ridge, Overlook west of Roundtop Hill at the Whitney Preserve, Cascade Springs, and Cascade Falls (Map 1). The Hutton acquisition was not completed until late in the field season, so that part of the Preserve has not had a baseline botanical inventory. Surveys at Cascade Springs and Cascade Falls focused primarily on four regionally-rare species.

The locations of the survey areas include:

Alabaugh Canyon	T8S, R5E, Sec 20
Roundtop Ridge	T8S, R4E, Sec 14
Overlook (west of Roundtop)	T8S, R4E, Sec 2
Cascade Springs	T8S, R5E, Sec 20
Cascade Falls	T8S, R5E, Sec 30

Plants and fungi were identified and recorded. Specimens were photographed in the field with a Nikon N6006 35 mm camera equipped with an AF Micro Nikkor 60mm macrolens using Sensia II slide film. Specimens were collected for pressing and mounting.

Known locations of the four rare species were surveyed, and an attempt made to locate these species in other appropriate sites in the area. Information about previous findings was obtained from Bob Paulson, Director of the Black Hills Program of The Nature Conservancy, and the South Dakota Natural Heritage Program.

RESULTS AND DISCUSSION

SPECIES INVENTORY

A listing of the plant species identified during the 2000 field season is enclosed. This list also includes the fungal specimens that have been collected as part of a research study with Dr. Audrey Gabel during the 1998, 1999, and 2000 field seasons. The inventory includes 204 plant species and 45 fungal species. Twelve of the fungal species were collected during 2000, and 33 were collected during 1998-1999.

There are approximately 25 plant species that have not been keyed yet, including several sedges. This identification will be completed, and an addendum report will be forwarded. All fungal specimens that were collected have been identified and are included in this inventory list.

Plants

Two-hundred four plant species were identified during this inventory. There are 136 plants that have been collected and pressed. Mounted specimens will be prepared for use at the Whitney Preserve. Some of the specimens were in poor condition and were not pressed. Future collections of those specimens will be made.

Over 400 slides were taken throughout the summer to provide permanent documentation of the species inventoried. Multiple photographs were taken of some species. Slides will be stored at the Conservancy's Black Hills Program office. Not all specimens were appropriate for photographing because of condition. Pictures of more than 100 species for which slides are available are enclosed.

Fungi

Four of the less common species that were collected in 1999 were not found summer 2000. These include *Coprinus comata* (shaggy mane), *Discina perlata* (pig's ears), *Helvella acetabulum* (ribbed-stalked cup), and *Morchella esculenta* (yellow morel). The locations where they were collected in 1999 were observed numerous times during the expected time of fruiting. Yellow morels did not fruit at the Wild Horse Sanctuary this year either (Dayton Hyde, personal communication). Yellow morels have not been documented in the Hills during the three-year fungal survey, and Dr. Audrey Gabel has not observed them here prior to the study (Dr. Audrey Gabel, personal communication).

Conditions at Cascade were very dry over the summer, and numbers of specimens collected were substantially less than previous years (1998 - 38, 1999 - 45, 2000 - 22). One of the survey routes chosen on Roundtop Ridge produced numerous fungal specimens during 1999, but no specimens were collected in that location during summer 2000.

Plant Species of Interest

The following four regionally-rare species are being tracked by the SD Natural Heritage Program. Their only known occurrence in South Dakota is in the Cascade area (Map 2).

Adiantum capillus-veneris (southern maidenhair-fern) historically is known to be abundant on stream banks in J.H. Keith Picnic Ground with widely scattered clumps along Cascade Creek to Cascade Falls. It

occurs in tufa deposits at waters edge with *Epipactis gigantea* and is mostly shaded by sparse riparian zone of Russian olive, juniper and elm (SDNHP).

Adiantum capillus-veneris is still abundant on stream banks at the picnic area and occurs streamside with *Epipactis gigantea* in mostly shaded areas. Downstream from the bridge at the Brainard Indian School Road, the fern is very abundant until reaching Hutton Ranch land where there has been extensive overgrazing and trampling. Scattered clumps are present all the way to Cascade Falls. The fern is relatively abundant at the Falls even though human impacts are tremendous - and growing.

Epipactis gigantea (stream orchid) historically is known to occur on steep, mostly shaded stream banks of Cascade Springs and Creek. The EOR from August 10, 1983, reported that between 150 and 250 plants were observed growing on moist banks and islands with *Adiantum*, and fewer than 50 plants were found on private land below the picnic area (SDNHP).

There were approximately 300 plants present at the J. H. Keith Picnic Ground observed in mid-June. Two hundred feet downstream from the bridge at the Brainard Indian School Road, the orchid grows with *Adiantum* on the streambanks and islands. On July 2nd there were literally hundreds of the orchids present along the creek until reaching Hutton Ranch land downstream. However, very few are seen beyond that point, and they do not extend as far downstream as Cascade Falls.

It was interesting to note that where the boundary fence of the Hutton Ranch land extends across the creek, a "night and day" scene is created. Immediately past the fence, shading streamside vegetation disappears, as do the orchids. Smaller clumps of fern are widely scattered down to Cascade Falls, but orchids were not found that far downstream.

Cirsium arvense (Canada thistle) invasion is very extensive at the J.H. Keith Picnic Ground, intermingling with the orchids (see "Exotics" below).

Eustoma grandiflorum (tulip gentian) is historically reported as locally abundant in low, wet sandy places along Cascade Creek (SDNHD). The EOR from August 10, 1983 reported 12 plants found within 25' of the stream bank in sandy loam, with graminoids, mostly exposed. One plant was found in 1983 at the Forest Service picnic area (SDNHD).

Many years ago, the gentian was known in a disturbed area in Alabaugh Canyon where horses made multiple crossings of Cool Creek (Bob Paulson and Cindy Reed, personal communication). Cindy Reed located a large number of the gentians at Fargo Lake in July of 1999 on land adjacent to the Whitney Preserve (Cindy Reed and Bob Paulson, personal communication). Photographs of the gentians taken by Cindy Reed document the large population found. In the TNC office, a slide of one tulip gentian is labeled "Cascade Springs, August 1998". This location was apparently misidentified (Bob Paulson, personal communication). The slide was taken by a volunteer photographer from Alabama and is the only information I have available for 1998.

On July 20, 2000, I observed 25 plants near Fargo Lake (N43°19'11.9", W103°32'53.2"). This is the same location where Cindy Reed found the gentians in 1999 (Marc Lamphere, personal communication). They were growing in conditions similar to those reported in 1983 - within 20' of the lake bank, mostly exposed, in an old two-track area. Associated plants included *Panicum virgatum*, *Hordeum jubatum*, *Spartina* pectinata, sedges, and *Glycyrrhiza lepidota*. Twenty plants were close to the lake, 3 were on the hillside opposite the lake, and 2 were downstream of the lake by the cattail pond that is directly south of

the lake dam. The only white gentian found was at that pond.

At the time of observation on August 5th, the plants had suffered heavy predation by grasshoppers. Some had already gone to seed. One week later, fire lines created by bulldozers because of the Flag Pole fire eliminated the plants by the cattail pond. The plants next to the lake were unharmed, and the seeds have been harvested for planting this fall.

The gentian population at Fargo Lake in 1999 was quadruple what it was in 2000 (Marc Lamphere, personal communication). Multiple sites in the project area were observed summer 2000, and this small population was the only one found. One specimen was collected for the BHSU Herbarium (without roots).

Eleocharis rostellata (beaked spikerush) is a tufted perennial sedge with flattened, wiry stems 1.3 to 3.3 feet long and beaked achenes. It regenerates by seed or vegetatively by sprouting and layering. It sprouts from short shallow rhizomes, and it has elongated layering culms which arch to the ground and root in moist soil from the apical bulbil. Beaked spikerush is an obligate wetland species and occurs in many types of alkaline wetlands, including hot spring edges (www.fs.fed.us/database).

Historically, beaked spikerush has been known in large stands along Cascade Creek from J.H. Keith Picnic Ground downstream to Cascade Falls (EOR of August 10, 1983 - SDNHP). Presently, beaked spikerush is very abundant along the streambanks below the Falls, and it forms extensive mats on both sides of the creek upstream from the Falls. Specimens were collected that include the elongated layering culms. The identification of *Eleocharis rostellata* was confirmed by Dr. Mark Gabel at Black Hills State University. Specimens were given to Dr. Gabel for inclusion in the BHSU Herbarium.

Other Species

Echinocereus viridifloris (hedgehog cactus) was observed on Roundtop Ridge in 1999 and 2000. Approximately 50 flowering plants were seen growing in dry, sandy soil on May 19, 2000 (N43°21'33.0", W103°36'07.9"). The cactus is much more difficult to see when not in bloom and may have been missed in other locations on the Preserve. The identification of this species was confirmed by Dr. Mark Gabel.

Coryphantha missouriensis (pincushion cactus) was observed in dry, rocky areas in Alabaugh Canyon, on Roundtop Ridge, and in a ravine diverging from Cascade Ridge.

Exotics

Cirsium arvense (Canada thistle) is extensive at Cascade Springs at J. H. Keith Picnic Ground and at Cool Springs in Alabaugh Canyon. Beth Burkhart, Botanist at Buffalo Gap National Grasslands, has spearheaded efforts to remove the thistle at Cascade Springs by pulling and/or mechanical applications. Efforts at this time have focused on removal of thistles crowding out the orchids below the gazebo. Beth has proposed that a weed district be established for the Cascade area and is working with Bob Paulson from TNC.

Tamarix ramosissima (salt cedar) was discovered by Gary Marrone during a butterfly survey on June 2, 2000. It appears to be one tree with multiple stems, and is located on Forest Service property along the irrigation ditch above Cascade Falls. Arrangements are being made by the USFS for removal.

Elaeagnus angustifolia (Russian olive) is extensive along Cascade Creek and into Alabaugh Canyon. The Nature Conservancy has a cooperative plan with the Forest Service to remove the trees over a ten-year period.

VEGETATIVE CLASSIFICATIONS

The following community classifications are suggested for the survey areas. It is not possible to prepare a complete mapping of the communities at the Whitney Preserve as additional work is needed.

VEGETATIVE CLASSIFICATION	ASSOCIATIONS/COMMUNITIES OBSERVED
BLACK HILLS (ROCKY MOUNTAINS) DRY CONIFER FORESTS & WOODLANDS	*Pinus ponderosa - Juniperus scopulorum* Woodland Ponderosa Pine - Rocky Mountain Juniper Woodland
GREAT PLAINS MIXEDGRASS PRAIRIES	*Pascopyrum smithii-Bouteloua gracilis-Carex filifolia* Herbaceaous Vegetation (Western Wheatgrass - Blue Grama - Threadleaf Sedge Prairie)
GREAT PLAINS WOODED RIPARIAN AREAS	*Populus deltoides - (Salix amygdaloides)/Salix exigua* Woodland Eastern Cottonwood - (Peachleaf Willow)/Sandbar Willow Woodland
GREAT PLAINS FRESHWATER WET MEADOWS/MARSHES	*Typha* spp. - *Scirpus* spp. Mixed Herbs Great Plains Herbaceous Vegetation

Plant communities observed at the Whitney Preserve were described from *International Classification Ecological Communities: Terrestrial Vegetation of the Midwestern United States* (Faber-Langendoen (editor), DRAFT 1999) and *Black Hills Community Inventory* (Marriott, et al., 1999). **Site-specific information follows each of the descriptions (bold type)**.

GREAT PLAINS MIXEDGRASS PRAIRIES. Prairies/grasslands occur on mineral soils over a wide range of depths. Temperature, droughts, and fire limit woody canopy encroachment (woody cover does not exceed 10%), and herbaceous cover is generally continuous. Great Plains mixedgrass prairies/grasslands are dominated by medium and short graminoids. The midgrass stratum is dominated by *Pascopyrum smithii* (western wheatgrass). Short graminoids are very abundant in this community type with the most common including *Bouteloua gracilis* (blue grama) and *Carex filifolia* (threadleaf sedge). Forbs do not contribute much of the canopy cover, but they are scattered throughout this community. Shrubs are a very minor component of the vegetation. This community is found on flat or gently sloping terrain. The soils are clay loam, silt loam, or loam and usually deep and fertile. Fire was likely a common event in this type historically. The *Pascopyrum smithii - Bouteloua gracilis -Carex filifolia* community is widespread in the Great Plains area (Faber-Langendoen (editor), DRAFT 1999).

***Pascopyrum smithii - Bouteloua gracilis - Carex filifolia* Herbaceous Vegetation community dominates the drier upland prairie on Roundtop Ridge. There are scattered patches of *Calamovilfa longifolia* (prairie sandreed). *Yucca glauca* (soapweed), *Artemisia frigida* (fringed sage), *Stipa comata* (needle-and-thread), *Koeleria macrantha* (prairie junegrass), *Opuntia polyacantha* (plains**

prickly pear*), Opuntia macrorhiza* (bigfoot prickly pear), and *Echinocereus viridifloris (*hedgehog cactus) also occur here. *Rhus aromatica*(skunkbush sumac) is very abundant throughout this site.

GREAT PLAINS WOODED RIPARIAN ZONE. The Great Plains Wooded Riparian Zone classification includes a floodplain or riparian wetland typically with channel features, where annual or periodic inundation of water occurs over the surface, often with subsequent drying by early- or mid-growing season (Faber-Langendoen (editor), DRAFT 1999). The *Populus deltoides-(Salix amygdaloides)/Salix exigua* Woodland community has an open canopy dominated by *Populus deltoides* (eastern cottonwood), *Salix amygdaloides* (peachleaf willow) is absent to common. *Fraxinus pennsylvanica* (green ash) may be present on the upland side, and closely spaced shrubs and small trees are present. *Salix exigua* (sandbar willow) is usually more abundant along the streamside margins of this community and where the canopy of taller trees is most open and immediately following a scouring event. Other shrubs found here include *Symphoricarpos occidentalis* (western snowberry). Graminoids adapted to mesic sites dominate the understory. This community is found along the banks of streams and rivers, usually within 100 feet of the stream channel. It develops on newly deposited alluvium. The soils are predominantly sand and are poorly developed. The water table fluctuates with the level of the river and flooding is common, especially in the spring. This type is subject to, and maintained by, periodic flooding. Thirty years post-flood, this type will likely transition into a grassland type, as the cottonwood and willow species do not regenerate (Faber-Langendoen (editor), DRAFT 1999).

Populus deltoides - (Salix amygdaloides)/Salix exigua **Woodland community is suggested as the vegetative classification for the Cool Creek riparian area in Alabaugh Canyon and for the Cascade Creek riparian area. In Alabaugh Canyon, the open canopy is dominated by *Populus deltoides* (eastern cottonwood) and** *Salix amygdaloides* **(peachleaf willow). *Salix exigua* (sandbar willow) does not occur here, and there is extensive invasion by *Elaegnus angustifolia* (Russian olive). *Populus deltoides* (eastern cottonwood) and** *Salix amygdaloides* **(peachleaf willow) are also dominant downstream from the bridge. *Salix exigua* (sandbar willow) is again absent in this area. At the Cascade Falls area, some sandbar willow is present. There is invasion here by *Elaegnus angustifolia* (Russian olive) and *Juniperus scopulorum* (Rocky Mountain juniper).**

BLACK HILLS (ROCKY MOUNTAINS) DRY CONIFER FORESTS & WOODLANDS. The *Pinus ponderosa - Juniperus scopulorum* Woodland (Ponderosa Pine - Rocky Mountain Juniper Woodland) community has a dense to moderately open canopy of *Pinus ponderosa (*ponderosa pine) that is typically 10-20 m high. *Juniperus scopulorum* (Rocky Mountain juniper) forms a subcanopy that is 2-4 m high and is also moderately dense to open. There is usually a shrub layer, but the herbaceous layer is sparse or absent, especially under areas of dense canopy or on very steep, eroding slopes. Where the herbaceous stratum is present, it is dominated by prairie graminoids, including *Bouteloua curtipendula* (sideoats grama), *Bouteloua gracilis* (blue grama), *Carex filifolia* (thread-leaved sedge), and *Schiza-chyrium scoparium* (little bluestem). This community is found primarily on slopes between 16-45% with a variety of aspects. The bedrock can be sandstone, limestone or shale. Soils are usually well drained, shallow, very stony, clay loams, silt loams, and sandy loams (Faber-Langendoen (editor), DRAFT 1999).

This community is the dominant woodland community on the Whitney Preserve, including Alabaugh Canyon and Roundtop Ridge. The dominant graminoid in these woodlands is *Schizachyrium scoparium* (little bluestem). This woodland was not classified as a *Pinus ponderosa - (*ponderosa pine) - *Schizachyrium scoparium* (little bluestem) Woodland as *Juniperus scopulorum* (Rocky Mountain juniper) is co-dominant with *Pinus ponderosa* (ponderosa pine).

GREAT PLAINS FRESHWATER WET MEADOWS/MARSHES. The wet meadows and marshes are mineral wetlands or peatlands that are periodically inundated by standing or slowly moving water or subject to seasonal saturation. Surface water levels may fluctuate seasonally, with declining levels exposing drawdown zones of matted vegetation or mudflats, or drying out of the surface horizon. Marshes characteristically show zonal or mosaic surface patterns composed of pools or channels interspersed with clumps of emergent sedges, grasses, rushes, and reeds (Faber-Langendoen (editor), DRAFT 1999).

The *Typha* spp. - *Scirpus* spp. - Mixed Herbs Great Plains Herbaceous Vegetation (Great Plains Cattail - Bulrush Marsh) is suggested for the ephemeral cattail pond west of Roundtop Ridge (T8S, R4E, Sec 2. There is a spring on a lower cattail pond (T8S, R4E, Sec 24). *Typha latifolia* provides the dominant vegetation with *Scirpus* spp. secondary.

These ponds were not completely evaluated during this baseline inventory, and they need further study to establish the appropriate classification. The smaller pond is close to the overlook west of Roundtop Hill, and the lower cattail pond is approximately one mile up on Roundtop Ridge. Both ponds dried up this summer which is unusual for the lower pond.

OTHER

***Artemisia tridentata* (big sagebrush) was observed in only one area during the survey. This is a large area at the top of Roundtop Ridge that encompasses the area of the lower cattail pond. Though it is a relatively large area, I do not feel that it represents a separate community type.**

CONCLUSIONS

The Cheyenne River Canyons is a designated portfolio site of The Nature Conservancy (TNC). It is located in Fall River County, south of Hot Springs, SD. The site includes thirteen adjacent canyons. Also included in this site is the unique warm spring community of Cascade Springs, one of only two in the Black Hills (the other one is in Hot Springs and is commercially developed). The Nature Conservancy owns the 3,451-acre Nathaniel and Mary Whitney Preserve at Cascade Creek within this site. With the recent acquisition of the 1,051-acre Hutton Ranch, a second mile of Cascade Creek has been preserved.

A baseline inventory of the plants present at the Whitney Preserve and adjoining Cascade Creek properties during the summer of 2000 has been completed. The four regionally-rare species were all observed. There appear to be viable populations of three of the species: ***Eleocharis rostellata*** (beaked spikerush), ***Adiantum capillus-veneris*** (southern maidenhair-fern), and ***Epipactis gigantea*** (stream orchid). These populations are located on US Forest Service land and on Conservancy property. The viability of ***Eustoma grandiflorum*** (tulip gentian) is questionable. The only known population here is on private land that is being developed, and it is only a fourth of what it was in 1999. ***Eustoma grandiflorum*** also grows in eastern Colorado, and G. K. Guennel (1995) noted in the *Guide to Colorado Wildflowers* that this gentian is nearly extinct.

Future surveys at the Nathaniel and Mary Whitney Preserve at Cascade Creek should include additional plant inventories with community classification mapping. Monitoring of the rare species should be ongoing, and hopefully measures can be taken to ensure a stable population of the beautiful tulip gentian.

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SPECIES ENCOUNTERED
SUMMER 2000

NATHANIEL AND MARY WHITNEY PRESERVE AT CASCADE CREEK, CASCADE SPRINGS, and CASCADE FALLS

*** Exotic species**
+ Specimen collected & pressed

SCIENTIFIC NAME	VERNACULAR NAME	FAMILY
Trees		
Acer negundo L.	Boxelder	Aceraceae
+**Elaeagnus angustifolia* L.	Russian olive	Elaegnaceae
Fraxinus pennsylvanica Marsh.	Green ash	Oleaceae
+*Juniperus scopulorum* Sarg.	Rocky Mountain juniper	Cupressaceae
+*Morus alba* L.	Mulberry	Moraceae
Pinus ponderosa Laws.	Ponderosa pine	Pinaceae
Populus deltoides Marsh.	Cottonwood	Salicaceae
Populus tremuloides Michx.	Quaking aspen	Salicaceae
Ulmus americana L.	American elm	Ulmaceae
Short Shrubs		
Artemisia cana Pursh	Dwarf sagebrush	Asteraceae
+*Artemisia filifolia* Torr.	Sand sagebrush	Asteraceae
Artemisia tridentata Nutt.	Big sagebrush	Asteraceae
Chrysothamnus nauseosus (Pall.) Britt.	Rabbit brush	Asteraceae
Juniperus communis L.	Common juniper	Cupressaceae
Prunus virginiana L.	Chokecherry	Rosaceae
+*Rhus aromatica* Ait.	Skunkbush sumac	Anacardiaceae
+*Ribes odoratum* Wendl.	Buffalo currant	Grossulariaceae
Ribes cereum Dougl.	Western red currant	Grossulariaceae
+*Rosa arkansana* Porter	Prairie wild rose	Rosaceae
+*Rosa woodsii* Lindl.	Western wild rose	Rosaceae
+*Salix exigua* Nutt.	Sandbar willow	Salicaceae
Salix amygdaloides Anderss.	Peachleaf willow	Salicaceae
+*Symphoricarpos occidentalis* Hook.	Western snowberry	Caprifoliaceae
**Tamarix ramosissima* Ledeb.	Salt cedar	Tamaricaceae
Yucca glauca Nutt.	Soapweed	Agavaceae
Vines		
+*Parthenocissus vitacea* (Knerr.) A.S. Hitchc.	Woodbine	Vitaceae
+*Vitis riparia* Michx.	Riverbank grape	Vitaceae
Graminoids		
**Agropyron cristatum* (L.) Gaertn.	Crested wheatgrass	Poaceae
Agropyron intermedium (Host) Beauv.	Intermediate wheatgrass	Poaceae
+**Agrostis stolonifera* L.	Redtop	Poaceae
+*Andropogon gerardii* Vitman	Big bluestem	Poaceae

SCIENTIFIC NAME	VERNACULAR NAME	FAMILY
Aristida purpurea Steud.	Red threeawn	Poaceae
+*Bouteloua curtipendula* (Michx.) Torr.	Sideoats grama	Poaceae
Bouteloua gracilis (H.B.K.) Lag. ex Griffiths	Blue grama	Poaceae
**Bromus inermis* Leyss.	Smooth brome	Poaceae
**Bromus japonicus* Thunb. ex Murr.	Japanese brome	Poaceae
**Bromus tectorum* L.	Downy brome	Poaceae
Buchloe dactyloides (Nutt.) Engelm.	Buffalograss	Poaceae
+*Calamovilfa longifolia* (Hook.) Scribn.	Prairie sandreed	Poaceae
+*Carex filifolia* Nutt.	Threadleaf sedge	Cyperaceae
+*Carex heliophila* Macken.	Sun sedge	Cyperaceae
+*Dactylis glomerata* L.	Orchardgrass	Poaceae
+*Dichanthelium oligosanthes* (Schult.) Gould var. *scribnerianum* (Nash) Gould	Scribner dichanthelium	Poaceae
+*Distichlis spicata* (L.) Greene	Saltgrass	Poaceae
+*Echinochloa crusgallli* (L.) Beauv.	Barnyardgrass	Poaceae
+*Eleocharis rostellata* Torr.	Beaked spikerush	Cyperaceae
+*Equisetum laevigatum* A. Br.	Smooth scouring rush	Equisetaceae
+*Elymus canadensis* L.	Canada wildrye	Poaceae
+*Hordeum jubatum* L.	Foxtail barley	Poaceae
+*Koeleria macrantha* (Ledeb.) Schult.	Prairie junegrass	Poaceae
+*Muhlenbergia racemosa* (Michx.) B.S.P.	Marsh muhly	Poaceae
Nasella viridula (Trin.) Britt.	Green needlegrass	Poaceae
+*Oryzopsis micrantha* (T. & R.) Thurb.	Littleseed ricegrass	Poaceae
Panicum capillare L.	Witchgrass	Poaceae
+*Panicum virgatum* L.	Switchgrass	Poaceae
Pascopyrum smithii (Rydb.) Love	Western wheatgrass	Poaceae
+*Phragmites australis* (Cav.) Trin.	Common reed	Poaceae
Poa compressa L.	Canada bluegrass	Poaceae
Poa palustris L.	Fowl bluegrass	Poaceae
+**Polypogon monspeliensis* (L.) Desf.	Rabbitfoot grass	Poaceae
+*Schizachyrium scoparium* (Michx.) Nash-Gould	Little bluestem	Poaceae
+*Scirpus* sp.	Bulrush	Cyperaceae
+*Sorghastrum nutans* (L.) Nash	Indian grass	Poaceae
+*Spartina pectinata* Link.	Prairie cordgrass	Poaceae
+*Sporobolus* sp.	Dropseed	Poaceae
+*Stipa comata* Trin. & Rupr.	Needle-and-thread	Poaceae
Typha latifolia L.	Broad leaved cattail	Typhaceae
Forbs		
+*Achillea millefolium* L.	Yarrow	Asteraceae
+*Agastache foeniculum* (Pursh) O. Ktze.	Lavendar hyssop	Lamiaceae
Allium textile Nels. & Macbr.	Wild onion	Liliaceae
+*Ambrosia artemisiifolia* L.	Common ragweed	Asteraceae
+*Ambrosia trifida* L.	Giant ragweed	Asteraceae
+*Amorpha canescens* Pursh	Leadplant	Fabaceae
Anemone cylindrica A. Gray	Candle anemone	Ranunculaceae
+*Anemone patens* L.	Pasque flower	Ranunculaceae
+*Antennaria microphylla* Rydb.	Pink pussy-toes	Asteraceae
Apocynum androsaemifolium L.	Spreading dogbane	Apocynaceae
Arctium minus Bernh.	Common burdock	Asteraceae
+*Arenaria hookeri* Nutt.	Desert sandwort	Caryophyllaceae
+*Argemone polyanthemos* (Fedde) GBO.	Prickly poppy	Papaveraceae

SCIENTIFIC NAME	VERNACULAR NAME	FAMILY
+*Artemisia campestris* L.	Western sagebrush	Asteraceae
+*Artemisia dracunculus* L.	Silky wormwood	Asteraceae
+*Artemisia frigida* Willd.	Fringed sage	Asteraceae
+*Artemisia ludoviciana* Nutt.	White sage	Asteraceae
+*Asclepias incarnata* L.	Swamp milkweed	Asclepiadaceae
+*Asclepias pumila* (A. Gray) Vail	Dwarf milkweed	Asclepiadaceae
+*Asclepias speciosa* Torr.	Showy milkweed	Asclepiadaceae
+*Asclepias stenophylla* Gray	Narrow leaved milkweed	Asclepiadaceae
Asparagus officinalis L.	Wild asparagus	Liliaceae
+*Astragalus adsurgens* Pall.	Standing milkvetch	Fabaceae
+*Astragalus crassicarpus* Nutt.	Ground plum	Fabaceae
+*Astragalus gilviflorus* Sheld.	Plains orophaca	Fabaceae
+*Astragalus gracilis* Nutt.	Slender milkvetch	Fabaceae
+*Aster falcatus* Lindl.	White prairie aster	Asteraceae
+*Calochortus nuttallii* T. & G.	Sego lily	Liliaceae
+*Calylophus serrulatus* (Nutt.) Raven	Yellow primrose	Onagraceae
Camelina microcarpa Andrz. ex D.C	Smallseed falseflax	Brassicaceae
+*Campanula rotundifolia* L.	Harebell	Campanulaceae
Cerastium arvense L.	Mouse ear chickweed	Caryophyllaceae
Chenopodium album L.	Lamb's quarters	Chenopodiaceae
**Cirsium arvense* (L.) Scop.	Canada thistle	Asteraceae
Cirsium undulatum (Nutt.) Spreng.	Wavy-leaved thistle	Asteraceae
Clematis ligusticifolia Nutt.	Western virgin's bower	Ranunculaceae
+*Cleome serrulata* Pursh	Bee plant	Capparaceae
Collomia linearis Nutt.	Slenderleaf collomia	Polemoniaceae
Convolvulus arvensis L.	Field bindweed	Convolvulaceae
+*Conyza canadensis* (L.) Cronq.	Horseweed	Asteraceae
+*Corydalis aurea* Willd.	Golden corydalis	Fumariaceae
*Coryphantha missouri*ensis (Sweet) Britt. & Rose	Missouri pincushion	Cactaceae
Cynoglossum officinale L.	Houndstongue	Boraginanceae
+*Dalea aurea* Nutt.	Silktop dalea	Fabaceae
+*Dalea candida* Michx.	White prairie clover	Fabaceae
+*Dalea enneandra* Nutt.	Nine anther dalea	Fabaceae
+*Dalea purpurea* Vent.	Purple prairie clover	Fabaceae
+*Echinacea angustifolia* DC.	Purple coneflower	Asteraceae
Echinocereus viridiflorus Engelm.	Hedgehog cactus	Cactaceae
+*Epipactis gigantea* Dougl.	Stream orchid/giant helleborine	Orchidaceae
+*Eriogonum annuum* Nutt.	Common buckwheat	Polygonaceae
+*Erigeron strigosus* Muhl. ex Willd.	Daisy fleabane	Asteraceae
+*Erysimum asperum* (Nutt.) DC.	Western wallflower	Brassicaceae
+*Euphorbia marginata* Pursh	Snow on the mountain	Euphorbiaceae
+*Eustoma grandiflorum* (Raf.) Shinners	Tulip gentian	Gentianaceae
+*Euthamia graminifolia* (L.) Nutt.	Grass-leaved goldenrod	Asteraceae
+*Galium aparine* L.	Bedstraw/cleavers	Rubiaceae
+*Gaura coccinea* Pursh	Scarlet gaura	Onagraceae
+*Gaura parviflora* Dougl.	Velvety gaura	Onagraceae
+*Geum triflorum* Pursh	Prairie smoke	Rosaceae
+*Glycyrrhiza lepidota* Pursh	Licorice	Fabaceae
Grindelia squarrosa (Pursh) Dun.	Gumweed	Asteraceae
Gutierrezia sarothrae (Pursh) Britt. & Rusby	Broom snakeweed	Asteraceae
Hedeoma hispida Pursh	False pennyroyal	Lamiaceae
+*Helianthus annus* L.	Common sunflower	Asteraceae
+*Heterotheca villosa* (Pursh) Skinners	Hairy goldaster	Asteraceae
+*Heuchera richardsonii* R. Br.	Alum root	Saxifragaceae

SCIENTIFIC NAME	VERNACULAR NAME	FAMILY
+*Hymenoxys acaulis* (Pursh) Parker	Stemless hymenoxys	Asteraceae
+*Ipomoea leptophylla* Torr.	Bush morning glory	Convolvulaceae
Kochia scoparia (L.) Schrad.	Summer cypress	Chenopodiaceae
+*Lepidium densiflorum* Schrader	Peppergrass	Brassicaceae
Lesquerella ludoviciana (Nutt.) Wats.	Bladderpod	Brassicaceae
+*Leucocrinum montanum* Nutt.	Mountain lily	Liliaceae
+*Liatris punctata* Hook.	Dotted gayfeather	Asteraceae
Linum perenne L.	Blue flax	Linaceae
Lithospermum incisum Lehm.	Fringed puccoon	Boraginaceae
+*Lobelia siphilitica* L.	Blue cardinal flower	Campanulaceae
+*Lomatium foeniculaceum* (Nutt.) Coult. & Rose	Desert biscuitroot	Apiaceae
+*Lupinus* sp.	Lupine	Fabaceae
+*Lygodesmia juncea* (Pursh) Hook.	Skeleton plant	Asteraceae
+*Maianthemum stellatum* (L.) Link	Spikenard	Liliaceae
**Medicago lupulina* L.	Black medic	Fabaceae
**Medicago sativa* L.	Alfalfa	Fabaceae
+**Melilotus alba* Medic.	White sweet clover	Fabaceae
+**Meliotus officinalis* (L.) Pall.	Yellow sweet clover	Fabaceae
+*Mentzelia decapetala* (Pursh) Urb. & Gilg	Tenpetal mentzelia	Loasaceae
+*Mertensia lanceolata* (Pursh) A. DC.	Bluebells	Boraginaceae
+*Mirabilis linearis* (Pursh) Hiemerl.	Narrow-leaved four-o'clock	Nyctaginaceae
Monarda fistulosa L.	Wild bergamot	Lamiaceae
+*Musineon tenuifolium* Nutt.	Threadleaf musineon	Apiaceae
+*Nasturtium officinale* R. Br.	Watercress	Brassicaceae
+*Nepeta cataria* L.	Catnip	Lamiaceae
Oenothera biennis L.	Thin-leaved evening primrose	Onagraceae
+*Onosmodium molle* Michx.	False gromwell	Boraginaceae
Opuntia macrorhiza Engelm.	Bigfoot pricklypear	Cactaceae
Opuntia polyacantha Haw.	Plains prickly pear	Cactaceae
Orobanche fasciculata Nutt.	Broomrape	Orobanchaceae
+*Orthocarpus luteus* Nutt.	Owl clover	Scrophulariaceae
+*Oxytropis lambertii* Pursh	Purple locoweed	Fabaceae
+*Oxytropis sericea* Nutt.	White locoweed	Fabaceae
+*Penstemon albidus* Nutt.	White beardtongue	Scrophulariaceae
+*Penstemon gracilis* Nutt.	Slender beardtongue	Scrophulariaceae
+*Penstemon grandiflorus* Nutt.	Large beardtongue	Scrophulariaceae
Phlox andicola Nutt.	Moss phlox	Polemoniaceae
+*Physalis virginiana* Mill.	Virginia ground cherry	Solanaceae
**Plantago major* L.	Broadleaf plantain	Plantaginaceae
+*Plantago patagonica* (Jacq.)	Woolly plantain	Plantaginaceae
+*Polygala alba* Nutt.	White milkwort	Polygalaceae
+*Psoralea argophylla* Pursh	Silver scurf pea	Fabaceae
Psoralea esculenta Pursh	Prairie turnip	Fabaceae
+*Psoralea tenuiflora* (Pursh) Rydb.	Wild alfalfa	Fabaceae
+*Ratibida columnifera* (Nutt.) Woot.&Standl.	Prairie coneflower	Asteraceae
+*Ranunculus* sp.		Ranunculaceae
+*Rumex crispus* L.	Curly dock	Polygonaceae
+*Sisyrinchium montanum* Greene	Blue eyed grass	Iridaceae
+*Sphaeralcea coccinea* (Pursh) Rydb.	Scarlet mallow	Malvaceae
+*Solidago rigida* L.	Rigid goldenrod	Asteraceae
+*Solidago missouriensis* Nutt.	Prairie goldenrod	Asteraceae
**Taraxacum officinale* Weber	Common dandelion	Asteraceae
**Thlaspi arvense* L.	Field pennycress	Brassicaceae
Toxicodendron rydbergii (Small) Greene	Poison ivy	Anacardiaceae

SCIENTIFIC NAME	VERNACULAR NAME	FAMILY
+*Tradescantia bracteata* Small	Common spiderwort	Commelinaceae
+**Tragopogon dubius* Scop.	Western salsify	Asteraceae
Tribulus terrestris L.	Puncture vine	Anacardiaceae
+*Trifolium hybridum* L.	Alskike clover	Fabaceae
+*Triodanis leptocarpa* (Nutt.) Nieuw.	Venus' looking glass	Campanulaceae
+*Triodanis perfoliata* (L.) Nieuw.	Venus' looking glass	Campanulaceae
Urtica dioica L.	Stinging nettle	Urticaceae
+**Verbascum thapsus* L.	Mullein	Scrophulariaceae
+*Verbena bracteata* Lag. & Rodr.	Prostrate vervain	Verbenaceae
+*Verbena hastata* L.	Blue vervain	Verbenaceae
+*Verbena stricta* L.	Woolly vervain	Verbenaceae
+*Viola nuttallii* Pursh	Yellow prairie violet	Violaceae
Xanthium strumarium L.	Cocklebur	Asteraceae
+*Zigadenus venenosus* Wats.	Death camas	Liliaceae
Ferns		
+*Adiantum capillus-veneris* L.	Southern maidenhair fern	Polypodiaceae
+*Pellaea atropurpurea* (L.) Link	Purple-stemmed cliffbrake	Polypodiaceae
Fungi		
Agaricales		
Agaricus silvicola (Vitt.) Sacc.		Agaricaceae
Amanita sp.		Amanitaceae
Amanita vaginata (Bull.:Fr.) Quel.		Amanitaceae
Clitocybe albirhiza Bigelow & Smith		Tricholomataceae
Clitocybe gibba (Fr.) Kummer		Tricholomataceae
Collybia dryophila (Bull.:Fr.) Kummer		Tricholomataceae
Coprinus comatus (Fr.) S.F. Gray		Coprinaceae
Hygrophorus chrysodon (Fr.) Fr.		Hygrophoraceae
Hygrophorus coccineus (Fr.) Fr.		Hygrophoraceae
Hygrophorus speciosus Peck		Hygrophoraceae
Inocybe fastigiata (Schaeff.ex Fr.) Quel.		Cortinariaceae
Lepiota clypeolaria (Bull.ex Fr.) Kummer		Agaricaceae
Leucopaxillus albissimus (Pk.) Singer		Tricholomataceae
Leucopaxillus laterarius (Pk.) Singer & Smith		Tricholomataceae
Marasmius oreades (Bolton:Fr.) Fr.		Tricholomataceae
Pleurotus ostreatus (Jacq.:Fr.) Kummer		Polyporaceae
Russula fragrantissima group		Russulaceae
Russula sp.		Russulaceae
Suillus granulatus (Fr.) Kuntze		Boletaceae
Aphyllophorales		
Ganoderma applanatum (Pers.) Patouillard		Ganodermataceae
Phellinus pini (Fr.) Ames		Polyporaceae
Spongipellis pachydon (Pers.) Kotl. & Pouz.		Polyporaceae
Trichaptum biforme (Fr. In Klotzch) Ryv.		Polyporaceae
Ascomycetes		
Discina perlata (Fries) Fries		Helvellaceae
Helvella acetabulum (Fr.) Quel.		Helvellaceae
Morchella esculenta Fr.		Morchellaceae
Parodiella sp.		Venturiaceae

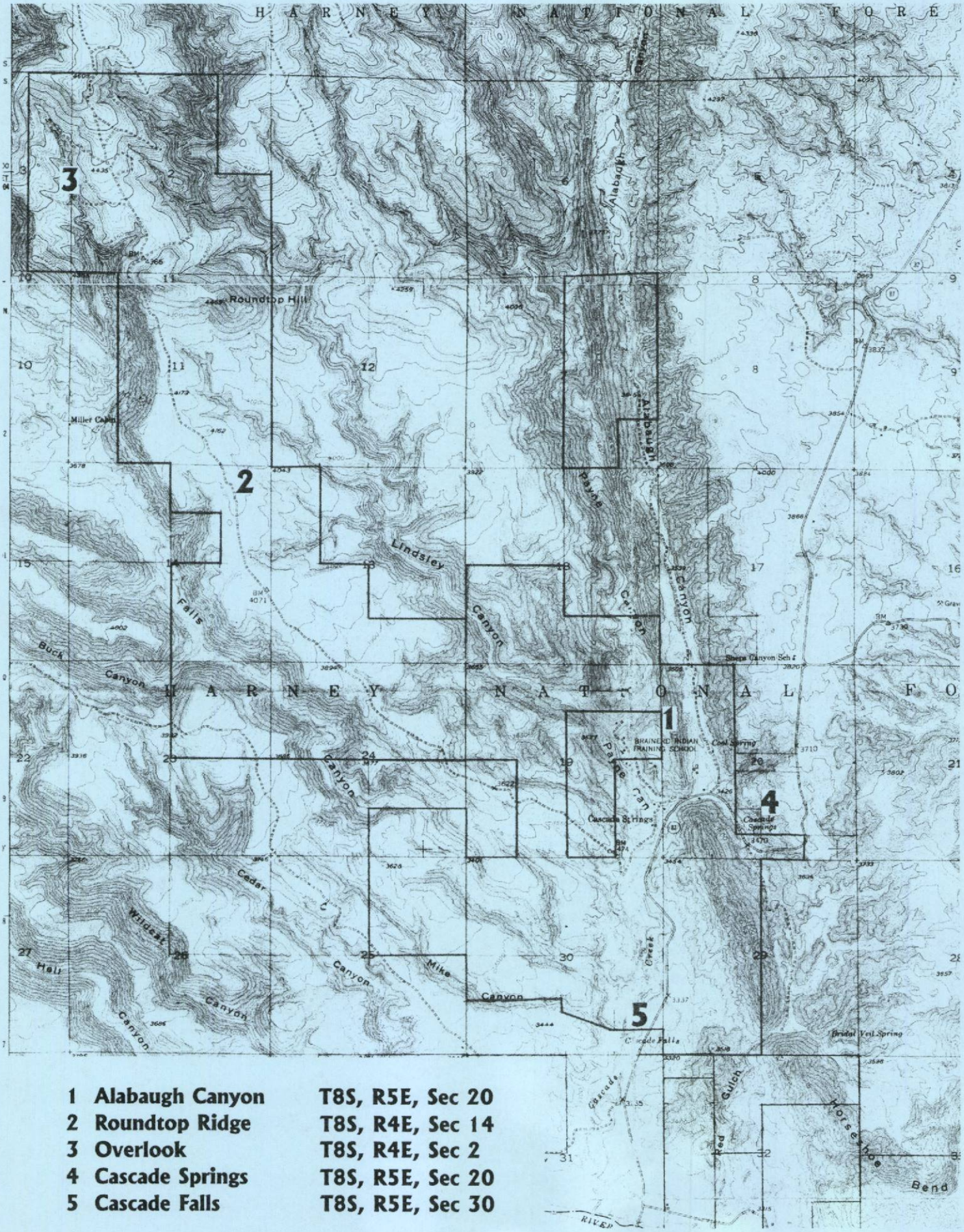
SCIENTIFIC NAME	VERNACULAR NAME	FAMILY
Gasteromycetes		
Calvatia cyathiformis (Bosc) Morgan	Purple-spored puffball	Lycoperdaceae
Calvatia gigantea (Bat. ex Pers.) Lloyd	Giant puffball	Lycoperdaceae
Geastrum campestre (Morg.) Kambly & Lee	Earthstar	Geastraceae
Lycoperdon perlatum Persoon	Common puffball	Lycoperdaceae
Phallus impudicus Persoon	Stinkhorn	Phallaceae
Tulostoma brumale Persoon	Stalked puffball	Tulostomataceae
Myxomycetes		
Fuligo megaspora Sturgis	Slime mold	Physaraceae
Fuligo septica (L.) Weber	Slime mold	Physaraceae
Lycogala epidendrum (L.) Fr.	Slime mold	Reticulariaceae
Lichens		
Acarospora chlorophana (Ach.) Mass.		Acarosporaceae
Cladonia sp.		Cladoniaceae
Parmelia ulophyllodes (Vain.) Sav.		Parmeliaceae
Psora decipiens (Ach.) Hoffm.		Psoraceae
Usnea hirta (L.) Wigg.		Usneaceae
*Xanthoparmelia chlorochroa*Tuck.		Parmeliaceae
Xanthoparmelia cumberlandia (Gyel.) Hale		Parmeliaceae
Xanthoparmelia subramigera (Gyel.) Hale		Parmeliaceae
Xanthoria fiallax (Hepp.) Arn		Teloschistaceae

SCIENTIFIC NAME	VERNACULAR NAME	FAMILY
AVES		
Agelaius phoeniceus	Red-winged blackbird	Emberizidae
Aix sponsa	Wood duck	Anatidae
Anas platyrhynchos	Mallard	Anatidae
Aquila chrysaetos	Golden eagle	Accipitridae
Bombycilla cedrorum	Cedar waxwing	Bombycillidae
Buteo jamaicensis	Red-tailed hawk	Accipitridae
Carduelis tristis	American goldfinch	Fringillidae
Cathartes aura	Turkey vulture	Cathartidae
Catherpes mexicanus	Canyon wren	Troglodytidae
Chaetura pelagica	Chimney swift	Apodidae
Charadrius vociferus	Killdeer	Charadriidae
Chordeiles minor	Common nighthawk	Caprimulgidae
Colaptes auratus	Northern flicker	Picidae
Columba livia	Rock dove	Columbidae
Corvus brachyrhynchos	American crow	Corvidae
Dendroica petechia	Yellow warbler	Emberizidae
Falco sparverius	American kestrel	Falconidae
Icterus galbula	Northern oriole	Emberizidae
Loxia curvirostra	Red crossbill	Fringillidae
Meleagris gallopavo	Wild turkey	Phasianidae
Myadestes townsendi	Townsend's solitaire	Muscicapidae
Parus atricapillus	Black-capped chickadee	Paridae
Pipilo maculatus	Spotted towhee	Emberizidae
Piranga ludoviciana	Western tanager	Emberizidae
Sialia currucoides	Mountain bluebird	Muscicapidae
Sturnella neglecta	Western meadowlark	Passeridae
Turdus migratorius	American robin	Turdidae
Tympanuchus phasianellus	Sharp-tailed grouse	Phasianidae
Tyrannus tyrannus	Eastern kingbird	Tyrannidae
Zenaida macroura	Mourning dove	Columbidae
INSECTA		
Danaus plexippus	Monarch butterfly	Danaidae
Diapheromera femorata	Walking stick	Phasmatidae
Hyalophora cecropia	Cecropia moth	Saturniidae
MAMMALIA		
Canis latrans	Coyote	Canidae
Felix rufus	Bobcat	Felidae
Odocoileus hemionus	Mule deer	Cervidae
Odocoileus virginianus	White-tailed deer	Cervidae
Tamias minimus	Least chipmunk	Sciuridae
Sylvilagus sp.	Cottontail	Leporidae

SCIENTIFIC NAME	VERNACULAR NAME	FAMILY
REPTILES & AMPHIBIANS		
Chelydra serpentina	Snapping turtle	Chelydridae
Chrysemys picta	Painted turtle	Emydidae
Crotalus viridis	Prairie rattlesnake	Viperidae
Pseudacris triseriata	Chorus frog	Hylidae

SURVEY AREAS

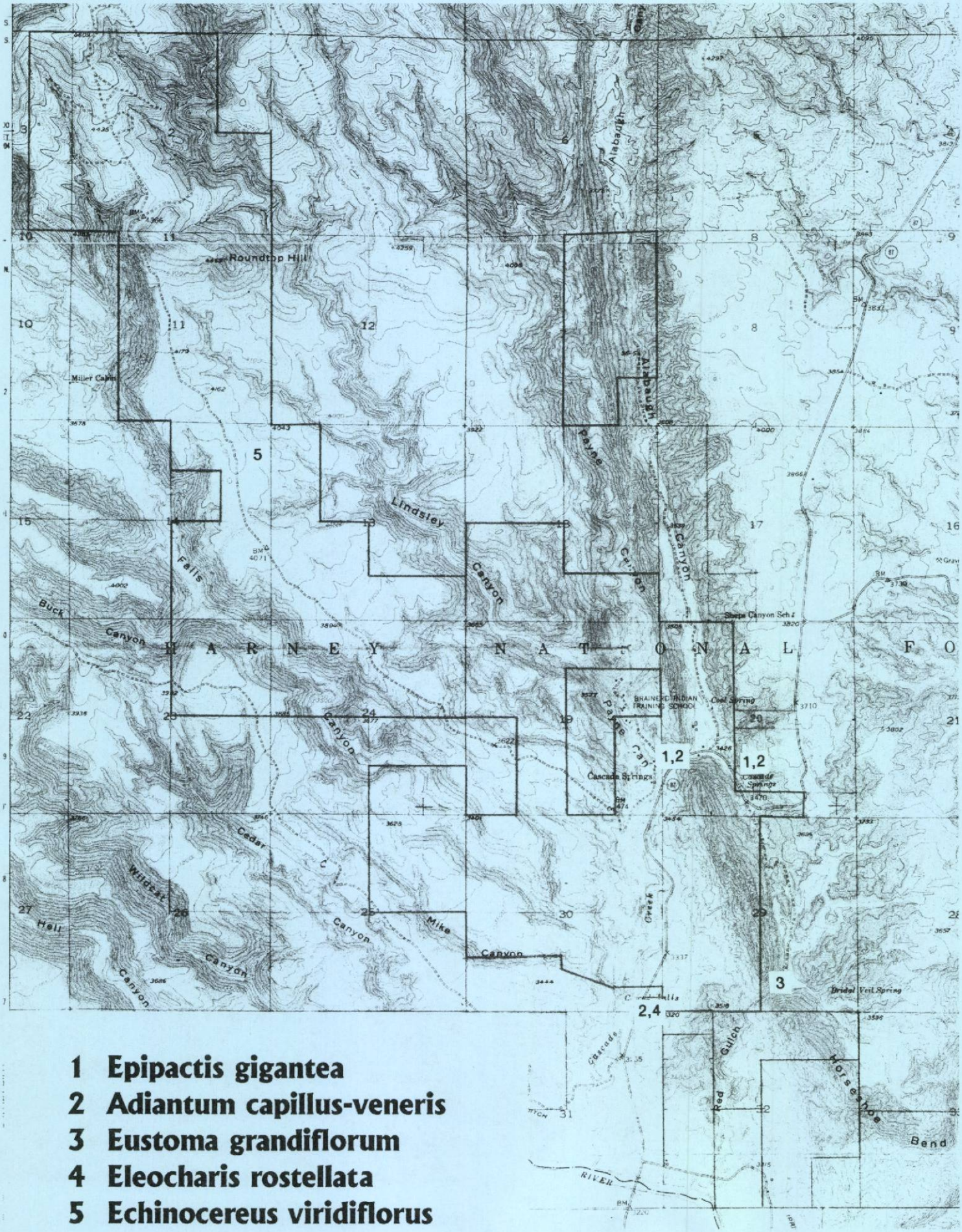
MAP 1



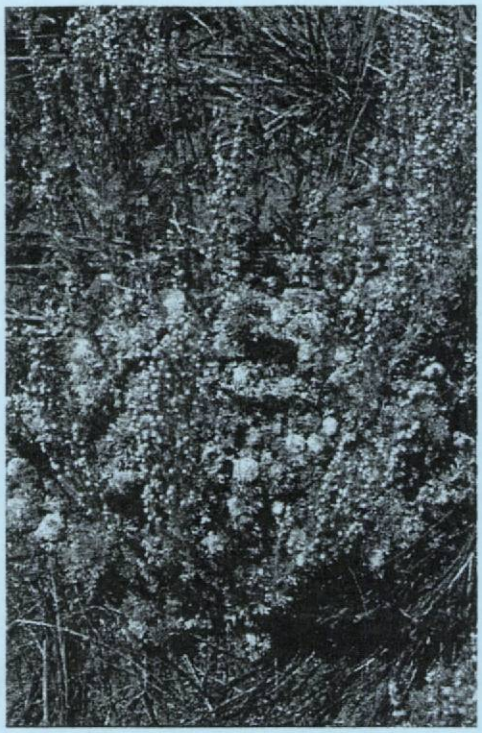
1	Alabaugh Canyon	T8S, R5E, Sec 20
2	Roundtop Ridge	T8S, R4E, Sec 14
3	Overlook	T8S, R4E, Sec 2
4	Cascade Springs	T8S, R5E, Sec 20
5	Cascade Falls	T8S, R5E, Sec 30

REGIONALLY RARE PLANTS

MAP 2



1 Epipactis gigantea
2 Adiantum capillus-veneris
3 Eustoma grandiflorum
4 Eleocharis rostellata
5 Echinocereus viridiflorus



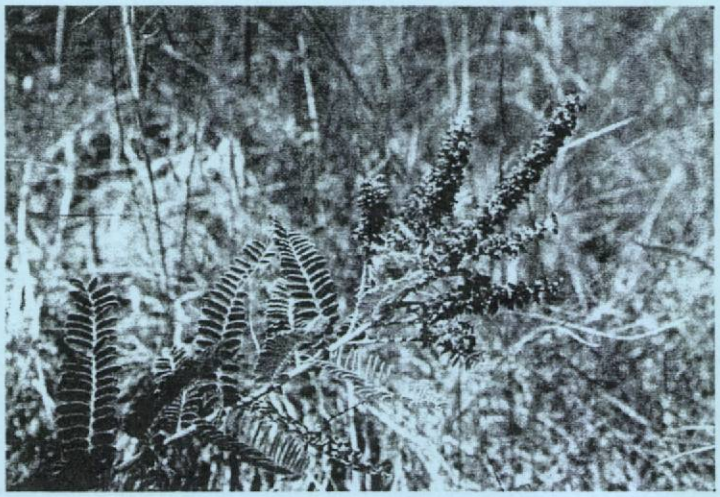
Artemisia frigida

Ambrosia artemisiifolia

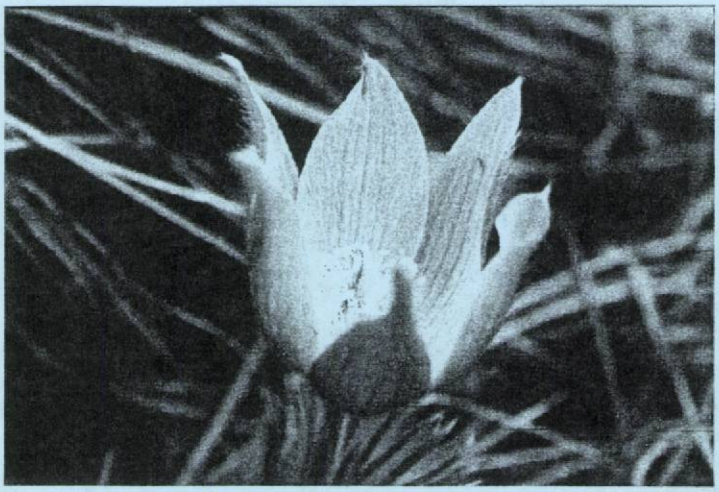
Ambrosia trifida and *Cleome serrulata*

Amorpha canescens

Andropogon gerardii



Amorpha canescens



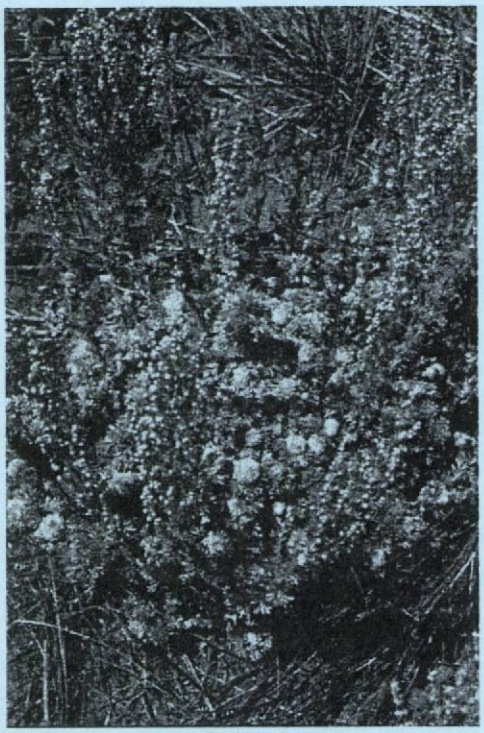
Anemone patens

Anemone patens

Antennaria microphylla

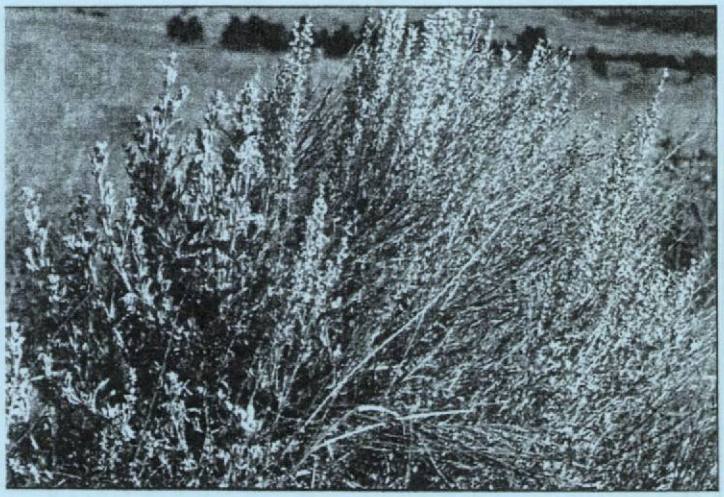
Arenaria hookeri

Argemone polyanthemos

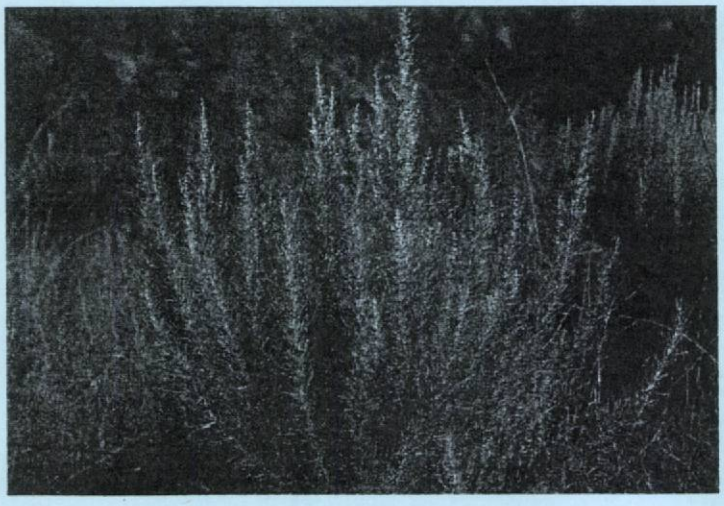


Artemisia frigida

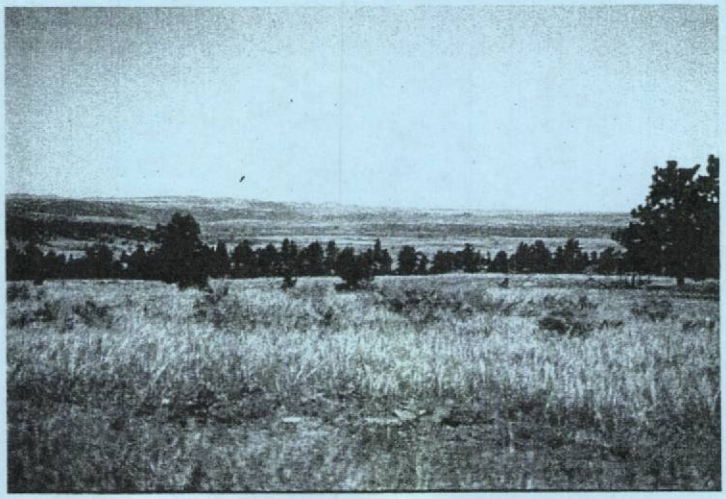
Artemisia dracunculus



Artemisia tridentata



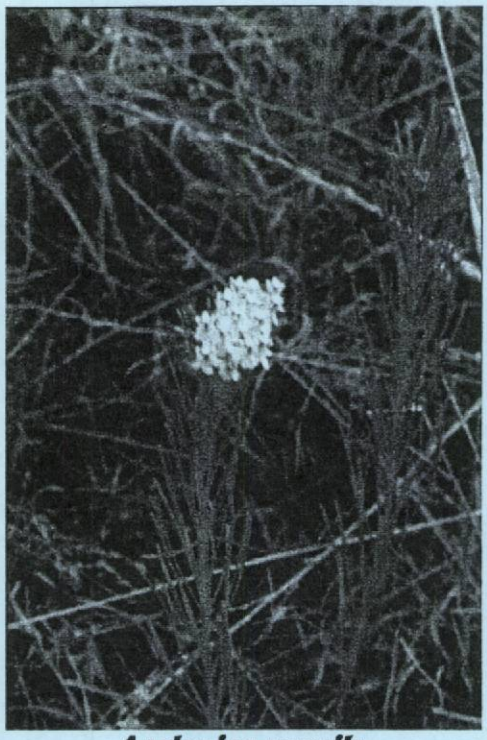
Artemisia filifolia



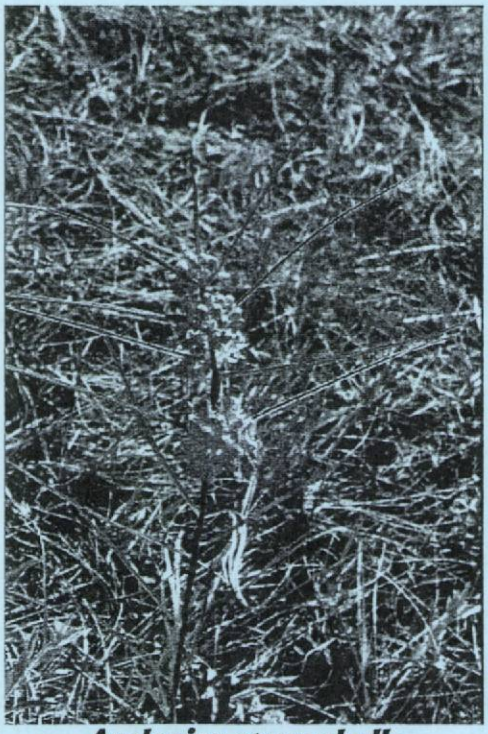
Artemisia tridentata

Asclepias speciosa

Asclepias incarnata



Asclepias pumila



Asclepias stenophylla

Asclepias incarnata

Asclepias speciosa

Astragalus crassicarpus

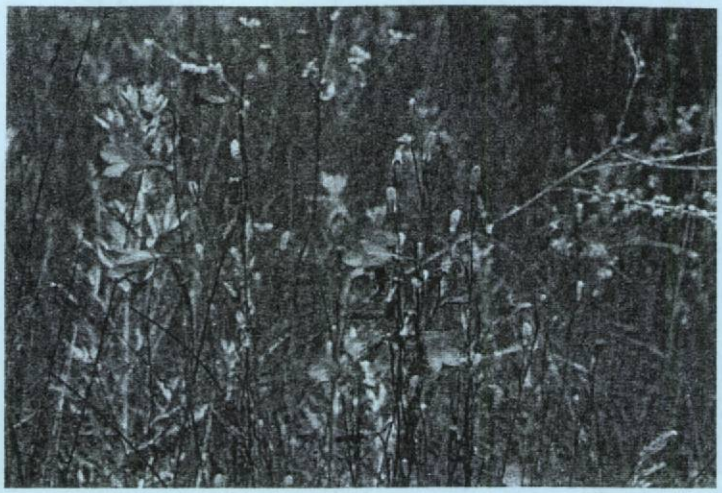
Aster falcatus

Astragalus gilviflorus

Calochortus nuttallii

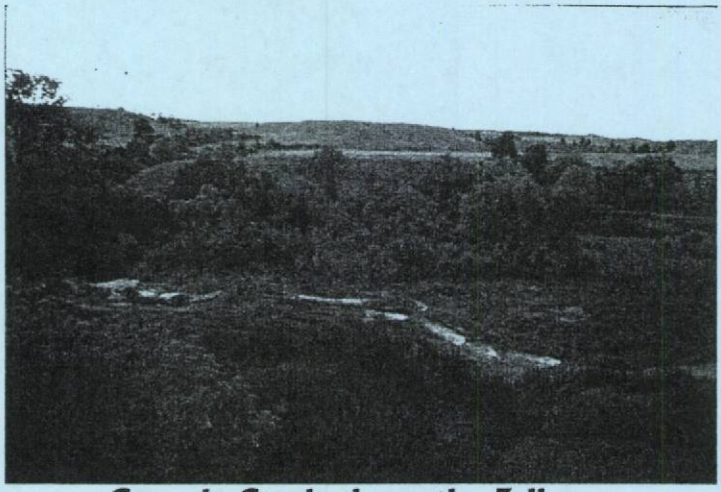
Calvatia gigantea

Cascade Creek above the Falls with *Eleocharis rostellata*

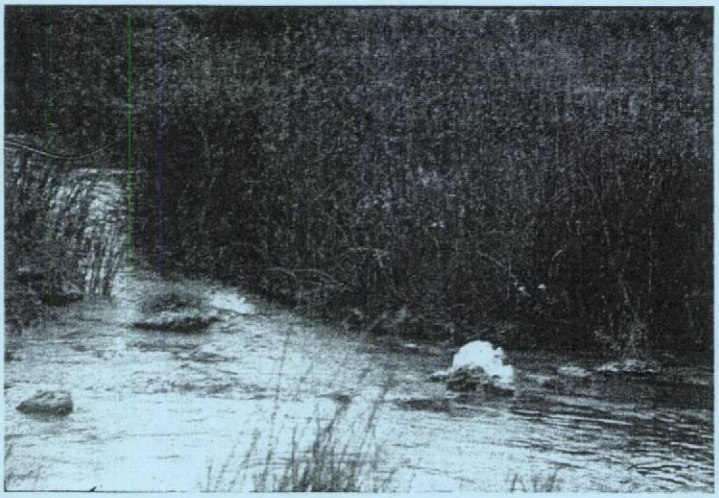


Campanula rotundifolia

Calylophus serrulatus



Cascade Creek above the Falls with *Eleocharis rostellata*

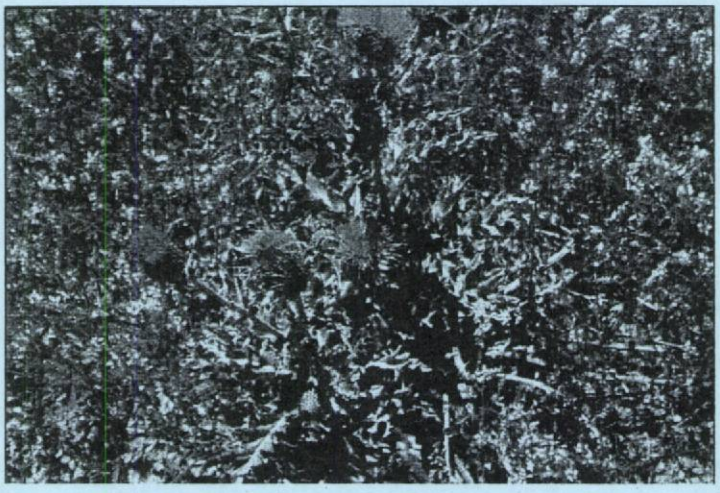


Cascade Falls with *Eleocharis rostellata*

Cascade Falls with *Eleocharis rostellata*

Cerastium arvense

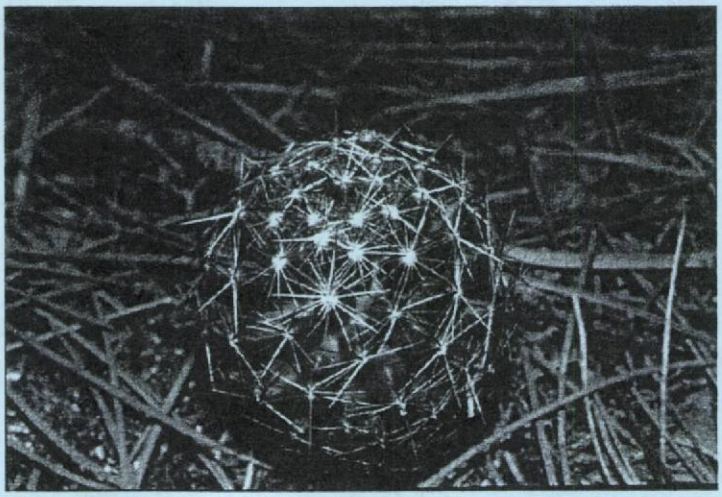
Cerastium arvense



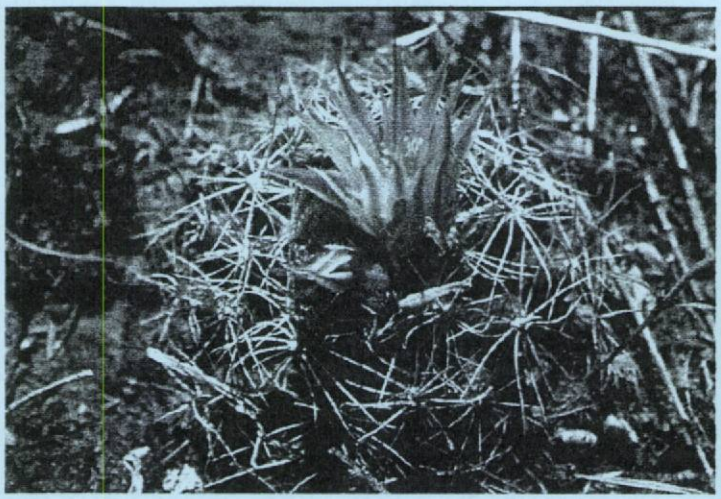
Cirsium undulatum

Cleome serrulata

Corydalis aurea



Coryphantha missouriensis

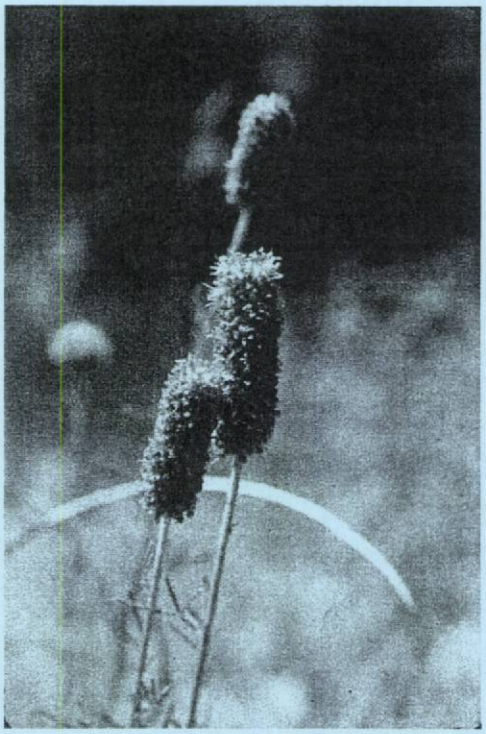


Coryphantha missouriensis

Coryphantha missouriensis

Coryphantha missouriensis

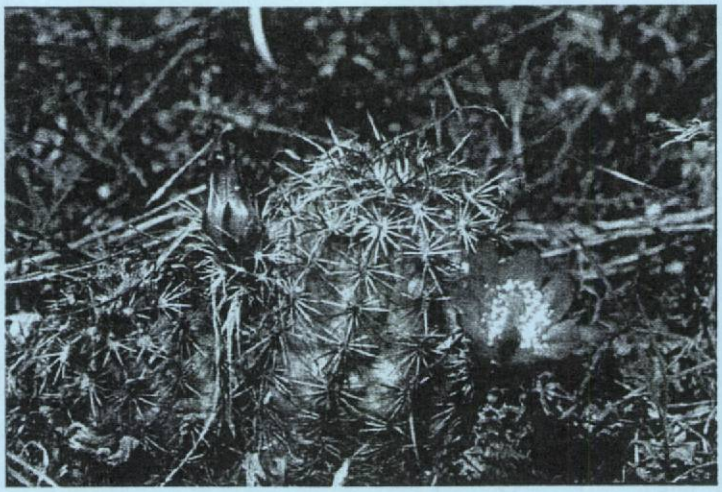
Dalea aurea



Dalea purpurea

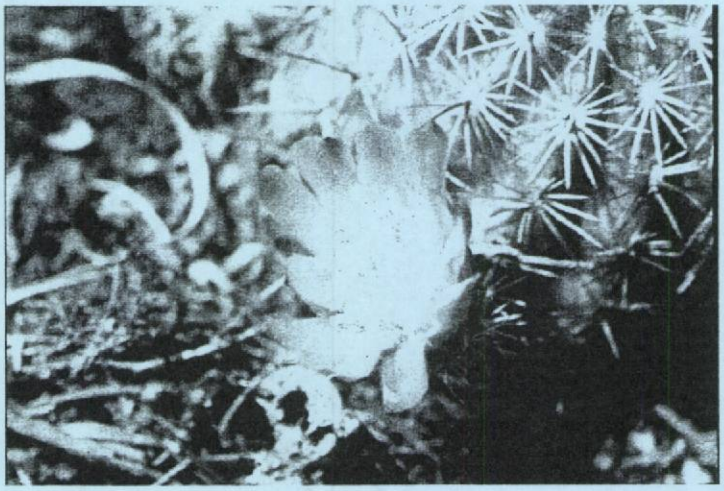
Distichlis spicata

Echinacea angustifolia



Echinocereus viridiflorus

Echinocereus viridiflorus



Echinocereus viridiflorus

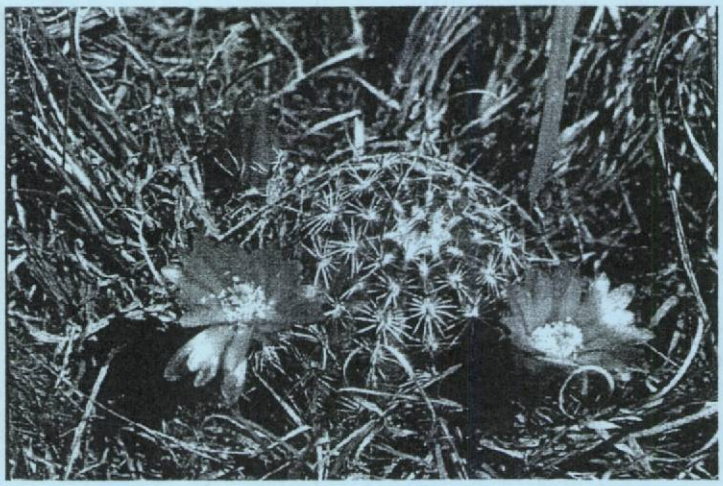
Echinocereus viridiflorus

Echinocereus viridiflorus

Echinocereus viridiflorus

Echinocereus viridiflorus

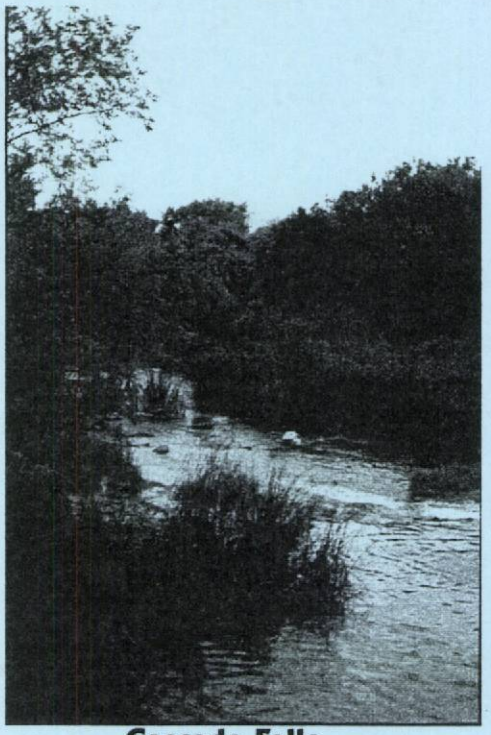
Echinocereus viridiflorus



Echinocereus viridiflorus

Echinocereus viridiflorus

Elaeagnus angustifolia



Cascade Falls
Eleocharis rostellata

Eleocharis rostellata

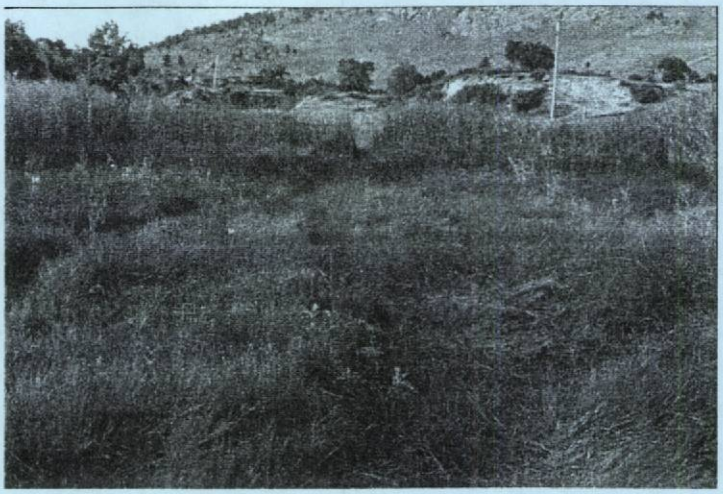
Eleocharis rostellata

Eleocharis rostellata

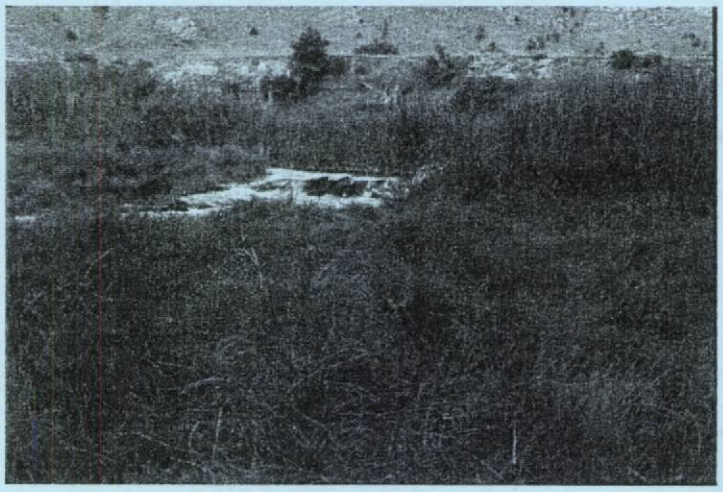
Eleocharis rostellata

Eleocharis rostellata

Eleocharis rostellata



Eleocharis rostellata



Eleocharis rostellata

Eleocharis rostellata

Elymus canadensis

Eustoma grandiflorum

Eriogonum annuum

Euphorbia marginata

Eriogonum annuum

Euphorbia marginata

Eustoma grandiflorum

Eustoma grandiflorum

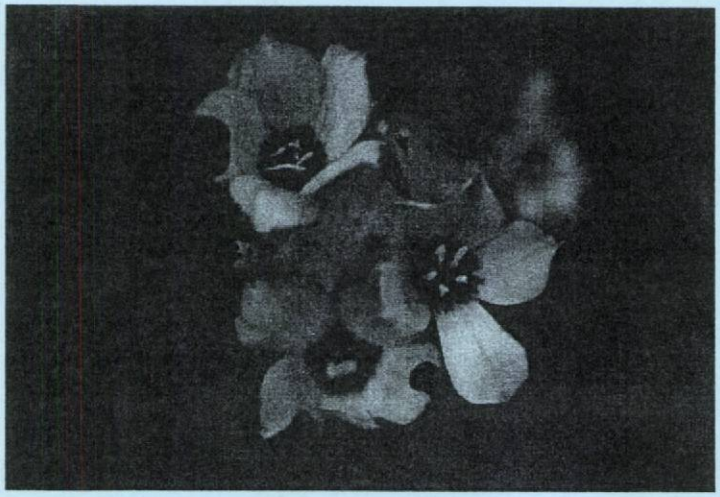
Eustoma grandiflorum

Eustoma grandiflorum

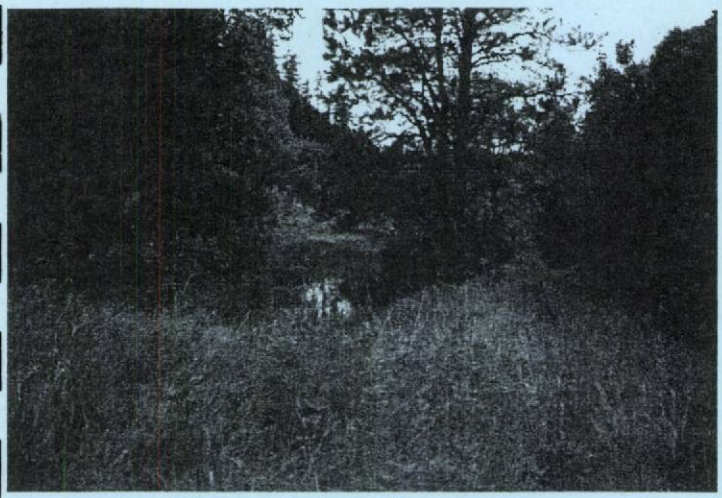
Eustoma grandiflorum

Eustoma grandiflorum

Eustoma grandiflorum



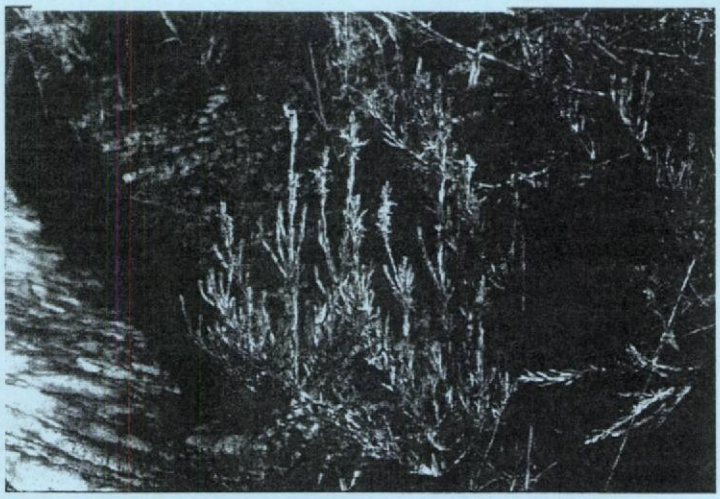
Eustoma grandiflorum



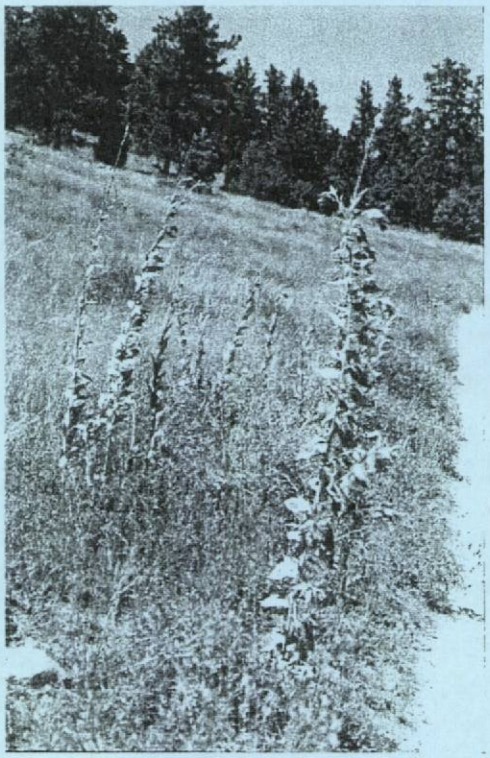
Fargo Lake, site of
Eustoma grandiflorum

Gaura parviflora

Geum triflorum



Gaura coccinea



Gaura parviflora

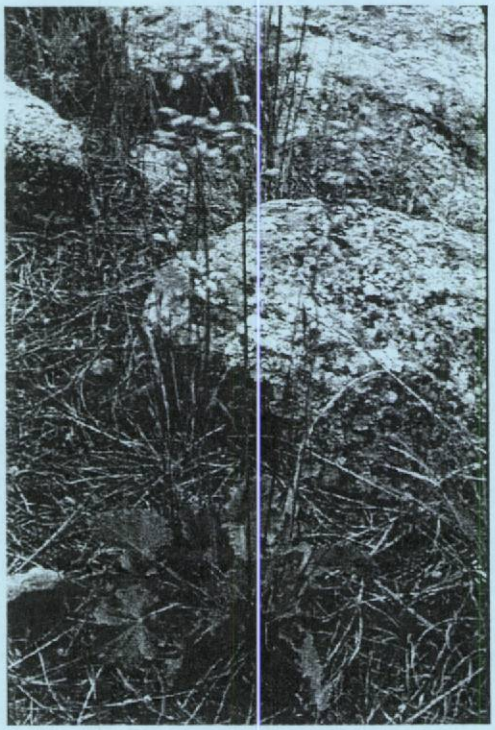
Glycyrrhiza lepidota

Helianthus annus

Glycyrrhiza lepidota

Grindelia squarrosa

Heterotheca villosa



Heuchera richardsonii

Hordeum jubatum

Ipomoea leptophylla

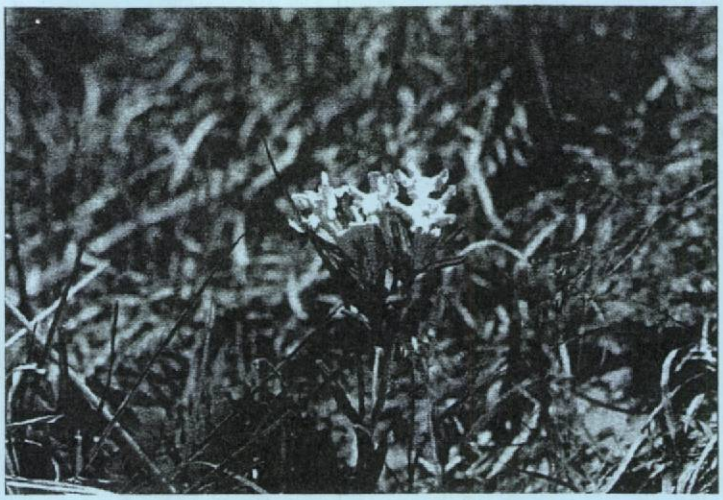
Ipomoea leptophylla

Leucocrinum montanum

Hymenoxys acaulis

Liatris punctata

Linum lewisii

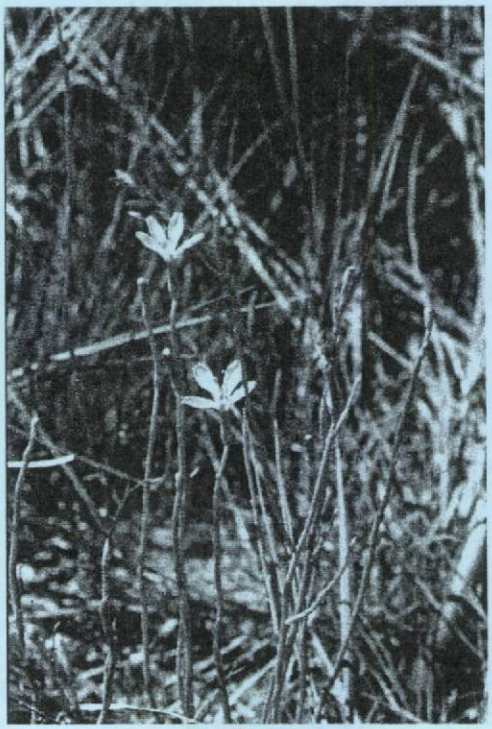


Lithospermum incisum

Lobelia siphilitica

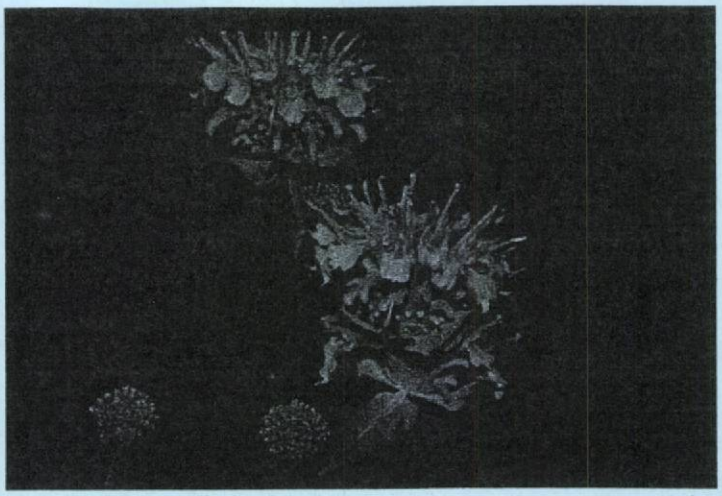
Lomatium foeniculaceum

Lygodesmia juncea



Lygodesmia juncea

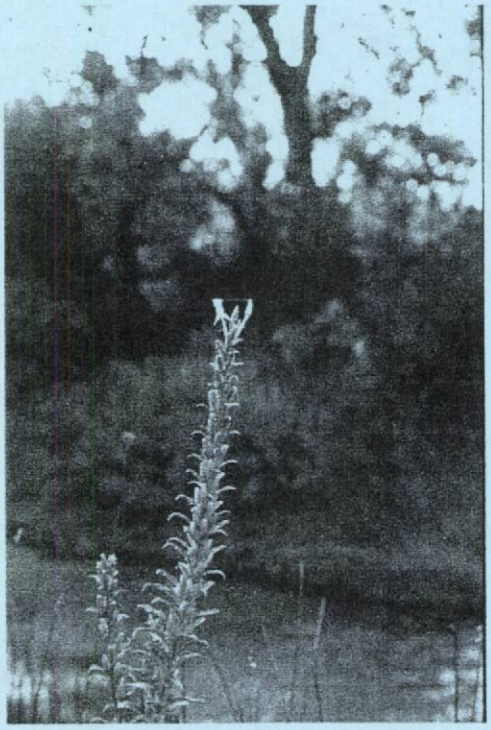
Maianthemum stellatum



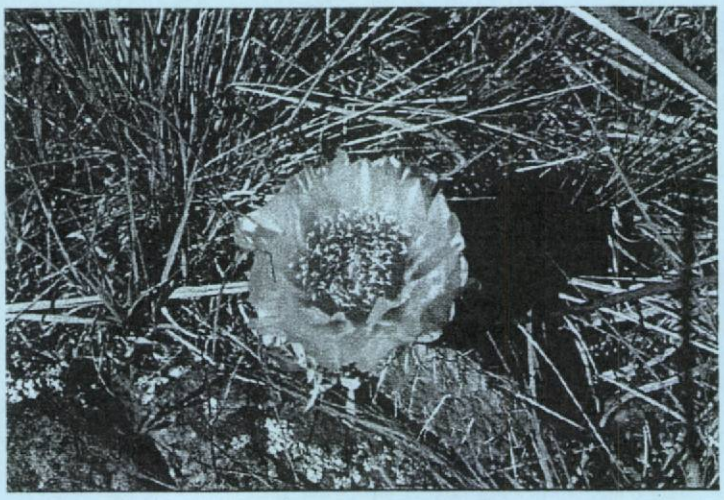
Monarda fistulosa

Morchella esculenta

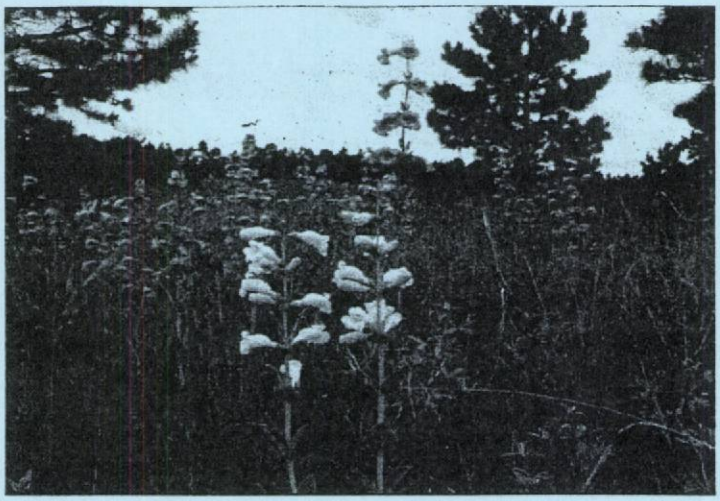
Musineon tenuifolium



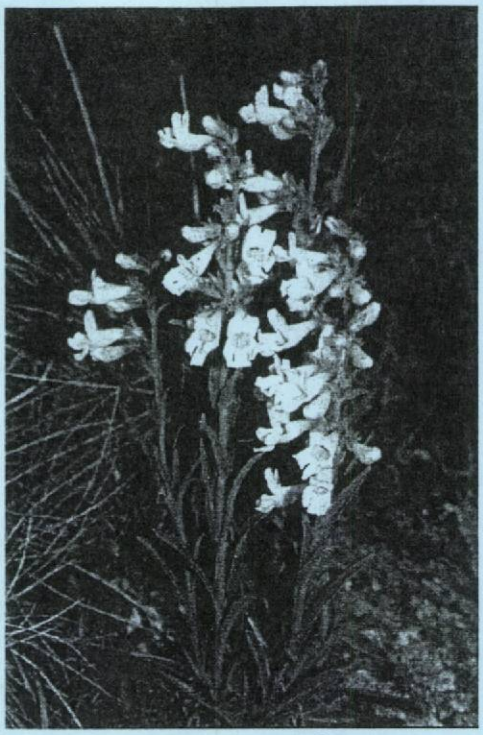
Oenothera biennis



Opuntia polyacantha

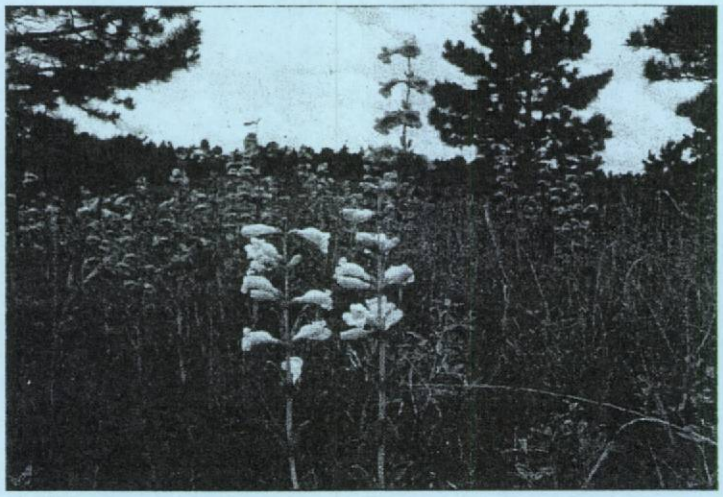


Penstemon grandifloris



Penstemon albidus

Phragmites australis



Penstemon grandifloris

Physalis virginiana

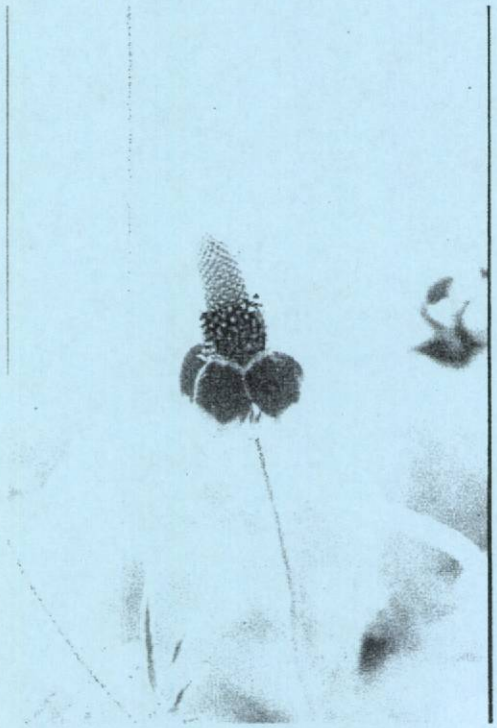
Pine/Juniper
Little Bluestem

Polypogon monspeliensis

Plantago patagonica

Ratibida columnifera

Ratibida columnifera



Ratibida columnifera

Ratibida columnifera

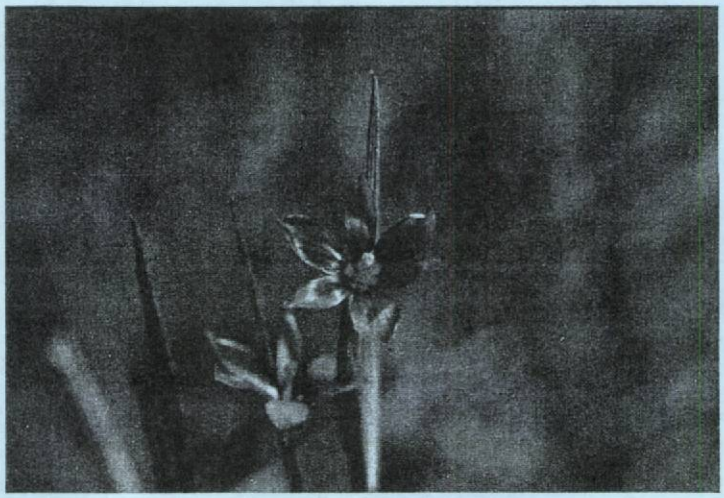
Rosa arkansana

Ribes odoratum

Rosa woodsii

Sedge

Schizachyrium scoparium



Sisyrinchium montanum

Rhus aromatica

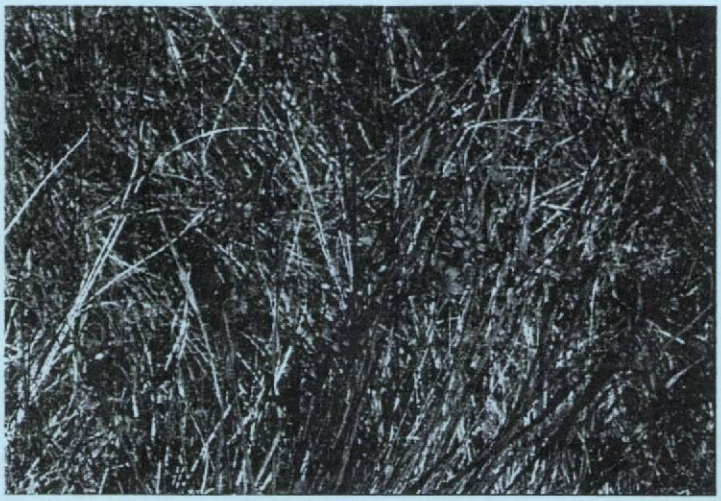
Rhus aromatica

Rhus aromatica

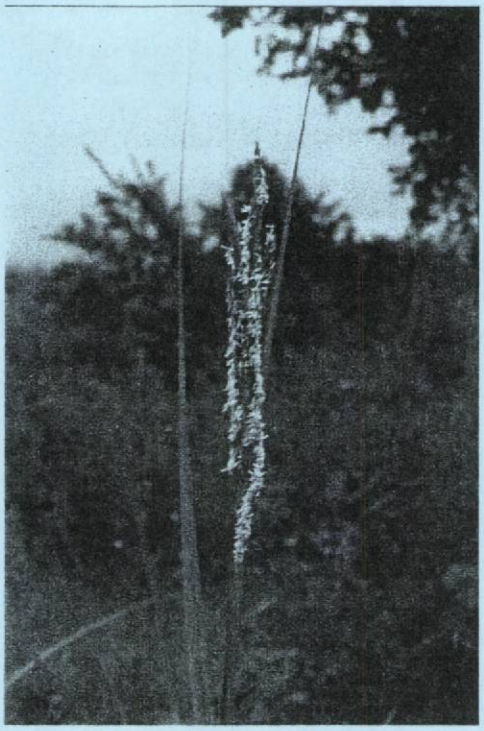
Ribes cereum

Ribes cereum

Ribes cereum



Sisyrinchium montanum



Spartina pectinata

Sphaeralcea coccinea

Tamarix ramosissima
above Cascade Falls

Tamarix ramosissima
above Cascade Falls

Tamarix ramosissima
above Cascade Falls

Tragopogon dubius

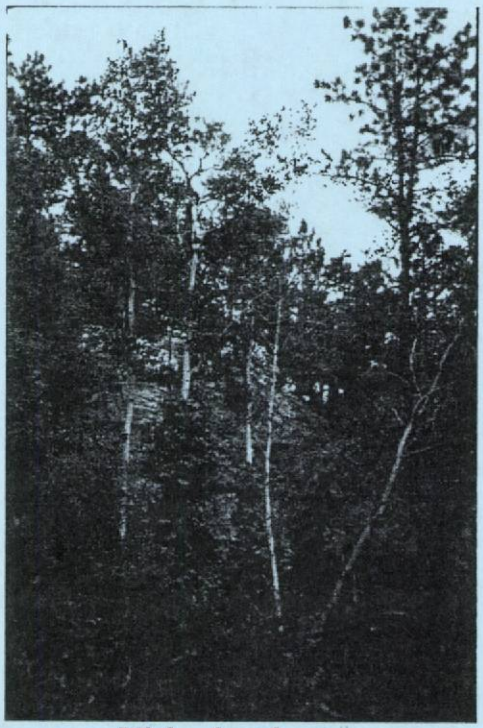
Tradescantia bracteata

Typha latifolia

Turtle
below Cascade Falls

Verbena bracteata

Viola nuttallii



***Vitis riparia* on**
Populus tremuloides

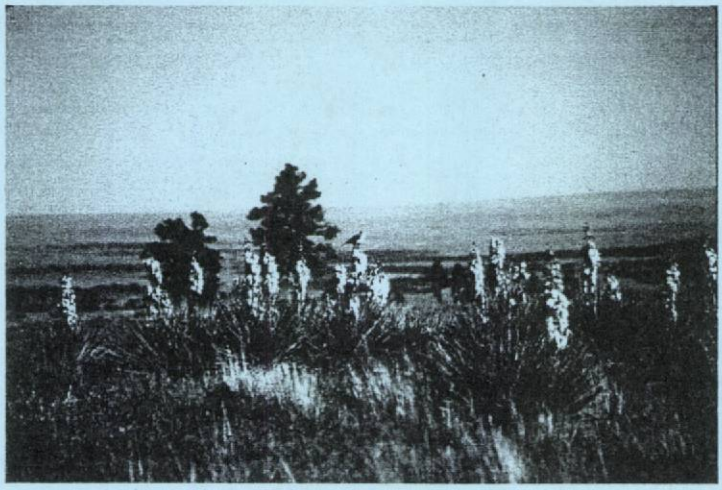
Verbena stricta

Walking Stick on
Andropogon gerardii

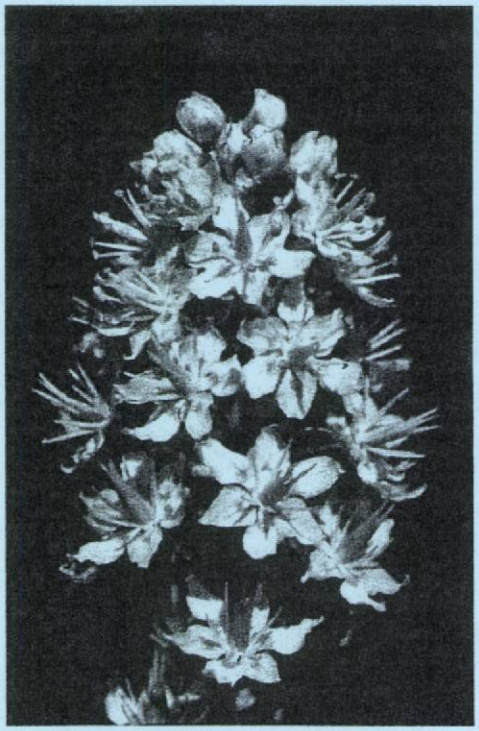
Walking Stick on
Andropogon gerardii

Walking Stick
on *Andropogon gerardii*

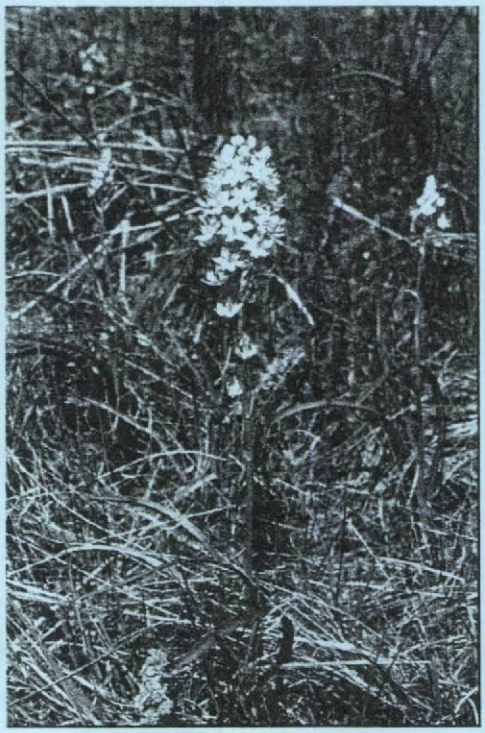
Xanthoparmelia cumberlandia



Yucca glauca



Zigadenus venenosus



Zigadenus venenosus