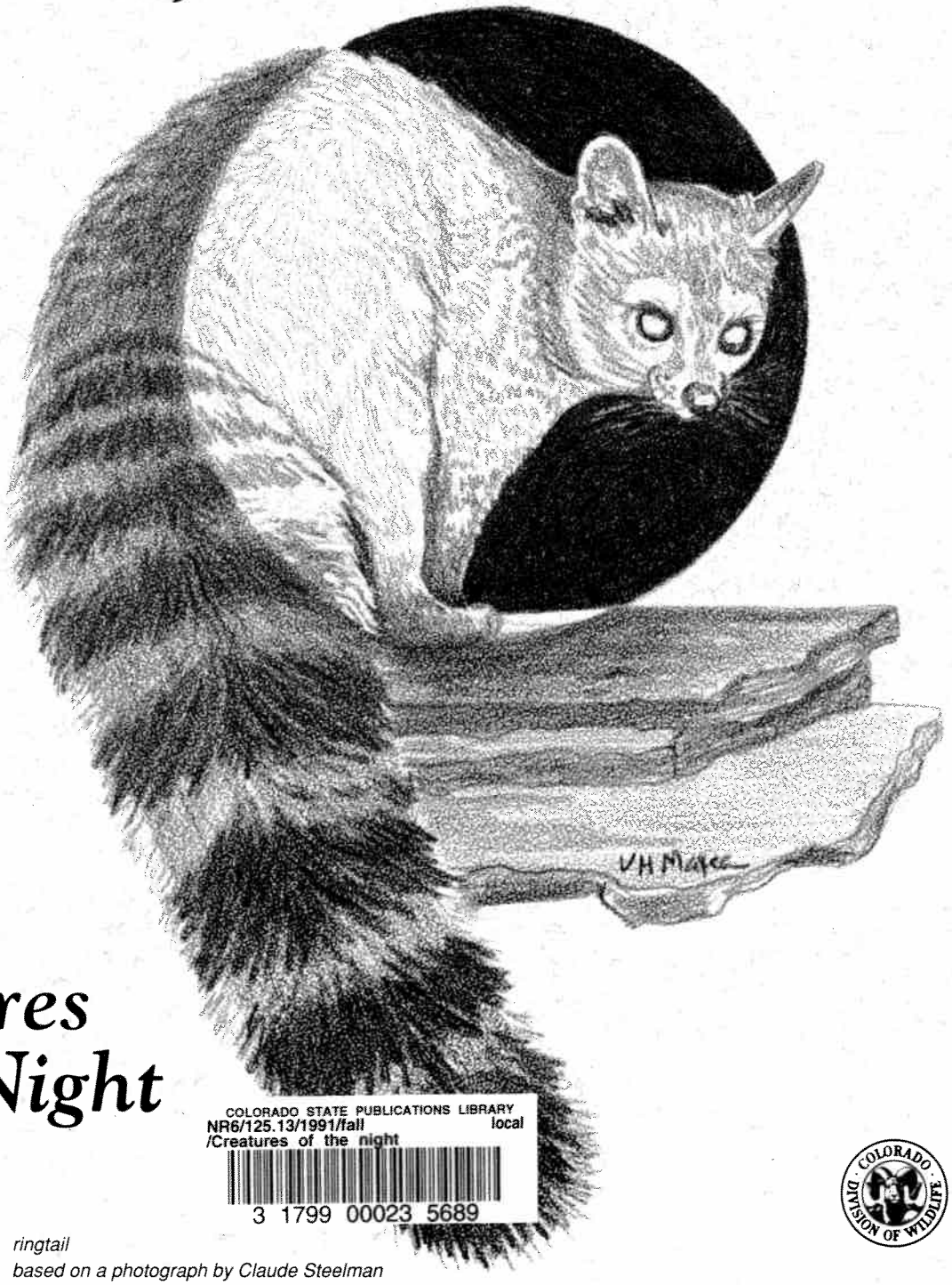
Colorado's Wildlife Company

COLORADO DIVISION OF WILDLIFE
Nongame and Endangered Wildlife Program
Watchable Wildlife Program



Creatures of the Night

ringtail
based on a photograph by Claude Steelman

Working The Night Shift

By Mary Taylor Gray

Nocturnal — Active at night.
Diurnal — Active primarily in daylight.
Crepuscular — Active at dawn and dusk.

Each evening the visual world changes — light fades, images become indistinct, color disappears. The sun retreats, and humans — along with other sight-dependent creatures of daylight — do the same. As people close their doors against the darkness, Colorado's meadows and woodlands come alive with creatures of the night.

Many animals work the night shift because darkness offers them protection from the heat of the day (see *Colorado's Wildlife Company*, 1990 summer compendium). Others seek the darkness to hide from predation. While some prey animals come out only at night, others are primarily active after dark, but sometimes work during daylight hours. As prey behavior dictates predator behavior, a large number of predators hunt during the night. Nocturnal predators also fill an ecological niche distinct from diurnal predators. By hunting at night, for example, most owls do not compete with diurnal raptors. And since most hunters are, in turn, hunted by something else, the predators also find protection in darkness. Prey and predator species that successfully work the night shift have adapted in various ways to their light-reduced environment.

Night Eyes

Some animals have successfully adapted to the night shift with an enhanced ability to see in reduced light. A variety of modifications enable "night eyes" to gather as much light as possible. Nocturnal species, like owls and ringtails, have large eyes with pupils that dilate widely. Enlarging the pupil four times its original size increases the amount of light the eye can gather by a factor of sixteen. Light-colored areas of fur or feathers (sometimes called "eye disks") surrounding the eyes also increase the light reflected into the eyes. The back portion of the night eye is oversized, producing a larger image. Owl eyes are so large there is no room for muscles to move the eyes; they move their head instead. An owl's flexible neck can be turned more than 180 degrees to either side, so an owl can look directly backwards.

If your headlights have ever caught the luminescent glow of a deer's eyes you've seen another night-vision mechanism at work. The tapetum, a mirror-like membrane behind the retina, produces this eye shine. Light that passes the retina without being absorbed is reflected back by the tapetum, increasing light received by the retina.

Hearing and Silence

Despite their large eyes, owls do not rely on sight to hunt; an owl can locate and nab prey unerringly using only its finely tuned sense of hearing. Its ears are asymmetrical — one is set higher on the head than the other — allowing the bird to orient in a vertical as well as horizontal plane relative to which ear the sound reaches first. In fact, research has verified that a barn owl sitting 10 feet away from a mouse in an unlit barn can locate the mouse accurately to within 3 inches.

Because prey animals often rely on sound to alert them, the owl has evolved as a silent hunter. With wide, rounded wings and soft feathers, it flies soundlessly. A serrated edge of the first primary feather breaks up and silences the flow of air across the wing. Owls also hunt the same territory night after night, relying on knowledge of the terrain to aid their hunt.

Echolocation

Spring through fall, bats patrol the night skies and gobble up thousands of insects in one shift. True specialists of the night, these amazing winged mammals use echolocation to navigate and to locate prey in the darkness. They emit ten to two hundred high-pitched pulses per minute, and the frequency increases as the hunter closes in on its victim.

Produced by the larynx, the high-pitched sounds of echolocation pass through the bat's nostrils or open mouth (which is why bats appear to be ferociously baring their teeth as they fly). Some bats have horseshoe or leaf-like appendages on their noses to help direct these sounds. The bat's huge ears pick up the echoes as the sound bursts bounce off objects. They judge position and distance to object or prey by the time elapsed between emitting a signal and reading its echo. Imagine pinpointing insects as small as mosquitoes strictly from reflected sound waves when both bat and insect are moving!

The emitted pulses are so loud they would be comparable to the deafening roar of a jet engine if we could hear them. To avoid being deafened by their own calls, bats have sound-dampening structures in their ears. With navigational and data gathering skills like that, who needs daylight?

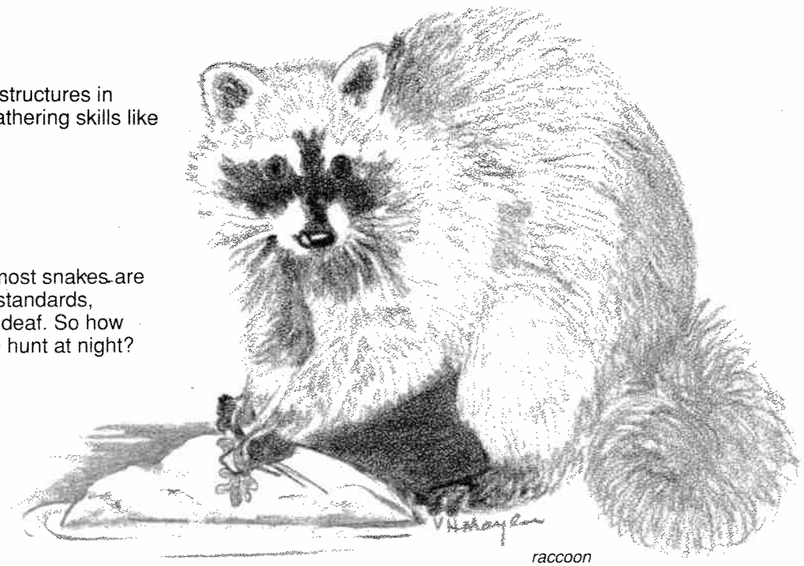
grasshopper mouse

Smell and Heat Sensors

Needing to avoid summer heat, most snakes are nocturnal. At the same time, by human standards, snakes have poor vision and are nearly deaf. So how does a limbless, blind and deaf creature hunt at night?

Although snakes lack both eardrum and external ear, they can sense vibrations through the ground. And by flicking out its tongue, a snake "tastes" the air, bringing scent molecules to receptors called a Jacobson's organ in the roof of the mouth. With this highly sensitive equipment, a snake can track a prey animal through grass like a hound on the scent.

Rattlesnakes can detect infrared radiation emitted from warm-blooded animals. Specialized pores (loreal pits) along the snakes' upper jaw sense external sources of body heat — especially useful for finding mice after dark on a cool Colorado evening. Pit vipers, as these heat-sensing snakes are called, can sense the presence of a fist-sized mouse one foot away. They also can sense temperature changes of one thousandth of a degree centigrade.



raccoon

Collective Senses

Many nocturnal animals lack the high-profile adaptations of real night specialists like bats and owls; instead they call on their collective senses of sight, smell and hearing to make nighttime living work for them.

Mammals: Some nocturnal mammals are familiar to people, while others are rarely seen. The bandit-masked raccoon is a well-known nocturnal hunter. The raccoon's shy cousin, the ringtail, hunts at night and is almost never seen by people. One of the ringtail's primary prey animals is the nocturnal woodrat or pack rat.

Kangaroo rats are classic nocturnal rodents. You won't see them by day because they shelter in their burrows, but shine a light across their grassland or desert habitat at night, and you'll see a world alive with jumping 'roo rats. Kit foxes, too, are almost entirely nocturnal, perhaps because kangaroo rats are a primary food source.

Other mammals are sometimes seen during the day, but they do most of their food gathering and hunting at night. The badger — a virtual digging machine — sniffs out mice, gophers and other rodents in burrows below the ground and digs rapidly to uncover them. The carnivorous grasshopper mouse patrols rodent runs at night, preying on other nocturnal mice (including other grasshopper mice!) as well as grasshoppers. Though equipped with their own unique defenses, both the skunk and the porcupine prefer nighttime for their foraging.

North America's only marsupial, the opossum, wakes at twilight to begin its search for fruit, roots, insects, small mammals or anything it can find. With few defenses beyond it's habit of playing dead when threatened, the opossum derives protective advantage from the dark. (P.S. For you opossum fans: This animal also gains survival advantage from its high reproductive rate. And — a little known fact — the opossum has the greatest number of teeth of any North American mammal.)

Herptiles (Amphibians and Reptiles): As with many other nocturnal animals, darkness affords salamanders, frogs and toads better protection from predators. It also increases their hunting success because their insect prey are more active and plentiful at night. But most herptiles are nocturnally active because it helps their temperature regulation. With moist, porous skin, the tiger salamander must avoid the drying effect of the hot sun. Salamanders emerge at dusk from their daytime hiding place under leaf litter or at a pond's edge.

Fish: Some fish are more active at night than during the day. Brown trout increase their hunting success by feeding on aquatic insects that drift downstream at night. Lake trout move into shallower water following plankton that move higher in the water as the sun goes down.

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A Little Night Music

By Mary Taylor Gray

coyote

Sun sets, darkness falls, and the night-world band strikes up in a cacophony of wild voices. Buzzes, hoots, squawks and whistles; grunts, howls, squeaks, and croaks — a myriad of night sounds enliven Colorado's forests, meadows and wetlands.

The great horned owl's hoot may be the classic night voice, the soft *hoo, hoo-hoo* sounding gently in the darkness. Pausing in its nighttime hunt, the owl lights on a tree limb and calls before continuing its rounds. You might hear two great horned owls calling together. The male owl, although smaller in size than the female, has the deeper voice.

The screech owl is seldom seen, but its voice is a familiar night sound in forests and wooded urban areas. It makes a series of short whistles that increase in frequency and drop in pitch toward the end.

Other night birds add their voices to the chorus. Moving at dusk from daytime roosts to their feeding grounds in shallows and marshy areas, a group of black-crowned night-herons call to each other, keeping in touch in the dark. Their loud "quawk!" cry gives the night-heron its nickname, "quok."

The common nighthawk glides in the evening sky on long, tapered wings, twisting and turning as it snatches up flying insects. Pinch your nose while saying *peent* or *pee-ik* and you'll have an idea of the nighthawk's call. Listen for the exhilarating sound of the nighthawk's wings as they shift direction at the bottom of this bird's dive for its insect prey.

Though most bat echolocation pulses are too high-pitched for humans to hear (we hear a range from 20 to 20,000 cycles per second, while bats are sensitive to almost 100,000 cps), we sometimes can hear their lower frequency calls as a high-pitched squeaking as they fly overhead.

Visit a pond at nightfall, and listen to the chorus of frog and toad voices (spring and early summer evenings are prime concert times). The territorial and mating calls of male frogs and toads vary by species — the bullfrog bellows *m-rum*; the leopard frog sounds like a motor boat; the chorus frog reminds you of someone running their thumb down the teeth of a comb. And if the pond is inhabited by beavers, you may just hear the warning slap of this nighttime dam-builder's tail as it dives for cover beneath the water.

No night voice is more familiar than the mournful howl of the coyote. One song-dog begins the yipping call, answered by another and another until the listener feels surrounded by a howling canid chorus. In autumn another voice joins the nighttime symphony as the bugling of the bull elk echoes through the forests and meadows of Colorado's high country.

The Colorado night is alive with music. Just listen!

DOW - Working For Wildlife

Report: Bats

"A mine is a terrible thing to waste," smiles Connie Knapp, better known as Bat Lady. As project coordinator, Connie is working with DOW biologist Kirk Navo and over 200 volunteers to save bats and their habitat in the abandoned mines of Colorado.

The new program, initiated in mid-May 1991, operates in cooperation with the Mined Land Reclamation Division (MLRD), part of the Colorado Department of Natural Resources. MLRD has been given the task of closing inactive mines — all considered extremely dangerous to the public. Upon recommendation by DOW, MLRD is installing specially constructed gates to close those mines identified as important to bats.

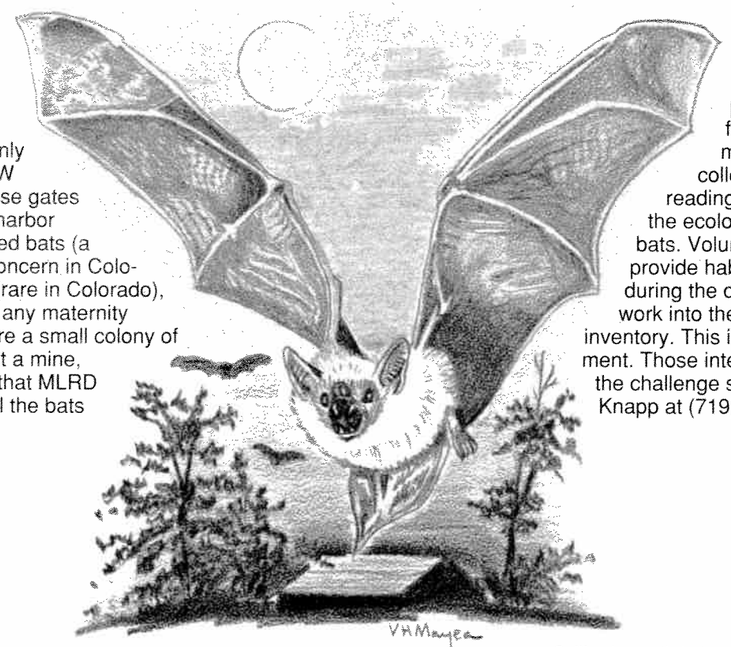
Keeping several steps ahead of the mine closure schedule, Connie assigns a team of four volunteers to evaluate each mine before contractors must close the entrance. The team must first locate the mine (not an easy task) and then determine if bats inhabit the chamber. Volunteers are instructed never to enter mines; instead they use an electronic bat detector that converts bat echolocation to sounds audible by humans. Where volunteers suspect bats may be present, DOW biologists follow up with species identification and inventory.

Because the bat gates are very expensive, DOW requests their use only in select cases. DOW requests MLRD to use gates to close mines that harbor Townsend's big-eared bats (a species of special concern in Colorado), spotted bats (rare in Colorado), any large colony, or any maternity colony of bats. Where a small colony of common bats inhabit a mine, DOW recommends that MLRD contractors wait until the bats fly out at night and then barricade the entrance to force the bats to relocate.

Bat gates must be carefully designed, constructed, and custom fitted to the entrance of each mine. Openings in the gate must be large enough to allow bats to navigate freely, yet small enough to keep people out. At the same time, the closure must not alter the microclimate of the mine. Any change in temperature or air flow, for example, could cause the bats to abandon the mine. Studies have determined that barred, metal gates with regularly spaced 6" x 24" openings seem to work best.

Connie reports a wonderful response from people volunteering to work with the bat habitat preservation program. Thus far, volunteer teams have been surveying mines in the Durango area, Summit County, the Breckenridge area, and Taylor Gulch in Chaffee County. More volunteers are needed from the Western Slope, and people are welcome to participate from around the state.

Due to the difficulty and potential danger of their mission, volunteers must be at least 21 years of age, physically fit, and capable of responsible decision-making. DOW requires and provides training for all volunteers in mine safety, data collection, map reading, bat biology, and the ecological importance of bats. Volunteers must provide habitat descriptions during the daylight hours and work into the night on bat inventory. This is no easy assignment. Those interested in meeting the challenge should call Connie Knapp at (719) 852-4783.



California myotis bat
based on a photograph by Claude Steelman

Colorado Taxpayers Help Nongame And Endangered Wildlife

By Judy Sheppard and Jim Bennett, Nongame Wildlife Specialists, Colorado Division of Wildlife

Thank you Colorado taxpayers! Your contributions to the Nongame Income Tax Check-off made it possible to carry out the following projects for wildlife during 1990 - 1991.

Program Highlights

Endangered Fishes:

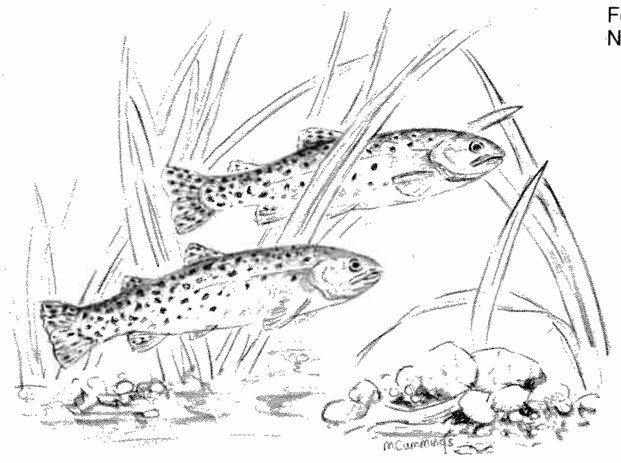
We researched interactions between endangered fishes (Colorado squawfish, humpback chub, razorback sucker, bonytail) and non-native sportfishes in the Yampa and Colorado rivers.

• In addition to 14 native fish residents, the Colorado River Basin is home to over 40 non-native fish species — mostly accidental introductions.

• We found that non-native fishes (black bullheads, largemouth and smallmouth bass, green sunfish and northern pike) are not having immediate or significant impact on native species via habitat competition or predation.

• However, northern pike preference for certain-sized prey could mean that Colorado squawfish or humpback chub of the "right" size might be at risk. This needs further research.

• For the time being, largemouth bass and green sunfish predation on endangered fishes appears limited because of the low abundance of endangered species. As opportunistic feeders, these predators are feeding on the more common, non-native fishes.



greenback cutthroat trout

Greenback Cutthroat Trout:

We created and maintained a brood fish program for greenback cutthroat trout at the DOW Research Hatchery near Fort Collins.

• In recovery programs it is sometimes necessary to put rare animals into suitable habitats in the wild. But because they are rare, it is difficult to obtain such animals.

• In the case of the greenback cutthroat trout, we brought fertilized eggs from pure, wild populations (through quarantine) into our fish research hatchery.

• Presently, we have about 1500 yearling, juvenile and sub-adult greenbacks ready for our propagation program. Our goal is to re-establish greenbacks in the wild, so that someday these native cutthroats will again become an integral part of the ecosystem.

Rare Amphibians:

We carried out surveys to define the biological status of rare amphibians around the state.

• Is it acid rain? Some insidious disease? Competition? Over-exploitation? We don't know why, but populations of boreal toads, striped chorus frogs, leopard frogs, some unique populations of tiger salamanders that mature as larvae (neotenic forms), and perhaps other species have undergone dramatic declines in numbers during the past decades.

• The first step in identifying the causes of these population declines is to compare historical data on range and abundance for each species with present day information.

• Later, carefully controlled studies will test population responses to conditions similar to those we believe are causing the problems in the wild.

Peregrine Falcons:

We inventoried and monitored breeding success of peregrine falcons statewide in cooperation with U.S. Forest Service, Bureau of Land Management, and National Park Service.

• We found 58 occupied nesting sites during 1990 - 1991, and 91 young fledged.

• Although no peregrines returned to the Denver area, more nesting sites were occupied along the Front Range than last year.

Bald Eagles:

We conducted a statewide survey of wintering bald eagles, monitored bald eagle nesting, and banded young eagles statewide.

• Again this year, bald eagles wintering in Colorado has remained at a stable population of about 600 birds.

• The bald eagle nest watch at Barr Lake reported that three young bald eagles hatched at that site this year. All three young were banded.

Pelicans:

We monitored the breeding population of white pelicans at Riverside and Antero Reservoirs.

• Pelicans were banded at Riverside Reservoir for the 30th consecutive year. Until 1989, Riverside Reservoir was the only nesting area for white pelicans in Colorado.

• In 1989 and 1990, we found pelicans nesting at Antero Reservoir. (This year, we learned they are also nesting at MacFarlane Reservoir.)

• This year, 61 young pelicans were banded at Antero Reservoir, and some 70 pelicans were found nesting there.

Plovers and Terns:

We surveyed least terns and piping plovers for population trends and distribution along the Arkansas and Platte rivers in cooperation with the Colorado Bird Observatory.

• We found that least terns are nesting in the highest numbers we have seen. More than 25 pairs of terns are nesting in the southeastern part of the state.

• Piping plovers did not do well during 1990 - 91. We found only 2 nesting pairs, and both failed.

Other Important Work

Birds:

• Monitored population and managed habitat for plains sharp-tailed grouse in Douglas County and Raton Mesa.

• Monitored populations and managed habitat for lesser prairie-chicken in Pueblo and Baca counties.

• Monitored greater sandhill crane breeding and staging areas in Routt County.

• Assisted in surveying breeding birds statewide in cooperation with Colorado Bird Atlas Partnership.

• Conducted transplants, monitored population and managed habitat for greater prairie-chickens.

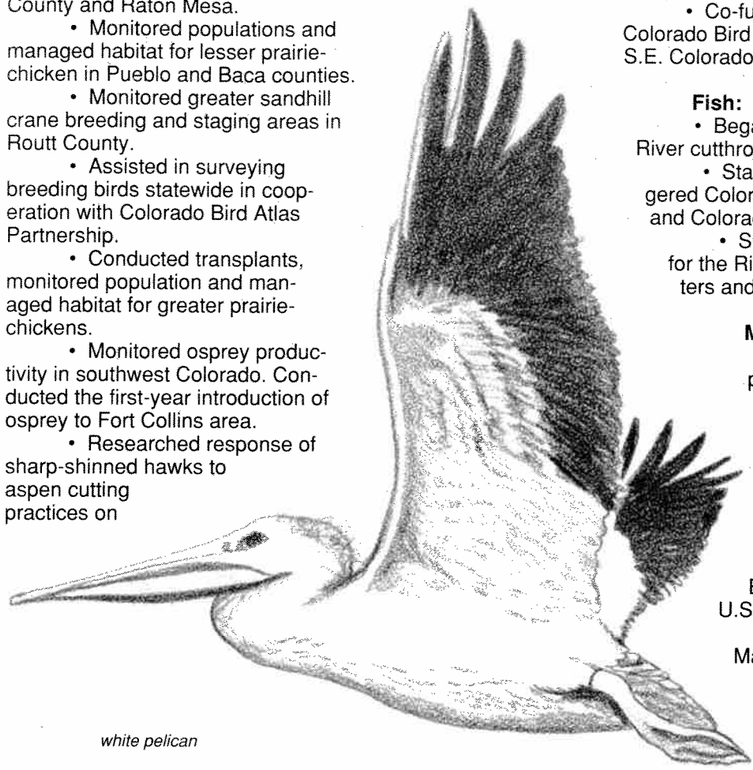
• Monitored osprey productivity in southwest Colorado. Conducted the first-year introduction of osprey to Fort Collins area.

• Researched response of sharp-shinned hawks to aspen cutting practices on the western slope in cooperation with the U.S. Forest Service and CSU.

• Studied upland game and nongame bird responses to: pesticides used in wheat farming, grazing in the alpine ecosystem, the Conservation Reserve Program, sandsage-bluestem prairie renovation, and prescribed burning in the big sagebrush ecosystem.

• Completed study of abundance and distribution of raptors on the Pawnee National Grasslands.

• Co-funded, with The Nature Conservancy, a Colorado Bird Observatory study of snowy plovers in S.E. Colorado.



white pelican

Fish:

• Began to draft the recovery plan for Colorado River cutthroat trout.

• Standardized monitoring program for endangered Colorado River fishes in the Yampa, White, and Colorado rivers.

• Surveyed, stocked, and enhanced habitat for the Rio Grande cutthroat trout in the headwaters and tributaries of the Rio Grande River.

Mammals:

• Initiated the bats/abandoned mines project.

• Continued river otter recovery efforts; researched monitoring and habitat needs on the Dolores River; monitored previous river otter transplant sightings throughout the state.

• Evaluated potential black-footed ferret habitat in Moffat and Rio Blanco counties in cooperation with the U.S. Bureau of Land Management.

• Revised and updated the Colorado Mammal Distribution Latilong Study in cooperation with the Denver Museum of Natural History.

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Colorado Taxpayers Help Nongame And Endangered Wildlife (continuted)

• Conducted study to radio-collar lynx on Vail Mountain in cooperation with U.S. Forest Service and Vail Associates.

• Funded a study to determine presence and distribution of Preble's meadow jumping mouse (a species of special concern) through the University of Northern Colorado.

Amphibians:

• Surveyed for abundance, distribution, and trend data for amphibians in high altitude areas.

• Initiated recovery efforts for the threatened wood frog and its habitat in north central Colorado; began to draft recovery plan.

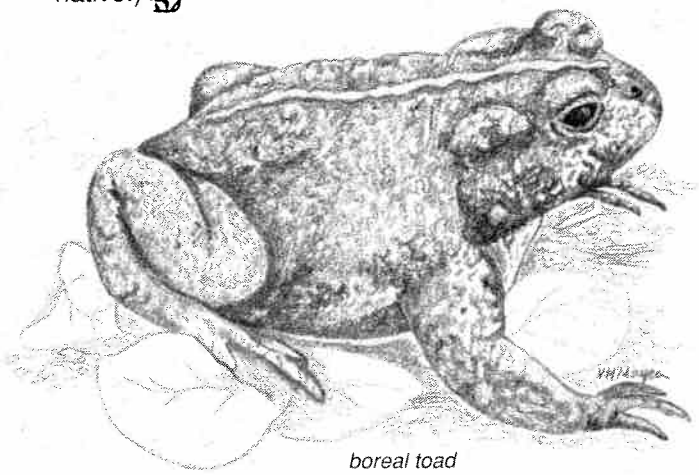
• Surveyed to determine status of neotenic tiger salamanders in high altitude waters near Crested Butte.

Statewide/Specieswide:

• Continued small grants cooperative projects with Colorado Natural Areas Program.

• Published *Colorado's Wildlife Company* in co-operation with DOW Watchable Wildlife Program.

• Sponsored the fifth annual Nongame Photo Contest. (This year's winner is a Claude Steelman photograph of a California myotis bat - a Colorado native.)



boreal toad

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