

Florissant Fossil Beds National Monument Vascular Plant Inventory



Susan Spackman Panjabi and Sharon J. Anderson
Colorado Natural Heritage Program, Colorado State University
Ft. Collins, Colorado 80523

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Colorado
State
University

Knowledge to Go Places

I. Background

As part of its biological inventory program, the National Park Service (NPS) contracted the Colorado Natural Heritage Program (CNHP) in 2001-2002 to conduct a field inventory of vascular plants of Florissant Fossil Beds National Monument (FLFO). In 2001 the Rocky Mountain Network of the NPS developed a study plan for biological inventories for parks in the Network. Although detailed botanical research had been conducted in FLFO (Edwards and Weber 1990), additional research was needed, particularly regarding the distribution of rare and non-native plants. The Network in cooperation with CNHP submitted a Biological Inventory Study Plan to the NPS Inventory and Monitoring Program, which was approved. That Plan provides detailed information and guidance for biological inventories in all Rocky Mountain Network parks.

The checklist of vascular plants of Florissant Fossil Beds National Monument (Edwards and Weber 1990) was developed over an eight-year period from 1981-1988, and documents about 430 taxa that occur in the Monument. Of these, two are considered to be rare in Colorado, *Oligoneuron album* (listed as *Unamia alba* in Edward and Weber 1990, prairie goldenrod), and *Woodsia neomexicana* (New Mexico cliff fern) (Colorado Natural Heritage Program 2002). This checklist represents one of the most thorough botanical inventories in all of Colorado.

II. Objectives

- Compile and review existing botanical data for FLFO.
- Document additional occurrence and distribution information for vascular plants at FLFO.
- Objectively quantify inventory completeness for plants surveyed at FLFO.
- Provide recommendations regarding further botanical inventory needs and management needs for protecting natural resources at FLFO.

III. Methods

We worked with FLFO staff, primarily Tom Ulrich, beginning in fall 2001, to plan and implement the project. This included scheduling site visits, permitting, compliance, and logistical assistance from Monument staff.

Our methods can be characterized as a standard floristic survey, following methods employed by Colorado botanists in numerous other similar studies (e.g., Maley 1994, Clark 1996, Freeman 2000). The surveys were based on subjective searches of a representation of all habitats (Edwards and Weber 1990), with the intent that as many as possible previously undocumented species within the Monument are located and identified.

In an effort to determine specific places to target for our research we referred to geology (ArcView coverage provided by Monument staff), soil (ArcView coverage provided by Monument staff), vegetation (USGS Rocky Mountain Mapping Center 2002) and topographic (Blue Star Komplex 1993) maps to look for areas in the Monument that may support unusual habitats and therefore previously undocumented plants. In particular, we targeted areas with Tertiary Formations, as these were uncommon formations in the Monument (please see geology map, Appendix 1) as well as unusual soil types (please see soil map, Appendix 1). In an effort to determine specific species to

target for our research we referred to the master plant list for the Monument (Edwards and Weber 1990), the University of Colorado Herbarium list of plant species for Teller County (University of Colorado Museum 2002), the Colorado Natural Heritage Program list of rare plant species for Teller County (Colorado Natural Heritage Program 2002), and the Colorado Department of Agriculture list of noxious weeds (Colorado Department of Agriculture 2000).

Field surveys were completed during May 20-September 11, 2002. We subjectively searched areas and habitats based on references described above, and distributed our survey effort across the entire Monument. We carried a master plant species list for the Monument (Edwards and Weber 1990), and took voucher specimens when appropriate. To add to information about the distribution of the vascular flora of FLFO, we made lists of all species that were flowering or producing fresh strobilii along survey routes.

We recorded survey times (as an estimate of survey effort) and locations, and compared these data with the survey results and master species lists to estimate survey completeness.

Species that were found to be new to the Monument were entered into the National Park Service Standard Collection Spreadsheet and delivered to David Pillmore, NPS Inventory and Monitoring Computer Technician at David_Pillmore@nps.gov. Nomenclature follows that of Kartesz (1999) as modified by the PLANTS Database (USDA, NRCS 2002).

IV. Results

We spent a total of fifteen person-days (approximately 120 person-hours) surveying Florissant National Monument during May-September of 2002, and located two species that were not represented in the FLFO Herbarium.

On July 14th, we located a population of the native, wetland species, *Pedicularis crenulata* (meadow lousewort), which was known from the Monument from plot data collected for the FLFO vegetation mapping project (pers. comm. Jim VonLoh 2002), but had not been collected for the Monument Herbarium. Unfortunately, the population size was too small to allow a collection, so we documented the species with voucher photographs including close-up photos of flowers and fruit, which should be adequate to identify this rather showy species. This species was found only in a very small area in a wet meadow along Grape Creek, about 100 meters south of the Maytag barn. The plants were found in saturated soils growing with *Carex aquatilis* (water sedge), *Ranunculus cymbalaria* (alkali buttercup), *Juncus balticus* (Baltic rush), *Deschampsia caespitosa* (tufted hairgrass), *Maianthemum stellatum* (starry false lily of the valley), and *Cirsium arvense* (Canada thistle, a non-native noxious weed).

On September the 11th, we documented a new species for the Monument: *Abutilon theophrasti* (velvetleaf). This species is not native to Colorado, and is listed on the state list of noxious weeds (Colorado Department of Agriculture 2000). It was found in a small area on a dry upland slope, in a historical agricultural area, on the east side of Cusack Barn. The specimen of *Abutilon theophrasti* and voucher photos of *Pedicularis crenulata* will be deposited at the FLFO Herbarium. Please see specimen labels (including a label for the voucher photos) in Appendix 2.

Species lists for surveys routes are provided in Appendix 4.

V. Discussion

The spring and summer of 2002 brought one of the driest years on record for Colorado. The Monument was so dry that many plant species were not flowering or sporulating when they usually would be during a non-drought year. September brought a bit more rain, and the plants at FLFO showed much more green than in the previous months. As we had not found any previously undocumented species as of the end of August, we were somewhat surprised to find a new species in September. However, our data strongly indicate that the inventory of the vascular flora of FLFO is quite complete, mostly due to the thoroughness of prior floristic inventory work in FLFO by Edwards and Weber (1990). The new finding in September indicates that the inventory may not be 100% complete, and there is a possibility that new species will continue to be found, especially if they are new weedy invaders. In conclusion, because a high level of sampling intensity documented only one additional taxa in FLFO, it can be assumed that the species richness of the vascular flora has been thoroughly documented.

VI. Recommendations

It is possible that additional surveys could find more plant species at FLFO. In particular, an intensive survey for rare species, such as *Draba rectifruca* (mountain draba) and *Botrychium* spp. (moonworts), during a non-drought year could identify new species for the Monument. More intensive rare species surveys could also identify additional populations of rare plants already known from the Monument such as *Oligoneuron album* (listed as *Unamia alba* in Edwards and Weber 1990, prairie goldenrod), and *Woodsia neomexicana* (New Mexico cliff fern) (Colorado Natural Heritage Program 2002).

Annual surveys targeting non-native invasive species would be an important step toward protecting the natural resources of FLFO. Early detection of these non-natives is one of the most cost effective, ecologically sensible defenses that land managers can take to manage and control weedy invaders (Colorado Department of Agriculture 2001). *Abutilon theophrasti* is considered to be a state noxious weed (Colorado Department of Agriculture 2000), and the Western Society of Weed Science warns that the seeds of this species can remain viable for more than 50 years, making it difficult to eradicate (Whitson et al. 2000). Numerous other species that are not native to Colorado have been documented in FLFO (Edwards and Weber 1990). Although all of these non-native species could present challenges, the following are of particular concern because they are known to be quite invasive and difficult to control: *Carduus nutans* ssp. *macrocephalus* (musk thistle), *Cirsium arvense* (Canada thistle), *Thlaspi arvense* (pennycress), *Convolvulus arvensis* (field bindweed), *Euphorbia esula* var. *uralensis* (leafy spurge), *Melilotus officinalis* (yellow sweetclover), *Bromus tectorum* (cheatgrass), *Linaria vulgaris* (butter-and-eggs), and *Elytrigia repens* (quackgrass) (Edwards and Weber 1990, Whitson et al. 2000, Colorado Department of Agriculture 2000).

Although the vascular flora of FLFO has now been fairly well documented, the nonvascular flora remains poorly understood. Nonvascular species, particularly lichens, are highly sensitive biological indicators of environmental change and quality (McCune et al. 1998, St. Clair 1999).

Thus, an assessment of the species richness and distribution of lichens, mosses and liverworts would provide FLFO with a powerful tool for monitoring the biological integrity of the area by establishing a baseline for future assessment.

Finally, to help assure the long-term protection of the biodiversity of FLFO, specific management for the protection of the locations that are known to support rare plant species would be an effective step. Although it is more common in other parts of its range, *Oligoneuron album* (prairie goldenrod) is only known from 12 locations in Colorado, which points of the significance of the three locations of this species at FLFO (please see Appendix 5). *Woodsia neomexicana* (New Mexico cliff fern) is another rare species that is known from two locations at FLFO (please see Appendix 5). This species is also common in other parts of its range, but known from only 21 locations in Colorado. Although *Pedicularis crenulata* (meadow lousewort) is considered to be common through out its range, including in Colorado, we found it to be one of the most rare species in the Monument. Monitoring the one known population of this species for any changes to the overall size, quality, and condition would help assure the long-term protection of this species at FLFO. In particular, this population was noted to contain an infestation of *Cirsium arvense* (Canada thistle), which is an extremely invasive noxious weed. *Cirsium arvense* is being sprayed with pesticides in other parts of FLFO in an effort to control its proliferation. Upon locating *Pedicularis crenulata* during this research, we alerted the staff at FLFO and recommended hand pulling over spraying for noxious weed management in the vicinity of this population.

CNHP Personnel

Botany Team Leader, Susan Spackman Panjabi: principal investigator and coordination of vascular plant inventory

Botanist, Sharon Anderson: responsible for field research and plant identification

Ecologist, Karin Decker: assist with field research, plant identification, GIS analyses, and map production

Science Information Manager, Jill Handwerk: responsible for input of data and data queries from CNHP databases

Database Manager, Alison Loar: maintenance of databases, quality assurance of data entered in from the project, technical assistance to the botanists

GIS Specialist, Amy Lavender: quality assurance of data and GIS analyses

References

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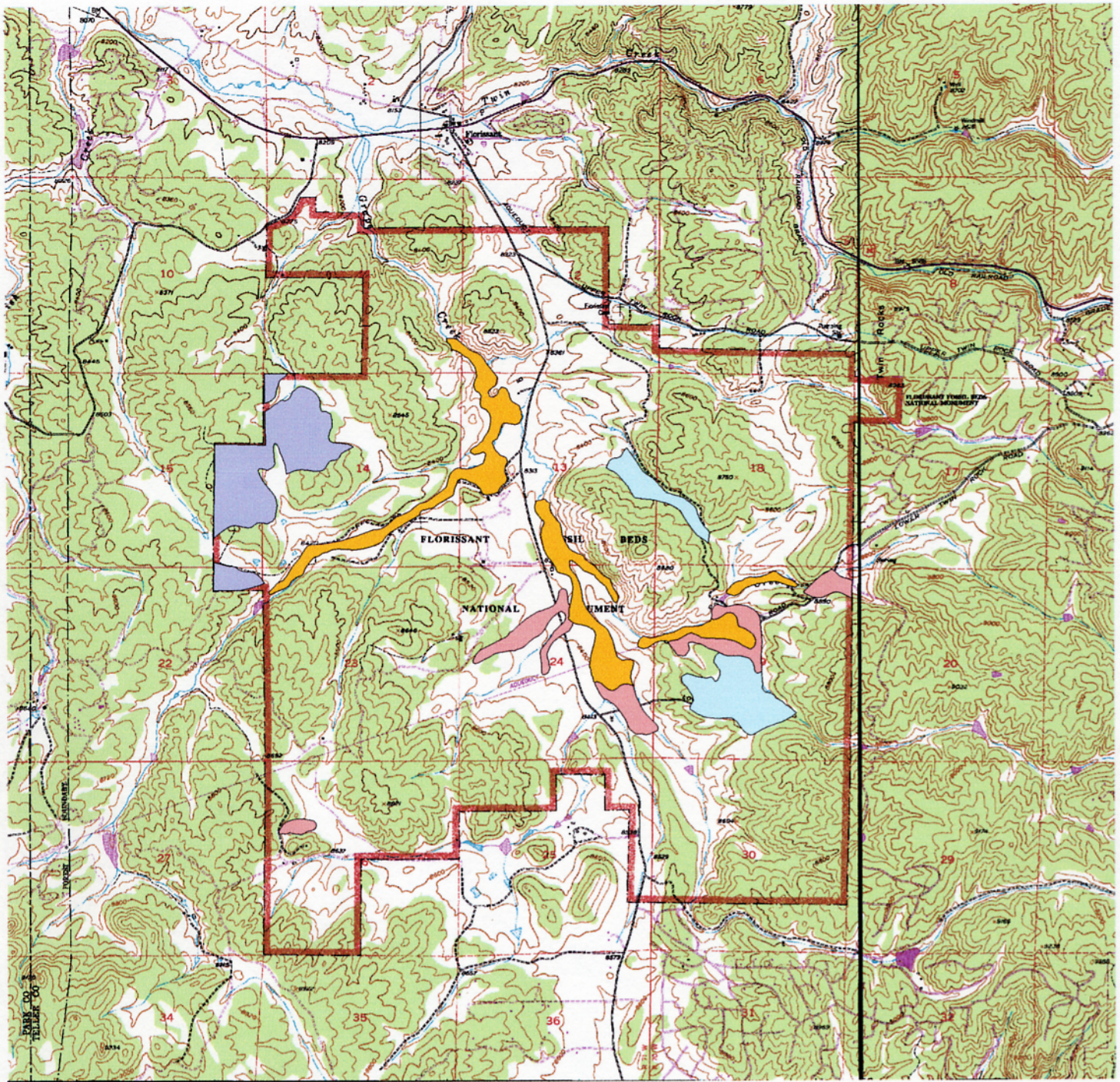
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Whitson, T.D., L.C. Burrill, S.A. Dewey, D.A. Cudney, B.E. Nelson, R.D. Lee, and R. Parker. 2000. Weeds of the West, 9th Edition. Western Society of Weed Science, the Western United States Land Grant Universities Cooperative Extension Services, and the University of Wyoming. Grand Teton Lithography, Jackson, Wyoming. 628 pp.

Appendix 1

Maps showing areas of geology and soil type that were targeted for survey.

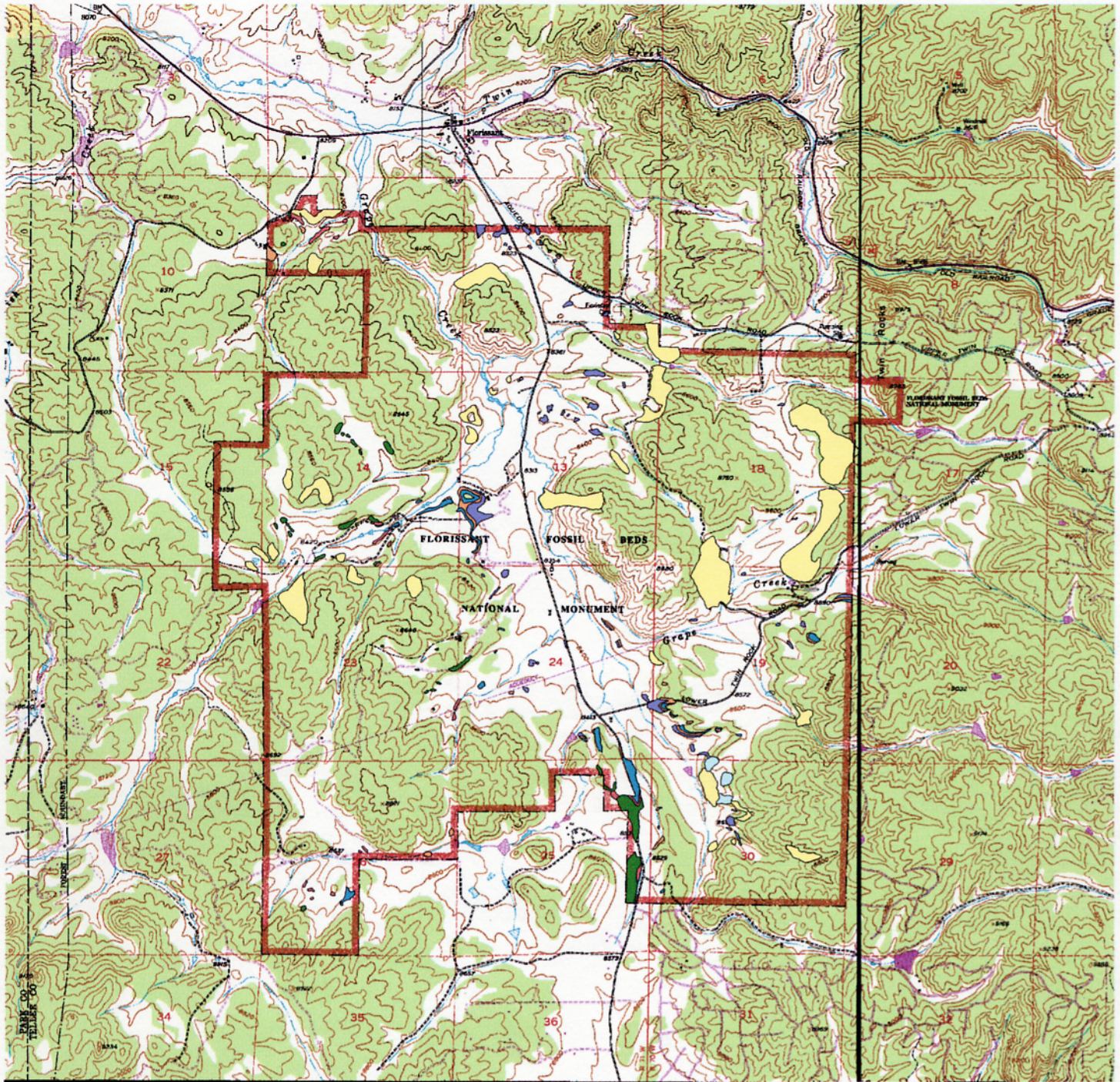


**Less common soil types of
Florissant Fossil Beds National Monument**

ArcView coverage supplied by Monument staff

- AD
- CN
- FO
- NV





**Tertiary formations of
Florissant Fossil Beds National Monument.**

ArcView coverage provided by Monument staff.



Appendix 2

Specimen labels for species new to the Florissant Fossil Beds National Monument herbarium

Plants of Colorado

Teller County

Malvaceae Det. by: Sharon Anderson

Abutilon theophrasti

Florissant Fossil Beds National Monument.
Slope on east side of Cusack Barn.
Dry, upland slope in historically agriculturally
disturbed area.

Sharon Anderson SJA-FLFO-02-01
September 11, 2002

Plants of Colorado

Teller County

Voucher Photo

Scrophulariaceae Det. by: Susan Spackman

Pedicularis crenulata

Florissant Fossil Beds National Monument.
Grape Creek meadow, about 100 m south of
Maytag barn, at meadow edge, in saturated soil.
Growing with *Carex aquatilis*, *Ranunculus*
cymbalaria, *Juncus balticus*, *Deschampsia*
caespitosa, *Maianthemum stellatus*, and
Cirsium arvense

Elevation: 8424 feet
UTM Zone 13, E476008, N4306642, NAD 27

S. Spackman, S. Anderson, and K. Decker 7/14/02

Appendix 3

Copy of Collection Permit

SCIENTIFIC RESEARCH AND COLLECTING PERMIT

Grants permission in accordance with the attached general and special conditions



United States Department of the Interior
National Park Service

Florissant Fossil Beds NM

Study#: FLFO-00001

Permit#: FLFO-2002-SCI-0001

Start Date: Jun-01-2002

Expiration Date: Apr-30-2003

Coop Agreement#:

Optional Park Code: biology

Name of principal investigator:

Ms Susan Spackman Phone:970-491-2992 Email:spack@lamar.colostate.edu

Name of institution represented:

Colorado State University

Additional investigator(s):

Name:Karin Decker Phone:970-491-6477 Email:Karin.Decker@state.co.us

Name:Sharon Anderson Phone:469-766-4179 Email:null

Project title:

Florissant and Great Sand Dunes Vascular Plant Inventories

Purpose of study:

As part of its biological inventory program, the National Park Service (NPS) wishes to conduct field inventories of vascular plants of Florissant Fossil Beds National Monument (FFB) and Great Sand Dunes National Monument and Preserve (GSD).

Locations authorized:

Florissant Fossil Beds National Monument

Transportation method to research site(s):

Vehicles and on foot.

Collection of the following specimens or materials, quantities, and any limitations on collecting:

Collection information required.

The applicant for this permit has indicated that specimen collection will occur.

A description of what will be collected is missing, or was not provided. Please consult the proposal documentation, if it exists, or contact the principle investigator for further collecting information.

Specimens will be cataloged and stored in the FLFO collections. Researcher will undertake the task of cataloging and numbering specimens consistent with NPS collections policy. Collection of rare and endangered species must be consistent with park collection needs, and additional permits may be required. See park staff before collecting R&E species.

Name of repository for specimens or sample materials if applicable:

Florissant Fossil Beds Nat. Mon.

Specific conditions or restrictions (also see attached conditions):

Recommended by park staff(name and title):

Herbert W. Meyer

Reviewed by Collections Manager:

YES NO

Approved by park

Date | June 2002

official: Jean H. Rodeck
Title: Superintendent

approved: June 2002

I Agree To All Conditions And Restrictions Of this Permit As Specified.
(Not valid unless signed and dated by the principal investigator)

Erin Spackman

(Principal investigator's signature)

10 June 2002

(Date)

**THIS PERMIT AND ATTACHED CONDITIONS AND RESTRICTIONS MUST BE
CARRIED AT ALL TIMES WHILE CONDUCTING RESEARCH ACTIVITIES IN THE
DESIGNATED PARK(S)**

Appendix 4

Lists of species found on survey routes, 2002.

Areas visited 18, 19, 20 June, 2002:

Boulder Creek Drainage

North arm Sawmill Trail and vicinity

South arm Sawmill Trail and vicinity

Drainage South of LTRR, South of Cusack barn

Drainage South of LTRR and East of Teller 1

For 18, 19, 20 June, 2002, flowering in the areas listed above were:

Nomenclature follows Weber and Wittmann, Colorado Flora, Eastern Slope, Third edition, 2001.

Species not native to Colorado are indicated following the common name.

Family	Species	Common name
Alsiniaceae	<i>Cerastium strictum</i>	Mouse-ear chickweed
Alsiniaceae	<i>Eremogone fendleri</i>	Sandwort
Alsiniaceae	<i>Stellaria longifolia</i>	
Apiaceae	<i>Aletes anisatus</i>	
Asteraceae	<i>Antennaria microphylla</i>	Pussytoes
Asteraceae	<i>Erigeron cana</i>	
Asteraceae	<i>Taraxacum officinale</i>	Dandelion (non-native)
Boraginaceae	<i>Mertensia ciliata</i>	Mountain bluebells
Boraginaceae	<i>Mertensia lanceolata</i>	
Brassicaceae	<i>Boechera drummondii</i>	
Brassicaceae	<i>Erysimum capitatum</i>	Wallflower
Capparaceae	<i>Cleome serrulata</i>	Beeplant
Convallariaceae	<i>Maianthemum stellatum</i>	False Solomon's seal
Crassulaceae	<i>Amerosedum lanceolatum</i>	Stoncrop
Cyperaceae	<i>Carex aquatilis</i>	Aquatic sedge
Cyperaceae	<i>Carex nebrascensis</i>	Nebraska sedge
Cyperaceae	<i>Carex</i> sp.	
Cyperaceae	<i>Carex utriculata</i>	Beaked sedge
Cyperaceae	<i>Eleocharis palustris</i>	Spikerush
Cyperaceae	<i>Scirpus microcarpus</i>	Small-fruited bulrush
Elaeagnaceae	<i>Elaeagnus commutata</i>	Silverberry
Equisetaceae	<i>Equisetum laevigatum</i>	Horsetails
Euphorbiaceae	<i>Tithymalus montanus</i>	
Fabaceae	<i>Astragalus parryi</i>	Parry's milkvetch
Fabaceae	<i>Vicia americana</i>	American vetch
Fumariaceae	<i>Corydalis aureus</i>	Golden smoke
Grossulariaceae	<i>Ribes cereum</i>	Wax currant
Grossulariaceae	<i>Ribes inerme</i>	Mountain gooseberry
Iridaceae	<i>Iris missouriensis</i>	Iris
Juncaceae	<i>Juncus balticus</i>	Baltic rush
Lamiaceae	<i>Scutellaria galericulata</i>	Scullcap
Linaceae	<i>Adenolinum lewisii</i>	Blue flax
Onagraceae	<i>Gaura coccinea</i>	
Oxalidaceae	<i>Oxalis stricta</i>	Wood sorrel
Pinaceae	<i>Pinus flexilis</i>	Limber pine
Pinaceae	<i>Pinus ponderosa</i>	Ponderosa pine
Poaceae	<i>Bromus inermis</i>	Smooth brome (non-native)

Poaceae	<i>Festuca arizonica</i>	Fescue
Poaceae	<i>Poa pratensis</i>	Kentucky bluegrass (non-native)
Primulaceae	<i>Dodecatheon pulchellum</i>	Shooting star
Ranunculaceae	<i>Atragene columbiana</i>	Blue clematis
Ranunculaceae	<i>Batrachium trichophyllum</i>	Water crowfoot
Ranunculaceae	<i>Ranunculus abortivus</i>	Small-flowered crowfoot
Ranunculaceae	<i>Ranunculus reptans</i>	Spearwort
Rosaceae	<i>Dasiphora floribunda</i>	Shrubby cinquefoil
Rosaceae	<i>Potentilla pulcherima</i> x <i>P. hippiana</i>	Beautiful cinquefoil
Rosaceae	<i>Prunus virginiana</i>	Choke cherry
Rosaceae	<i>Rosa woodsii</i>	Woods' rose
Rubiaceae	<i>Galium boreale</i>	Northern bedstraw
Saxifragaceae		White flowered herb
Saxifragaceae	<i>Micranthes rhomboidea</i>	Snowball saxifrage
Scrophulariaceae	<i>Castilleja integra</i>	Orange paintbrush
Valerianaceae	<i>Valeriana edulis</i>	Tobacco root
Violaceae	<i>Viola biflora</i>	Twin-flower violet
Violaceae	<i>Viola epipsilioides</i>	Swamp violet

Areas visited 14, 15 July, 2002:

Southwest corner of Monument

West arm Sawmill Trail and vicinity

North arm Sawmill Trail and vicinity

Grape Creek meadow, about 100m South of the Maytag barn

Large hill Northwest of the Hornbek homestead

For 14, 15 July, 2002, flowering in the areas listed above were:

Nomenclature follows Weber and Wittmann, Colorado Flora, Eastern Slope, Third edition, 2001.

Species not native to Colorado are indicated following the common name.

Family	Species	Common name
Alliaceae	<i>Allium cernuum</i>	
Alsiniaceae	<i>Stellaria longifolia</i>	
Amaranthaceae	<i>Amaranthus</i> sp.	
Apiaceae	<i>Pseudocymopterus montanus</i>	
Asteraceae	<i>Achillea lanulosa</i>	
Asteraceae	<i>Chrysothamnus viscidiflorus</i>	Rabbitbrush
Asteraceae	<i>Cirsium ochrocentrus</i>	
Asteraceae	<i>Erigeron canus</i>	
Asteraceae	<i>Erigeron flagellaris</i>	
Asteraceae	<i>Erigeron subtrinervis</i>	
Asteraceae	<i>Heterotheca villosa</i>	
Asteraceae	<i>Picradenia richardsonii</i>	
Asteraceae	<i>Ratibida columnifera</i>	
Asteraceae	<i>Rudbeckia hirta</i>	
Asteraceae	<i>Packera</i> sp.	
Asteraceae	<i>Solidago</i> sp. (yellow rays)	
Asteraceae	<i>Taraxacum officinale</i>	Dandelion (non-native)
Boraginaceae	<i>Hackelia floribunda</i>	
Boraginaceae	<i>Lithospermum multiflorum</i>	

Boraginaceae	<i>Mertensia lanceolata</i>	
Brassicaceae	<i>Boechera fendleri</i>	
Brassicaceae	<i>Draba streptocarpa</i>	
Brassicaceae	<i>Erysimum capitatum</i>	Wallflower
Brassicaceae	<i>Lepidium ramosissimum</i>	
Brassicaceae	<i>Thlaspi arvense</i>	(non-native)
Campanulaceae	<i>Campanula rotundifolia</i>	
Caryophyllaceae	<i>Cerastium nutans</i>	
Caryophyllaceae	<i>Cerastium vulgatum</i>	
Convallariaceae	<i>Maianthemum stellatum</i>	False Solomon's seal
Crassulaceae	<i>Amerosedum lanceolatum</i>	Stonecrop
Cyperaceae	<i>Carex aquatilis</i>	Aquatic sedge
Cyperaceae	<i>Carex utriculata</i>	Beaked sedge
Euphorbiaceae	<i>Tithymalus montanus</i>	
Fabaceae	<i>Astragalus parryi</i>	Parry's milkvetch
Fabaceae	<i>Astragalus</i> sp.	
Fabaceae	<i>Medicago lupulina</i>	Black medic (non-native)
Fabaceae	<i>Melilotus officinale</i>	Sweetclover (non-native)
Fabaceae	<i>Oxytropis lambertii</i>	
Fabaceae	<i>Trifolium repens</i>	White clover (non-native)
Fabaceae	<i>Vicia americana</i>	American vetch
Fumariaceae	<i>Corydalis aurea</i>	Golden smoke
Gentianaceae	<i>Frasera speciosa</i>	
Geraniaceae	<i>Geranium caespitosum</i>	
Geraniaceae	<i>Geranium richardsonii</i>	
Hydrangeaceae	<i>Jamesia americana</i>	
Hydrophyllaceae	<i>Phacelia heterophylla</i>	
Iridaceae	<i>Sisyrinchium montanum</i>	
Juncaceae	<i>Juncus balticus</i>	Baltic rush
Lamiaceae	<i>Mentha arvensis</i>	
Convallariaceae	<i>Maianthemum stellatum</i>	
Lemnaceae	<i>Lemna</i> sp.	
Linaceae	<i>Adenolinum lewisii</i>	Blue flax
Loasaceae	<i>Nuttallia rusbyi</i>	
Onagraceae	<i>Gaura coccinea</i>	
Onagraceae	<i>Oenothera caespitosa</i>	
Onagraceae	<i>Oenothera villosa</i>	
Poaceae	<i>Agropyron cristatum</i>	(non-native)
Poaceae	<i>Beckmannia syzigachne</i>	
Poaceae	<i>Bouteloua gracilis</i>	
Poaceae	<i>Bromus inermis</i>	Smooth brome (non-native)
Poaceae	<i>Danthonia parryi</i>	
Poaceae	<i>Deschampsia caespitosa</i>	
Poaceae	<i>Poa</i> sp.	
Polemoniaceae	<i>Gilia pinnatifida</i>	
Polemoniaceae	<i>Ipomopsis aggregata</i>	
Polygonaceae	<i>Eriogonum alatum</i>	
Primulaceae	<i>Dodecatheon pulchellum</i>	Shooting star
Ranunculaceae	<i>Batrachium trichophyllum</i>	Water crowfoot
Ranunculaceae	<i>Ranunculus abortivus</i>	Small-flowered crowfoot
Rosaceae	<i>Dasiphora floribunda</i>	Shrubby cinquefoil
Rosaceae	<i>Potentilla pulcherima</i>	Beautiful cinquefoil

Rosaceae	<i>Rosa woodsii</i>	Woods' rose
Rubiaceae	<i>Galium boreale</i>	Northern bedstraw
Scrophulariaceae	<i>Pedicularis crenulata</i>	
Scrophulariaceae	<i>Besseya plantaginea</i>	
Scrophulariaceae	<i>Castilleja integra</i>	Orange paintbrush
Scrophulariaceae	<i>Penstemon</i> sp.	
Scrophulariaceae	<i>Veronica anagallis-aquatica</i>	
Selaginellaceae	<i>Selaginella densa</i>	
Valerianaceae	<i>Valeriana edulis</i>	Tobacco root

August 2002 was a rather non-fruitful or flowerful month at the Florissant Fossil Beds National Monument. We walked the northeast portion of the park, from near the Florissant Cemetery, east to the abandoned dugout.

Nomenclature follows Weber and Wittmann, Colorado Flora, Eastern Slope, Third edition, 2001.

Species not native to Colorado are indicated following the common name.

August 10, 2002, species found to be flowering:

Family	Species	Common name
Alliaceae	<i>Allium cernuum</i>	nodding onion
Alsinaceae	<i>Eremogone fendleri</i>	Sandwort
Amaranthaceae	<i>Amaranthus</i> spp.	Pigweed (non-native)
Apiaceae	<i>Heracleum spondylium</i> ssp. <i>montanum</i>	Cow parsnip
Asteraceae	<i>Achillea lanulosa</i>	Yarrow
Asteraceae	<i>Artemisia frigida</i>	fringed sage
Asteraceae	<i>Aster foliaceus</i>	aster
Asteraceae	<i>Chrysothamnus viscidiflorus</i>	rabbitbrush
Asteraceae	<i>Cirsium arvense</i>	canada thistle (non-native)
Asteraceae	<i>Grindelia squarrosa</i>	gumweed
Asteraceae	<i>Heterotheca villosa</i>	golden aster
Asteraceae	<i>Picradenia richardsonii</i>	Colorado rubber plant
Asteraceae	<i>Rudbeckia hirta</i>	Blackeyed Susan
Boraginaceae	<i>Lithospermum multiflorum</i>	puccoon
Boraginaceae	<i>Mertensia ciliata</i>	bluebells
Boraginaceae	<i>Oreocarya virgata</i>	Miners candle
Brassicaceae	<i>Lepidium ramosissimum</i>	peppergrass
Campanulaceae	<i>Campanula parryi</i>	harebell
Campanulaceae	<i>Campanula rotundifolia</i>	harebell
Chenopodiaceae	<i>Chenopodium berlandieri</i>	Lamb's quarters
Convolvulaceae	<i>Convolvulus arvensis</i>	Bindweed (non-native)
Fabaceae	<i>Melilotus officinalis</i>	yellow sweetclover (non-native)
Fabaceae	<i>Trifolium repens</i>	White clover (non-native)
Fabaceae	<i>Vicia americana</i>	American vetch
Gentianaceae	<i>Frasera speciosa</i>	Monument plant
Gentianaceae	<i>Gentianella acuta</i>	Little gentian
Geraniaceae	<i>Geranium caespitosum</i>	caespitose geranium
Hypericaceae	<i>Hypericum formosum</i>	st. john's wort
Juncaceae	<i>Juncus balticus</i> (<i>J. arcticus</i>)	Baltic rush
Poaceae	<i>Alopecurus aequalis</i>	
Poaceae	<i>Beckmannia syzigachne</i>	Sloughgrass
Poaceae	<i>Blepharoneuron tricholepis</i>	pine dropseed
Poaceae	<i>Bouteloua gracilis</i>	Blue grama

Poaceae	<i>Bromus inermis</i>	smooth brome (non-native)
Poaceae	<i>Bromus porteri</i>	porter's brome
Poaceae	<i>Koeleria macrantha</i>	junegrass
Poaceae	<i>Muhlenbergia montana</i>	Mountain muhly
Poaceae	<i>Phalaroides arundinacea</i>	reed canarygrass (non-native)
Poaceae	<i>Phleum pratense</i>	Timothy (non-native)
Polemoniaceae	<i>Ipomopsis aggregata</i>	Trumpet gilia
Polygonaceae	<i>Bistorta bistortoides</i>	Bistort
Rosaceae	<i>Argentina anserina</i>	Silverweed
Rosaceae	<i>Pentaphylloides floribunda</i> (<i>Dasiphora fruticosa</i>)	shrubby cinquefoil
Rosaceae	<i>Potentilla pulcherrima x hippiana</i>	Silverleaf cinquefoil
Rosaceae	<i>Rosa woodsii</i>	Wood's rose
Rosaceae	<i>Rubus deliciosus (Oreobatus)</i>	Boulder raspberry
Scrophulariaceae	<i>Castilleja integra</i>	indian paintbrush
Scrophulariaceae	<i>Linaria vulgaris</i>	yellow toadflax (non-native)
Urticaceae	<i>Urtica dioica (U. gracilis)</i>	stinging nettle
Valerianaceae	<i>Valeriana edulis</i>	Tobacco root

For the September floristics work at FLFO, we surveyed five drainages, and one upland area. Nomenclature follows Weber and Wittmann, Colorado Flora, Eastern Slope, Third edition, 2001. Species not native to Colorado are indicated following the common name. September 8-11, 2002, species found to be flowering:

Family	Species	Common name
Amaranthaceae	<i>Amaranthus</i> spp.	Pigweed (non-native)
Asteraceae	<i>Achillea lanulosa</i>	Yarrow
Asteraceae	<i>Artemisia frigida</i>	fringed sage
Asteraceae	<i>Aster laevis</i> var. <i>geyeri</i>	
Asteraceae	<i>Carduus nutans</i>	musk thistle (non-native)
Asteraceae	<i>Chrysothamnus viscidiflorus</i>	Rabbitbrush
Asteraceae	<i>Cirsium canescens</i>	
Asteraceae	<i>Cirsium arvense</i>	canada thistle (non-native)
Asteraceae	<i>Gnaphalium uliginosum</i> (<i>Filaginella</i>)	Cudweed
Asteraceae	<i>Grindelia squarrosa</i>	Gumweed
Asteraceae	<i>Heterotheca villosa</i>	Golden aster
Asteraceae	<i>Lygodesmia juncea</i>	Skeleton weed
Asteraceae	<i>Picradenia richardsonis</i>	Colorado rubber plant
Asteraceae	<i>Solidago canadensis</i>	goldenrod
Asteraceae	<i>Taraxacum officinale</i>	Dandelion (non-native)
Asteraceae	<i>Thlaspi arvense</i>	Pennycress (non-native)
Asteraceae	<i>Trimorpha lonchophylla</i>	Fleabane daisy
Asteraceae	<i>Ximenesia encelioides</i> (<i>Verbesina</i>)	Cowpen daisy (non-native)
Boraginaceae	<i>Mertensia lanceolata</i>	Bluebells
Capparaceae	<i>Cleome serrulata</i>	Beeplant
Chenopodiaceae	<i>Chenopodium album</i>	Lambsquarters (non-native)
Fumariaceae	<i>Corydalis aureus</i>	golden smoke
Gentianaceae	<i>Gentianella acuta</i>	Little gentian
Gentianaceae	<i>Pneumonanthe affinis (Gentiana)</i>	Bottle gentian
Juncaceae	<i>Juncus balticus (J. arcticus)</i>	baltic rush

Linaceae	<i>Linum lewisii</i>	blue flax
Malvaceae	<i>Abutilon theophrasti</i>	Velvetleaf (non-native)
Onagraceae	<i>Epilobium brachycarpum</i>	Willowherb
Poaceae	<i>Agropyron cristatum</i>	crested wheatgrass (non-native)
Poaceae	<i>Agrostis stolonifera</i>	Bentgrass (non-native)
Poaceae	<i>Alopecurus aequalis</i>	Mousetail
Poaceae	<i>Bouteloua gracilis</i>	blue grama
Poaceae	<i>Bromus inermis</i>	smooth brome (non-native)
Poaceae	<i>Bromus tectorum</i>	Cheatgrass (non-native)
Poaceae	<i>Deschampsia caespitosa</i>	Tufted hairgrass
Poaceae	<i>Elymus elymoides</i>	Squirreltail
Poaceae	<i>Glyceria striata</i>	Mannagrass
Poaceae	<i>Critesion jubatum</i>	Foxtail Barley
Poaceae	<i>Muhlenbergia montana</i>	Mountain muhly
Poaceae	<i>Phleum pratense</i>	Timothy (non-native)
Poaceae	<i>Stipa robusta (Achnatherum)</i>	Sleepygrass
Poaceae	<i>Triticum aestivum</i>	Wheat (non-native)
Polygonaceae	<i>Polygonum ramosissimum</i>	Smartweed
Ranunculaceae	<i>Batrachium trichophyllum</i>	Water crowfoot
Rosaceae	<i>Pentaphylloides floribunda</i> <i>(Dasiphora fruticosa)</i>	shrubby cinquefoil
Saxifragaceae	<i>Saxifraga odontoloma</i> <i>(Micranthes)</i>	Saxifrage
Scrophulariaceae	<i>Linaria vulgaris</i>	Yellow toadflax (non-native)
Scrophulariaceae	<i>Penstemon virgatus</i> ssp. <i>asa-grayi</i>	Beard-tongue
Scrophulariaceae	<i>Veronica catenata</i>	Speedwell
Solanaceae	<i>Solanum triflorum</i>	Nightshade

Appendix 5

Element occurrence records for *Oligoneuron album* (= *Unamia alba*) and *Woodsia neomexicana* at FLFO (Colorado Natural Heritage Program 2002).

Element Occurrence Record

UNAMIA ALBA PRAIRIE GOLDENROD

LOCATORS

PLACE NAME: FLORISSANT NM LAT: 385440N
POTENTIAL CONSERVATION AREA: FLORISSANT LONG: 1051710W

MAPPING PRECISION: SECONDS: ACTUAL MAPPED LOCATION OR EQUIVALENT PROVIDED

COUNTY: Teller QUADNAME: LAKE GEORGE

TOWNSHIP/RANGE: SECTION:
013S071W 24

DIRECTIONS: FLORISSANT FOSSIL BEDS NM (AREA C). N-FACING SLOPE (CONPS). NORTH OF SERVICE ROAD, ON DRY SLOPES OF NW TO N-FACING BANK (ARMSTRONG/DENHAM).

MINIMUM ELEVATION 8440 MAXIMUM ELEVATION: 8440

HABITAT: ELEVATION RANGE 8400-8500 FT. GEOL: ASPECT:N-NW. ASSOC TAXA: PONDEROSA, POPULUS, OXYTROPIS, CIRSIUM, CASTILLEJA.

SPECIES AND SPECIFIC OCCURRENCE STATUS

GLOBAL RANK: G5 STATE RANK: S2S3 FED. LEGAL: STATE LEGAL:

OCCURRENCE RANK: E RANK DATE: 1999-02-17

OCCURRENCE RANK COMMENTS:
[CNHP 1999:] INSUFFICIENT INFORMATION TO ASSIGN AN ELEMENT OCCURRENCE RANK.

SURVEY DATE: 1982-08-16 LAST OBSERVED: 1985-99-99 FIRST OBSERVED: 1981-99-99

SPECIFIC OCCURRENCE BIOLOGICAL DATA:

MANAGEMENT, OWNERSHIP AND PROTECTION

MANAGEMENT AREA NAME: FLORISSANT FOSSIL BEDS NATIONAL MONUMENT OCCURRENCE WHOLLY CONTAINED?: Y

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OWNER: NPS, FLORISSANT NM
OWNER COMMENTS:

INFORMATION SOURCES AND RECORD MAINTENENCE

SPECIMEN CITATIONS:

COLORADO NATIVE PLANT SOCIETY. 1982. SPECIMEN (COLLECTION #200) AT UNIVERSITY OF COLORADO HERBARIUM.

BEST SOURCE: ARMSTRONG, A. & M.L. DENHAM. 1981. SPECIMEN (COLLECTION #259) AT COLO HERBARIUM.

COMMENTS: NEAR MONUMENT RESIDENTIAL AREA

BOUNDARIES: Y

PHOTOS: N

UPDATE:

PDAST8P1F0*004*CO

PRINTOUT DATE: 13 JAN 2003

Element Occurrence Record

UNAMIA ALBA PRAIRIE GOLDENROD

LOCATORS

PLACE NAME: FLORISSANT NM LAT: 385445N
POTENTIAL CONSERVATION AREA: FLORISSANT LONG: 1051543W

MAPPING PRECISION: SECONDS: ACTUAL MAPPED LOCATION OR EQUIVALENT PROVIDED

COUNTY: QUADNAME:
Teller LAKE GEORGE

TOWNSHIP/RANGE: SECTION:
013S070W 19

DIRECTIONS: FLORISSANT FOSSIL BEDS NATIONAL MONUMENT (AREA E). GENTLE MOIST SE-FACING SLOPE 1.8 MI NE OF STOCK POND E OF CUSACK BARN.

MINIMUM ELEVATION 8595 MAXIMUM ELEVATION: 8595

HABITAT: ASPECT:SE. ASSOC TAXA: SYMPHYOTRICHUM, FESTUCA, GENTIANELLA, SCHIZACHYRIUM.

SPECIES AND SPECIFIC OCCURRENCE STATUS

GLOBAL RANK: G5 STATE RANK: S2S3 FED. LEGAL: STATE LEGAL:

OCCURRENCE RANK: E RANK DATE: 1999-02-17

OCCURRENCE RANK COMMENTS:

[CNHP 1999:] INSUFFICIENT INFORMATION TO ASSIGN AN ELEMENT OCCURRENCE RANK.

SURVEY DATE: LAST OBSERVED: 1986-08-28 FIRST OBSERVED: 1986-08-28

SPECIFIC OCCURRENCE BIOLOGICAL DATA:

MANAGEMENT, OWNERSHIP AND PROTECTION

MANAGEMENT AREA NAME:

OCCURRENCE WHOLLY CONTAINED?:

FLORISSANT FOSSIL BEDS NATIONAL MONUMENT

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OWNER: NPS, FLORISSANT NM

OWNER COMMENTS:

INFORMATION SOURCES AND RECORD MAINTENENCE

SPECIMEN CITATIONS:

BEST SOURCE: WINGATE, J. & M. EDWARDS. 1986. SPECIMEN (COLLECTION #706) AT COLO HERBARIUM.

COMMENTS:

BOUNDARIES: N

PHOTOS: N

UPDATE:

PDAST8P1F0*007*CO

PRINTOUT DATE: 13 JAN 2003

Element Occurrence Record

UNAMIA ALBA
PRAIRIE GOLDENROD

LOCATORS

PLACE NAME: FLORISSANT NM LAT: 385510N
POTENTIAL CONSERVATION AREA: FLORISSANT LONG: 1051731W

MAPPING PRECISION: SECONDS: ACTUAL MAPPED LOCATION OR EQUIVALENT PROVIDED

COUNTY: QUADNAME:
Teller LAKE GEORGE

TOWNSHIP/RANGE: SECTION:
013S071W 14

DIRECTIONS: SAWMILL TRAIL (AREA C). 1.8 MI NE OF MARY GHIST HOUSE, ON BROAD BENCH ABOVE DRAINAGE.

MINIMUM ELEVATION 8400 MAXIMUM ELEVATION: 8400

HABITAT: GEOL: GRANITIC. SOIL: DECOMPOSING GRANITE; FINE DARK LOAM. ASSOC TAXA: BROMUS, MUHLENBERGIA, ORTHOCARPUS.

SPECIES AND SPECIFIC OCCURRENCE STATUS

GLOBAL RANK: G5 STATE RANK: S2S3 FED. LEGAL: STATE LEGAL:

OCCURRENCE RANK: C RANK DATE: 1999-02-17

OCCURRENCE RANK COMMENTS:

[CNHP 1999:] MORE INFORMATION ON THE NUMBERS OF INDIVIDUALS IS NEEDED. THE EORANK OF 'C' IS BASED ON THE 'ABUNDANT LOCALLY' COMMENT AND THE CONDITION OF THE HABITAT, HOWEVER THE RANK MAY CHANGE WITH MORE INFORMATION.

SURVEY DATE: 1983-08-18 LAST OBSERVED: 1983-08-18 FIRST OBSERVED: 1983-99-99

SPECIFIC OCCURRENCE BIOLOGICAL DATA:

ABUNDANT LOCALLY. -

MANAGEMENT, OWNERSHIP AND PROTECTION

MANAGEMENT AREA NAME: OCCURRENCE WHOLLY CONTAINED?:
FLORISSANT FOSSIL BEDS NATIONAL MONUMENT

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OWNER: NPS, FLORISSANT NM

OWNER COMMENTS:

INFORMATION SOURCES AND RECORD MAINTENENCE

SPECIMEN CITATIONS:

BEST SOURCE: COLORADO NATIVE PLANT SOCIETY. 1983. SPECIMEN (COLLECTION #E-515) AT COLO HERBARIUM.

COMMENTS: OTHER VEGETATION SPARSE.

BOUNDARIES: N

PHOTOS: N

UPDATE:

PDAST8P1F0*009*CO

PRINTOUT DATE: 13 JAN 2003

Element Occurrence Record

WOODSIA NEOMEXICANA
NEW MEXICO CLIFF FERN

LOCATORS

PLACE NAME: GRAPE CREEK LAT: 385450N
POTENTIAL CONSERVATION AREA: FLORISSANT LONG: 1051626W

MAPPING PRECISION: MINUTES: MAPPED WITHIN CA. 1 MINUTE

COUNTY: Teller QUADNAME: LAKE GEORGE

TOWNSHIP/RANGE: SECTION:
013S071W 24

DIRECTIONS:

MINIMUM ELEVATION MAXIMUM ELEVATION:

HABITAT:

SPECIES AND SPECIFIC OCCURRENCE STATUS

GLOBAL RANK: G4? STATE RANK: S2 FED. LEGAL: STATE LEGAL:

OCCURRENCE RANK: E RANK DATE: 1999-02-17

OCCURRENCE RANK COMMENTS:
[CNHP 1999:] INSUFFICIENT INFORMATION TO ASSIGN AN ELEMENT OCCURRENCE RANK.

SURVEY DATE: LAST OBSERVED: 1983-09-17 FIRST OBSERVED: 1982-99-99

SPECIFIC OCCURRENCE BIOLOGICAL DATA:

MANAGEMENT, OWNERSHIP AND PROTECTION

MANAGEMENT AREA NAME: OCCURRENCE WHOLLY CONTAINED?:
FLORISSANT FOSSIL BEDS NATIONAL MONUMENT

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OWNER: NPS, FLORISSANT FOSSIL BEDS NM
OWNER COMMENTS:

INFORMATION SOURCES AND RECORD MAINTENENCE

SPECIMEN CITATIONS:

BEST SOURCE: EDWARD, MARY. 1985. FLORISSANT NM.

COMMENTS:

BOUNDARIES: N

PHOTOS: N

UPDATE:

PPDRY0U060*003*CO

PRINTOUT DATE: 13 JAN 2003

Element Occurrence Record

WOODSIA NEOMEXICANA NEW MEXICO CLIFF FERN

LOCATORS

PLACE NAME: TWIN ROCKS VALLEY, FLORISSANT
FOSSIL BEDS NM **LAT:** 385522N
POTENTIAL CONSERVATION AREA: FLORISSANT **LONG:** 1051514W

MAPPING PRECISION: SECONDS: ACTUAL MAPPED LOCATION OR EQUIVALENT PROVIDED

COUNTY: Teller **QUADNAME:** LAKE GEORGE

TOWNSHIP/RANGE: SECTION:
013S070W 18

DIRECTIONS: FLORISSANT FOSSIL BEDS NATIONAL MONUMENT. NE 1/4 SEC 18 T13SR70W. 2650 MSM TWIN ROCKS VALLEY (AREA E)

MINIMUM ELEVATION **MAXIMUM ELEVATION:**

HABITAT: GRANITE OUTCROPS ON N SIDE OF VALLEY

SPECIES AND SPECIFIC OCCURRENCE STATUS

GLOBAL RANK: G4? **STATE RANK:** S2 **FED. LEGAL:** **STATE LEGAL:**

OCCURRENCE RANK: E **RANK DATE:** 1999-02-17

OCCURRENCE RANK COMMENTS:

[CNHP 1999:] INSUFFICIENT INFORMATION TO ASSIGN AN ELEMENT OCCURRENCE RANK.

SURVEY DATE: **LAST OBSERVED:** 1983-09-17 **FIRST OBSERVED:** 1983-09-17

SPECIFIC OCCURRENCE BIOLOGICAL DATA:

MANAGEMENT, OWNERSHIP AND PROTECTION

MANAGEMENT AREA NAME:

FLORISSANT FOSSIL BEDS NATIONAL MONUMENT

OCCURRENCE WHOLLY CONTAINED?:

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OWNER: NPS, FLORISSANT FOSSIL BEDS NM

OWNER COMMENTS:

INFORMATION SOURCES AND RECORD MAINTENENCE

SPECIMEN CITATIONS:

BEST SOURCE: ROOT, P. 1983. SPECIMEN # 83-39 CU HERBARIUM

COMMENTS:

BOUNDARIES:

PHOTOS:

UPDATE:

PPDRY0U060*011*CO

PRINTOUT DATE: 13 JAN 2003

Element Occurrence Record

WOODSIA NEOMEXICANA
NEW MEXICO CLIFF FERN

LOCATORS

PLACE NAME: TWIN ROCKS VALLEY, FLORISSANT
FOSSIL BEDS NM LAT: 385522N
POTENTIAL CONSERVATION AREA: FLORISSANT LONG: 1051514W

MAPPING PRECISION: SECONDS: ACTUAL MAPPED LOCATION OR EQUIVALENT PROVIDED

COUNTY: TELLER
QUADNAME: LAKE GEORGE

TOWNSHIP/RANGE: SECTION:
013S070W 18

DIRECTIONS: FLORISSANT FOSSIL BEDS NATIONAL MONUMENT. NE 1/4 SEC 18 T13SR70W. 2650 MSM TWIN ROCKS VALLEY (AREA E)

MINIMUM ELEVATION MAXIMUM ELEVATION:

HABITAT: GRANITE OUTCROPS ON N SIDE OF VALLEY

SPECIES AND SPECIFIC OCCURRENCE STATUS

GLOBAL RANK: G4? STATE RANK: S2 FED. LEGAL: STATE LEGAL:

OCCURRENCE RANK: E RANK DATE: 1999-02-17

OCCURRENCE RANK COMMENTS:

[CNHP 1999:] INSUFFICIENT INFORMATION TO ASSIGN AN ELEMENT OCCURRENCE RANK.

SURVEY DATE: LAST OBSERVED: 1983-09-17 FIRST OBSERVED: 1983-09-17

SPECIFIC OCCURRENCE BIOLOGICAL DATA:

MANAGEMENT, OWNERSHIP AND PROTECTION

MANAGEMENT AREA NAME:

FLORISSANT FOSSIL BEDS NATIONAL MONUMENT

OCCURRENCE WHOLLY CONTAINED?:

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OWNER: NPS, FLORISSANT FOSSIL BEDS NM

OWNER COMMENTS:

INFORMATION SOURCES AND RECORD MAINTENENCE

SPECIMEN CITATIONS:

BEST SOURCE: ROOT, P. 1983. SPECIMEN # 83-39 CU HERBARIUM

COMMENTS:

BOUNDARIES:

PHOTOS:

UPDATE:

PPDRY0U060*011*CO

PRINTOUT DATE: 13 JAN 2003