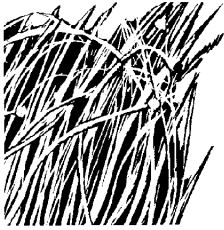


# 1999 SPECIES REPORT CARD

*The State of  
Colorado's  
Plants and  
Animals*





## 1999 Species Report Card

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*The mission of The Nature Conservancy is to preserve the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and water they need to survive.*



*The mission of the Colorado Natural Heritage Program is to preserve the natural diversity of life by contributing the essential scientific foundation that leads to lasting conservation of Colorado's biological wealth.*

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## Summary

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*Healthy ecosystems are key to the survival of our native plants and animals and to the well-being of our economy.*



**H**ow are our state's plants and animals faring? Which species are at greatest risk and most in need of special care to ensure their survival? Conservation of our natural resources often requires difficult choices, and in an era of limited resources we must have clear priorities that provide answers to questions such as these.

*The 1999 Species Report Card: The State of Colorado's Plants and Animals* addresses this need by providing the latest figures on the condition of our species from the scientific databases of the Colorado Natural Heritage Program (CNHP) at Colorado State University and The Nature Conservancy of Colorado, in cooperation with the Colorado Division of Wildlife.

Healthy ecosystems are key to the survival of our native plants and animals and to the well-being of our economy. Unfortunately, these natural systems face mounting pressures, and many of the species that depend on them have suffered serious declines as a result. With our state's population growing at a rate twice the national average, the impact of habitat degradation and destruction looms as the biggest threat to many species' survival.

*The 1999 Species Report Card* assesses the condition of approximately 4,350 species of plants and animals, representing the most comprehensive appraisal available on the conservation status of native Colorado species.

### *The Good News*

Colorado's native plants and animals, as a whole, are doing better than species in many other parts of the United States. About 3,300 (76 percent) of our state's species and subspecies in this report card receive satisfactory marks. These species appear to be relatively secure at present, although for some there may be cause for long-term concern.

### *The Bad News*

About one in five of Colorado's species and subspecies are considered vulnerable or imperiled. Certain groups are particularly affected. Of the 19 species and subspecies of amphibians, nearly 75 percent are considered vulnerable, imperiled or extirpated. Freshwater fish have been hit especially hard, with more than 22 percent of these species and subspecies of global conservation concern. Mammals and tiger beetles also have a high proportion of their species and subspecies ranked as globally imperiled.

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## ***Key Discoveries***

Ongoing biological exploration is essential to improving our understanding of Colorado's plants and animals, and to helping us protect these biological resources. This report card presents 10 key discoveries that are among the most important and interesting finds. Some bring good news. One species, the Smith whitlow-grass, was prevented from being federally listed after the Colorado Natural Heritage Program conducted a biological inventory and found it to be more common than initially believed. New discoveries include the *Lesquerilla vicina*, which a scientist found while visiting friends in Montrose. There are the native species that we won't ever see again, such as the yellowfin cutthroat trout. Then again, there are invasive weeds that we would be glad never to see again. The dalmation toadflax is one of these dastardly species, pushing out native grasses and perennials.

## ***Raising Our Grades***

*The 1999 Species Report Card* reflects not only the condition of our state's plants and animals, but also how we as a society are doing at protecting our biological resources. While we are encouraged by the number of species that are relatively secure, this report card docu-

ments that a significant number of our state's flora and fauna are at risk.

For the sake of both our wild companions and ourselves, we have a responsibility to set priorities for the conservation of these vanishing assets. We also need to rededicate ourselves to the conservation commitment – public and private – needed to raise these grades and provide lasting protection for our biological inheritance.

*For the sake of both our wild companions and ourselves, we have a responsibility to set priorities for the conservation of these vanishing assets.*





## Vanishing Assets

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Spanning the breadth and depth of Colorado is a remarkable array of ecosystems and the plants and animals that live here. From the southwestern desert to the windswept plains, and from foothills hogbacks to the rugged alpine peaks, our state harbors an abundance of biologically important areas. Our natural heritage has inspired people to flock to Colorado for hundreds of years, but never at such an unprecedented rate as the current influx.

Our natural resources have provided much more than inspiration—they are the basis of our economic health. The same soils found on some of our nation's farmlands support some of the last remaining expanses of short-grass and sandsage prairies. Unfortunately, these same ecosystems are facing mounting pressures as human activities take their toll. Bearing much of the burden of this ecological deterioration are the plants and animals that depend upon these ecosystems for survival. Indeed, the condition of Colorado's wild species serves as an indicator of the state's overall environmental health.

Over the expanses of geological time there has always been a loss of species, but this loss was counterbalanced by the evolution of new

species of plants and animals. The tradeoff between the losses and the arrival of new species increased the overall diversity of life on our planet and developed the ecological systems on which we depend.

We cannot be complacent about the current rate of species losses. The pace of extinction now far exceeds anything seen in the fossil record since the dinosaurs disappeared. Current extinction rates are believed to be at least 10,000 times greater than historical levels. If there were an equally high rate of species development, there would be less concern; but creation of new species generally takes a very long time, usually thousands or millions of years. Such a slow rate will not offset the loss of our biological assets, which has occurred mostly within the last few decades.

Extinction represents the irretrievable loss of a species' unique genetic, chemical, behavioral and ecological traits and contributions. Are these just hypothetical trends? No! Extinction has already occurred for at least 526 U.S. species. Forever gone from the world is our only native parakeet, the Carolina parakeet; the once abundant human food source, the passenger pigeon; and the beautiful Sexton mountain mariposa lily.

*We cannot be complacent about the current rate of species losses. The pace of extinction now far exceeds anything seen in the fossil record since the dinosaurs disappeared.*

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Most of these extinctions are not inevitable, but a human choice. Those who have observed the large wintering populations of bald eagles appreciate the inspiration and fulfillment they provide. Yet, 20 years ago, this species was on the brink of extinction. Now populations are nearly recovered and experts are envisioning full recovery. Such a remarkable turnaround was possible not only with the support of many agencies and experts, but also from a committed people. This commitment resulted in protecting bald eagles and the habitat they need to survive.

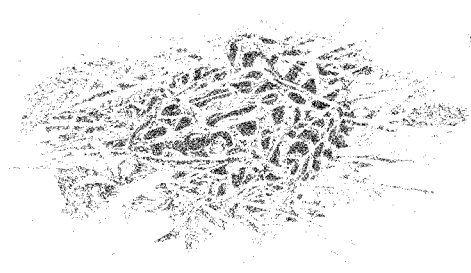
There are vigorous debates occurring about the way in which we as a society should protect our natural heritage, particularly our endangered species and ecosystems. No matter what the view, all sides agree that we should rely on the best scientific information. Such knowledge is critical to a clear understanding of the problem and to effective and efficient solutions. With such information, the choices that balance conservation goals with human needs and aspirations become more apparent.

The Nature Conservancy of Colorado and the Colorado Natural Heritage Program are working together to make the best biological information available to

improve decisions about conservation and economic development. Building on the long-term efforts of Colorado's museums, university scientists and agency partners, the Colorado Natural Heritage Program seeks to discover and document the condition of the state's natural diversity. As those data become available, we have an early-warning system that identifies the species and ecosystems at highest risk and the locations where they can be most effectively conserved.

The Nature Conservancy uses this scientific information to identify critical natural areas for protection. Working with our Natural Heritage, agency and private partners, the Conservancy has created the largest system of nature sanctuaries in the world. By identifying, protecting and managing important natural landscapes, the Conservancy has protected more than 310,000 acres in Colorado and 11 million acres in the United States and Canada.

*The Nature Conservancy of Colorado and the Colorado Natural Heritage Program are working together to make the best biological information available to improve decisions about conservation and economic development.*





# Life in Colorado: What We Know

**S**tories of the numerous undiscovered species in the tropics and other remote regions of the Earth are familiar, stunning and understandable to most people. But in Colorado, we assume that our state's species are well known. We have several major universities and colleges and two internationally recognized museums of natural history. Explorers have surveyed the state since the early 1800s. But the reality is that there are many gaps in our knowledge of Colorado's biological heritage.

This report necessarily addresses only the known species in Colorado. Vertebrates are well known and it is rare to find a previously unknown species in our state. But even with vertebrates there are surprises. Although still being reviewed by bird experts, sage grouse populations south of the Colorado River have recently been identified as distinctive and likely comprise a new species! Plants, often more cryptic in their appearances, are also well known in Colorado, but new species are regularly described. For example, in the past year, the Pueblo goldenweed was described in an area between Pueblo and Canon City. Similarly, a previously unknown mustard was discovered near Montrose.

Many of the invertebrate groups are very poorly known, with new species frequently being found. Studies in the past decade around the Great Sand Dunes revealed at least five insects new to science. Even with such well-known groups as butterflies and skippers, our evolving knowledge of food plants, life histories and distribution reveals new species almost annually.

This report covers the best known groups of organisms, many of which are familiar to Coloradans and

play dominant roles in our ecosystems. Included are all of the vertebrates, butterflies, skippers, freshwater mollusks, dragonflies, damselflies and tiger beetles. All vascular plants (except mosses) are also included.

We are fortunate in Colorado to have a diverse natural landscape that provides homes for numerous other species. That there are species not yet known is exciting for naturalists of all ages, but it also encourages us to take even greater care in deciding the future of our natural heritage.

We report here on the conservation status of 1,266 animals and 3,088 plants regularly occurring in Colorado. This represents 10 major groups of plants and animals that have been classified and studied in sufficient detail to allow comprehensive assessments of the status for all of their species (Table 1). This information is drawn primarily from the Colorado Natural Heritage Program databases, supplemented by the Colorado Division of Wildlife databases. The museum and natural history collections are particularly important sources of information. Note that the term "species" in this report is used in its broad sense, referring to full species as well as subspecies and varieties.

**TABLE 1**

**NUMBER OF NATIVE COLORADO SPECIES, SUBSPECIES AND VARIETIES TREATED IN THIS REPORT**

**VERTEBRATES**

Mammals	175
Birds	385
Reptiles	58
Amphibians	19
Fish	58

**INVERTEBRATES**

Butterflies/Skippers/selected Moths	388
Freshwater Mussels	33
Dragonflies/Damselflies	106
Tiger Beetles	44

**PLANTS**

Conifers and Flowering Plants	3,088
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<b>TOTAL</b>	<b>4,354</b>
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# Assessing Conservation Status



**W**hich species are thriving, and which are on the brink of extinction?

These are crucial questions for targeting conservation action toward those species and ecosystems in greatest need. To answer these questions, the Natural Heritage Network and The Nature Conservancy have developed a method for evaluating the health and condition of both species and ecological communities. This assessment leads to the designation of a conservation status rank; for species this provides an approximation of their risk of extinction.

Rare species are particularly vulnerable to both human-induced and natural hazards. As a result, rarity is a key predictor of a species' risk for extinction. Although rarity may seem a straightforward concept, it is complex to characterize. For this reason, Natural Heritage biologists evaluate four distinct characteristics of rarity for each species when assessing its conservation status: the total population size, or number of individuals of the species; the number of different populations or occurrences of the species; the extent of its habitat; and the breadth of the species' geographic range. Scientists also factor in other considerations to determine conservation status. For example, population trend –

whether a species' numbers are increasing, stable or declining – is a key factor. Extinction, after all, is simply the ultimate decline in population numbers. We must also consider threats to the species – human and natural – since these are important in predicting their future decline.

Conservation status ranks are based on a one-to-five scale (Table 2), ranging from critically imperiled (G1) to demonstrably secure (G5). Species known to be extinct, or missing and possibly extinct, also are recorded. In general, species classified as vulnerable (G3) or rarer may be considered to be “at risk.”

Conservation status assessments must be continually reviewed, refined and updated. During 1998 alone, Colorado Natural Heritage Program and Nature Conservancy scientists reappraised and updated the status of almost 1,400 species. Natural Heritage biologists rely on the best available information in making and documenting conservation status determinations, including such sources as natural history museum collections, scientific literature, previously published reports, and documented sightings by knowledgeable biologists. To augment this knowledge, Heritage biologists conduct extensive field inventories and

population censuses, especially targeting those species thought to be imperiled or for which few existing data are available. Most changes in status assessments tend to reflect this improved scientific understanding of the condition of the species.

Designed to assist in setting research and protection priorities, these conservation status ranks are biological assessments rather than legal categories. They do not confer legal protection, as do listings under the U.S. Endangered Species Act.

**TABLE 2**

**DEFINITION OF CONSERVATION STATUS RANKS**

<b>GX</b>	<b>PRESUMED EXTINCT</b> Not located despite intensive searches
<b>GH</b>	<b>POSSIBLY EXTINCT</b> Of historical occurrence; still some hope of rediscovery
<b>G1</b>	<b>CRITICALLY IMPERILED</b> Typically 5 or fewer occurrences or 1,000 or fewer individuals
<b>G2</b>	<b>IMPERILED</b> Typically 6 to 20 occurrences or 1,000 to 3,000 individuals
<b>G3</b>	<b>VULNERABLE</b> Rare; typically 21 to 100 occurrences or 3,000 to 10,000 individuals
<b>G4</b>	<b>APPARENTLY SECURE</b> Uncommon but not rare; some cause for long-term concern; usually more than 100 occurrences and 10,000 individuals
<b>G5</b>	<b>SECURE</b> Common; widespread and abundant



# State of Colorado's Species

## *Colorado's Unique Legacy – Species of Global Significance*

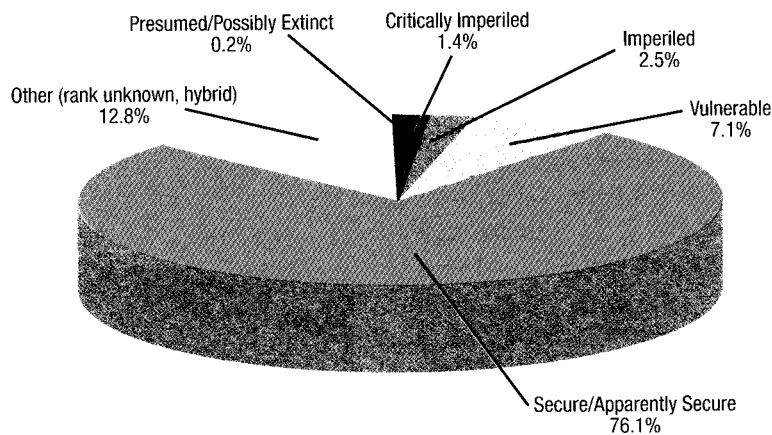
Just over one-tenth (11.2 percent) of the 4,354 species and subspecies assessed in Colorado are of global conservation concern (Figure 1). Eight of these plants and animals are presumed to be

tat ranging from altered stream flow to changes in water quality, and to hybridization and competition with non-native species. From watersheds throughout the state, stories of the demise of Colorado's native fish are disturbingly common. The dramatic population reductions in the big-river fish of the mighty Colorado River – which hosts some of the continent's most unusual fish species such as the humpback chub (*Gila cypha*) and the Colorado pikeminnow (*Ptychocheilus lucius*) – have spawned a massive fish recovery. In Colorado's high-altitude streams and lakes, unique strains of cutthroat trout such as the Rio Grande cutthroat (*Oncorhynchus clarki virginalis*) and the greenback cutthroat (*Oncorhynchus clarki stomias*) remain only in a few areas, just a fraction of their former ranges. And most recently, the plight of the fishes adapted to the shallow, slow-moving rivers of the plains has caught the attention of biologists who have documented declines.

Tiger beetles and mammals also have high proportions of their species and subspecies ranked as globally imperiled. But the reasons for this are quite different from the factors affecting Colorado's fish species. A number of unique species have evolved within the multi-

Figure 1

### Global Ranks



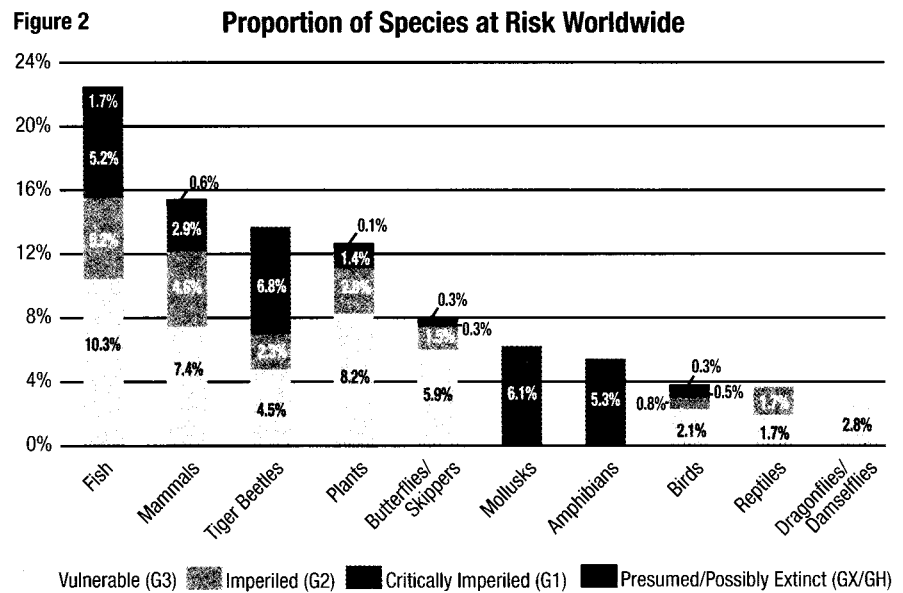
extinct worldwide. In addition, 59 are classified as critically imperiled, 107 as imperiled, and 309 as vulnerable. The 10 groups of plants and animals considered in detail here have fared very differently. The proportion of species at risk (GX-G3) in these groups ranges from a high of 22.4 percent for fish – representing the worst overall condition – to a low of 2.8 percent for dragonflies and damselflies (Figure 2).

Colorado's native fish must cope with a variety of impacts to their natural habi-

tude of habitats found in the state, and represent a part of Colorado's natural heritage that can be found nowhere else in the world. For example, the Great Sand Dunes tiger beetle (*Cicindela theatina*) lives among the sparse vegetation in the vicinity of Great Sand Dunes National Monument. The northeastern part of the San Luis Valley encompasses the entire range of this species. So, although the population of Great Sand Dunes tiger beetles may not have declined much from historic levels, its inherent rarity leads to its vulnerability. Significant habitat destruction in the Great Sand Dunes area would mean serious trouble for this species.

A few Of Colorado's mammals are globally imperiled because of impacts to their native habitat, such as the Preble's meadow jumping mouse (*Zapus hudsonius preblei*). This subspecies lives only along the lower foothills of the Rockies between Colorado Springs and Cheyenne, Wyoming. Its dependence on streamside willow habitats has left it vulnerable to land-use conversions that are changing the face of Colorado's Front Range.

Plants, though, are the organisms in greatest peril when considering sheer number of species of global concern. The 12.4 percent of at-



risk plant species represent almost 75 percent more species than the number of at-risk vertebrate animals. Among the most conspicuous features of our natural environment, plants form the basis of the world's food chain. The more than 3,000 species of flowering plants in Colorado come in a dazzling array of forms, from the wildflowers that brighten springtime to the aspen groves that enliven woodlands in autumn. But because many wild plants are adapted to very specific soil types or habitats and grow only in restricted areas, they are especially vulnerable to direct human disturbances.

The good news is that Colorado's native plants and animals, on the whole, are doing better than species in many other parts of the

*A number of unique species have evolved within the multitude of habitats found in the state, and represent a part of Colorado's natural heritage that can be found nowhere else in the world.*

United States. We have not yet experienced the wholesale landscape changes that are common along both coasts, in Hawaii, and throughout the major eastern river valleys such as the Mississippi and Tennessee rivers. Coloradans have a responsibility to the global community to manage our biological resources wisely. If we recognize the issues and act quickly to preserve areas of worldwide significance, there is still time to save vulnerable species and to preserve our natural legacy for future generations.

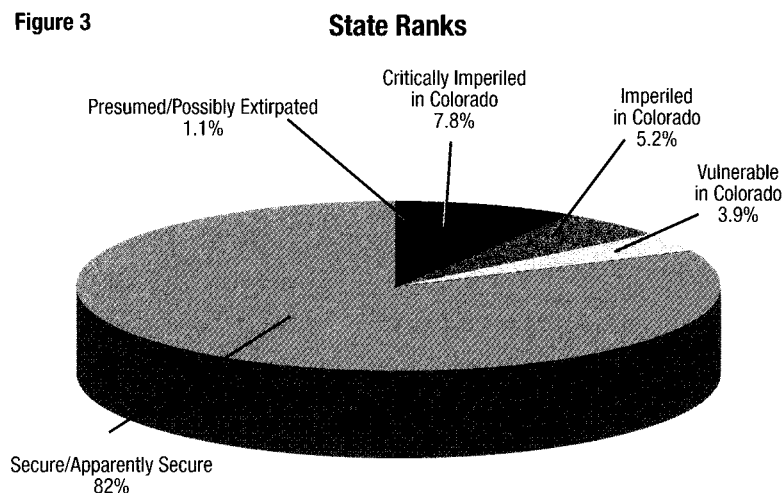
### *Our Own Backyard — Species of Statewide Significance*

Species imperilment can also be viewed from a more local perspective. A number of species that are more common elsewhere in North America are of conservation

concern within Colorado (Figure 3). In fact, nearly one in five (18 percent) of Colorado's species and subspecies are considered vulnerable or imperiled within the state.

Colorado's amphibians have the highest percentage of imperiled species and subspecies (figure 4), with nearly 75 percent of the state's 19 species and subspecies considered vulnerable because of small populations or few occurrences. From the diminutive Blanchard's cricket frog (*Acris crepitans blanchardi*) to the somewhat heftier boreal toad (*Bufo boreas boreas*), amphibians face many challenges in Colorado. The wetland habitats needed by these species are often few and far between because of Colorado's arid climate. As a result, any loss of habitat has an impact on species survival in the state. In addition, although many amphibian species are still relatively common globally, they have experienced dramatic population declines in recent years. Scientists throughout the world are racing to understand this phenomenon in the hopes of saving amphibians from a devastating series of extinctions.

Figure 3



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Five species groups, including fish, reptiles, tiger beetles, mammals and mollusks, have nearly 40 to 50 percent of their species and subspecies ranked as vulnerable within Colorado. Fish have been impacted by water use, while mammals and tiger beetles have a number of subspecies that have evolved within relatively small areas defined by Colorado's diverse habitats. For the reptiles and mollusks, their imperilment reflects the fact that many species reach the edges of their range near Colorado's borders, so few individuals can be found within the state. Yet these populations are also valuable because they may contain unique adaptations for surviving in habitats that are drier or otherwise more extreme than the typical habitat for the species. By helping to conserve these peripheral populations, we are ensuring that the genetic diversity of these species is maintained.

### *Causes of Imperilment*

While some species are naturally rare, many imperiled species were once more abundant and have declined because of human activities. People have seriously affected most ecosystems in Colorado, directly or indirectly influencing the ability of native species to thrive. The most serious human impacts include habitat destruction or degradation, the introduction

of invasive non-native species, pollution and predator control.

The leading cause of imperilment is habitat degradation and destruction. While outright habitat destruction is usually quite obvious, alteration and degradation of sensitive habitats can be subtle, often occurring over long periods of time and escaping notice. To the plants and animals that depend on these habitats for survival, the results may be just as fatal as complete habitat destruction. Degradation of habitats can occur in various ways, including direct alteration, fragmentation, changes in the water quality or quantity in streams and rivers, and the elimination of key natural ecological processes, such as periodic burns in fire-adapted ecosystems.

Non-native species pose an especially serious but often under-appreciated threat. These invasive species are indigenous to other countries or regions, and have been introduced beyond their natural ranges intentionally or inadvertently through human actions. Invasive aliens can be particularly damaging to those native species that are already vulnerable as a result of other factors. In some instances, they may provide the final push toward extinction.

*If we recognize the issues and act quickly to preserve areas of worldwide significance, there is still time to save vulnerable species and to preserve our natural legacy for future generations.*

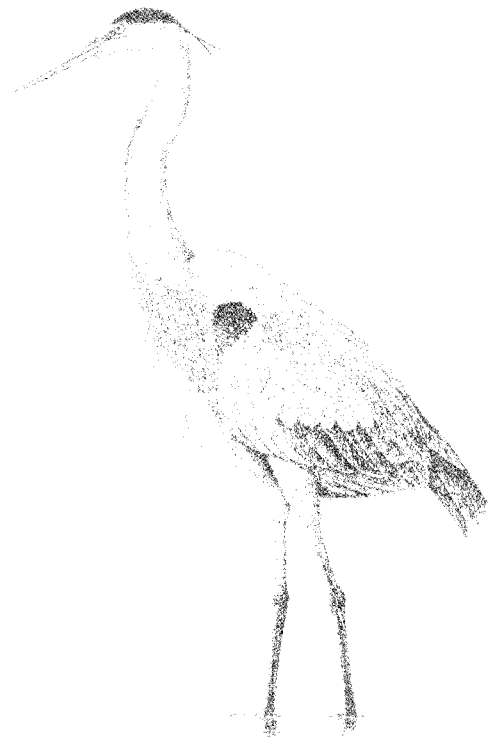
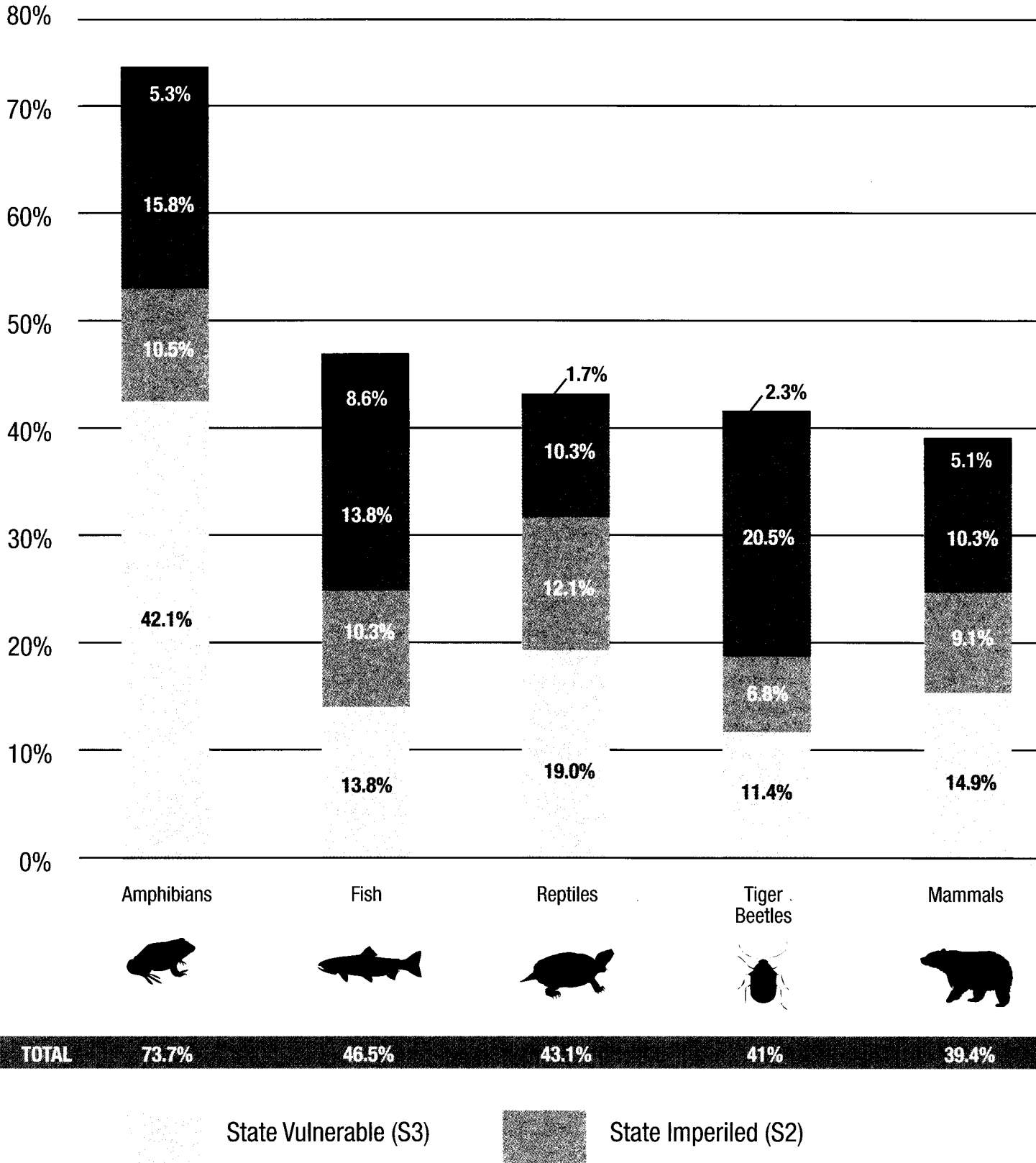
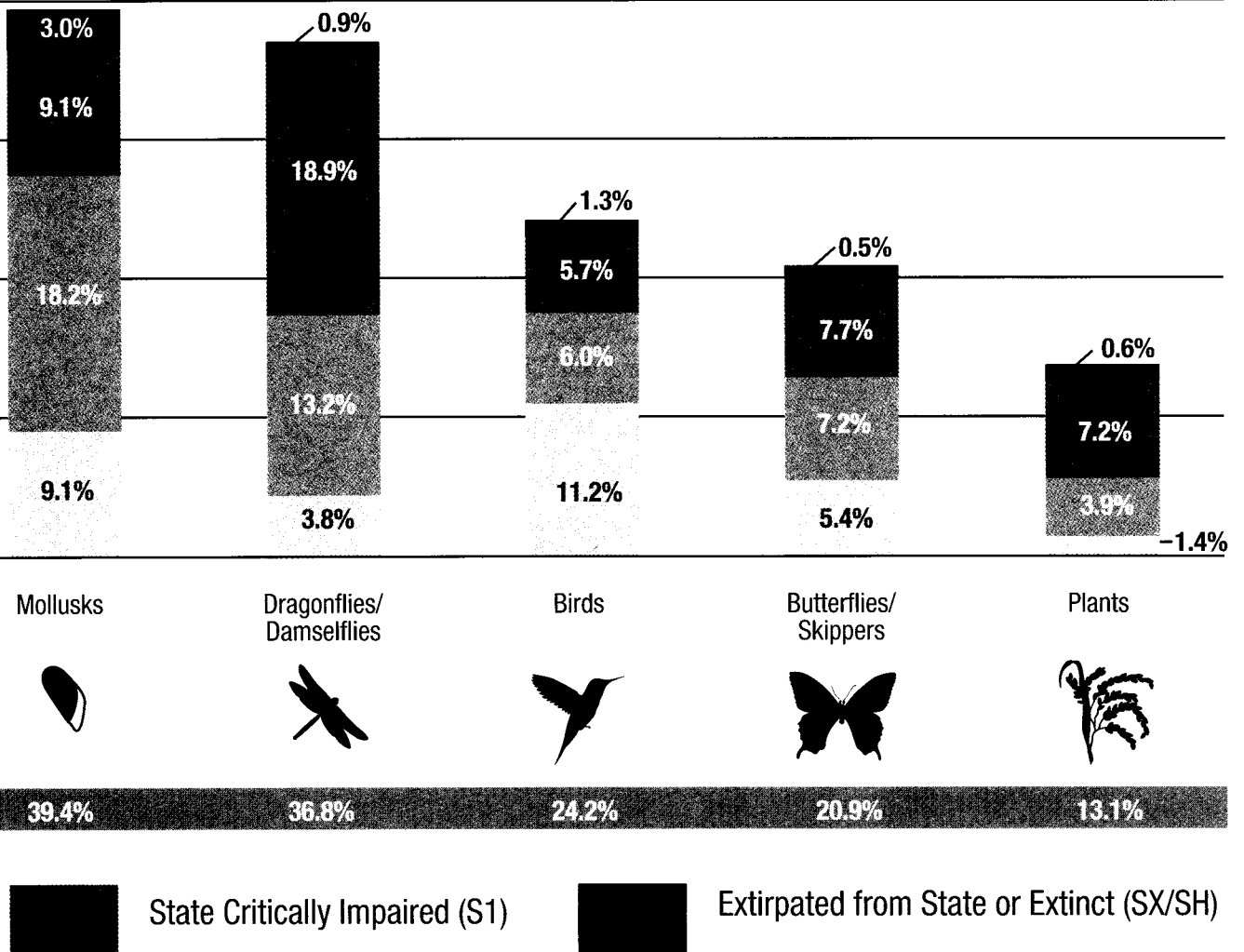


Figure 4

Proportion of Species Imperiled in the State



This graph displays the percent of species of conservation concern in each of 10 major plant and animal groups. Species groups are arranged in order of relative risk, with those in greatest danger at left. Species at risk include those with a conservation status of vulnerable, imperiled, critically imperiled or extinct; intensity of color denotes severity of risk.





## Where the Wild Things Aren't

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### *Gone Forever*

Complete eradication of a species from earth, or extinction, is the ultimate consequence of imperilment. Documenting extinctions, though, can be extremely difficult. In some ways it is like searching a haystack for a needle that isn't there anymore. For this reason, we are very cautious in ranking species as presumed extinct (GX) unless exhaustive searches of all suitable habitats have been carried out and there is no more cause for hope. Those species suspected of being extinct but warranting further searches are ranked in the more conservative category of possibly

extinct (GH). The distinction between the ranks of GX and GH is tightly linked to the intensity of inventory efforts.

Two taxa that are known to have occurred in Colorado meet the stricter criteria of presumed extinct worldwide: the Carolina Parakeet (*Conuropsis carolinensis*) and the yellowfin cutthroat trout (*Oncorhynchus clarki macdonaldi*). The Carolina parakeet was primarily a resident of southeastern hardwood forests, but its range extended as far west as New Mexico and Colorado. This species was sensitive to habitat disturbances, and was hunted heavily for its plumage and value as a caged bird. It quickly disappeared from areas of human settlement. The last Carolina parakeet observed in Colorado was in 1877, and the last known individual died in the Cincinnati Zoo in 1914.

The yellowfin cutthroat trout was native to Colorado but its history is murky (see Key Discoveries). Known only from high mountain lakes in Colorado, especially Twin Lakes and the lakes of Grand Mesa, the yellowfin cutthroat trout was unable to hold its own in the face of widespread stocking of rainbow trout. It has not been seen since the mid-1930s, and is presumed extinct.

Plants in Colorado tend to be more poorly known than animals. Thus, four of the six GH species that once occurred in Colorado are plants, and we hope that more intensive inventories may still locate existing populations. These plants are the Grand Junction cat's eye (*Cryptantha aperta*), Colorado watercress (*Rorippa coloradensis*), Mancos columbine (*Aquilegia micrantha var mancosana*) and small-flower beardtongue (*Penstemon parviflorus*). None have been positively identified since the late 1800s, and each has its own interesting history. But a common thread is that these unusual plants probably have very specific habitat needs which confine them to very small areas. Combined with the fact that the historical records do not give precise locations for the areas where the species were originally found, it becomes very difficult for scientists to know for sure if they are even looking in the right place when searching for any remaining populations. Targeted searches have been conducted for all four of these species with no success, but the wide range of possible areas to look holds out the possibility that one day, maybe during the next search, the species will be found.





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### Local Losses

At the local level, Colorado is missing a number of species that still hang on, or even thrive, elsewhere in the world. When a species or subspecies is lost from a local area, such as Colorado, the process is called extirpation. As with global extinctions, we recognize two levels of concern. Species are only presumed extirpated (SX) after there have been thorough searches of potential habitat that have not resulted in documentation of existing populations. Otherwise, the more conservative rank of possibly extirpated (SH) is used.

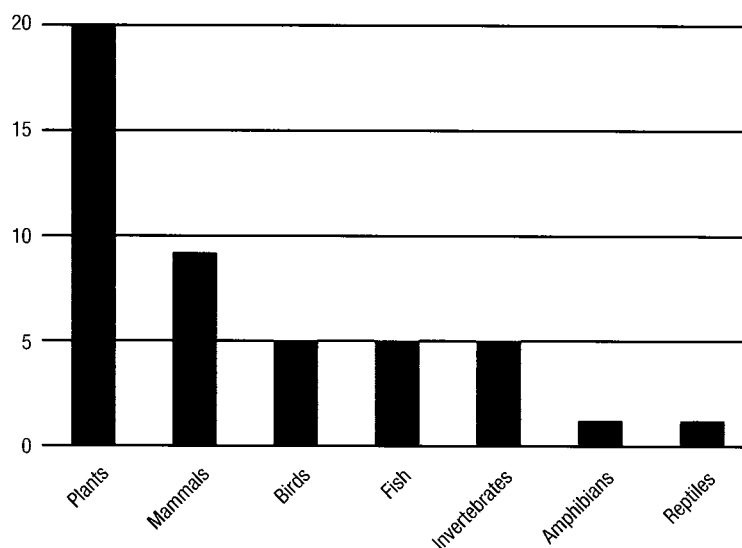
Once again, we can see stark differences in the way different types of species groups have fared in Colorado. Figure 5 shows the number of species from each taxonomic group that fall into either the presumed or possibly extirpated categories. Once again, plants have fared poorly. Each of these species or subspecies has very specific habitat requirements that make survival difficult in the face of habitat changes, or make it difficult for researchers to relocate small, poorly known populations.

Mammals represent the next most vulnerable group. But here we see the strong emergence of an area effect. Of the nine mammals presumed or possibly extirpated from the state, one-third (the gray wolf, American bison and grizzly bear) are all large-bodied animals that require big expanses of open space to survive. They have also been heavily persecuted by people for economic, sport and predator control reasons. In this regard, Colorado's extirpations are typical of the kinds of species losses that are occurring in many places. Worldwide, large mammals have been extirpated from extensive areas of their former range.

### Ongoing Concerns

These categories of species, the extinct and the extirpated, represent the most extreme examples of species imperilment in Colorado. To protect our natural heritage, we must focus our energy on keeping the number of species in these categories from getting any higher. The flora and fauna that are known to be vulnerable need our help to avoid the same path as the gray wolf. With foresight and well-planned conservation action we can protect the habitat of these species, their homes and communities, and ensure that future generations will enjoy the same richness of life in Colorado that we do today.

Figure 5 Numbers of Species and Subspecies Extirpated from Colorado





## Exploration: Ten Key Discoveries

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*We present here 10 key discoveries that add to the fabric of our knowledge and help us better assess the state of Colorado's plants and animals.*

The age of exploration is far from over. While the broad outlines of life on Earth are now in focus, biologists continue to make discoveries, large and small, filling out the fundamental knowledge about our fellow inhabitants on this planet.

Protecting plants and animals requires the work of modern-day biological explorers to reveal the distribution, abundance and basic identity of our nation's species. We present here 10 key discoveries that add to the fabric of our knowledge and help us better assess the state of Colorado's plants and animals.

Conservation efforts are only as effective as the knowledge on which they are based. Fortunately, a small but dedicated community of professional and amateur biologists is committed to furthering knowledge about biodiversity. Especially important in this

effort are the institutions that undertake and support basic inventory and taxonomic classification efforts, including universities, botanical gardens, zoos, natural history museums, and a variety of state and federal agencies. Natural Heritage programs and The Nature Conservancy rely upon the findings of these institutions and also carry out extensive field surveys of their own to locate and document species of conservation concern.

The 10 discoveries that follow represent a few of the most important and interesting findings. Some bring good news, such as the discovery of new populations of a species that was previously considered for protection under the Endangered Species Act. Other findings expand the frontiers of our knowledge, including the discovery of a new species near Montrose. Still other findings bode ill for Colorado's ecological systems, such as the proliferation of yet another damaging alien pest, or reports of species that, while not yet gone, appear to be on a path toward extinction. On the whole, however, these discoveries demonstrate the central role that continued inventory and exploration have in our ability to conserve Colorado's biological resources.



# Research Brings New Hope

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## *The Uncompahgre Fritillary*

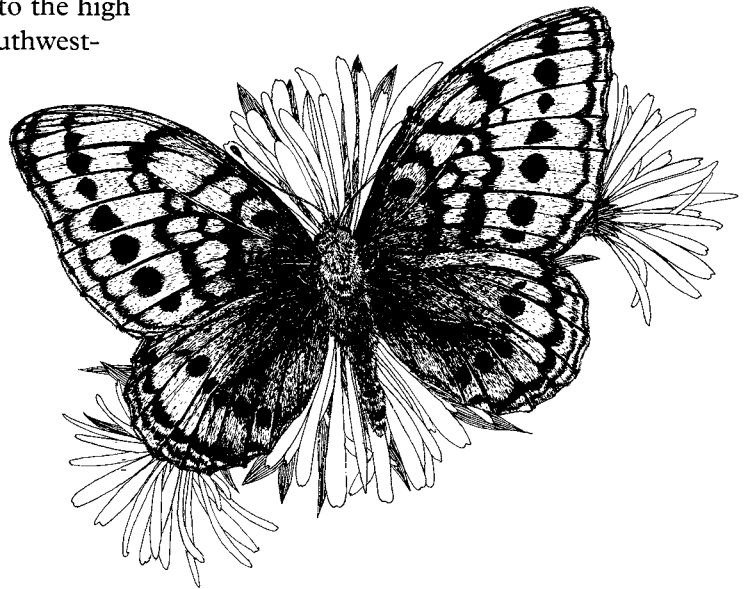
Conservation Status: IMPERILED

Discovered only in 1978 and described as a new species in 1984, this listed endangered butterfly is endemic to the high alpine meadows of the San Juan Mountains in southwestern Colorado. Believed to be broadly distributed near glacial margins during the Wisconsin glaciation, the Uncompahgre fritillary (*Boloria acrocneuma*) is now confined to small patches of habitat where glacier-like environments have persisted from the Holocene to the present.

Intensive collecting pressure, improper grazing by domestic livestock, periods of prolonged drought conditions, mining activity, and an increase in alpine recreation coincided with its dramatic population decline and led to its listing as an endangered species under the U.S. Endangered Species Act in 1982. Listing the species led to extensive studies to develop knowledge of its natural history, genetics and population trends, and prompted searches for new colonies.

Prior to 1995, only two colonies of this butterfly were known to exist. Between 1995 and 1998, intensive inventory efforts by the Colorado Natural Heritage Program led to the discovery of eight additional colonies, with the most recent being discovered in 1998. Monitoring techniques are being used to estimate population sizes of the colonies. Preliminary studies with maps, aerial photos and ground surveys indicate that numerous areas have high potential for additional colonies.

Although there is much optimism with the discovery of these new populations, threats to this species still exist. Illegal collecting, increased recreation, and possible global warming all continue to threaten colonies of this butterfly.



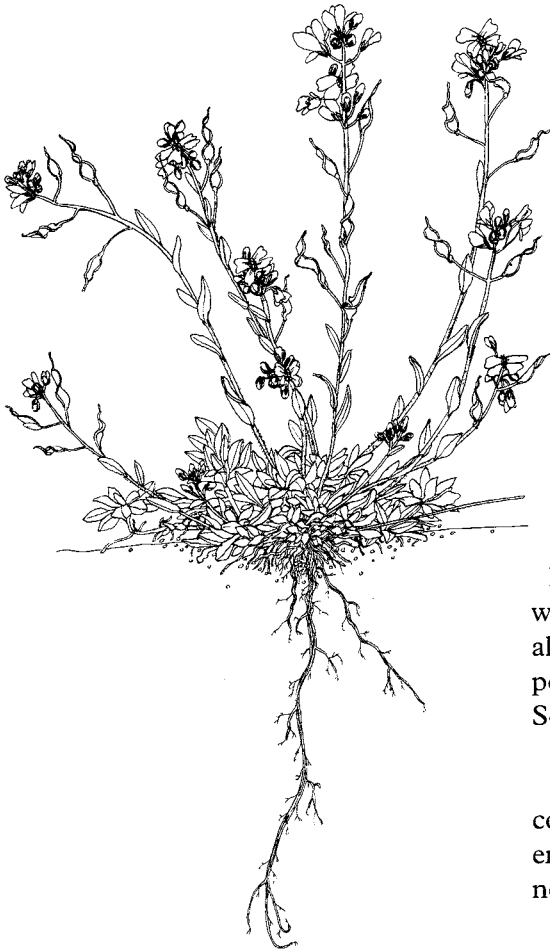
# Kept off the Endangered Species List

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## *Smith whitlow-grass*

Conservation Status: IMPERILED

In this era of wrangling over whether species should or shouldn't be listed, it's encouraging when research keeps a species from federal listing under the Endangered Species Act. A case in point is the Smith whitlow-grass. In 1997, the Colorado Natural Heritage Program began conducting a biological inventory of the San Luis Valley. One of the targeted species was Smith whitlow-grass (*Draba smithii*), a member of the mustard family that was first located in 1938 and not collected again until 1971. By 1996, the Smith whitlow-grass was known from seven sites, all in Colorado. Of these sites, only one was known to harbor a population of at least 50 plants, and all of the other documented locations mentioned vague, if any, details about population size.



By the end of the 1998 field season, CNHP's field staff had discovered the mother lode of Smith whitlow-grass in the San Juan Mountains. We currently know of 12 sites in four counties, with several of the larger occurrences harboring hundreds of individual plants. Not only have we found Smith whitlow-grass to be more common than initially believed, but we also have found that the threats are minimal since many of the populations are within Wilderness Areas that the U.S. Forest Service has designated.

Although Smith whitlow-grass is far from being classified as common, it is exciting that the species, once nearly listed as endangered by the U.S. Fish & Wildlife Service, is secure enough not to warrant listing under the Endangered Species Act.

# Rediscovered in a Unique Encounter

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## *Silky Pocket Mouse*

Conservation Status: CRITICALLY IMPERILED IN COLORADO

Unrecorded in Colorado for over 30 years, the silky pocket mouse (*Perognathus flavus sanluisi*) made numerous appearances in the summer of 1997. This tiny, 8-gram mouse is endemic to the San Luis Valley of southern Colorado and northern New Mexico. It was first documented from southern Colorado in 1908 and had not been noted since the 1960s.

It is possible that this subspecies had been captured recently by biologists working in the San Luis Valley, but there were no documented reports. Some accounts of this mouse mention that it is relatively uncommon and not easily trapped. Because the silky pocket mouse is so small, the smallest of Colorado's heteromyids, it may be too light to trigger traps that are set too tightly.

In 1997, this subspecies was found to be fairly common in certain areas, when targeted for capture. It resides in a burrow system constructed at the base of shrubs such as greasewood, rabbitbrush, cactus or yucca in sandy soils or semiarid grasslands. It is a nocturnal seed-eater, as observed by Natural Heritage Program biologists who observed mouse tracks in the headlights while driving along a sandy road. After following tracks and searching with flashlights, a silky pocket mouse was found nibbling on Indian ricegrass seeds. Biologists found burrow systems throughout the area. This unique encounter seemed to indicate that this uncommon mouse was doing well at this location.

While we know this mouse is still present in Colorado, we still have much to learn about its status, distribution, habitat preferences and habits.



# One of the World's Rarest

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## *Brandegee's Wild Buckwheat*

Conservation Status: CRITICALLY IMPERILED

First described in 1917, Brandegee's wild buckwheat (*Eriogonum brandegei*) was collected for the first time in 1873 near the Garden Park Dinosaur Quarry just north of Canon City. For 50 years, this remained the only known location in the world of this species. Then in 1967, another collection was made a county away and across the Arkansas River canyon. Since then, scientists have conducted several thorough searches for this species. But its distribution remains as two separate populations covering only about 16 square miles of habitat. In addition, the two populations are found on different geologic substrates (Dry Union Formation and the Morrison Formation).

The distribution may be puzzling, but it is quite clear that Brandegee's wild buckwheat is one of the world's rarest plant species. Not only is this species naturally rare, it is threatened by human disturbances such as recreational use, mining, fossil excavation and residential development. Many of the individual plants occur on Bureau of Land Management or Colorado State Forest properties. These organizations have teamed up with the Colorado Natural Heritage Program for the past several years to update information, continue additional surveys and work to create management practices that will allow for the long-term survival of this species.



# Meeting a New ‘Neighbor’

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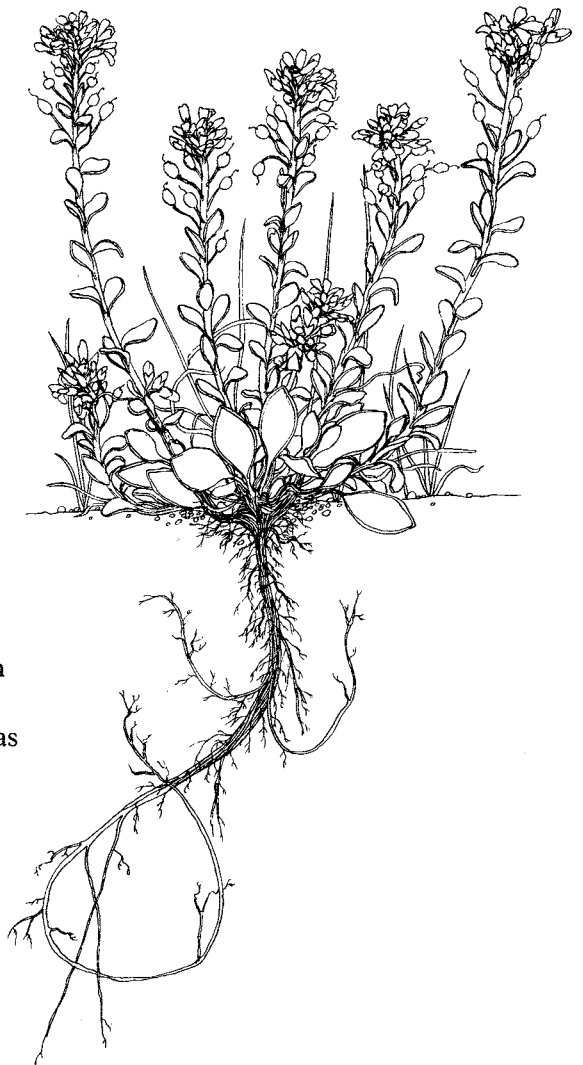
## *Lesquerella vicina*

Conservation Status: IMPERILED

*Lesquerella vicina* was first described as a new species in November, 1997. Because it is so new it doesn't even have a common name. Dr. James Reveal of the University of Maryland discovered the plant species while visiting friends in Montrose. The plants were discovered just over the fence on a neighbor's property, so he named it *Lesquerella vicina*, meaning "neighbor."

Local botanists have been asking themselves why nobody noticed it before. One possible explanation is that it is a very early bloomer, setting seed before most botanists are out and about. (Colorado Natural Heritage Program staff found it in full bloom at the end of March.) It is a fairly modest little mustard, the only white-flowered member of its genus in Colorado. By June, when the flowers have gone, it is almost identical to its common yellow-flowered relative *Lesquerella rectipes*, for which it has probably been mistaken.

When CNHP's field staff began to look for it in earnest in 1998, in conjunction with the Uncompahgre Basin Biological Survey, it turned out to be more common than expected. It was found in both sagebrush and pinyon-juniper communities, from the south rim of the Black Canyon to the Uncompahgre Plateau. The Natural Heritage Program now knows of 14 occurrences in two counties. Some of these occurrences have thousands of individuals. Scientists expect to find many more populations as they spend more time searching. Presently, based on the known occurrences, it is ranked as a G2S2.



# The Ghost of the Prairie

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## *Mountain Plover*

Conservation Status: IMPERILED

During the past three decades, the mountain plover has been living up to its nickname, prairie ghost. Originally, the bird was given this moniker because it will turn from an observer and lie motionless, almost disappearing. But sadly, the mountain plover (*Charadrius montanus*) has been disappearing in other ways as well. Due to a history of over-harvest, habitat degradation and human disturbance, populations are declining. By some estimates the populations have been decreasing by 3 percent annually since the 1970s. This decline has caused great concern for the welfare of this prairie specialist, which has been recommended for protection under the Endangered Species Act.

Market hunters in the late 1800s took advantage of the plover's relatively tame demeanor, diminishing the numbers substantially. Historic accounts of mountain plover harvest depict hunters holding hundreds of birds each. Removal of prairie dogs, bison and pronghorn from some prairie environments has altered native grassland composition and negatively affected plover populations. Also, some farming practices in these areas have conflicted with the plover's nesting and ability to detect predators.



But there is still hope for the mountain plover. Some habitat management practices have aided plover recovery. For example, in areas where grasslands are burned or grazed, plovers use the habitat in spring for nesting, and in fall and winter for night roosts. Scientists are conducting monitoring studies throughout the plover's range to get a better handle on population trends. Through proper habitat management, the prairie ghost may be returning to some of its old haunts.



# Of Mice and Men

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## *Preble's Meadow Jumping Mouse*

Conservation Status: CRITICALLY IMPERILED

Much of our current concern for biodiversity has resulted from the impacts to natural diversity made by escalating human populations. In Colorado, the Front Range corridor from Fort Collins to Colorado Springs has been developing at an alarming rate, with at least one county ranking in the nation's top ten fastest growing. An inconspicuous resident of the Front Range riparian communities is the Preble's meadow jumping mouse (*Zapus hudsonius preblei*), the namesake of naturalist Edward A. Preble. Because of its restricted range and the difficulty in locating substantial populations, the mouse was listed as threatened under the Endangered Species Act in May of 1998. This appealing mouse thrives in densely-vegetated riparian communities, and has become the poster species for the conservation of riparian communities along the Front Range.

Preble's meadow jumping mouse is a physiological whirlwind, feeding voraciously and producing multiple litters before hibernating for six months of the year. Hardly larger than a house mouse and usually weighing between 18-22 grams, this mouse will add an additional 20 percent of its weight to prepare for the long winter underground. During this time, the mouse is bulking up on arthropods, seeds, vegetation and fungi in grassland vegetation surrounding willow habitats. True to its name, it has large hind feet and hind legs that allow it to leap distances of 5-6 feet. To counterbalance the mouse while it bounds through dense, herbaceous vegetation, it has a long tail that encompasses nearly two-thirds of its total length.



With the growing concern over the conservation of the Preble's meadow jumping mouse and its habitat, scientists have completed more surveys and the known range for the mouse now extends north into southeastern Wyoming and as far south as Colorado Springs. A plan to integrate the conservation of this subspecies and growing development of Colorado's Front Range has been initiated in a cooperative effort between the U.S. Fish and Wildlife Service and the State of Colorado.

# Gone from Waters Everywhere

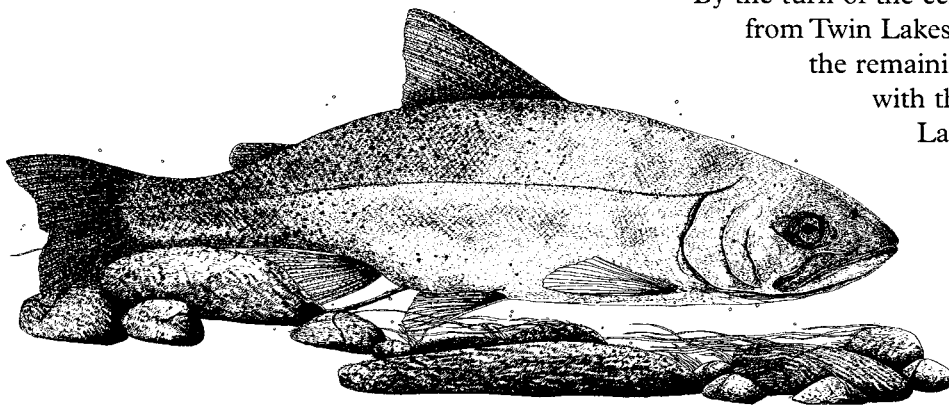
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## *The Yellowfin Cutthroat Trout*

Conservation Status: EXTINCT

The yellowfin cutthroat trout has got to hold the record for the shortest history of any modern vertebrate in Colorado. Evidence of this subspecies was lacking from the first accounts of trout from Twin Lakes, Colorado in 1877; the only mention of trout in the lakes referenced the smaller greenback cutthroats. A few years later, reports of 10-pound trout in the lakes started to emerge, and speculation surrounds the origin of these large trout. No one is sure whether they were transplanted (if so, from where?), or if they were simply missed in earlier catches.

The 1885-1886 report of the Colorado Fish Commissioner represents the first official documentation of these silvery trout, which were named *Oncorhynchus clarki macdonaldi* after the U.S. Fish Commissioner, Marshall MacDonald. Following its naming, the road to presumed extirpation of the yellowfin cutthroat appears to have been short. Eggs from both greenback and yellowfin cutthroat in Twin Lakes were used for propagation purposes at the newly constructed Leadville National Fish Hatchery. This practice persisted from 1891-1897. In 1899, eggs were again taken, but this time from lakes on Grand Mesa. These trout were referred to as black-spotted trout and were presumed to be the same as yellowfins, but no specimens were ever preserved for scientific evaluation. Presumed yellowfin from these propagation efforts were stocked into waters in Colorado, Germany, Belgium and Wales. The concurrent stocking of rainbows in these same waters was also heavy over the years, and most definitely contributed to the extirpation of the yellowfin cutthroat trout.



By the turn of the century, yellowfins had disappeared from Twin Lakes; rainbows were dominant, and the remaining greenbacks had hybridized with the rainbows. Greenbacks in Twin Lakes soon followed the fate of their yellowfin cousin. The last record of a yellowfin catch by an angler came from Island Lake on Grand Mesa in the 1930s. No evidence of yellowfins remains in any of the waters anywhere in the world.

# A Hotspot of Biodiversity

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## *The Great Sand Dunes - A Haven for Endemic Insects*

Conservation Status: OUTSTANDING BIODIVERSITY SIGNIFICANCE

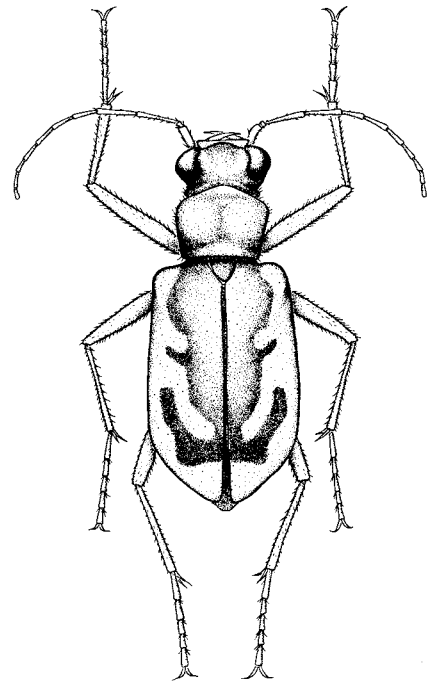
The Great Sand Dunes system of southern Colorado is known to harbor at least six endemic species of insects. Perhaps the most well known insect is the Great Sand Dunes tiger beetle (*Cicindela theatina*). This beetle was formally described in 1944 and belongs to a group of tiger beetles restricted to sandy habitats throughout North America. *C. theatina* is the only tiger beetle in North America considered endemic due to a restricted geographical region, the Great Sand Dunes ecosystem.

Two other endemic beetles are also sand-restricted and were described in 1998. These are *Amblyderus wernerii* and *Amblyderus triplehorni*. These are more commonly known as ant-like flower beetles as their small size and body shape give them an appearance similar to that of ants. Another endemic beetle is *Eleodes hirtipennis*, a circus beetle, which was described in 1964. This beetle is a scavenger uniquely adapted to its sandy habitat.

There are also two undescribed species currently considered to be endemics of the Great Sand Dunes, as no other specimens have emerged in extensive museum searches or during field surveys. One of these, *Hypocaccus*, is a beetle whose larvae live in sand at the roots of dune grasses and probably feed on the larvae of weevils. The other, the only member of these invertebrates that is not a beetle, is *Proctacanthus*, an undescribed robber fly. This remarkably large and predacious fly will feed on other insects that match its own size.

This unique assemblage of invertebrates indicates that the Great Sand Dunes has been a fairly stable system over time. Among all permanent sand dune systems of North America, that of the eastern San Luis Valley is considered to be one of the most remarkable. It resembles an island in some respects, as it is a very compact system that is geographically isolated, has rather harsh environmental conditions, and provides a variety of environmental influences responsible for the high level of endemic invertebrate species.

Because of the uniqueness of the Great Sand Dunes system and its endemic invertebrates, it merits both conservation protection and well planned management.



# Explosion in Slow Motion

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## *Dalmation Toadflax*

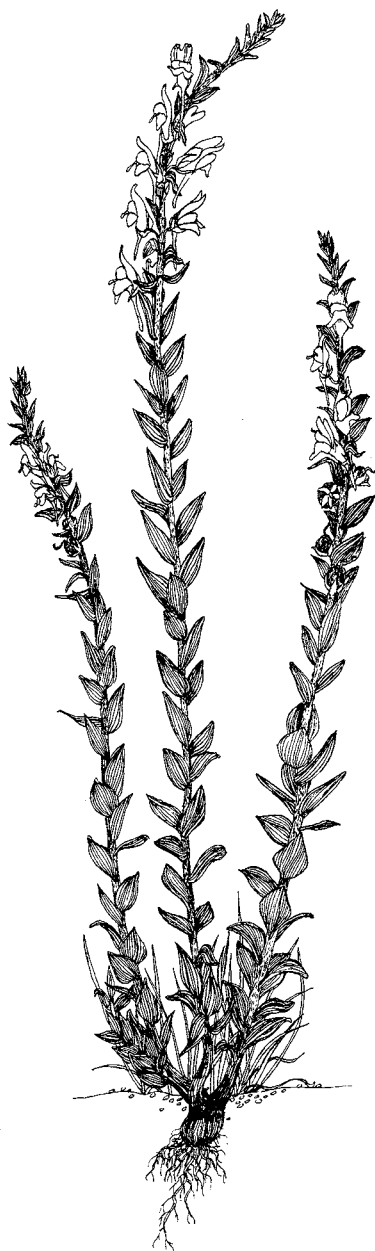
Conservation Status: NON-NATIVE IN NORTH AMERICA

In the last decade, awareness of the threats non-native species pose to the integrity of natural areas has greatly increased among wildland managers. Over 60 percent of The Nature Conservancy stewards polled nationwide in 1992 indicated weeds were among their top ten management problems. This increased understanding of the impact of weed species on biodiversity and ecosystem function has led natural area managers to redefine weeds and pests, and to reassess management techniques and strategies.

Most alien weeds are invasive, which is to say they move into an area and become dominant. Impacts of weed invasions can include significant alteration of ecosystem processes; elimination or reduced populations of native species; promotion of invasions and population increases by non-native animals, fungi, or microbes; and alteration of the gene pool.

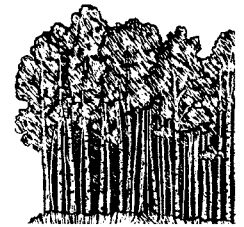
Some of these alien species have been accidentally introduced through a variety of means such as agricultural products, while others have escaped from cultivated environments such as home gardens and are considered “escaped ornamentals.” Dalmation toadflax (*Linaria dalmatica*) is an example of an escaped ornamental. Once established, its characteristics of high seed production and vegetative reproduction, as well as its extensive root system, allow for rapid spread and high persistence.

A native of the Mediterranean region, dalmation toadflax is now most common in the western United States and is listed as a noxious weed in Colorado, Arizona and New Mexico. In the Laramie Foothills along northern Colorado’s Front Range, it has invaded shortgrass prairie and foothills sites. It has truly exemplified the weed concept of an “explosion in slow motion,” with 400 percent increases in populations occurring on an annual basis.



# Raising Our Grades

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**T**he 1999 *Species Report Card* is a reflection of our natural and cultural history. Some species were never common. Other species and natural communities have become rare or imperiled with Colorado's burgeoning population. The condition of our natural areas is a strong indicator of how we value our state. There is no longer any doubt that many of Colorado's species are declining or even extirpated or extinct. This report documents that it has indeed happened and is in danger of repeating itself in every region of the state. However, in almost every case there is ample time to stop or reverse these trends. What are the actions that we as Coloradans can take to protect our rich natural heritage?

## *Conserve the Ecosystems on Which Species Depend*

The most effective means of protecting Colorado's many plant and animal species is to conserve the ecosystems that support them. Many of our species are known from the same ecosystems, creating an efficiency in conserving many plants and animals. With destruction or degradation of habitat being the leading cause of species losses and declines, conservation of ecosystems offers the only reasonable hope of protecting

our rich natural diversity. Ecosystem approaches sustain biodiversity and support responsible human uses of the same areas. Many Coloradans have voiced a desire to protect their natural heritage in such working landscapes.

## *Protect those species at greatest risk*

While focusing protection on large ecosystems is an effective way of conserving many species, we should not forget the species or natural communities that are at highest risk, such as the 3.9 percent of Colorado's species that are ranked as imperiled or critically imperiled globally. Another 9.1 percent are common elsewhere but imperiled in Colorado. These species are known from relatively few locations with equally few options for survival. However, in many cases, the local efforts required for protection of the most imperiled species, mostly plants, are small and cost-effective. For the 7.1 percent of the globally vulnerable species, many other options are available. In many cases, these species can be important in the identification of high-quality ecosystems needed for the conservation of more common species.

## *Improve Understanding of Vanishing Flora and Fauna*

Although the 1990s have resulted in enormous leaps in our understanding of Colorado's natural heritage, there are many gaps in our knowledge. What species exist in Colorado? Which ones are at risk? Exactly where are they found? What really threatens them? Limited resources have been spent in Colorado on answering these questions; yet the answers are imperative for conducting effective conservation. Conservation activities that are informed by good research on the taxonomy, distribution and ecology of our flora, fauna and natural systems will provide the basis for effective and efficient conservation.



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### *Launch Searches to Relocate Missing Species*

Some species, such as the yellowfin cutthroat trout, have already disappeared from Colorado. For them it is too late. However, for several species that have not been observed in several years, they may not yet be extinct. The boreal toad, once common in Colorado, declined precipitously to the point that very few populations were known. However, concerted efforts by many agencies, organizations and individuals located several previously unknown sites that are critical to successful conservation. Clarifying a species' chance for survival as "too late" or "still a possibility" might not only prevent the loss of distinctive and highly imperiled elements of our natural heritage, but will also increase our confidence that conservation resources are not being wasted.

### *Remember the Little and Less Glamorous Creatures*

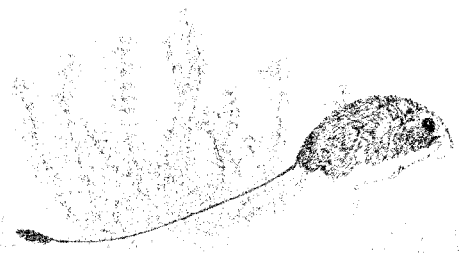
Conservation efforts in Colorado bring about images of peregrine falcons, lynx and greenback cutthroat trout. While these species are beautiful and symbolic of wild places, the majority of species are equally wondrous species but less glamorous. These species are often hidden from view, small and even ugly (in a traditional sense); however, these species often play an invaluable role by pollinating, recycling or merely providing habitat for the better-known species. In fact, our state's ecological fabric and economic vitality depend on these species. Ignoring the condition and conservation of these less glamorous species and their habitats because we cannot ascribe a traditional dollar value is unwise, at best.

### *Instill a Commitment to Conservation*

Coloradans have discovered our state's rich natural diversity; in fact, it is what has

drawn many of us here. This natural heritage has fueled the development of one of the nation's healthiest economies. Our cultural heritage relies on our natural diversity, and our citizens have demonstrated their willingness to protect it. We in Colorado have played a leading role in the United States in developing a conservation ethic and the accompanying tools for effective conservation.

By recognizing private landowners and government agencies as partners in conservation, Colorado has developed such programs as the Smart Growth Initiative, Great Outdoors Colorado, and many local land trusts. Leaders in conservation come from the ranching, conservation, government, natural resource, academic and business communities. However, as this report shows, a significant part of our natural diversity is at risk. We now have the responsibility, and still have the opportunity, to move ahead in an effective manner. We must renew our commitment to conservation, public and private, and raise our conservation grades to ensure the perpetual conservation of our remarkable natural heritage.



# Credits and Acknowledgments

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## *Credits*

**Principal Authors: Mary Klein and Chris Pague**

**Authors of “Ten Key Discoveries”:**

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Smith whitlow-grass - Renee Rondeau  
Silky Pocket Mouse - Renee Rondeau  
Brandegees Wild Buckwheat - Kim Fayette  
*Lesquerella vicina* - Peggy Lyon  
Mountain Plover - Rob Schorr  
Preble's Meadow Jumping Mouse - Rob Schorr  
Yellowfin Cutthroat Trout - Mike Wunder  
Great Sand Dunes - Phyllis M. Pineda  
Dalmation Toadflax - Heather Knight

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**Design: Margaret Donharl**

**Illustrations: All species illustrations by Paula Chandler  
except for tiger beetle on page 25 by Karolyn Darrow**

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