

Colorado Natural Heritage Program

2004 Project Abstracts



**Colorado
State**
University

Knowledge to Go Places

Cover photo: Peggy Lyon, CNHP botanist, reading a vegetation transect at Senator Beck Basin, an alpine basin above Red Mountain Pass in Ouray County.

From the Director:

One of my morning rituals is starting the day off by reading our local newspaper while sipping a cup of hot coffee. On March 17th, 2005 the following headline caught my attention: “Senate OKs drilling in Alaskan refuge.” I’ve never been to the Arctic National Wildlife Refuge (ANWR), but I know this is one of our country’s last great wilderness areas, with over 15 million acres of pristine tundra that hosts an incredible list of wildlife, from polar bears and caribou to flocks of nesting birds. My husband’s response to Congress’ approval was “when protecting the environment we have to win over and over again, but we only have to lose once and it is gone forever.” Although Colorado doesn’t have anything as large as ANWR, we do have plenty of landscapes that we can’t afford to “lose forever.”



The Colorado Natural Heritage Program (CNHP) specializes in documenting which of Colorado’s landscapes maintain species and plant communities that are found nowhere else in the world or for which Colorado is one of the best locations. It is this gathering and sharing of information with our partners that leads to successful conservation.

The year 2004 was a conservation success for Colorado, with two large conservation transactions leading to the protection of some of our most precious landscapes. The acquisition of the 100,000 acre Baca Ranch was the cornerstone of the newly formed Great Sand Dunes National Park, that will protect six sand dune endemic species of insects and a suite of rare ecological communities. The acquisition of the Red Mountain and Soapstone Ranches that comprise Larimer County’s “Mountains to Plains” project provides protection to our Front Range foothills and shortgrass prairie ecosystems, making this landscape-scale project a legacy to future generations. CNHP’s previous work on documenting the biological significance of both of these projects was important to the success of these projects. Our efforts in both of these projects led to CNHP receiving the NatureServe “Conservation Impact Award” in 2004.

In the following report we highlight our significant findings of 2004. We worked on 44 projects, funded by 19 organizations. Each project added significant information to our knowledge of Colorado’s rare and imperiled species and ecological communities. The primary biological information gathered in all of these projects resides in our constantly updated biological conservation database, with over 11,000 element occurrence records and 1,800 Potential Conservation Areas and Networks of Conservation Areas. All of this information is available to decision makers and land managers to assist with the protection of Colorado’s most biologically significant areas.

Renée J. Rondeau
March 19, 2005

Colorado Natural Heritage Program

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Primary Funders (in alphabetical order)

Center for Avalanche and Snow Studies



**Vegetation Monitoring of
Senator Beck Basin**

Colorado State Land Board



**State Land Board Stewardship
Trust Surveys**

City of Fort Collins



**Assessment of Critical
Biological Resources, Larimer
County**

Great Outdoors Colorado



**Assessment of Critical Biological
Resources, Larimer County**

City of Loveland



**Assessment of Critical
Biological Resources, Larimer
County**

Larimer County



**Assessment of Critical
Biological Resources, Larimer
County**

Colorado Department of Natural Resources



**Survey of Critical Wetland and
Riparian Areas in Dolores
County
Vegetation Index of Biotic
Integrity for Colorado Wetlands:
Phase 1**

National Fish and Wildlife Foundation



**Pollination Study for Globally
imperiled Plant Species in the
Arkansas Valley**

Colorado Department of Transportation



**Colorado Department of
Transportation Noxious Weed
Mapping**

National Park Service

**Great Sand Dunes National Park
and Preserve 2003 Vascular Plant
Inventory**

**NPS Species of Mgmt. Concern
and Invasive Animals Databases
NPS Threatened and Endangered
Species Database**

**Population Status Survey of
Schmoll's Milkvetch at Mesa
Verde National Park**

**Prelim. Vegetation Classification
for Canyonlands NP and Glen
Canyon NRA**

**Rocky Mountain National Park
Vegetation Classification and
Mapping**

Colorado Division of Wildlife



**Boreal Toad Monitoring and
Survey Project
Central Shortgrass Prairie Data
Gathering
Colorado Small Mammal
Survey
Montane Mollusk and Crustacean
Survey of Western Colorado
Vegetation Index of Biotic Integrity
for Colorado Wetlands: Phase 1**



NatureServe



Internet Data Delivery Workshop
Submission of CNHP Wetland and Riparian Plot Data to VegBank

The Land Rights Council

Natural Heritage Inventory of La Sierra Land Grant, Costilla County

The Nature Conservancy



Central Shortgrass Prairie Ecoregional Assessment
Ecological Systems Viability Specifications for the Central Shortgrass Prairie
General Support from The Nature Conservancy
Measures of Success for the Southern Rocky Mountains Ecoregional Plan
Monitoring of Tamarisk Removal Areas on San Miguel River

U.S. Bureau of Land Management



BLM Fuel Reduction Monitoring
Gunnison Gorge National Conservation Area Survey of Impacts on Rare Plants
Native Plant Restoration Opportunities in the Uncompahgre Plateau
Survey of Critical Wetlands in South Park, Park County

U.S. Department of Defense



Buckley Air Force Base Wildlife Management Plan
Central Shortgrass Prairie Ecoregional Assessment
Conservation and Management Plan for F.E. Warren Air Force Base
Monitoring Vegetation at Pueblo Chemical Depot: 1998-2004
Natural Heritage Inventory of Peterson Air Force Base
Preble's Meadow Jumping Mouse Populations at the U.S. Air Force Academy
Round Leaf Four-O'Clock Management Plan

U.S. Environmental Protection Agency



Survey of Critical Wetland and Riparian Areas in Dolores County
Vegetation Index of Biotic Integrity for Colorado Wetlands: Phase 1

U.S. Fish and Wildlife Service



Pawnee Montane Skipper Post-fire Habitat Assessment Survey
Round Leaf Four-O'Clock Management Plan
Threatened and Endangered Plant Species Data Development

U.S. Forest Service



Botanical Survey of Winter Park Ski Area
Comanche National Grasslands Planning Project
Rare Plant Survey of San Juan NF in Dolores and Montezuma Cos.
Supplemental Botanical Survey of Strawberry Lake Fen
U.S. Forest Service Region 2 Data Development
U.S. Forest Service Region 2 Technical Conservation Assessments

2004 Projects

With over 44 projects simultaneously occurring in one year, CNHP has the opportunity to work in all of Colorado's habitats including high and low elevations, wet and dry habitats, and all four corners of the state. Along with the varied terrain, we also work with a variety of subjects that include all major taxonomic groups and ecological communities. The common thread that ties all of these projects together is our commitment to providing quality conservation science.

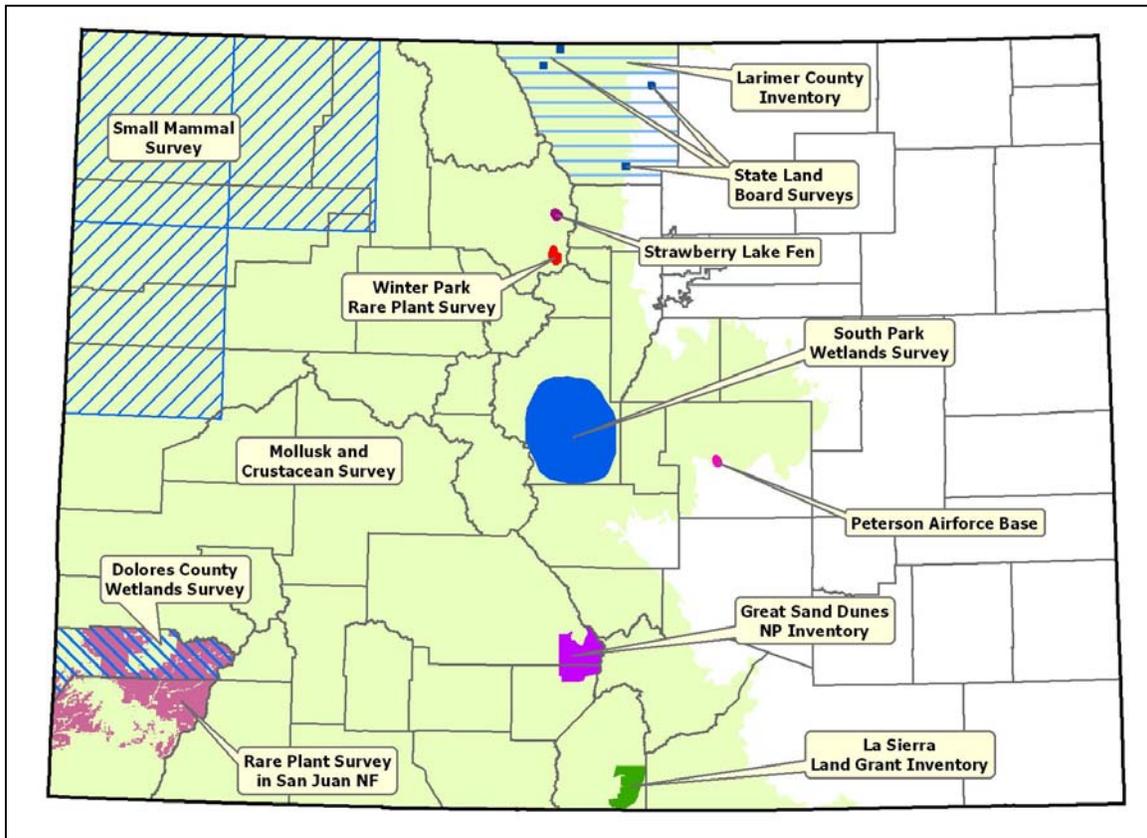
Throughout all of our projects we aim to answer one or more of the following questions:

- 1. What species and ecological communities exist in Colorado?**
- 2. Which are of greatest risk of extinction?**
- 3. What are their biological and ecological characteristics?**
- 4. Where are they found?**
- 5. What is their condition at those locations?**
- 6. What processes or activities are sustaining or threatening them?**
- 7. Where are the most important sites to protect?**
- 8. What actions are needed for the protection of those sites?**

These basic questions are important to carrying out biodiversity conservation efforts, and are at the core of all Heritage Programs. As you read through these abstracts you will see this foundation in all of our projects.

Red Mountain Ranch,
Larimer County.

Inventory



Colorado Small Mammal Survey

Jeremy Siemers

In 2001, The Colorado Division of Wildlife (CDOW) contracted with CNHP to develop a protocol for a statewide small mammal survey. The primary objective of this 10-year project is to expand knowledge of the distribution of lesser-known mammals in the orders Insectivora, Chiroptera, and Rodentia. CNHP biologists, in consultation with CDOW, developed a list of priority species for inventory. In addition, to better evaluate the presence of small mammals in habitats throughout Colorado, CNHP biologists identified major ecological systems within each area to survey.

CNHP surveyed northwest Colorado during the 2004 field season. Efforts focused on the Wyoming pocket gopher (*Thomomys clusius*), pocket mice (*Perognathus* spp.) and bats. We documented new occurrences of two species of rare bat: the spotted bat (*Euderma maculatum*) and the pallid bat (*Antrozous pallidus*). We also recorded additional records of the state rare sagebrush vole (*Lemmiscus curtatus*). Additional survey work will continue in western Colorado in 2005.

Montane Mollusk and Crustacean Survey of Western Colorado

John Sovell

There is little current information on the distribution of mollusks and crustaceans in western Colorado, yet such information is essential for defining conservation issues and developing conservation plans for these invertebrates. The Colorado Division of Wildlife is funding this three-year project, now in its third year, to identify current distributions and abundance of mollusk and crustacean species in western Colorado. The range fluctuations of these invertebrates are unknown, but given the difficulties in dispersal of these non-vagile animals, real expansions in range are uncommon. On the other hand, range contractions may occur because of sensitivities to disturbance and pollution of aquatic habitats.



Sampling for mollusks and crustaceans at De Weese Reservoir north of Westcliff, Colorado.

This project has recorded range extensions in Colorado for three species of crayfish - *Orconectes immunitis*, *Orconectes nais* and *Orconectes neglectus*. These extensions probably do not reflect an actual range extension, but rather a lack of past survey effort and the absence of readily accessible existing data.

Mollusk genera identified in our survey include *Pisidium*, *Lymnaea*, *Gyraulus*, *Physa*, and *Helisoma*. Distributions we observed for these genera reflect current understanding of their range and abundance in Colorado except for *Helisoma*. *Helisoma* was documented at only four locations whereas it had previously been documented at 50 locations. The reason for the apparent decline in *Helisoma* is unknown. Hopefully the results of this survey will assist conservation planners in identifying species of conservation concern.

Natural Heritage Inventory of Peterson Air Force Base

Rob Schorr and Ron Abbott

To update the natural heritage inventory conducted in 1997, Peterson Air Force Base (AFB) and the U.S. Fish and Wildlife Service funded a zoological, botanical, and ecological inventory in 2004. Much of the inventory focused on the ecological function of the shortgrass prairies in the eastern section of Peterson AFB, but small mammal trapping also was conducted to assess whether the Preble's meadow jumping mouse (*Zapus hudsonius preblei*) is found along the major riparian system of East Fork of Sand

Creek. Although no rare plants were documented during the survey, the rare plant community of big bluestem/prairie sandreed (*Andropogon gerardii/Calamovilfa longifolia*) was found. Additionally, several birds of conservation concern, including the Ferruginous Hawk and Grasshopper Sparrow, were seen during the inventory. No Preble's meadow jumping mice were captured along the East Fork of Sand Creek.

Assessment of Critical Biological Resources, Larimer County

Georgia Doyle and Stephanie Neid

CHNP has been systematically conducting county-based surveys for rare and imperiled species and significant plant communities since 1992. During the 2004 field season, we surveyed Larimer County with support from Great Outdoors Colorado (GOCO), Larimer County, and the cities of Fort Collins and Loveland. Larimer County is the first county to undergo a second round of a CNHP inventory. This project supplemented information collected in 1996. Larimer County Open Lands requested the update to collect additional data on existing protected open space properties and to provide data for development review purposes through the County planning department. In addition, the county requested help in assessing the biological integrity on lands under consideration for conservation action, especially in the northeastern part of the county where they and their partners are having great success with the Mountains to Plains project.

The Mountains to Plains project links over 55,000 acres of ponderosa pine woodlands, foothills shrublands, and grasslands in an ecologically intact setting. CNHP assisted Larimer County in obtaining an \$11.6 million grant from GOCO to acquire Red Mountain Ranch, a key piece of the project. In addition to gathering baseline information, CNHP is assisting Larimer County and the City of Fort Collins with management recommendations for the Red Mountain Ranch and adjoining Soapstone Ranch. The Mountains to Plains project area is teeming with species and communities of concern, including many declining grassland bird species and rare mountain mahogany shrubland communities in excellent condition.



The Big Hole on Red Mountain Ranch, recently protected as part of the Mountains to Plains project.

Other survey highlights from 2004 include a newly discovered population of North Park phacelia (*Phacelia formosula*) in the Laramie River Valley. This federally listed endangered species was previously known only from North Park. It and two other newly documented rare plants, Ward's goldenweed (*Oenopsis wardii*) and dropleaf buckwheat

(*Eriogonum exilifolium*), grow on shale barrens near the Laramie River. Highlights from the animal kingdom include a new breeding location for the state endangered boreal toad (*Bufo boreas*) and a stonefly (*Capnia arapahoe*) globally known only from two tributaries of the Poudre River.

State Land Board Stewardship Trust Surveys

Georgia Doyle and Stephanie Neid



Rocky Mountain ragwort on Jimmy Creek.

In 2004, CNHP received funding from the State Land Board (SLB) to conduct biological surveys on four Stewardship Trust Parcels in Larimer County. Stewardship Trust lands, representing about ten percent of SLB properties, are selected based on their high biological values. The SLB requested the surveys to add to their baseline knowledge of the parcels and to help design management activities to ensure conservation of significant biological resources.

During the surveys, CNHP discovered four new element occurrences and expanded and updated information for six others. The new discoveries included the largest known Colorado population of Southern Rocky Mountain cinquefoil (*Potentilla ambigens*), a globally vulnerable (G3) species. This plant and two new occurrences of rare ponderosa pine communities were documented at the Pinewood Lake SLB parcel near Carter Lake. The state rare (G4 S1)

Rocky Mountain ragwort (*Packera debilis*) was discovered within wetlands on Jimmy Creek in northwestern Larimer County. Occurrences of the Laramie River Valley endemic larch-leaf beardtongue (*Penstemon laricifolius* ssp. *exilifolius*) were expanded at both the Jimmy Creek and Sand Creek parcels in northwestern Larimer County. Other survey results verified the importance of the Park Creek Hogback parcel as part of the largest undisturbed occurrence of the globally imperiled (G2) Bell's twinpod (*Physaria bellii*). The results of the surveys verify the biological importance of the SLB stewardship properties in protecting the biodiversity of Colorado.

Survey of Critical Wetlands in South Park, Park County

Denise Culver

CNHP and Colorado State University received funding from the Bureau of Land Management, Royal Gorge Field Office, to survey critical wetlands located on BLM lands in South Park, Colorado. The results of the 2003-2004 field surveys are an

addendum to the report *Mapping and Characterization of Mires and Fens in South Park, Park County, Colorado*, prepared by Johnson and Gerhardt in 2002.



Tarryall River fen, South Park.

South Park has been intensively studied because of the presence of unique and high quality wetland types, such as extreme rich fens, riparian areas, and playa wetlands. These studies were intended to supply data for proactive planning by land managers in order to prevent or minimize further loss or degradation of wetland and riparian areas.

The goal of the 2003-2004 project was to survey remaining parcels that were not included in the 2001-2002 survey. During the field seasons of 2003 and 2004, CNHP surveyed a total of 31 parcels; nine parcels consisting of 498 acres were designated as being in Proper Functioning Condition; seven parcels consisting of 122 acres were Functioning At Risk, and 15 parcels consisting of 161 acres were Nonfunctional. Three globally vulnerable (G3) plant associations and six globally common (G4 and G5) plant associations were documented on 12 of the 31 parcels surveyed.

Survey of Critical Wetlands and Riparian Areas in Dolores County

Maggie March and Denise Culver

In 2004, CNHP received funding from the Colorado Department of Natural Resources (DNR) through a grant from the U.S. Environmental Protection Agency (EPA), Region 8,



Beaver pond and montane willow shrubland along Fish Creek.

to survey for critical wetlands within Dolores County. The goals of this project were to 1) identify high-quality examples, and the corresponding natural heritage value, of all types of wetland/riparian areas in Dolores County (using CNHP's Comprehensive Statewide Wetland Classification); 2) evaluate the functions associated with each wetland type; 3) assess the restoration potential of each wetland type; and 4) identify potential reference wetlands.

Results of the wetland and riparian survey confirm that Dolores County

contains areas with high biological significance and a diverse array of wetlands that support a wide variety of plants, animals, and plant associations. At least thirty-two major wetland/riparian plant communities, as well as four rare or imperiled animal species and three rare or imperiled plant species are known to occur in, or are associated with, wetlands in Dolores County. Twenty-five wetland and riparian sites of biodiversity significance are profiled in the final report as Potential Conservation Areas (PCAs). These PCAs represent the best examples of 48 wetland and riparian communities observed on the private and public lands we visited. Of the 25 wetland and riparian PCAs, two are nearly irreplaceable in terms of biodiversity significance (B2), 13 are of high biodiversity significance (B3), eight are of moderate biodiversity significance (B4), and two are of general biodiversity significance (B5).

Supplemental Botanical Survey of Strawberry Lake Fen

Joe Rocchio

The U.S. Forest Service recently acquired the Strawberry Lake Fen in Grand County. In response to recently proposed activities in the project area, CNHP was contracted to 1) conduct a botanical inventory of the Strawberry Lake project area, 2) discuss the importance of the fen, and 3) make management recommendations. Much of this work in this multi-year project was completed in previous years. In 2004, CNHP conducted a late spring/early summer inventory to complement previous surveys in mid- and late-summer.

Approximately 12 additional species were documented in 2004, bringing the total number of species found in the fens, riparian areas, and ponds to 112.

Previously, CNHP documented three state classified rare plants – slender sedge (*Carex lasiocarpa*), round-leaf sundew (*Drosera rotundifolia*), and marsh cinquefoil (*Comarum palustre*) – and two state rare plant associations – slender sedge and inflated sedge (*Carex vesicaria*) herbaceous wetlands. No new rare species or plant communities were



Strawberry Lake Fen.

documented during the early summer 2004 visit. Based on the rare occurrences, CNHP has identified Strawberry Lake as a Potential Conservation Area of high biodiversity significance (B3 ranking). Very few non-native, invasive species were observed at the site.

CNHP recommended that the Strawberry Lake Fen be considered for Research Natural Area designation. This important area could benefit from some level of protection from

future human activities in order to maintain its high-quality wetland areas and rare plant populations.

Rare Plant Survey of San Juan National Forest in Dolores and Montezuma Counties Peggy Lyon and Julia Hanson



Botany technician Julia Hanson at Lizard Head Peak, San Juan Mountains.

This project is a continuation of the rare plant survey of the San Juan National Forest that began in 2001 in Archuleta County, and continued into San Juan County (2002) and La Plata County (2003). In 2004 we also included some Bureau of Land Management (BLM) lands, and will continue to survey BLM lands in 2005. Some of the significant findings in 2004 were excellent occurrences of Gray's townsend-daisy (*Townsendia glabella*) and Colorado tansy-aster (*Machaeranthera coloradoensis*), both ranked G2S2, or imperiled, by CNHP. Hikes into the high alpine areas of the forest yielded new occurrences of San Juan whitlow-grass (*Draba graminea*), Altai cottongrass (*Eriophorum altaicum* ssp. *neogaeum*), House's stitchwort (*Alsianthe macrantha*), Colorado Divide whitlow-grass (*Draba streptobrachia*), boreal whitlow-grass (*Draba borealis*), and Altai chickweed (*Stellaria*

irrigua). At lower elevations we documented new occurrences of little penstemon (*Penstemon breviculus*), Abajo penstemon (*Penstemon lentus*), King's clover (*Trifolium kingii*) and San Juan gilia (*Gilia haydenii*). In addition, we compiled complete species lists for selected sites surveyed.

Botanical Survey of Winter Park Ski Area David G. Anderson and Jill Handwerk

The U.S. Forest Service (USFS), in response to recently proposed activities in Winter Park Resort, contracted CNHP to conduct a botanical survey of specific project areas on the Arapaho-Roosevelt National Forest within the permit boundary of Winter Park Resort. CNHP also spent one day searching for peatlands elsewhere in Grand County that are similar to the peatland known from Discovery Park at Winter Park Resort. The project areas were searched for target species of concern and communities as well as invasive species during phenologically appropriate times.

Approximately 75 plant species were observed during the site visits, including those in the project areas and elsewhere in Grand County. Moonworts (*Botrychium* spp.) and stiff club-moss (*Lycopodium annotinum*) were documented at Winter Park Resort within the proposed project areas. Based on these occurrences, CNHP has identified the Prospect Lift site as a Potential Conservation Area of high biodiversity significance (B3 ranking). The noxious weed oxeye daisy (*Chrysanthemum leucanthemum*) was found in small to medium sized populations at four sites in the Winter Park Resort. All four populations of oxeye daisy appear to be fairly discrete at this time, and could probably be eradicated or effectively managed.



Botrychium sp. at the Winter Park Resort.

Twelve locations were visited throughout the Fraser Valley in Grand County to assess their merits relative to the Discovery Park Fen. During this brief survey, no wetlands that meet the definition of a fen were identified within the Fraser Valley. A report documenting the survey results with maps of the survey routes and the rare and invasive plant sites was provided to the Winter Park Resort and the USFS- Arapaho-Roosevelt National Forest.

Great Sand Dunes National Park and Preserve 2003 Vascular Plant Inventory

Susan Spackman Panjabi, Karin Decker, and Georgia Doyle



CNHP Ecologist, Karin Decker, collecting plants at the Great Sand Dunes National Park and Preserve.

As part of its biological inventory program, the National Park Service contracted CNHP in 2001-2004 to conduct field inventories of vascular plants of the Great Sand Dunes National Park and Preserve (GRSA). To help assure the long-term protection of the biodiversity of GRSA, these inventories provide specific data for the management and protection of rare plant species and communities. We objectively quantified inventory completeness for plants using a master list approach and by plotting number of species observed against survey effort. Surveys targeted rare and non-native plant species, and species for which the GRSA lacked a voucher specimen. In 2003, we verified 127 plant species that had not previously been documented with voucher specimens at the GRSA Herbarium.

Two of the newly vouched taxa are considered to be rare in Colorado. The globally rare slender spiderflower (*Cleome multicaulis*) was previously known from the GRSA but

was not included in the GRSA collection. The other rare taxon, Intermountain bitterweed (*Hymenoxys helenoides*), is a sterile hybrid resulting from a cross of two common taxa, pingue (*H. richardsonii*) and orange sneezeweed (*H. hoopesii*). We also identified two new locations for James catseye (*Cryptantha cinerea* var. *pusulosa*), another globally imperiled plant species.

Seventeen of the 127 newly vouched species are not native to Colorado, and among these, one is included on the state list of noxious weeds - *Euphorbia esula* (leafy spurge). Early detection of non-natives is one of the most effective actions that land managers can take to control weedy invaders. Our results suggest that there are many more vascular plant species to document at GRSA. We estimate that there may be 200-400 undocumented vascular plants, and additional field seasons of collecting may be necessary to achieve a 90% documentation rate.

Natural Heritage Inventory of La Sierra Land Grant, Costilla County John Sanderson

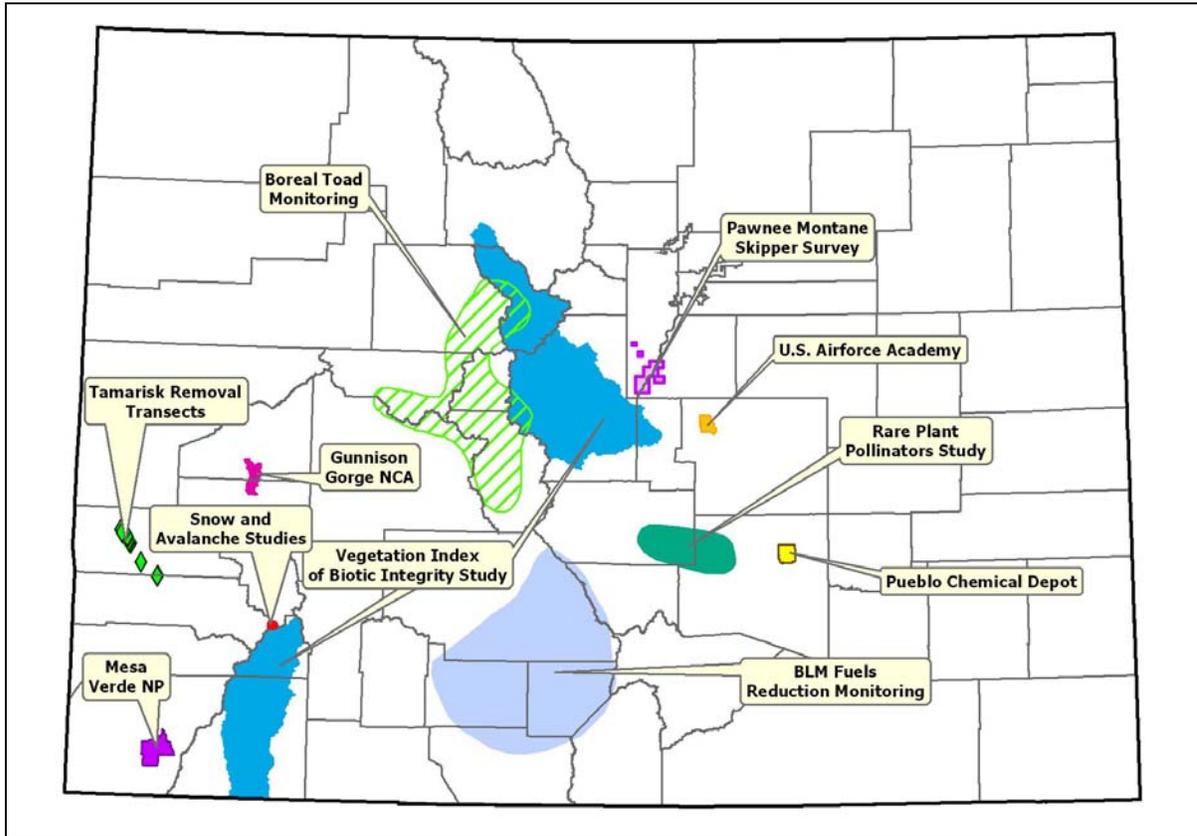
The Land Rights Council of San Luis, Colorado, hired CNHP to inventory the La Sierra Land Grant and develop a portfolio of Potential Conservation Areas. La Sierra—formerly known as the “Taylor Ranch”—is a 77,000-acre landscape in the Sangre de Cristo Mountains near the New Mexico border. It contains a wide variety of common ecosystem types, from alpine meadow, through spruce-fir and mixed



Mountain muhly grassland at La Sierra Land Grant.

conifer forests, down to sagebrush and piñon-juniper woodlands. Over the past several decades, an elaborate network of logging roads had been cut through the forests of La Sierra, and forest structure had been widely altered. Nonetheless, La Sierra still supports several excellent populations of the Rio Grande cutthroat trout. Also, we were surprised to find an extensive complex of aspen forest and montane grassland dominated by mountain muhly (*Muhlenbergia montana*), two ecosystems that are regionally rare. All parties involved in management of La Sierra have expressed a desire to protect these species and ecosystems, and we hope our report will provide a concrete starting point for action.

Monitoring and Research



Boreal Toad Monitoring and Survey

Brad Lambert

CNHP formed a partnership with the U.S. Forest Service and the Colorado Division of Wildlife (CDOW) in 1999 to monitor known breeding sites and to survey locations throughout Colorado for new populations of the state endangered boreal toad (*Bufo boreas*). The data collected have been used by the Boreal Toad Recovery Team to assess the status of the boreal toad in Colorado, and by the U.S. Fish and Wildlife Service to assess the status for potential federal listing as an endangered species. CNHP has continued this work yearly through 2004 and a new contract with the CDOW is in place to extend the project through 2008.

In 2004, CNHP monitored 23 known breeding sites in Chaffee, Eagle, Summit, and Pitkin counties. In addition, 123 sites throughout Colorado were surveyed for boreal toads, which resulted in the discovery of two new breeding sites. CNHP also continued a mark-recapture



Boreal toad at Trout Creek in Larimer County, a newly discovered breeding location.

study in the Cottonwood Creek drainage in Chaffee County. The study was set up in 1999 to look at demographic variables in a large metapopulation of boreal toads. Over 1,000 adult toads were tagged between 1998 and 2004. CNHP is currently analyzing these mark-recapture data to increase understanding of estimated population size, survival, site fidelity, and movement between breeding sites.

Pawnee Montane Skipper Post-fire Habitat Assessment Survey

John Sovell and Boyce Drummond

The Hayman and Schoonover forest fires burned across a large amount of Pawnee montane skipper butterfly (*Hesperia leonardus montana*) habitat during the summer of 2002. The U.S. Forest Service, the U.S. Fish and Wildlife Service, and Denver Water funded a three-year post-fire monitoring study within the range of this federally listed Threatened species to estimate the fire's effect on skipper habitat.



A USFWS biologist holds a whiteboard with information on the plot, date, and transect being surveyed on one of the moderate-to-high severity burn

Understanding the population trends of the Pawnee montane skipper butterfly, and the recolonization dynamics of burned areas, are important to understanding the conservation status of the butterfly. Three years of monitoring data show that unburned plots support significantly more Pawnee montane skippers, and populations on low severity burn areas are recovering. At this point, the change in forest structure in the moderate-to-high severity burn area has not proven beneficial to *Hesperia* skippers. The effect on skippers

appears not to have resulted from loss of host and nectar plant populations, as those populations appear influenced more by drought than fire and have recovered significantly over all burn conditions following increased precipitation in 2003 and 2004. It is more likely that changes in forest structure have resulted in avoidance of these areas, or that the Hayman Fire extirpated all life stages of the Pawnee montane skipper from intensely burned areas and recolonization has yet to occur.

Fire changed the forest structure. Significantly more dead trees exist on burn areas and their numbers increase with burn severity. Our research cannot exclude the possibility that Pawnee montane skippers are selectively avoiding intensely burned areas because of this change in forest structure. Alternatively, recovery of Pawnee montane skipper populations in the moderate- to high-severity burn area depends on the protracted process of dispersal and recolonization by skippers from unburned and low severity burn areas. Further monitoring will be necessary to determine whether skippers are selectively avoiding burned areas.

Preble's Meadow Jumping Mouse Populations at the U.S. Air Force Academy

Rob Schorr, Jeremy Siemers, Chris Gaughan, and Craig Hansen

CNHP has been working with the United States Air Force Academy (USAFA) since 1997 to understand the distribution, movement patterns, and population parameters of Preble's meadow jumping mice (PMJM). Currently in its 7th year, this long-term study has provided invaluable estimates of PMJM movement, survival, and abundance.

CNHP zoologists trapped four sets of transects along Monument Creek twice during the 2004 season. Trapping events took place over five nights in late May/early June and again in late August/early September. During spring trapping, 38 PMJM were captured 108 times. During fall trapping, 29 PMJM were captured 44 times. The estimated number of PMJM per kilometer of riparian habitat along Monument Creek was approximately 26 ± 4 and 22 ± 7 in spring and fall, respectively.



Monument Creek, at the U.S. Air Force Academy.

The seasonal trend in sex capture bias continued in 2004, with no females being captured in late May. As has been reported in other jumping mouse studies in North America, the females emerge from hibernation later than most males. This has created some challenges for zoologists, however, since this capture bias makes it difficult to estimate female over-summer survival. Next year the first trapping visit may occur in early to mid-June to ensure that all females are active.

In 2004, zoologists confirmed the capture of at least the second individual captured in 4 separate years. A conservative age estimate for this particular individual is 3 years.

Vegetation Index of Biotic Integrity for Colorado Wetlands: Phase 1

Joe Rocchio

The U.S. Environmental Protection Agency and Colorado Division of Wildlife have provided CNHP with funds for a multi-year project to develop a Vegetation Index of Biotic Integrity (VIBI) for Colorado wetlands in the Southern Rocky Mountains ecoregion. The objective is to develop a bioassessment monitoring tool by sampling various attributes of wetland vegetation across a human-induced disturbance gradient (e.g., pristine to heavily disturbed). Those attributes that show a predictable response to increasing human disturbance are chosen as metrics to be incorporated into the VIBI. The resulting VIBI provides a numeric value that can be used to evaluate biotic integrity of a specific wetland with time or used to compare quality of wetlands of a similar type (i.e., same hydrogeomorphic class). Thus, the VIBI value can be used for 1) monitoring



Calcareous fen in Grand County, CO.

and evaluating wetland protection, restoration, enhancement, and creation projects; 2) monitoring and evaluating the effectiveness of wetland management practices; 3) prioritizing wetland restoration and protection projects; and 4) identifying reference conditions for specific wetland types.

During the summer of 2004, 20 wetlands were sampled in the Blue River and South Platte Headwater watersheds in Park and Summit counties. Wetland vegetation was sampled using a 20 x 50 meter releve-type

plot. Presence/absence and cover were recorded for all plant species. The level of disturbance was rated according to multiple categorical ranking forms. Data analysis is ongoing and no results are available at this time. Additional plot data will be collected in 2005, at which point a VIBI model will be constructed. If funding is available, the model will be calibrated and validated on an independent dataset in 2006.

BLM Fuel Reduction Monitoring

Joe Stevens

The Bureau of Land Management (BLM) contracted CNHP to conduct multiple years of monitoring on several parcels of land where fuel reduction treatments were completed during the summer of 2003. CNHP completed the second season of monitoring in 2004. The primary objective of the treatments was to reduce the density and cover of trees on the treatment areas. To accomplish the desired reductions, the live canopy fuels in the treatment areas were mechanically reduced using a “hydro-axe.”



Field crew surveys a plot at Nolan Gulch, Saguache Co.

The treatment areas ranged in size from 160 acres to 2,100 acres, totaling approximately 5,680 acres on eight different project sites. Permanent monitoring plots were randomly established on each of the eight areas, using a criterion of one plot per 150 acres, for a total of 40 plots. Attributes monitored at each plot include density and cover of trees and tree saplings by species, understory cover by physiognomic type and species, frequency of understory species, percent cover of bare ground, percent cover of down litter, and plot

appearance (photographs). A combination of square quadrats, line transects, and photo points were used within each plot to measure the selected attributes.

Preliminary analysis of the data suggests that, between 2003 and 2004, a significant decrease in tree density and tree cover occurred, as well as a significant increase in pinyon and juniper shrub density. Bare ground and litter increased on the treatment sites, exposed rock decreased, while graminoids and forbs stayed about the same.

Gunnison Gorge National Conservation Area Survey of Impacts on Rare Plants

Peggy Lyon



Long-flower cat's eye, one of five rare plants found in the Gunnison Gorge NCA.

The Gunnison Gorge National Conservation Area, adjacent to Black Canyon National Park in Montrose and Delta counties, is an area of adobe badlands (Mancos shale) that is home to five rare plant species: clay-loving wild buckwheat (*Eriogonum pelinophilum*), Colorado desert parsley (*Lomatium concinnum*), adobe beardtongue (*Penstemon retrorsus*), long-flower cat's-eye (*Cryptantha longiflora*), and Uinta Basin hookless cactus (*Sclerocactus glaucus*).

The Bureau of Land Management Uncompahgre Basin Resource Area sponsored this survey to help determine future management needs to protect these plants. The major concern in the area is the impact of off-road vehicle use. An intensive search yielded 68 new populations or sub-populations of all five rare species. Individual plants were flagged and the perimeters of the populations were mapped using hand-held Global Positioning Systems (GPS). Roads, trails and vehicle tracks within the populations were noted, and their area was used to estimate of the number of plants that may have been lost due to off-road vehicle impacts.

Monitoring of Tamarisk Removal Areas on San Miguel River for The Nature Conservancy

Peggy Lyon

CNHP conducted a survey of current vegetation at selected areas along the San Miguel River and two tributaries in 2004. The Nature Conservancy (TNC) identified areas selected for removal of the noxious weed tree tamarisk (*Tamarix ramosissima*). Permanent transects were established to enable monitoring of changes in vegetative cover after treatment. With the



Tamarisk along the San Miguel River.

assistance of TNC's San Miguel Steward Mallory Dimmitt and three TNC interns, 16 transects were completed. Plots were read at 20-foot intervals along each 200 foot transect. Vegetation cover was estimated for all plants, and photographs were taken at each transect. The study showed that there is an abundant seed source of exotic species that may increase with treatment, but prevention of tamarisk spread and any increase in native species would be a positive result.

Population Status Survey of Schmoll's Milkvetch at Mesa Verde National Park David G. Anderson

In 2001, Mesa Verde National Park contracted with CNHP to conduct a population status survey of Schmoll's milkvetch (*Astragalus schmolliae*), which is among the most rare of Colorado's endemic plant species. CNHP assessed the population extent and density of Schmoll's milkvetch on Chapin Mesa in 2001. Survey work in the second year was postponed due to severe drought conditions that caused most plants to remain dormant. Then approximately half of the area occupied by *Astragalus schmolliae* in Mesa Verde National Park was burned in the Long Mesa fire. CNHP completed fieldwork in 2003 with the mapping of the Park Mesa and West Chapin Spur populations.



Schmoll's milkvetch in an area burned by the Long Mesa Fire of 2002. Photo taken in May of 2003.

Permanent demographic monitoring plots were established and sampled to obtain baseline data on seedling establishment and recruitment success. Plants in burned areas were vigorous and produced far more viable seed than plants in unburned sites, where most plants did not set seed and had abortive flowers. Seedlings were observed in abundance in 2003 in both burned and unburned sites. Herbivory and desiccation were major sources of mortality for seedlings in both burned and unburned areas. The total population of Schmoll's milkvetch appears to have declined 39% between 2001 and 2003. However, there was no significant difference in the population decline between burned and unburned areas. This strongly suggests that drought in 2002 was responsible for the observed decline. While fire does not appear to have serious direct detrimental effects on Schmoll's milkvetch, indirect impacts, chiefly weed invasion, have the potential to greatly impact portions of the population in burned areas.

Snow and Avalanche Studies: Vegetation Monitoring of Senator Beck Basin

Peggy Lyon and Julia Hanson

Senator Beck Basin is a high alpine basin (11,000 to 13,000 feet) above Red Mountain Pass in Ouray County that was selected as a study site by Snow and Avalanche Studies of Silverton, Colorado.

Studies in global warming predict significant impacts in alpine environments, where winter climate is a driving force in the landscape ecology. The need for long-term studies of these ecosystems and their processes are therefore critical. CNHP performed a baseline survey of the vegetation and soil surface characters of Senator Beck Basin in 2004. This baseline vegetation study and its future re-measurements will, in conjunction with two snow system research plots already in place in the Basin, provide an excellent resource for understanding the effects of future global warming in this and similar Basins of the San Juan Mountains. This study will also be instrumental in determining long-term effects of activities such as livestock grazing and recreational vehicle use on the vegetation and soil surface characters of the Basin.



Botany Technician Julia Hanson sets up transect at Senator Beck Basin.

Pollination Study for Globally Imperiled Plant Species in the Arkansas Valley

Susan Spackman Panjabi

Brandege wild buckwheat (*Eriogonum brandegei*), golden blazing star (*Nuttallia chrysantha*), Arkansas Canyon stickleaf (*Nuttallia densa*), Arkansas Valley evening primrose (*Oenothera harringtonii*), Pueblo goldenweed (*Oonopsis puebloensis*), round leaf four-o'clock (*Oxybaphus rotundifolius*), and Degener penstemon (*Penstemon degeneri*) are globally imperiled plant species known only from geographically restricted areas in the middle Arkansas River Valley of Colorado. Rare, geographically restricted plant species such as these may be susceptible to human disturbances that would reduce the frequency and/or diversity of potential pollinator visits. Management plans for these plant species should consider the ecology of associated pollinators, which may play an important role in their pollination ecology. In 2004, populations of these rare plant species were observed in order to determine the diversity of insect visitors (potential pollinators) and approximate insect visitation rates.



CNHP Botanist, Ron Abbott collecting visiting insects.

A total of 55 insect taxa were identified as visitors to the rare plants. None of the insects are rare, nor are they specialists. Bees and flies were the most common visitors for *Eriogonum brandegei*, *Nuttallia chrysantha*, *Nuttallia densa*, and *Oxybaphus rotundifolius*, while bees, flies, and wasps visited *Penstemon degeneri*. Primarily bees and sphinx moths visited the night-blooming *Oenothera harringtonii* and *Oonopsis puebloensis* was visited primarily by flies, bees, and butterflies. Further information regarding the pollination biology of the rare plants is needed before thorough conservation strategies can be developed.

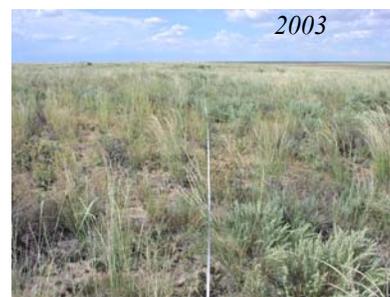
Monitoring Vegetation at Pueblo Chemical Depot: 1998-2004

Renée Rondeau

Prior to the Europeans settling the Great Plains, some 30 million bison and 80 million pronghorn roamed the unfragmented prairies. European settlement brought significant changes in the grazing pressures on the prairies, first with the near elimination of bison and pronghorn, followed by the introduction of cattle, sheep, fencing, and farming. A unique situation at Pueblo Chemical Depot (PCD) has allowed CNHP to study the differences between areas that haven't been grazed by cattle since the 1940's with those areas that were continuously grazed by cattle up until 1998.

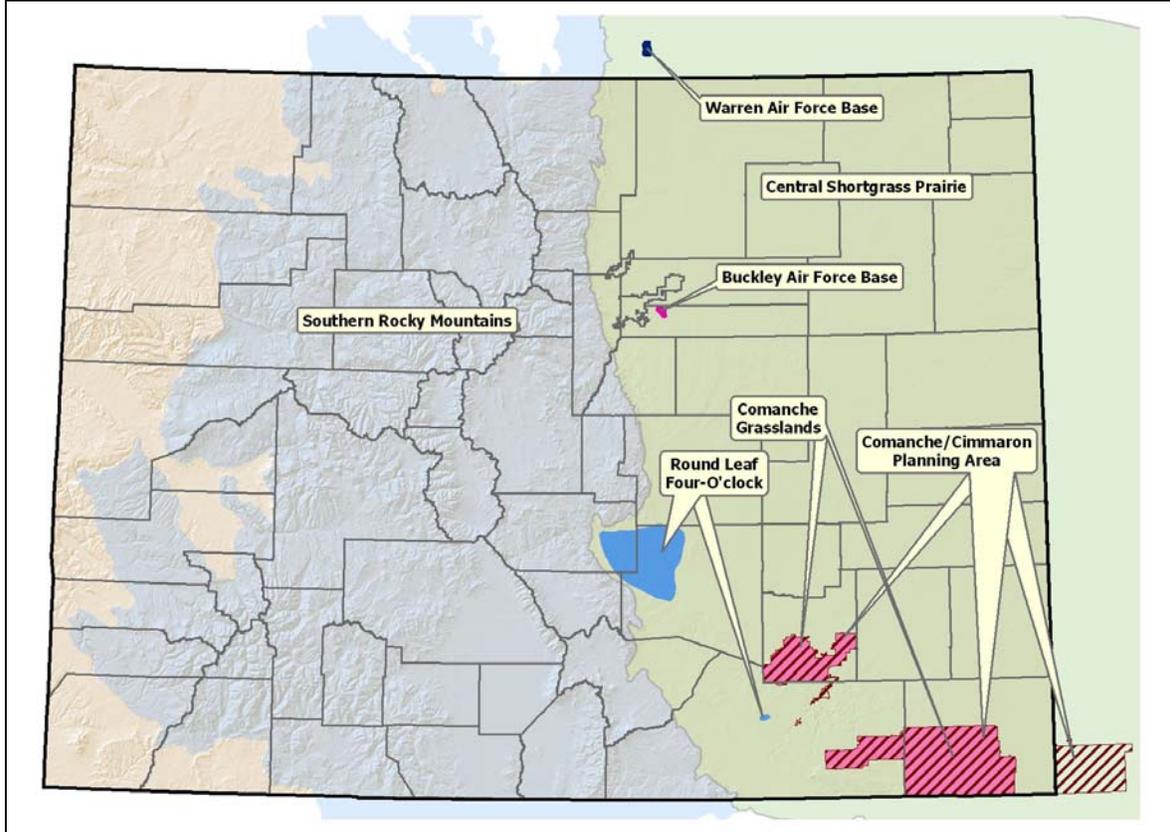
In addition to observing the differences between these two treatments, we also set up permanent monitoring plots to assess how rapidly or slowly the prairie responds to the cessation of all cattle grazing on the areas that were grazed up until 1998. Over 40 permanent plots were sampled for changes in vegetation.

Differences in vegetation and the amount of bare ground have been documented for the shortgrass prairie, sandsage prairie, and greasewood shrublands within PCD. Seven years of monitoring permanent plots has given us new insight into how the biotic community changes with the removal of cattle grazing. This study occurred over the worst recorded drought and has added additional insight into the effects of drought. Up until 2004, weeds were always a minor component of all vegetation types, but in 2004 weeds filled in the patches of bare ground that were left after a major blue grama dieback. Ungrazed areas had an average of 60% more weeds than the previously grazed areas.



Sandsage plot showing effects of drought.

Conservation Planning



Central Shortgrass Prairie Ecoregional Assessment

Renée Rondeau, Lee Grunau, David G. Anderson, John Sovell, Melissa Landon, Amy Lavender, Karin Decker, and Michelle Fink

CNHP is assisting The Nature Conservancy (TNC), the U.S. Department of Defense, and numerous other partners, in updating TNC's 1998 Central Shortgrass Prairie (CSP) Ecoregional Assessment. The CSP ecoregion covers portions of Colorado, Kansas, Nebraska, New Mexico, Oklahoma, Texas, and Wyoming. CNHP's biology and planning staff are participating in an interdisciplinary planning team and providing assistance with ecological analyses, identifying priority areas, developing a monitoring framework, and collecting data to catalyze conservation action and mitigate impacts to biodiversity in the Central Shortgrass Prairie. Primary activities include coordinating data exchanges with the other Natural Heritage Programs in the CSP, identifying species and ecological systems that will provide the focus for conservation strategies, developing viability guidelines and conservation goals, and developing species management templates. This project is currently in the early stages of analysis. The final assessment is scheduled for completion in the fall of 2006.

Central Shortgrass Prairie Data Gathering for the Colorado Division of Wildlife Renée Rondeau

The objective of this project was to gather, update and synthesize biological data of the shortgrass prairie of Colorado to help the Colorado Division of Wildlife (CDOW), federal and state agencies, and non-governmental conservation organizations identify conservation priorities and guide collaborative conservation activities in the shortgrass prairie. This project also provided supporting information for the CDOW's Species Conservation Partnership, State Comprehensive Wildlife Conservation Plan, and other prairie conservation projects.

We compiled a list of Central Shortgrass Prairie ecoregion wildlife conservation targets that are tracked by CNHP including 7 amphibians, 30 birds, 4 fish, 12 mammals, 9 reptiles, 5 mollusks and 22 insects. CNHP collected existing data for selected targets from a variety of sources, including Rocky Mountain Bird Observatory (RMBO), CDOW, University of Northern Colorado, and existing literature. Occurrence level data were processed and integrated into BIOTICS (Biodiversity Tracking and Conservation Data System), which is the standard database used by NatureServe and the Heritage Programs. In all, 354 wildlife records were new or updated for the Colorado portion of the CSP ecoregion. Over 220 new or updated bird occurrence records from RMBO and CDOW's previous studies on the eastern plains of Colorado were processed. RMBO, Playa Lakes Joint Venture, and CDOW collaborated with CNHP to create or update Potential Conservation Areas for the rarest Eastern Plains birds.

Comanche National Grasslands Planning Project Renée Rondeau

The U.S. Forest Service (USFS) is revising their 1984 Land and Resource Management Plan for the Comanche and Cimarron National Grasslands. The Nature Conservancy (TNC) is also engaged in the revision of their 1998 assessment for the Central Shortgrass Prairie ecoregion. Both of these planning efforts require new and updated information that can be used to guide management and conservation of ecological systems, plant



Pronghorn

communities, and species of special interest within both planning areas. The USFS, CNHP, and TNC worked collaboratively to identify data needs, collect new data, and locate existing data for incorporation into these plan revisions.

Although all taxonomic groups were considered, there was an emphasis on birds with Colorado Division of Wildlife and Rocky Mountain Bird Observatory providing important bird data. The Comanche National Grassland contains the primary habitat for Lesser Prairie Chicken, one of the eastern plains' most imperiled species. The Central Shortgrass Prairie is also of utmost importance to Long-billed Curlew, Mountain Plover, Ferruginous Hawk, and the endemic plant Colorado gentian (*Frasera coloradensis*).

Eleven ecological system descriptions and specifications were developed for this area, and 14 Potential Conservation Areas were assessed or created to reflect all of the new information.

Conservation and Management Plan for F.E. Warren Air Force Base

Lee Grunau, Rob Schorr, and Jill Handwerk

F.E. Warren Air Force Base (AFB), just west of Cheyenne, Wyoming, supports populations of two federally threatened sub-species: Preble's meadow jumping mouse (*Zapus hudsonius preblei*) and Colorado butterfly plant (*Gaura neomexicana* ssp. *coloradensis*). In fact, Warren AFB supports one of the best-known occurrences of the Colorado butterfly plant, and the only population known on federal land. Both of these sub-species are restricted in range to riparian/wetland habitats, primarily along the eastern edge of the Rocky Mountains in Wyoming and Colorado. CNHP led an effort, in cooperation with the Wyoming Natural Diversity Database and Warren AFB, to conduct a conservation assessment of these populations of Preble's meadow jumping mouse and Colorado butterfly plant, and to develop a conservation and management plan.

The most significant planning issue was encroachment of four noxious weeds: Canada thistle, leafy spurge, common hound's tongue, and Dalmatian toadflax. Other planning issues included willow encroachment into *Gaura* habitat, on-going development and maintenance of Warren AFB facilities, status of Preble's meadow jumping mouse on the AFB, and potential barriers to Preble's mouse movement. The final conservation and management plan was completed in June of 2004. Significant strategies included control of noxious weeds, habitat enhancement through willow control and mowing to benefit Colorado butterfly plant, removal of existing barriers and habitat restoration for Preble's meadow jumping mouse, and continuing research and monitoring to fill data gaps and inform adaptive management.



Colorado butterfly plant.

Round Leaf Four-O'clock Management Plan

David G. Anderson, Renée Rondeau, and Jill Handwerk



Round leaf four-o'clock.

CNHP worked in cooperation with the U.S. Fish and Wildlife Service (USFWS) and the U.S. Department of Defense (DOD) to develop a management guidance plan for the round leaf four-o'clock (*Oxybaphus rotundifolius*) on DOD installations. The round leaf four-o'clock is a globally imperiled (G2) plant species endemic to the Arkansas Valley Chalk Barrens. The Chalk Barrens are threatened with destruction from rapid commercial and residential development of private lands. Approximately two-thirds of the known occupied habitat is on private land. The remainder is primarily on DOD land with a very small portion on state land. The USFWS hopes that with proper management of the species and its habitat on DOD land, adding this species to the federal list of threatened and endangered species can be avoided.

CNHP provided up-to-date element occurrence records of round leaf four-o'clock to the USFWS, and incorporated the latest information available from scientists around the state into BIOTICS, our Biodiversity Tracking and Conservation Data System. In addition, CNHP provided rangewide distribution maps, acreage, land ownership, current protections and threats, and population viability information to the USFWS for incorporation into the management plan. These data included a detailed analysis of the current condition and viability of the eleven best occurrences of the round leaf four-o'clock, 75% of which occur on DOD lands. Adaptive management and monitoring recommendations include an annual rapid assessment of the size, condition and landscape context of the eleven best occurrences. Detailed assessments will follow on an annual basis, with continued monitoring of these sites to evaluate the impact of disturbance regime variables on population viability.

Buckley Air Force Base Wildlife Management Plan

Lee Grunau and Rob Schorr

CNHP is coordinating with Buckley Air Force Base (AFB), the U.S. Fish and Wildlife Service, and the Colorado Division of Wildlife, to prepare a Wildlife Management Plan for Buckley AFB. Project goals include development of management strategies that are based on a holistic ecosystem approach, enhance the AFB's role in ecosystem function at local and regional levels, contribute to conservation of wildlife resources within the constraints of the military mission, and minimize risks to human health and flight safety from wildlife.

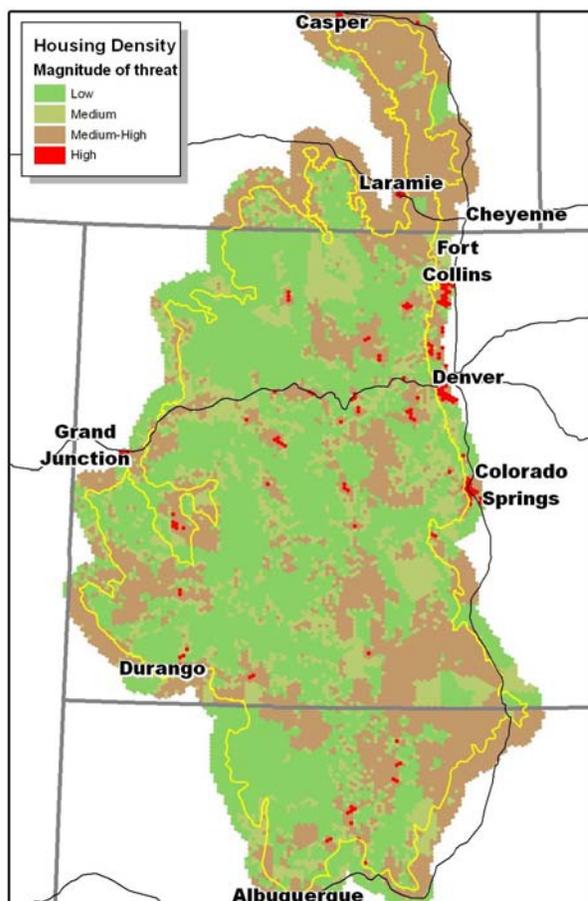
Significant planning issues include Bird Aircraft Strike Hazard (BASH), management of black-tailed prairie dogs and Burrowing Owls (especially within the flight zone), protection of migratory birds, and future development plans within and around the AFB.

CNHP will identify proposed management practices that balance the need for reduction of significant risks relative to BASH with the need for species conservation in the context of encroaching urban development. The final Wildlife Management Plan will outline life history and habitat characteristics of significant species, potential hazards and management issues, goals, and objectives for conservation and management, and a prioritized implementation plan. The final plan is scheduled for completion in September 2005.

Measures of Success for the Southern Rocky Mountains Ecoregional Plan

Renée Rondeau and Michelle Fink

The framework used by The Nature Conservancy (TNC) for their ecoregional conservation efforts includes four iterative components: Setting Priorities, Developing Strategies, Taking Conservation Action, and Measuring Success. Previously, CNHP helped TNC develop a conservation plan for the Southern Rocky Mountains (SRM) ecoregion. In 2004, TNC again partnered with CNHP to develop measures of success of their conservation planning for the SRM ecoregion.

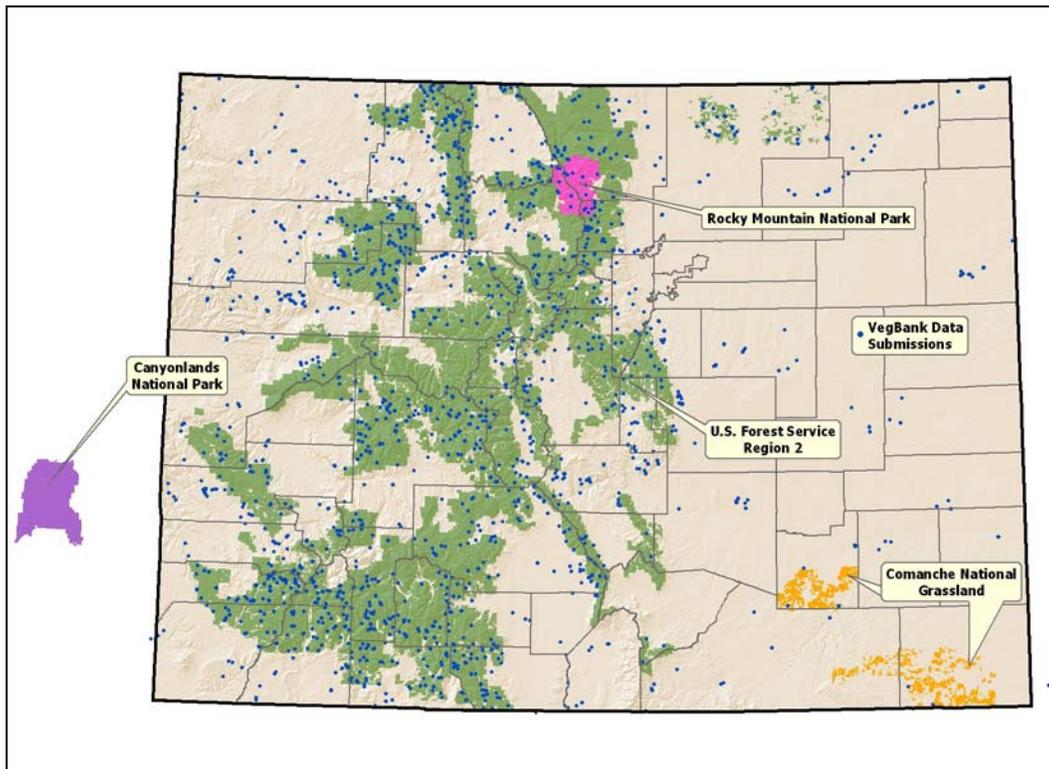


Example of a measured threat; housing density.

The purpose of the measures is to establish baselines and show trends for certain factors that affect the ecological integrity of the ecoregion as a whole, as well as specific components therein. The five broad categories of measures used were 1) Progress Toward Meeting Goals, 2) Protected Area Status, 3) Management Effectiveness, 4) Ecoregional Threat Status, and 5) Land Cover Status. CNHP worked directly on all measures except #3, with the greatest effort being spent on measuring the status of major ecoregional threats.

Measured threats included oil and gas development, residential (housing) development, fire regime alteration, and hydrological modification. The magnitude of each threat was measured as a combination of both scope (quantity) and severity (intensity). This was a pilot project and the methods developed by CNHP to measure these threats may become the standard for all TNC conservation projects.

Vegetation Classification, Heritage Methodology, and Data Exchange

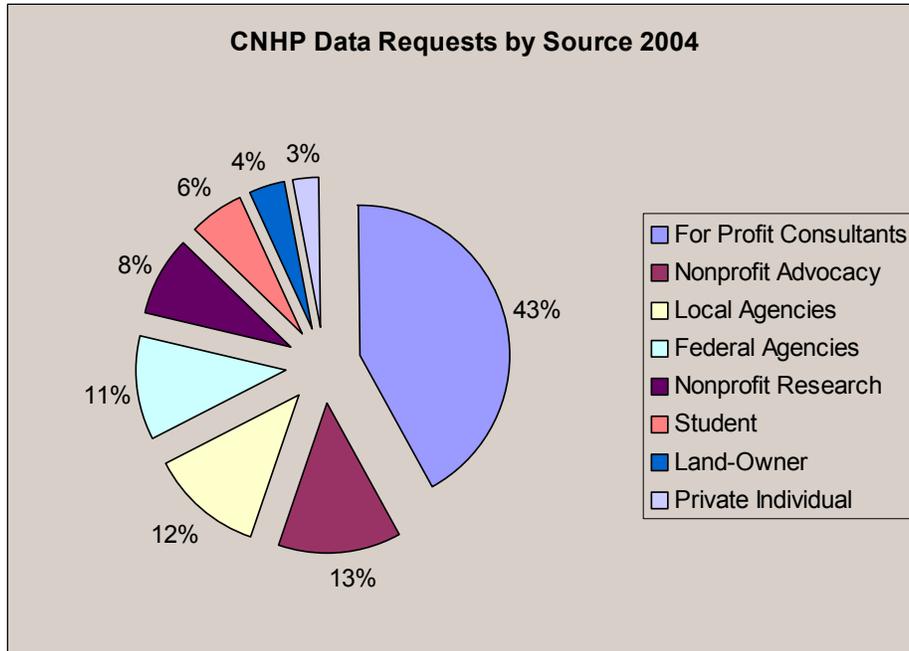


CNHP Data Distribution and Environmental Review Projects

Michael Menefee

CNHP maintains the most comprehensive spatial database of element occurrence locations for sensitive species and plant communities across the state of Colorado. CNHP also maintains an extensive library of publications available for distribution, such as the Larimer County Biological Assessment. For a nominal fee, CNHP will conduct a spatial search of the Biodiversity Tracking and Conservation System (BIOTICS) database for documented records of rare species, plant communities and critical conservation areas near or in a given project site. CNHP also provides recent reports including site inventories that have been completed for nearby properties, and may also provide conservation planning assistance when requested. CNHP can also provide life history and habitat information for all tracked species and communities, as well as their legal protection status with various federal and state agencies. This information serves as a vital resource for a variety of planning, environmental science, and information technology professionals.

Every year CNHP handles hundreds of data requests for a variety of projects in both the public and private sector. In terms of total requests, for-profit consultants make up nearly half of all data requests (see chart), with governmental and research requests making up the next largest sources for data inquiries.



General Support from The Nature Conservancy
Renée Rondeau

Natural Heritage programs and heritage methodology began in the office of The Nature Conservancy (TNC) in the 1970's. Development of the biological conservation database and its associated methodology was so successful that Heritage Programs were established in every state. At first, all Heritage Programs were part of TNC, but over time they realized that the best placement for these effective conservation programs was within state entities. Although the Colorado Natural Heritage Program has been part of Colorado State University since 1994, TNC has maintained close ties. The continuing support of The Nature Conservancy through our General Support agreement allows this conservation partnership to flourish. CNHP has been extremely active with TNC's ecoregional planning effort, measures of success, and local scale conservation planning. See Karin Decker's abstract on Ecological Systems, Peggy Lyon's abstract on Tamarisk monitoring, and Michelle Fink's abstract on Threats analysis for more detail.

National Park Service Species of Management Concern and Invasive Animals Databases

Michelle Fink, Fagan Johnson, and Melissa Landon

In 2004, CNHP began the first year of a new multi-year project with the National Park Service (NPS) to develop nationwide databases for tracking Species of Management Concern (SOMC) and Invasive Animal Species (IAS).

This project consists of three main tasks: 1) develop two relational databases to house information on the presence, status, condition, source, and expenditures for SOMC and

IAS in all National Parks; 2) continue to develop, update, maintain, and augment these two databases; and 3) provide support and training to NPS personnel towards utilizing the databases, summary sheets and related information more effectively.

CNHP created the two relational databases to contain baseline data regarding presence, status, trend, and expenditures for SOMC and IAS in the parks. The data contained in the SOMC database includes the condition (self-sustaining, non-self-sustaining, or unknown), source, and expenditure for each SOMC in a park. The data contained in the IAS database includes the status (invasive, non-invasive, not present, or N/A), condition (controlled, uncontrolled, or unknown), source, and expenditure for each invasive animal species in a park. The databases also provide the functionality, if needed, for the parks/regional managers to add species not contained in the baseline data. Upon receipt of the edited databases from the parks and regional managers, CNHP reviews the data for quality assurance and then produces regional summaries for NPS.

National Park Service Threatened and Endangered Species Database

Fagan Johnson, Michelle Fink, and Melissa Landon

CNHP is in the fifth year of an ongoing partnership with National Park Service (NPS) to maintain and enhance a nationwide Threatened and Endangered (T&E) species database. This project consists of two main tasks: 1) development and integration of several existing databases that contain information on the status and presence of T&E species in the National Parks; and 2) development of summary sheets describing the recovery plan requirements for listed T&E species.

CNHP used four NPS data sources to create a single relational database that integrates and contains all of the status and occurrence data for T&E species in the parks. The data contained in the database include the species listed by the U.S. Fish and Wildlife Service as threatened or endangered, the inventory of T&E species identified as occurring on Park lands and their ranking status as defined by NatureServe element occurrence ranks, the suite of tasks assigned to individual parks for management of the species, and the designated critical habitat for each of the listed species. The T&E species database has now been linked into the service-wide National Park Service NPSpecies database and will soon be available over the NPS intranet. CNHP is also currently working with NPS to develop a website to deliver information about T&E species in the parks to the general public.

CNHP has also created summary sheets for each T&E species found on NPS lands. The summary sheets provide the NPS and park managers with a concise account of the specific requirements for conservation of T&E species that occur in their parks. The summary sheets also provide appropriate conservation guidance for species lacking final recovery plans. CNHP has produced over 400 species summary sheets for use by NPS Resource Managers and has developed a complete library for NPS of all of the available recovery plans including any subsequent updates or revisions.

Internet Data Delivery Workshop

Melissa Landon and NatureServe Staff

In April 2000, CNHP and NatureServe hosted a workshop sponsored by the National Science Foundation entitled, “Internet-based Biodiversity Database Workshop: an assessment of needs and tools” to define the need and set the framework for a seamless distributed data system for the International Network of Conservation Data Centers (U.S. Heritage and Conservation Data Centers in Canada and Latin America). The objectives of that workshop were to:

1. Identify the priority issues and constraints in developing a distributed data access system for the network of Conservation Data Centers.
2. Evaluate distributed database models in the context of the current and future needs for conservation.
3. Design the framework for a prototype database system.

The results from the 2000 workshop were used by NatureServe to guide the development of a new National Science Foundation, Biological Databases & Informatics grant award entitled “Developing a New Infrastructure for Dynamic Access to Multi-Institutional Biodiversity Data” for construction of a prototype database.

The Internet Data Delivery Workshop, which represents the beginning phase of this new project, was organized by CNHP and held at the 2004 NatureServe Leadership Conference in Tucson, Arizona. The objective of the workshop was to gather feedback on key challenges to developing a distributed, Internet data delivery system, such as the different constraints and regulatory environments among NatureServe members and partner agencies, models for ensuring fair and equitable system implementation, and a framework for providing secure access to sensitive data. Results from the workshop will be posted to a website for further feedback from participating partners.

U. S. Forest Service Region 2 Data Development

Melissa Landon, Fagan Johnson, Amy Lavender, Jill Handwerk, Jodie Bell, and Jeremy Siemers

CNHP is in the 12th year of an on-going partnership with Region 2 of the U.S. Forest Service (USFS) to manage biological and conservation data on Threatened, Endangered, Forest Service Sensitive, and other rare or imperiled species on USFS lands. Forest Service wildlife biologists and botanists across the state submit field inventory data to CNHP annually. Our scientists and information managers incorporate these raw data into CNHP’s BIOTICS (Biodiversity Tracking and Conservation System) database. Element occurrences are digitized in GIS, and supporting data are uploaded into associated tabular databases. This year CHHP processed 122 new element occurrence records, updated 111 element occurrence records, and entered 25 new watch-listed species observations. We provide each National Forest and Ranger District office with CDs containing the comprehensive dataset for all USFS lands within Colorado once per year. As part of this

on-going partnership, we also provide data and expertise on revisions to the USFS Sensitive Species list, comment on the potential impacts of USFS projects and management plans, and work with the USFS to continually improve data management and distribution methods and tools.

U.S. Forest Service Region 2 Technical Conservation Assessments

David G. Anderson, Karin Decker, Susan Spackman Panjabi, Stephanie Neid, and Joe Rocchio



Pagosa ipomopsis (*Ipomopsis polyantha*).

CNHP botanists are currently writing technical conservation assessments for the Region 2 Forest Service Species Conservation Project. Writing these assessments involves a rigorous compilation of the existing knowledge for each species, which had not been done for most of these species prior to this project. The assessments are then peer reviewed and published on the web at <http://www.fs.fed.us/r2/projects/scp/index.shtml>.

This project has been an unprecedented opportunity to amass information on the targeted species, and has contributed greatly to our understanding of their distribution, abundance, habitat, rarity, threats, and research priorities. As a result, we have changed global status ranks (G ranks) for several species including *Botrychium echo*, *B. simplex*, and *Thelypodopsis juniperorum*. Numerous new element occurrences have also been identified by our searches of herbaria and conversations with experts.

Twelve technical conservation assessments authored by CNHP are complete and are now available on the USFS website (*Botrychium campestre*, *Botrychium echo*, *Botrychium hesperium*, *Cirsium perplexans*, *Eriogonum coloradense*, *Gilia sedifolia*, *Neoparrya lithophila*, *Thelypodopsis juniperorum*, *Astragalus anisus*, *Ipomopsis polyantha*, and *Ipomopsis globularis*). Ten of these were completed in 2004. We have completed drafts for 20 other species. CNHP will ultimately complete 42 assessments on rare plants in Region 2, making CNHP the single greatest contributor of species assessments to the project.

Threatened and Endangered Plant Species Data Development

Jill Handwerk, Amy Lavender, and David G. Anderson

CNHP, the Colorado Natural Areas Program (CNAP), and the U.S. Fish and Wildlife Service (USFWS) initiated a partnership in 2003 to manage biological and conservation data on Threatened, Endangered, and Candidate vascular plant species occurring in Colorado. A number of public



Penstemon penlandii.

and private botanists from across the state regularly submit specimens to herbaria or field survey data to CNHP. Our scientists and information managers incorporate these raw data into CNHP's BIOTICS (Biodiversity Tracking and Conservation System) database. Element occurrences are digitized in GIS, and supporting data are uploaded into associated tabular databases.

In 2004, element occurrence data for five species (*Eriogonum pelinophilum* (federally listed Endangered); *Penstemon penlandii* (federally listed Endangered), *P. scariosus* var. *albifluvis* (Candidate for federal listing); *Phacelia submutica* (Candidate for federal listing); and *Ptilagrostis porteri* (petitioned for listing and denied) were augmented and updated. The data assimilated in this project were provided to the USFWS Western Colorado Ecological Services office and the CNAP office within Colorado State Parks, and included GIS data depicting all known element occurrences and associated tabular data for all five of the species covered. Prior to this project, a considerable backlog of unassimilated data was housed at CNHP for these five species. Through this project, a total of 97 element occurrence records were updated in BIOTICS. Another four records were added that represent newly recognized occurrences of federally listed species. Additional funding has been secured for a second year of Threatened, Endangered, and Candidate vascular plant species data development, and will be completed in 2005. The assimilation of these data supports the management and conservation of these species by integrating all element occurrence data into a single comprehensive source.

Rocky Mountain National Park Vegetation Classification and Mapping

Joe Stevens, Rhiannon Thomas, and Brett Wolk



Ecology technician Katie Driver sampling a plot in the high alpine.

The National Park Service (NPS) is currently completing a multi-year vegetation classification and mapping program for all the National Parks. The program brings together park managers and administrators with ecologists, photo-interpreters, and data managers to classify and map park vegetation using the U.S. National Vegetation Classification Standard. The objective of the individual projects is to

provide each park with a list of all the plant associations in that park, a detailed description of each association as it occurs in the park, a field key to all the associations, and a map for the locations of the associations.

In Rocky Mountain National Park (ROMO), CNHP is completing the vegetation classification portions of the Vegetation Mapping and Classification project. In addition to the data collected for the classification and mapping, we also collected data on the amount of forest fuels at each of the plot locations and provided the park with over 3,000 digital plot photos. Since the start of the project, we have collected the vegetation data and completed the vegetation classification, identifying approximately 160 different associations. During the summer of 2004, we collected a total of 1,260 plots for the accuracy assessment phase of the project. These plots will be used to determine the accuracy of the vegetation map and ensure the completeness of the field key.

The field data were also analyzed to provide new Element Occurrence Records (EORs) for the park. The data we collected provided about 75 EORs for plant communities tracked by CNHP, and 20 EORs for plants with a Global Status Rank of G3 (vulnerable) or higher. Currently, we are editing and finalizing the local association descriptions and field key. The project is scheduled to conclude in May 2005 with the delivery of the final report.

Vegetation Classification for Canyonlands National Park and the Orange Cliffs section of Glen Canyon National Recreation Area

Karin Decker

In the fall of 2004, CNHP was contracted by engineering-environmental Management, Inc. (e²M), to produce preliminary vegetation classifications for two National Park Service (NPS) units in the Colorado Plateau as part of the National Park Service / U.S. Geological Survey National Vegetation Mapping Program. The mapping program uses the U.S. National Vegetation Classification Standard, which provides a uniform system of naming plant communities across the United States. CNHP, NatureServe, and other Heritage programs nationwide also use this same standard. This project focused on Canyonlands National Park and Glen Canyon National Recreation Area.



Canyonlands National Park from the Green River overlook.

CNHP, NatureServe, and e²M staff analyzed data from over 900 plots using a variety of multivariate methods (including summary statistics, outlier analysis, ordination, cluster

analysis, indicator species analysis, and tabular analysis), and assigned plots to new or previously known plant associations based on the results of the analyses. Input from the classification will be used to guide the photo interpretation and mapping efforts for each park. This project is part of an ongoing effort to describe the plant associations of the Colorado Plateau region, where many plant community types are not well documented or well described. Identification and characterization of these plant associations allows conservation efforts to be targeted more precisely.

Ecological Systems Viability Specifications for the Central Shortgrass Prairie

Karin Decker and Renée Rondeau

Ecological systems are dynamic assemblages or complexes of plant and/or animal communities that 1) occur together on the landscape; 2) are tied together by similar ecological processes, underlying abiotic environmental factors, or gradients; and 3) form a readily identifiable unit on the ground. The ecological system is a practical analysis



Southwest High Plains Canyon ecological system, Vogel Canyon, Comanche NF.

tool for both land managers and conservation professionals working at landscape scales. Viability specifications are useful for ranking relative health and quality of ecological systems and their constituent plant associations. Specifications are developed for each system that describe the size, condition, and landscape context that are necessary for the system to remain viable (i.e., persist for many years). The ranking process facilitates the identification of the best examples of each system.

As part of the Central Shortgrass Prairie ecoregional planning effort by The Nature Conservancy (TNC) (see abstract on page 20), CNHP worked with U.S. Forest Service and TNC staff to develop viability specifications for eleven ecological systems found on Comanche National Grassland in southeastern Colorado. These specifications are applicable to occurrences of these systems throughout the Central Shortgrass Prairie ecoregion, and will be used in identifying conservation targets for the ecoregion, as well as in the evaluation of potential conservation areas.

Submittal of CNHP Wetland and Riparian Plot Data to VegBank

Karin Decker

NatureServe provided funding for CNHP to submit data to VegBank, an online archive for sharing vegetation plot data. VegBank (<http://vegbank.org/vegbank/index.jsp>) is operated by the Ecological Society of America's Vegetation Panel in cooperation with the National Center for Ecological Analysis and Synthesis. VegBank consists of three linked databases that contain 1) the actual plot records, 2) vegetation types recognized in the U.S. National Vegetation Classification and other vegetation types submitted by users, and 3) all plant taxa recognized by ITIS/USDA as well as all other plant taxa recorded in plot records. Vegetation plots are one of the most important sources of information about the distribution and composition of the plant communities that we hope to preserve.

Over two thousand plots collected between 1990 and 1999 as part of CNHP's efforts to classify the wetland and riparian vegetation of Colorado were formatted for submission to VegBank. This effort was one of the first data submissions that was not part of a National Park Service (NPS) vegetation mapping project, and allowed the process for non-NPS data submissions to be tested and improved.

The screenshot shows the VegBank website interface. The browser window title is 'Plot Observation Summary View - Mozilla Firefox'. The address bar shows the URL: http://vegbank.org/vegbank/views/observation_summary.jsp;sessionId=CF9051BA8291EF4F66DE21327F7576D?view=std&wpar. The page title is 'View Plot-Observations'. Below the title, there are navigation links: '<more pages', '<previous', 'page 1', '2', '3', '4', '5', '6', '7', '8', '9', '10', 'next', and 'more pages>'. The page indicates 'records 1 through 10 of 2011'. There are two main data tables:

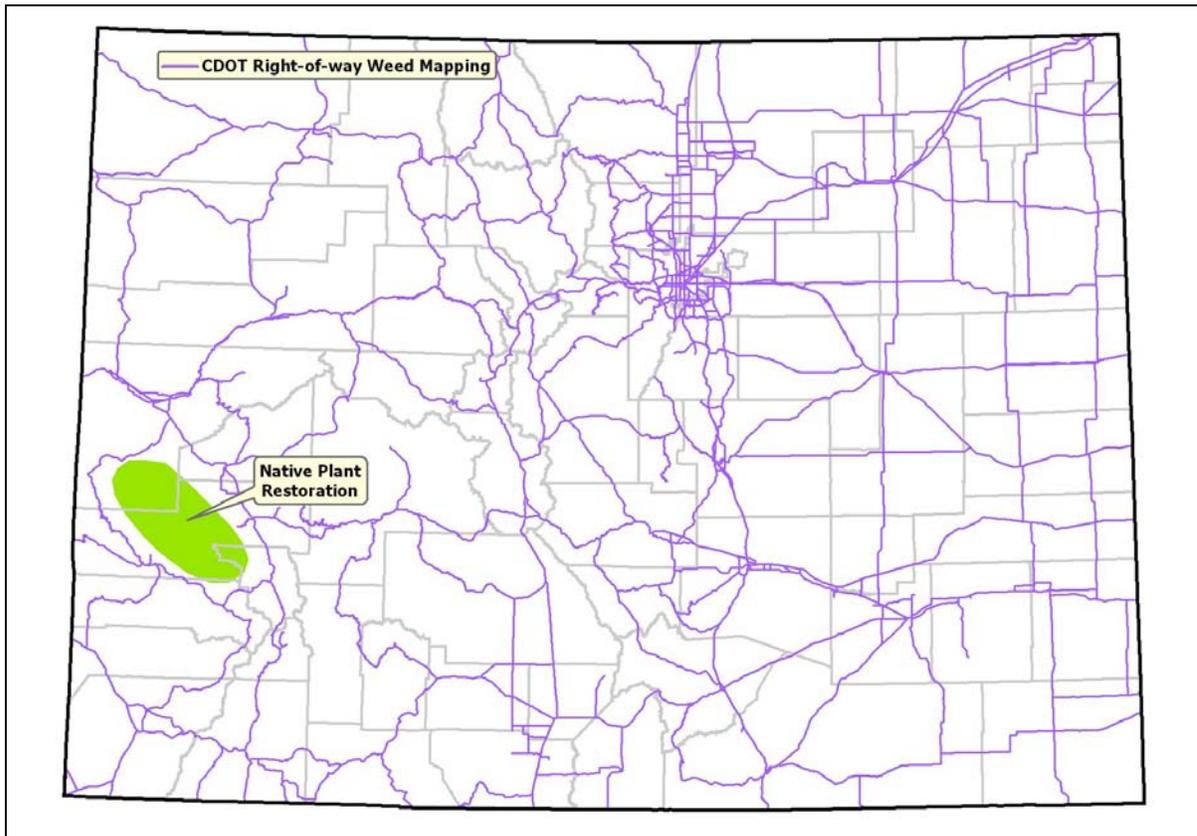
Plot Level Data: JS94-42E	
Plot ID Fields:	
Author Plot Code	JS94-42E
Author Observation Code	JS94-42E
Location Fields:	
Confidentiality Status	0
Latitude	39.84555218 °
Longitude	-106.4986142 °
Named Places	
	quadrangle: Piney Peak
	county: Eagle
	region state province: Colorado
	area country territory: United States
Layout Fields:	
Permanence	
Environment Fields:	
Elevation	2975 m
Methods Fields:	
Project	Colorado Wetland and Riparian Classification
Observation Start Date	1994-07-15 00:00:00-07
Cover Method	Percentage (%)
Stratum Method	Carolina Vegetation Survey
Taxon Cover Automatically Calculated?	no
Plot quality Fields:	
	--no data--
Overall Plot Vegetation Fields:	

Taxa occurring on this plot-observation	
show strata SHOWING overall cover show strata + overall	
Taxon	Cover
Salix monticola	99 %
Heracleum maximum	5 %
Mertensia ciliata	3 %
Equisetum arvense	2 %
Saxifraga odontoloma	2 %
Senecio triangularis	2 %
Calamagrostis canadensis	1 %
Geranium richardsonii	1 %
Taraxacum officinale	0.1 %

Below the taxa table, there is a section for 'Stratum Definitions:' which states: 'Sorry, no Stratum Definitions found. This table is SORTABLE. Click the headers to sort ascending and descending.'

CNHP plot data on VegBank website.

Restoration and Weed Mapping



Colorado Department of Transportation Noxious Weed Mapping

Dan Burkhart, Fagan Johnson, Jill Handwerk, Jodie Bell, and Lee Grunau

CNHP completed the fourth year of an on-going partnership with Colorado Department of Transportation (CDOT) to map noxious weeds along the right-of-ways (ROWs) of existing state and federal highways. We worked with CDOT to develop a GIS database and to provide technical assistance to CDOT maintenance personnel. The primary objectives of this inventory and mapping effort were to accurately identify lands with populations of noxious weeds and unwanted plants, and to identify areas that are sensitive to spraying and mowing (i.e., occupied by rare plants). CNHP provided training and technical support on the use of Global Positioning System (GPS) and GIS mapping technology, and on the identification of noxious weeds, rare plants, and sensitive habitats. In addition, our GIS Specialists assisted CDOT with detailed mapping of highways, off-ramps, maintenance yards, ROWs, and other physical features of the existing highway network. CNHP botanists developed noxious weed brochures to assist CDOT personnel in the identification of high priority weed species.

Native Plant Restoration Opportunities and Constraints in the Uncompahgre Plateau

Peggy Lyon

This project began in 2002 and was completed in 2005. It was a cooperative project between CNHP and the University of Wyoming (Dr. William Baker, principal investigator), funded by the Bureau of Land Management's (BLM) Native Plant Materials Development Program, in association with the Uncompahgre Project (UP). The goal of this study was to help determine when seeding should be done after a disturbance (such as fire), when natural succession should be allowed to take place, and, if seeding is to be done, which species should be seeded at a given site.



Peggy Lyon measuring Utah juniper on the Uncompahgre Plateau.

To accomplish this, 150 random points, stratified by geology, vegetation, slope, and aspect, were selected within the pinyon-juniper and sagebrush zones of BLM land on the Uncompahgre Plateau (about 600,000 acres). At each site, a 50 x 20 meter plot was established. All plants within the plot were identified and percent cover was estimated. Diameters of trees and height of sagebrush in the plots were measured and recorded. A nearby "companion plot" in a different stratum (i.e., differing in vegetation, geology, slope or aspect) was also surveyed, increasing the total number of plots to 300. Results were entered into a GIS format by CNHP, and are now being analyzed by the University of Wyoming. Meanwhile, the data provide a vivid picture of the distribution of individual plant species on the Uncompahgre Plateau.

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Documents and Reports Currently Available on the Web
www.cnhp.colostate.edu

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