Canyon of the Ancients National Monument Amphibian and Reptile Inventory

by

Brad Lambert

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Colorado Natural Heritage Program Colorado State University Campus Delivery 8002 Fort Collins, CO 80523

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Executive Summary

In 2003 the Bureau of Land Management contracted the Colorado Natural Heritage Program to conduct field surveys for amphibians and reptiles in the Canyon of the Ancients National Monument. Approximately 915 acres were surveyed between April and September 2003 in selected areas of the monument. There were 28 targeted surveys in each of the representative habitats that resulted in 196 reptile and amphibian observations. Three species of amphibians, eight species of lizards and two snake species were documented on the monument. The desert spiny lizard and longnose leopard lizard, both rare in Colorado, were observed in several locations. Drift fences with funnel traps were set up at two sites near Hamilton Mesa in hope of documenting species that are hard to detect with visual encounter surveys. The drift fences were not very efficient at capturing herpetofauna. Only two species of lizards, the northern plateau lizard and the western whiptail lizard, were captured by the drift fence/funnel trap arrays. Visual encounter surveys were successful for finding active lizards, but did not result in many snake observations. Minnow traps were effective at capturing adult and larvae tiger salamanders.

Introduction

Canyon of the Ancients National Monument (CANM) was declared a National Monument in 2000 and is managed by the U.S.D.I. Bureau of Land Management. The 164,000 acre monument located in the southwestern corner of Colorado in Montezuma County (Fig. 1 and 2), has a rich and diverse assemblage of amphibians and reptiles. In 1976 the BLM established a 443 acre parcel in Bridge Canyon called the McElmo Rare Snake and Lizard Area (MLSA). Bury (1977) conducted an intensive survey of the MLSA and other surrounding areas that later became part of the Canyon of the Ancients National Monument. Since Bury's work in 1977, research and inventory work has been lacking on the monuments diverse herpetofauna. There have been 7 species of amphibians, 12 species of lizards and 8 species of snakes documented on or near the monument. Several species have a limited range in Colorado and only occur in the west

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central and southwestern corner of the state. Of the 18 species of amphibians in Colorado, 7 are documented in the CANM. There is high diversity for lizards and snakes on the monument as well, where 63% of Colorado's lizards and 31% of Colorado's snakes can be found. The unique herpetological resources found at CANM make a sound BLM management plan a priority.

In 2003, the BLM contracted the Colorado Natural Heritage Program (CNHP) to conduct a herpetological inventory of the CANM. Between April 4 and September 17, approximately 915 acres were surveyed on the monument for reptiles and amphibians. The objectives were to (1) visually survey as much of the monument as time allowed, including surveys in each of the representative habitats, (2) record each amphibian and reptile observation to document distributions on the monument and (3) experiment with drift fences and funnel traps as a sampling tool. Two focal species were the desert spiny lizard (Sceloporus magister) and the longnose leopard lizard (Gambelia wislizenii), both considered rare species in Colorado. This report describes the results of the surveys and gives a species account for each amphibian and reptile encountered on the monument and also discusses additional herpetofauna that may exist in this area.

Location of the Canyon of the Ancients National Monument in Colorado

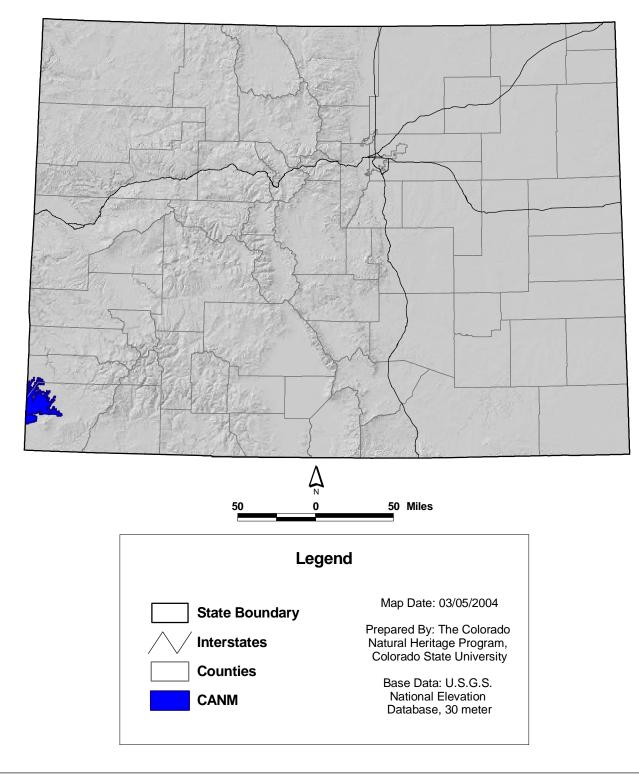
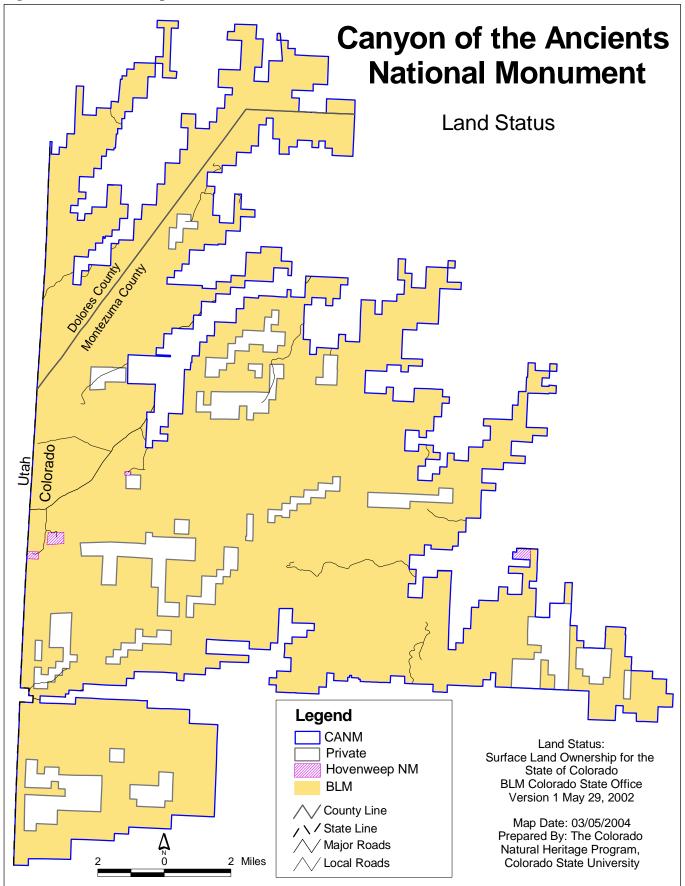


Figure 2. Land Status Map



Methods

Field surveys were conducted in four, week long periods staggered throughout the spring and summer of 2003. Visual encounter surveys made up the majority of the survey effort. The surveyed areas were based on historical records, habitat type, or ease of access. Personnel on foot carefully surveyed portions of the monument for amphibians and reptiles. Each observation was then recorded on a standard form. UTM Northing and Easting were taken with a twelve channel GPS at each observation point (NAD 27 datum). The approximated area surveyed was outlined on a 7.5 minute USGS quad map. The majority of surveys were conducted between 8:00 a.m and 12:00 a.m, as the reptile activity was reduced in late morning due to the hot daily temperatures. Several attempts were made at road cruising during late evening and early night hours in hope of observing some of the more nocturnal species. Minnow traps were placed in several stock ponds throughout the monument to sample for amphibian larvae. These traps were left in the ponds overnight and were checked and removed the following day.

Species identification was made visually, with Hammerson's (1999) book <u>Amphibians</u> <u>and Reptiles in Colorado, 2nd edition</u> used as a field reference. Many of the species mentioned in this report are currently under taxonomic scrutiny and various institutions have put out revised taxonomic lists (e.g. Collins and Taggert 2003 and Crother 2001) with differing nomenclature. For consistency and also due to the location of this study, the zoological nomenclature in this report follows Hammerson (1999).

In an effort to try and capture some of the more elusive herpetofauna on the monument, four drift fences with funnel traps were set up. Drift fences were 10 ft. x 14 in. wide strips of aluminum flashing purchased at a hardware store. Each fence was buried approximately four inches in the soil. The drift fences had two funnel traps at each end, for four total traps per fence. The funnel traps were constructed out of aluminum window screen following the design of Gerber et al. (1997). A small piece of cardboard was placed in each trap and vegetation was placed over the trap for shade. Each trap was placed flush against and parallel to the fence with the trap opening facing the center of

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the fence. Two fence arrays were installed on top of Hamilton Mesa and two fence arrays were placed at the base of Hamilton Mesa. The traps were set out for three day intervals in late April and in early June. Traps were checked each morning by 10:00 a.m. Lizards caught in the traps were temporarily marked with a black dot(s) on the right rear leg with a marker pen to identify unique individuals and released at the trap site.



Drift fence # 1A – Hamilton Mesa



Drift Fence #2A – Base of Hamilton Mesa

Habitat Overview

Western Montezuma County has typical Colorado Plateau desert-shrub and pinyonjuniper habitats. Canyon of the Ancients National Monument is dominated by three major vegetation types: saltdesert shrub, big sagebrush and pinyon-juniper. The mesa tops typically have dense stands of pinyon-juniper with open areas of greasewood and sagebrush vegetation. The mid-slope region of the canyons is mostly rocky talus slopes with sparse vegetation that includes sagebrush, skunkbrush, junipers and cacti. The habitat of the canyon bottoms consists of greasewood, sagebrush, saltbrush, rabbitbrush and grasses. The riparian areas along the canyon bottoms typically include tamarisk, willows and cottonwoods.



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Mesa top habitat
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Canyon mid-slope habitat



Canyon bottom habitat

Results

Targeted Surveys

Approximately 915 acres within the Canyon of the Ancients National Monument were surveyed between April and September of 2003(Fig. 3). A total of 196 observations of reptiles and amphibians were made during targeted surveys, including incidental observations that were made while traveling to survey sites. Several sites including Bridge Canyon, Cross Canyon and Hamilton Mesa were surveyed multiple times. Due to the work of Bury (1977) in the MLSA within Bridge Canyon, several surveys were conducted in this area to make comparisons between the studies. There were 28 targeted surveys conducted between April 4 and September 17 in all of the representative habitats found on the monument.

Three species of amphibians, the red-spotted toad, woodhouse's toad and tiger salamander were all found within the CANM boundaries. The northern leopard frog and

New Mexico spadefoot toad have been documented on the monument, but were not observed during 2003 surveys. Although not previously recorded on the monument, chorus frogs were heard calling along McElmo Creek on private property and might occur in a few locations on the monument. A few notable finds were a breeding chorus of red-spotted toads (approximately 20 adults) observed at dusk on June 5 at a stock pond near McElmo Creek, approximately 2 mi from the Utah border. A woodhouse's toad was found near the red-spotted toad breeding pond indicating both species may use the same pond for breeding and hybridization between these two species is a possibility. Tiger salamanders were found in almost every body of standing water on the monument.

Eight species of lizards were found on the monument in 2003. Two species that have been documented on the monument that were not observed this year were short horned lizards and sagebrush lizards. The rare desert spiny lizard was found along Bridge Canyon and was also found in Utah just outside of the Colorado border in Cross Canyon. Another rare lizard, the longnose leopard lizard was found on Cannonball Mesa. The tree lizard was only found in Sand Canyon and appeared to be absent from Bridge Canyon where Bury (1977) had collected specimens. Other species such as the side-blotched lizard, northern plateau lizard and western whiptail lizard were all quite common in all the habitats within the monument.

Only two species of snakes were observed within the monument in 2003, the bullsnake and western rattlesnake. The striped whipsnake was observed in Utah near the Colorado border in Cross Canyon and likely occurs throughout the monument. There are several species of snakes that have been documented on or near the monument that were not found in 2003. The common kingsnake, night snake, wandering garter snake, milk snake and smooth green snake are all known to occur in this area.

Drift Fence Results

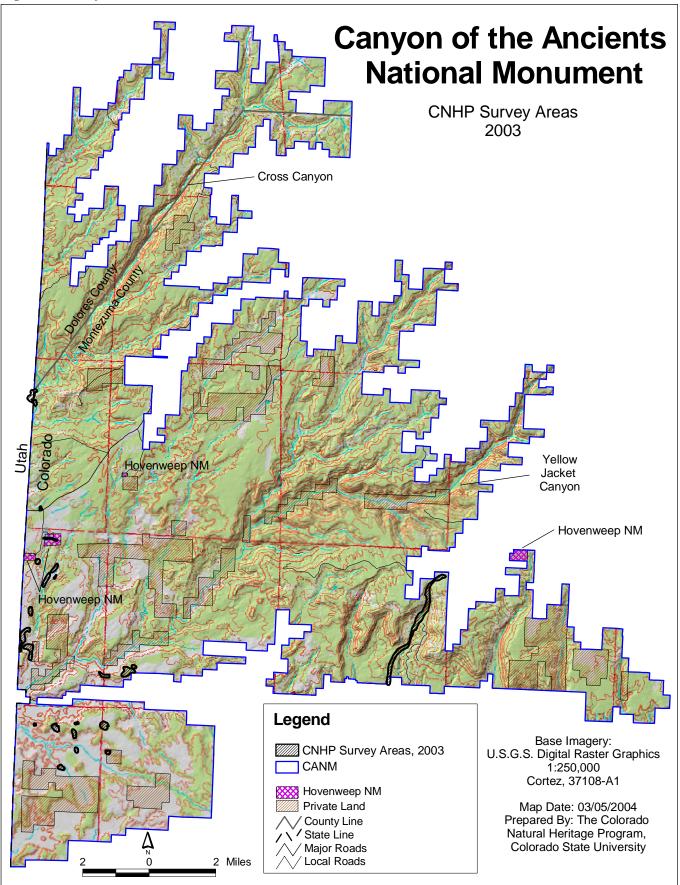
Drift fences in conjunction with pit-fall traps or funnel traps are generally regarded as an effective tool for sampling terrestrial amphibians and reptiles (Gerber et al. 1997, Heyer et al. 1994, Bury 1977). In 2003, there were 92 trap-nights total from the two drift fence

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arrays set up on Hamilton Mesa and two arrays set up at the base of Hamilton Mesa (Fig. 4). Only one western whiptail lizard was captured from the two arrays on top of Hamilton Mesa. The two arrays at the base of Hamilton Mesa captured two western whiptails and two northern plateau lizards. Trap success was a surprisingly low 5% for all four arrays combined. The trap arrays at the base of Hamilton Mesa had a relatively better trap success at 4% then the arrays on the mesa top 1%. Only northern plateau lizards and western whiptails were captured by the trap arrays, both common species on the monument. Other species were observed near the drift fences, including collard lizards and side-blotched lizards, and a western rattlesnake, but they were never captured by the traps.

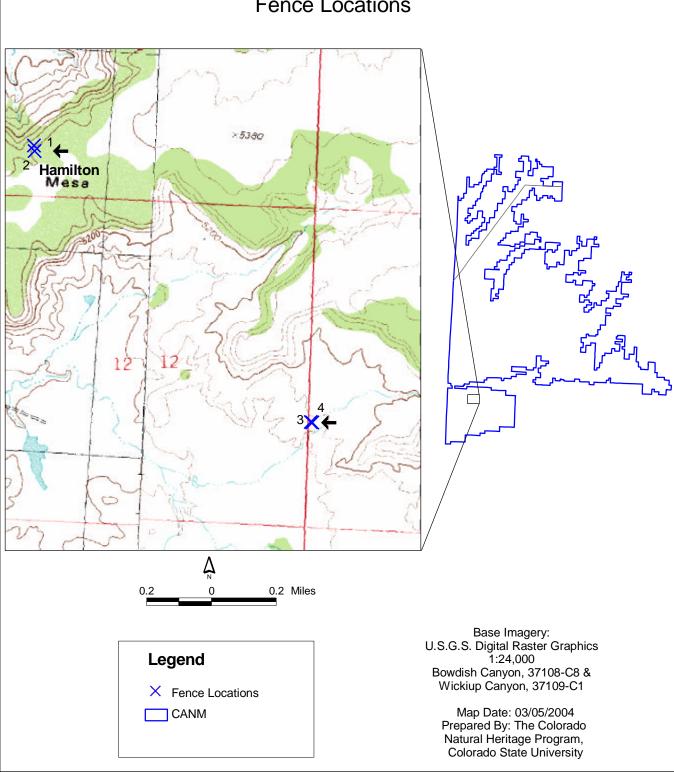
It was not clear why the trap success rate was so low. Gerber et al. (1997) did a similar study in the Canyons of Idaho and had good success for a number of lizards and snakes. The study in Idaho, however, did have longer fences (25 ft. sections) combined into 27 arrays. Some of the factors that may have inhibited the use of drift fences for this study might have been length of fence, location of fences or length of sampling period.

Figure 3. Survey Locations





Fence Locations



Species Accounts

Amphibians Observed in 2003 Surveys: See Appendix A for individual species maps.

Ambystoma tigrinum – Tiger Salamander (map 1)

Tiger salamanders were found in seven locations during this inventory. The salamanders were found in stock ponds and springs and probably occur throughout the monument in suitable habitat. Larvae were present in several stock ponds in large numbers. Salamander adults and larvae were found in a spring below the Cannonball Mesa ruins. Their distribution on the monument is restricted to areas with permanent or ephemeral sources of water. Bury (1977) captured a juvenile in a pit-fall trap in Bridge Canyon.



Tiger salamander – Stock pond near McElmo Creek

Bufo punctatus - Red-Spotted Toad (map 2)

Red-spotted toads were found in one location during this inventory. A breeding aggregation of approximately 20 adults was observed in June at a stock pond near McElmo Creek. Hundreds of tadpoles along with Bufo woodhousii tadpoles were discovered on June 16 in Cross Canyon in Utah near the Colorado border. This site was revisited in July and several metamorphs of both species were observed. Hybridization between these species has been documented (Hammerson, 1999), and potentially occurs

at this site. It is likely that red-spotted toads are common throughout the monument near permanent or ephemeral water. Langlois (1981) observed breeding red-spotted toads below the Hackberry group ruins. Bury (1977) found red-spotted toads in Bridge Canyon near McElmo Creek and 2.5 miles north of the MLSA.



Red-spotted toad – Stock pond near McElmo Creek

Bufo woodhousii - Woodhouse's Toad (map 3)

Within the monument, only one adult woodhouse's toad was found in 2003 along McElmo Creek 2 miles east of the Utah border. A breeding population was found on the Utah side of Cross Canyon near the Colorado border on June 16 with hundreds of tadpoles in an impounded stretch of creek (see *Bufo punctatus* account). Woodhouse's toads likely occur throughout the monument along the canyon bottoms in areas near permanent and temporary ponds. Bury (1977) reported one adult captured in pit-fall traps in the MLSA.

Pseudacris triseriata – Boreal Chorus Frog

Chorus frogs were heard calling from the irrigated meadows along McElmo Creek in

early June. The irrigated meadows are on private property that borders the monument.

Chorus frogs are probably rare on the monument as they usually occur in wet, marshy

habitat, which is lacking on most of the monument.

Reptiles Observed in 2003 Surveys

Crotaphytus collaris – Collard Lizard (map 4)

Collard lizards were found throughout the monument in all habitat types. They were most common among mid-slope rocky outcrops and least common on mesa tops. A gravid female was found in early June and a hatchling was observed in September. These lizards with their striking colors are easy to spot perching on rocks. Bury (1977) reported collecting collard lizards at Bridge Canyon, Hovenweep Canyon, and south of the Holly House ruins and also observed them in many areas on the monument.



Adult male collard lizard – Base of Hamilton Mesa



Adult female (gravid) collard lizard - Base of Hamilton Mesa

Gambelia wislizenii – Longnose Leopard Lizard (map 5)

Longnose leopard Lizards are rare and appear to have a limited range on the monument. In 2003, they were only found on Cannonball Mesa in dense juniper/greasewood habitat with sandy soils. There have also been recent reports of longnose leopard lizards observed on Hamilton Mesa, although none were found in 2003. Bury (1977) reported a few observations from the mesa tops near Bridge Canyon.



Long-nose leopard lizard – Cannonball Mesa – photo by C. Thompson

Sceloporus magister – Desert Spiny Lizard (map 6)

Desert spiny lizards are rare on the monument, although they can be common in localized areas. They were found in 2003 in Bridge Canyon and an adult was found in Utah along Cross Canyon approximately 50 m from the Colorado border. It is likely that desert spiny lizards occur within the monument in Cross Canyon. They were most often found perching on rocks in canyon bottoms along dry washes. These lizards were common in Utah alongside the road in Cross Canyon. These lizards are unique in Colorado to the southwest corner of the state. Bury (1977) reported desert spiny lizards from Bridge Canyon and Yellowjacket Canyon.



Desert spiny lizard - Cross Canyon, Utah

Sceloporus undulates – Northern Plateau Lizard (Fence Lizard) (map 7) Northern plateau lizards were common throughout the monument in all habitat types. They were observed in 2003 most frequently among rocky outcrops. Northern plateau lizards in Montezuma County exhibit variation in dorsal patterns and color and can be difficult to visually identify from a distance. Bury (1977) found northern plateau lizards to be the most frequently observed lizard in the MLSA.



Northern plateau lizard (Fence Lizard) – Bridge Canyon

Urosaurus ornatus – Tree Lizard (map 8)

Surveys in 2003, revealed the tree lizard to be a rare lizard on the monument. They were only found along the Sand Canyon trail in dense pinyon/juniper stands among sandstone ledges. Specimens were collected by Maslin (1959) at the mouth of Yellowjacket Canyon and Bury (1977) collected four specimens from Bridge Canyon. It is possible that tree lizards have experienced a decline on the monument, or the conditions in which surveys were conducted in 2003 were not conducive for them to be detected.



Tree lizard – Sand Canyon

Uta stansburiana – Side-blotched Lizard (map 9)

Side-blotched Lizards were the most frequently observed lizard on the monument during 2003 surveys. They were observed in all habitats and were especially common on mesa rims and canyon mid-slopes. Side-blotched lizards were the only lizards observed in early April. Bury (1977) reported side-blotched lizards as being one of the most abundant lizards in the MLSA.



Side-blotched lizard – Bridge Canyon

Cnemidophorus tigris – Western Whiptail Lizard (map 10)

Western whiptails were found in all habitat types in the monument, especially in dry wash's along the canyon bottoms. They appeared to be quite common and were often observed to be active well into the mid-day heat. In September, hatchlings were found more frequently then the adults. Bury (1977) reported western whiptails to be common within the MLSA in valley bottoms and mesa tops.



Western whiptail lizard – Bridge Canyon

Cnemidophorus velox – Plateau Striped Whiptail Lizard (map 11) Plateau striped whiptails were found along McElmo Creek, near the Holly Group Ruins, and along the Sand Canyon trail. These lizards appear to be more restricted in distribution within the monument then *C. tigris*, and were found primarily in stands of pinyon/juniper with sandy soils. Like *C. tigris*, hatchlings were observed with more frequency then adults in September surveys. Bury (1977) collected specimens around the mouth of Yellow Jacket Canyon near the Ismay Trading Post.



Plateau striped whiptail lizard – McElmo Creek

Masticophis taeniatus – Striped Whipsnake (map 12)

Striped whipsnakes were not recorded within the monument during 2003 surveys, however several were observed in Cross Canyon in Utah within 100 meters of the Colorado border. The snakes found in Utah occurred in a dry wash lined with tamarisk and cottonwoods. Striped whipsnakes probably occur throughout the monument. This snake was not reported from surveys in 1977 by Bury, but is cited by Maslin (1959) as occurring in McElmo Canyon.

Pituophius catenifer – Bullsnake/Gopher Snake (map 13)

One adult bullsnake was found during 2003 surveys in the monument in the valley wash of Bridge Canyon and another one was observed on the Pleasant View Road just north of the monument. Bullsnakes are probably common throughout the area. Bury (1977) reported bullsnakes from Hovenweep headquarters and one from Bridge Canyon.



Adult bullsnake - Irrigated field just north of the monument

Crotalus viridis – Western Rattlesnake (map 15)

Western rattlesnakes were observed in 2003 at the base of Hamilton Mesa and near the Hovenweep Holly Group Ruins. The snake found at the base of Hamilton Mesa was observed crossing the road in sparsely vegetated/dry wash habitat. The other snake found near the Hovenweep ruins was observed crossing the road at night in thick pinyon/juniper habitat. Western rattlesnakes probably occur throughout the monument in all habitats.

Species documented from the monument that were not recorded during 2003 surveys:

Spea multiplicata – New Mexico Spadefoot Toad

New Mexico spadefoot toads were not recorded during the 2003 surveys. They have been reported from around Cortez (Maslin 1959) and Bury (1977) collected specimens along McElmo Road, Pleasant Valley Road and in Bridge Canyon. These toads are most active at night during periods of rainfall, which make them difficult to locate. They are likely limited in their distribution on the monument to areas with permanent or temporary ponds in which to breed in. They are also most often associated with areas of sandy soils in which they bury themselves for most of the year. Unfortunately, none of the surveys in 2003 were conducted around a time of significant rainfall and few surveys were conducted at night, which is probably the reason for no spadefoot toads being found during this inventory.

Rana pipiens – Northern Leopard Frog

Northern leopard frog specimens were collected at the mouth of Yellowjacket Canyon and along McElmo Creek as reported by Maslin (1959). There is very little suitable habitat in the monument for these frogs which prefer permanent still water with dense vegetation. Northern leopard frogs might still be present along McElmo Creek and Yellowjacket Creek on private property, but are probably absent from the rest of the monument.

Hyspsiglena torquata – Night Snake

Specimens of night snakes have been reported from Mesa Verde National Park (Maslin 1958), and Bury (1977) cites Zortman (1968) of listing night snakes as present on the MLSA (Bridge Canyon). There have been no documented specimens from the monument, but it potentially exists in the rocky canyon slopes found throughout the area.

Lampropeltis getula – Common Kingsnake

Spencer (1974) discovered this species along McElmo Creek in 1966. Although a rare snake in Colorado, it may still exist on the monument. The private hayfields along McElmo Creek would be likely habitat for this species.

Phyrnosoma hernandesi – Short-horned Lizard

There is a short-horned lizard specimens from Yellowjacket, Mesa Verde National Park, and Cortez (Maslin 1959). These lizards are likely to occur on mesa tops and in areas of oakbrush.

Sceloporus graciosus – Sagebrush Lizard

Maslin (1959) reported specimens from the mouth of Yellowjacket, Yellowjacket, and 5 mi west of Cortez (McElmo Creek). Bury (1977) observed one specimen in Hovenweep Canyon. This lizard is rare on the monument and was not observed during surveys in 2003.

Additional species with the potential to occur on the monument

Spea bombifrons – Plains Spadefoot Toad

Plains spadefoot toads have not been documented in Montezuma County, but do occur in San Juan County, Utah along the border with Colorado (Hammerson 1999). It is probable that these toads are present in the monument along McElmo Creek near the Utah border. These toads are generally active above ground only after substantial rainfalls, which make them difficult to locate most of the spring and summer. Unfortunately, none of the surveys in 2003 were conducted around a time of significant rainfall.

Hyla arenicolor - Canyon Treefrog

Canyon treefrogs have been documented in west central Colorado in deep canyons with intermittent streams (Hammerson 1999). There is suitable habitat along some of the larger canyons within the monument, especially in Cross Canyon and Yellowjacket Canyon, which both usually have flowing water.

Lampropeltis triangulum – Milk Snake

Milk snake specimens were referenced by Maslin (1959) from Cortez and Mesa Verde National Park. This is a secretive snake that may be present on the monument.

Lichlorophis vernalis - Smooth Green Snake

Smooth green snakes have been documented at Mesa Verde National Park (Maslin 1959) and have the potential to occur on the Canyon of the Ancients National Monument. This species is most often found near riparian areas (Hammerson 1999). One possible area on the monument where this species might occur is along McElmo Creek. Smooth Green Snakes have also been found in the town of Dolores (C. Thompson, pers. comm.).

Tantilla hobartsmithi – Southwestern Black-Headed Snake

This snake has only been reported from Delta and Mesa Counties in Colorado (Hammerson 1997). The habitat in the monument is similar to the habitat where it has previously been found, and there might be a chance this small secretive snake may be documented in Montezuma County.

Thamnophis elegans - Wandering Garter Snake

Wandering garter snakes were collected in the Cortez area, Mesa Verde, McElmo Creek and 10 mi south of Yellowjacket (Maslin 1959). Bury (1977) reported one individual captured at Arriola School near Cortez. During surveys for this study in 2003 there was a possible *T. elegans* sighting in Cross Canyon, but it escaped view before being verified and hence was not recorded. This species is associated with riparian habitat so may be present along McElmo Creek, Yellowjacket Canyon and Cross Canyon.

Discussion

Canyon of the Ancients National Monument represents an area of great herpetological diversity that is unique in Colorado. Two of Colorado's rare lizards, the desert spiny lizard and the longnose leopard lizard, both occur within the monument and were found during 2003 surveys. This inventory also helped define the distribution of many amphibian and reptile species on the monument. The great assemblage of lizards found at the monument, present a great opportunity for future research studies. Additional surveys in this area could potentially add several new species to the herpetofauna of the monument, as there are large portions of the monument that remain unsurveyed. The amphibians and reptiles found during surveys conducted in the McElmo Rare Snake and Reptile Area in 2003 were comparable to the study by Bury (1977). One species that Bury found that was not observed in 2003 was the New Mexico spadefoot toad.

The summer of 2003 was very dry with little rain until September, which probably affected the success of locating amphibians. An effort should be made in the future to include intensive surveys after significant rainfall, which would stimulate activity by spadefoot toads. Also, conducting night surveys in the springtime at water sites would likely reveal more amphibian breeding aggregations.

One of the objectives of this inventory was to use drift fences in conjunction with funnel traps in hope of documenting some of the more elusive species. The four trap arrays set up in 2003 did not capture many animals and was more time intensive to install and check than anticipated. More trap arrays with longer fences would likely have better results, but would require more personnel and resources. Less intrusive means of sampling, such as cover boards might be a better choice then drift fences due to the restrictions on installing fences near sensitive archeological resources. Minnow traps were very efficient at capturing adult and larvae tiger salamanders. Visual encounter surveys worked well on the monument for active lizards, but may have not been effective for finding some of the smaller secretive snakes.

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Acknowledgements

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This project was conducted under approved scientific inventory and collecting permits from the Colorado Division of Wildlife and the Colorado State University Animal Care and Use Committee.

References

Bury, R. B. 1977. *Amphibians and reptiles of the McElmo Rare Lizard and Snake Area in southwest Colorado*. Report to Bureau of Land Management, Montrose, Colorado.

Collins, J. T. and T. W. Taggert. 2003. *Standard common and current scientific names for North American amphibians, turtles, reptiles and crocodilian. Fifth Edition.* Publication of The Center for North American Herpetology, Lawrence, Kansas.

Crother, B. I. 2001 (editor). *Scientific and standard English names of amphibians and reptiles of North American north of Mexico, with comments regarding confidence in our understanding*. Society for the Study of Amphibians and Reptiles, Herpetological Circular No. 29.

Gerber, M. F., J. C. Munger, A. Ames, and J. Stewart. 1997. *Reptiles and amphibians in deep canyons: The Big Jacks and Little Jacks Creek drainages of Owyhee County, Idaho.* Bureau of Land Management Technical Bulletin No. 97-1.

Hammerson, G. A. 1999. *Amphibians and reptiles in Colorado. Second Edition*. University Press of Colorado, Niwot, Colorado.

Heyer, W. R., M. A. Donnelly, R. W. McDiarmid, L. C. Hayek, and M. S. Foster (editors). 1994. *Measuring and monitoring biological diversity*. Smithsonian Institute Press.

Langlois, D. 1981. Canyon Chorus. Colorado Outdoors 30 (6):32-34.

Maslin, T. P. 1959. *An annotated check list of amphibians and reptiles of Colorado*. University of Colorado Studies, Series in Biology 6.

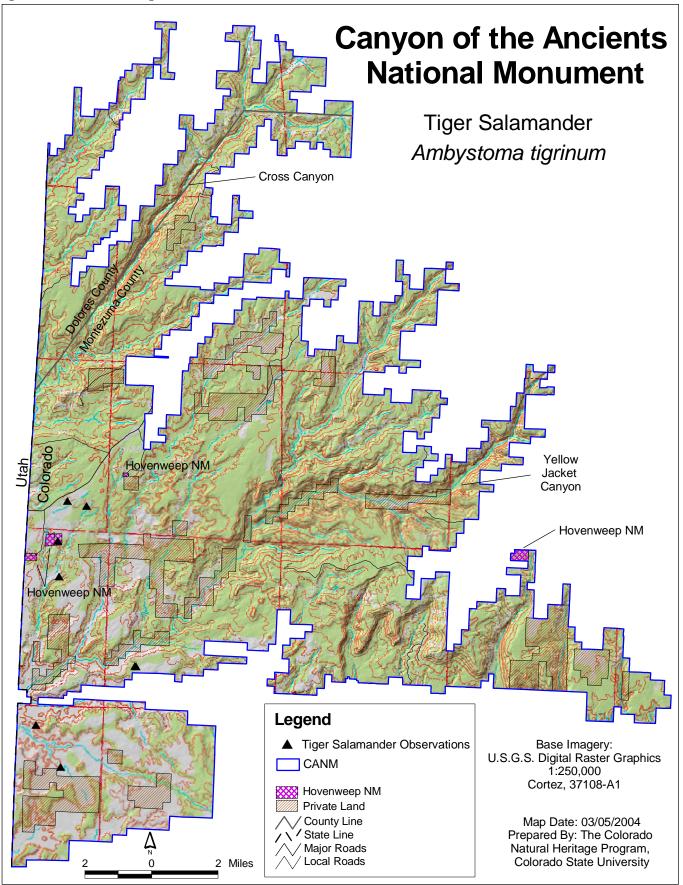
Spencer, A. W. 1974. First record of the kingsnake *Lampropeltis getulus* in Colorado. *Journal of Colorado-Wyoming Academy of Science* 7 (5):79-80.

Zortman, R. D. 1968. *Natural areas in Colorado, their administration by the Bureau of Land Management*. Masters Thesis, Colorado State University.

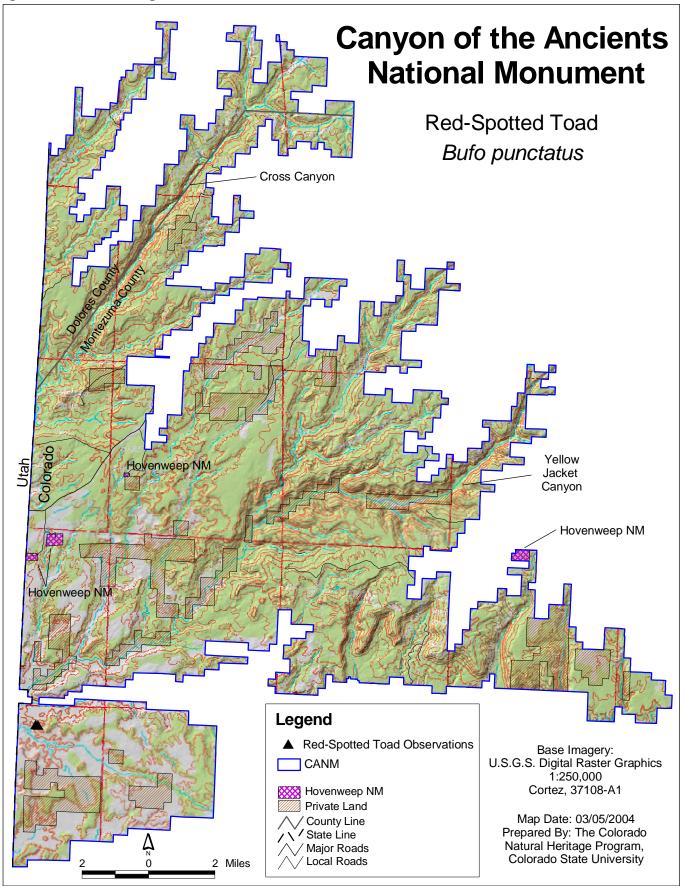
APPENDICES

Appendix A: Species Observation Maps Appendix B: Survey Results

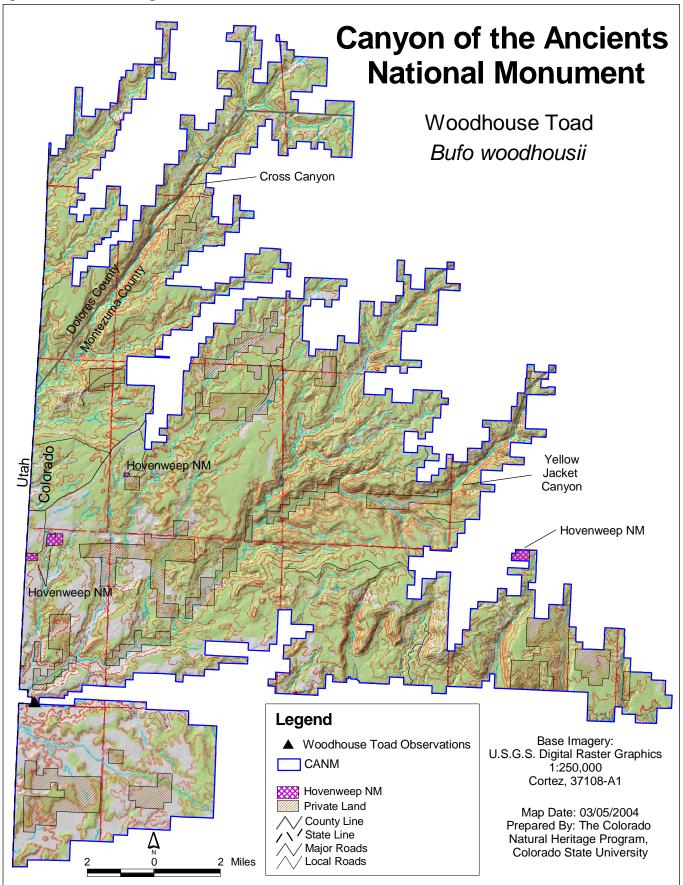
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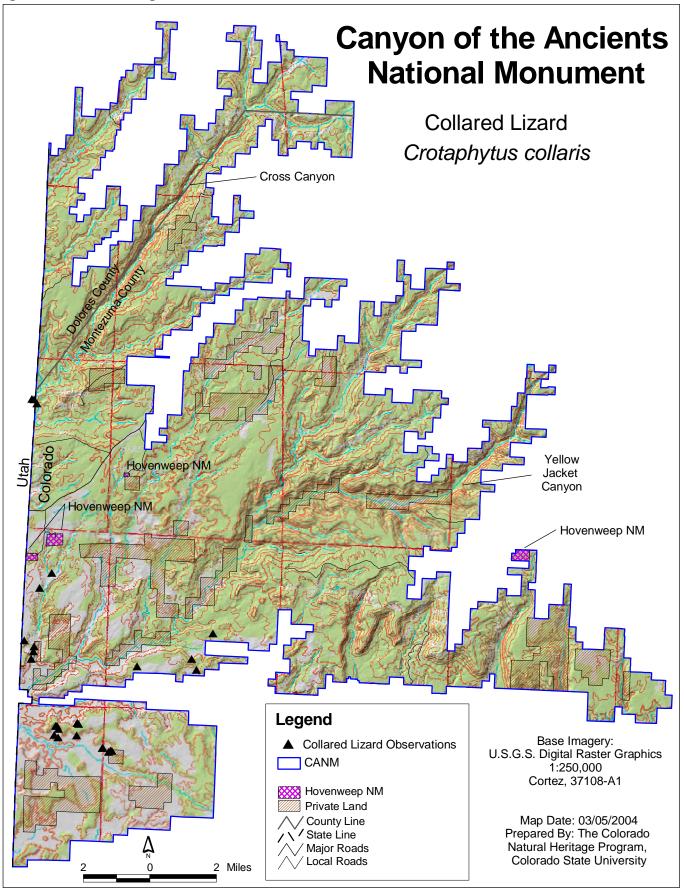
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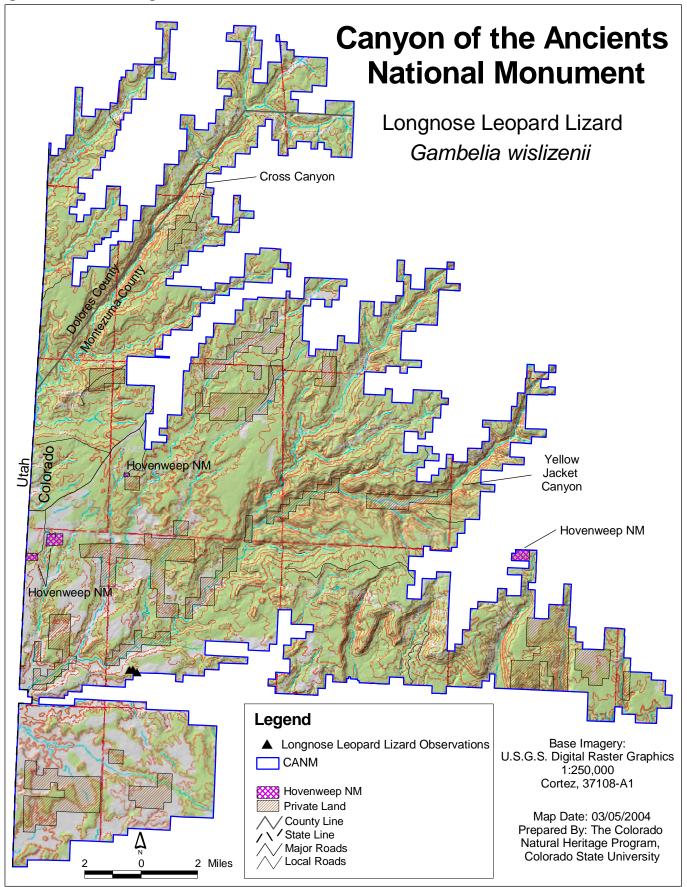
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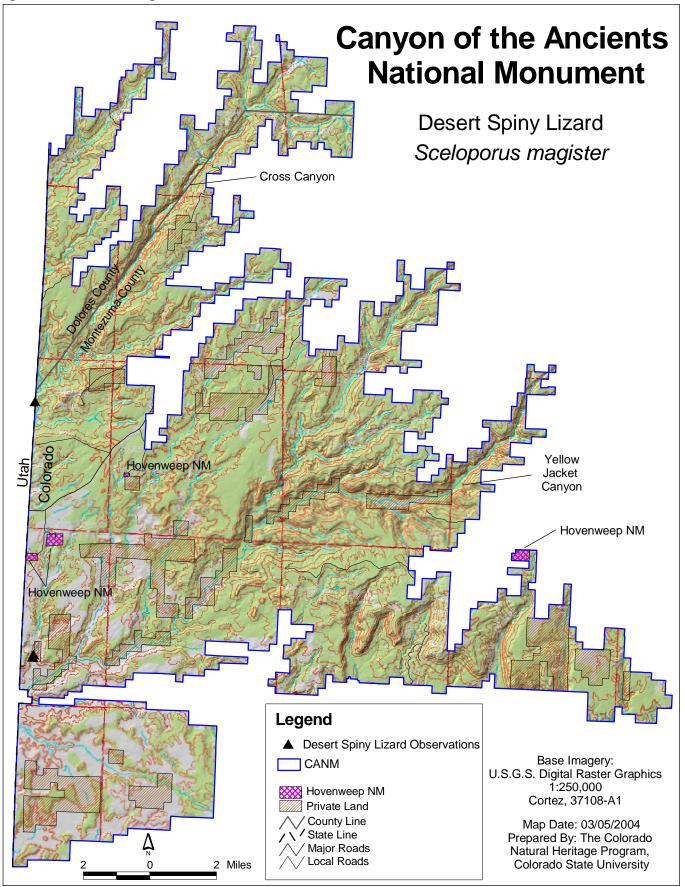
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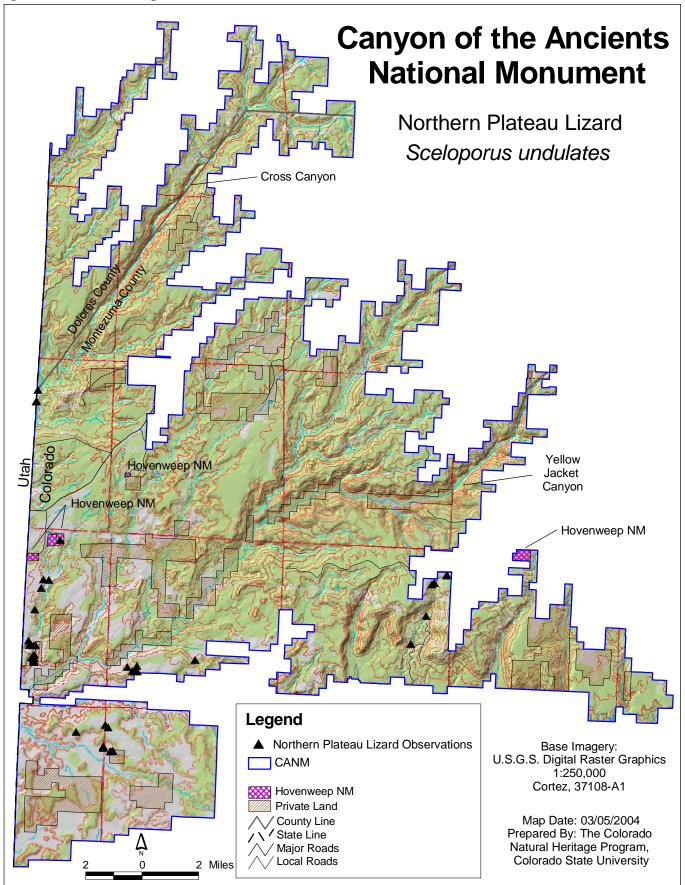
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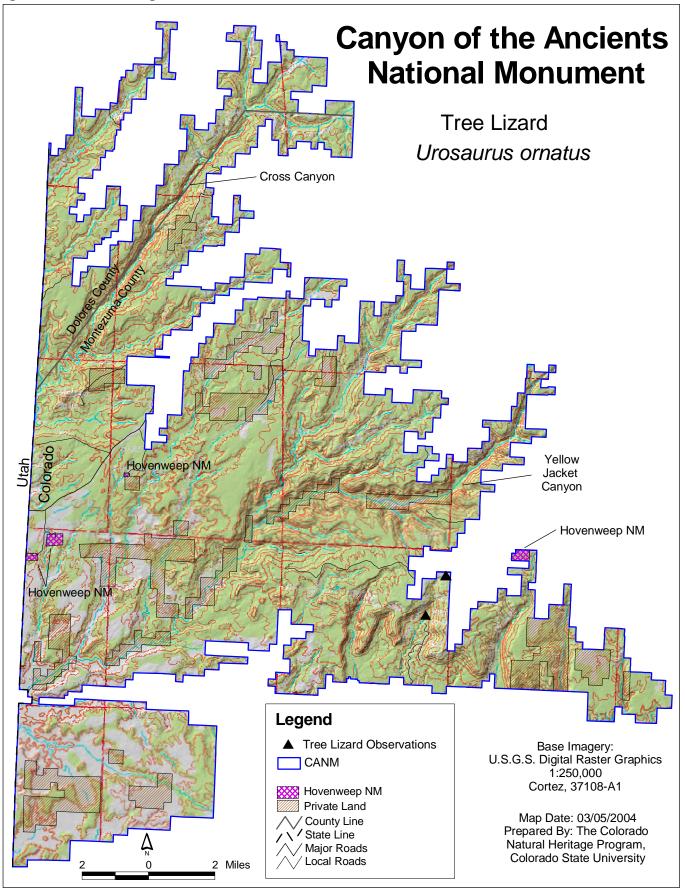
Species Observation Map 6



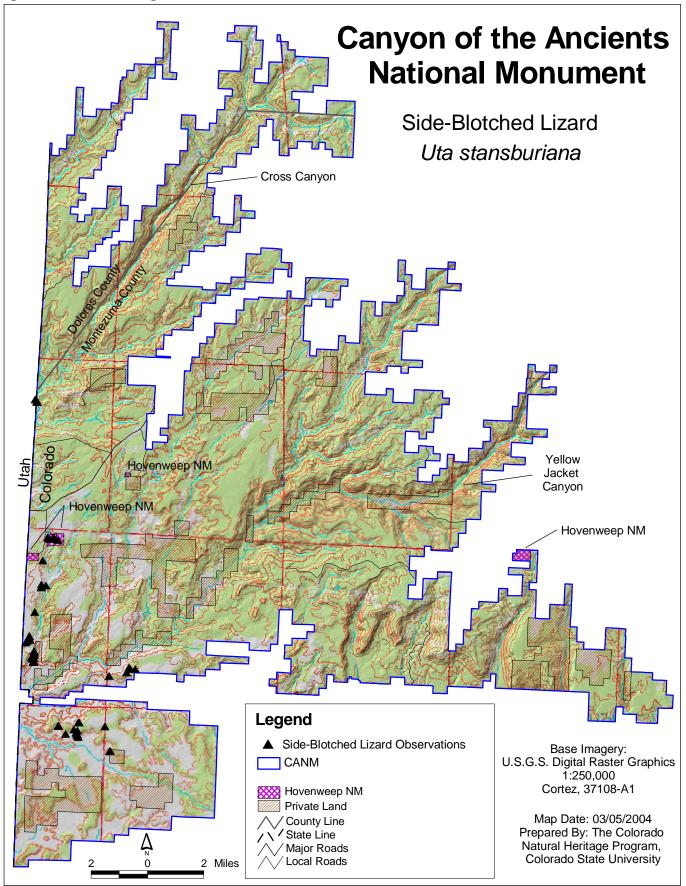
Species Observation Map 7



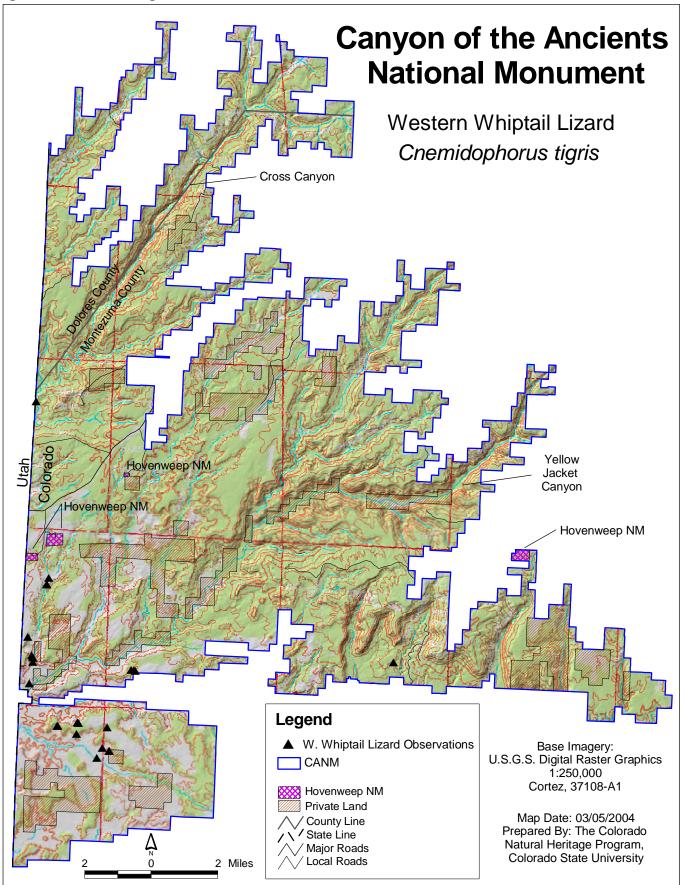
Species Observation Map 8



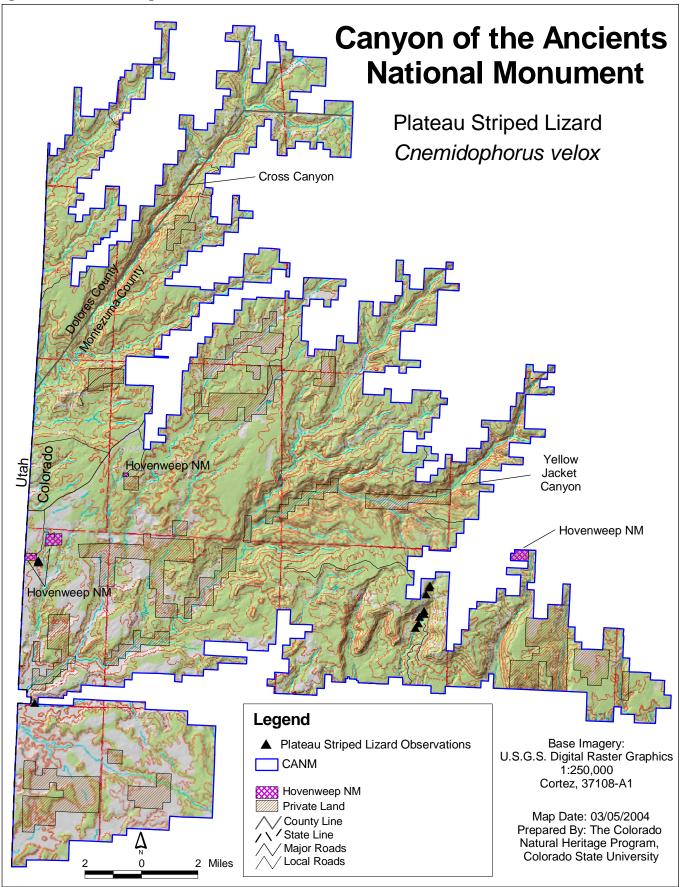
Species Observation Map 9



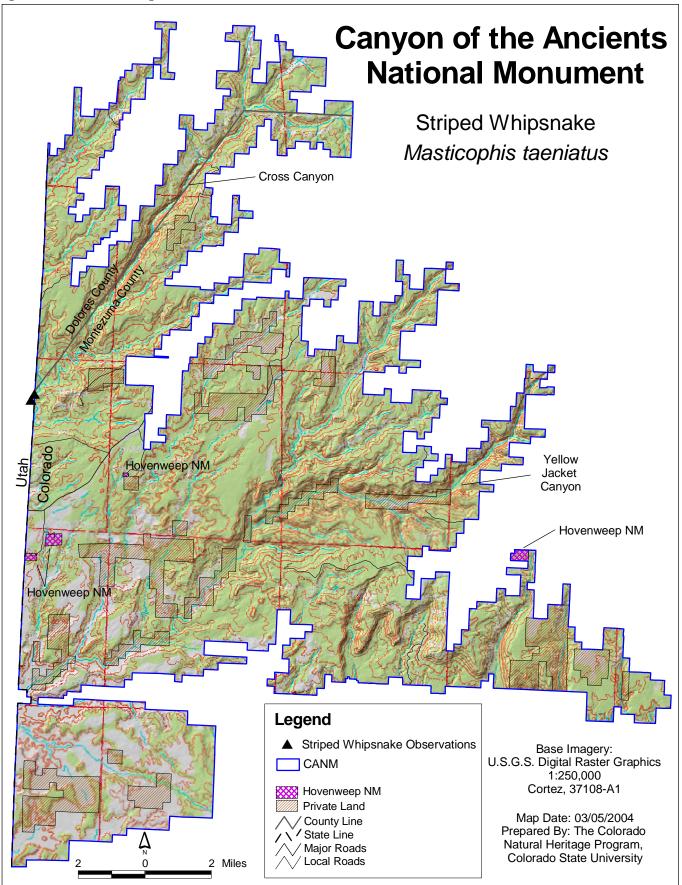
Species Observation Map 10



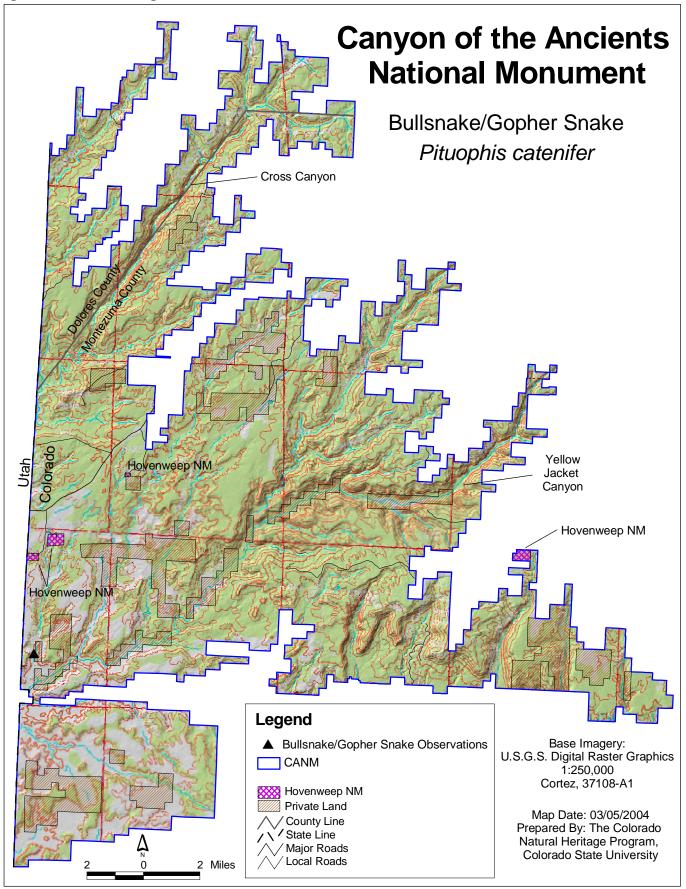
Species Observation Map 11



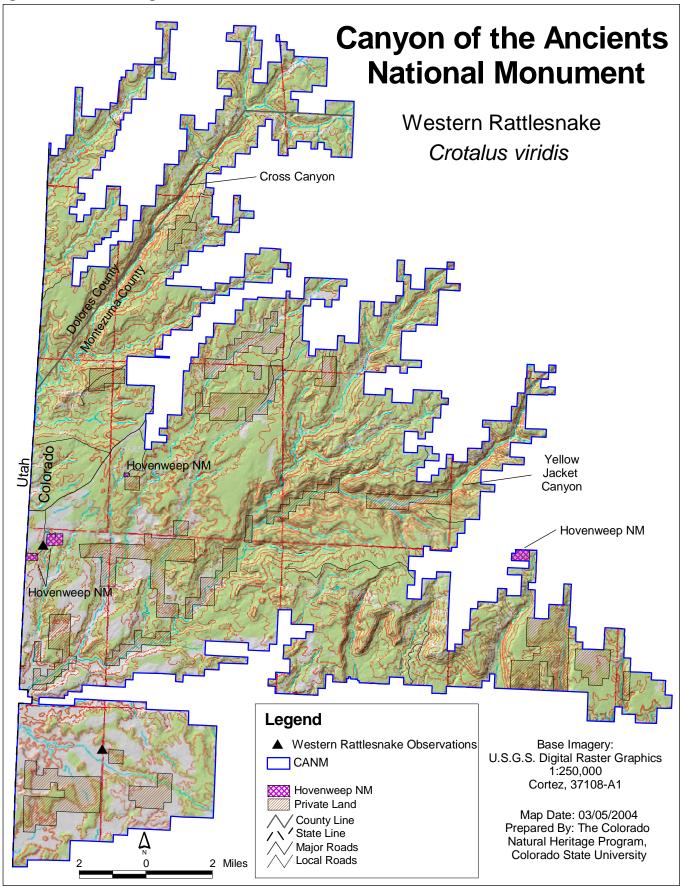
Species Observation Map 12



Species Observation Map 13



Species Observation Map 14



Appendix B: Survey Results

Date	Species Name	Common Name	General Location	Easting Z 12	Northing Z 12
4/4/2003	Uta stansburiana	Side-Blotched Lizard	Bridge Canyon	673815	4134782
4/4/2003	Uta stansburiana	Side-Blotched Lizard	Bridge Canyon	673309	4135865
4/23/2003	Sceloporus undulates	Northern Plateau Lizard	Hamilton Mesa	678087	4130228
4/23/2003	Uta stansburiana	Side-Blotched Lizard	Hamilton Mesa	676711	4127074
4/23/2003	Uta stansburiana	Side-Blotched Lizard	Hamilton Mesa	676663	4127073
4/23/2003	Uta stansburiana	Side-Blotched Lizard	Hamilton Mesa	676418	4127195
4/23/2003	Uta stansburiana	Side-Blotched Lizard	Hamilton Mesa	676818	4127095
4/24/2003	Sceloporus undulates	Northern Plateau Lizard	Hamilton Mesa	678087	4130228
4/24/2003	Cnemidophorus tigris	Western Whiptail Lizard	Rincon Canyon	677825	4129561
4/25/2003	Crotaphytus collaris	Collared Lizard	Hamilton Mesa	676668	4131436
4/25/2003	Uta stansburiana	Side-Blotched Lizard	Bridge Canyon	673819	4134776
4/25/2003	Sceloporus undulates	Northern Plateau Lizard	Bridge Canyon	673825	4134794
4/25/2003	Crotaphytus collaris	Collared Lizard	Bridge Canyon	673741	4134937
4/25/2003	Uta stansburiana	Side-Blotched Lizard	Bridge Canyon	673741	4134937
4/25/2003	Uta stansburiana	Side-Blotched Lizard	Bridge Canyon	673779	4134986
4/25/2003	Uta stansburiana	Side-Blotched Lizard	Bridge Canyon	673708	4135027
4/25/2003	Sceloporus undulates	Northern Plateau Lizard	Bridge Canyon	673708	4135027
4/25/2003	Uta stansburiana	Side-Blotched Lizard	Bridge Canyon	673742	4135125
4/25/2003	Sceloporus undulates	Northern Plateau Lizard	Bridge Canyon	673762	4135119
4/25/2003	Cnemidophorus tigris	Western Whiptail Lizard	Bridge Canyon	673753	4135153
4/25/2003	Uta stansburiana	Side-Blotched Lizard	Bridge Canyon	673827	4135188
4/25/2003	Pituophis catenifer	Bullsnake/Gopher Snake	Bridge Canyon	673815	4135260
4/25/2003	Uta stansburiana	Side-Blotched Lizard	Bridge Canyon	673839	4135324
4/25/2003	Crotaphytus collaris	Collared Lizard	Bridge Canyon	673841	4135368
4/25/2003	Uta stansburiana	Side-Blotched Lizard	Bridge Canyon	673819	4135413
4/25/2003	Sceloporus undulates	Northern Plateau Lizard	Bridge Canyon	673533	4135742
4/25/2003	Sceloporus undulates	Northern Plateau Lizard	Bridge Canyon	673633	4135731
4/25/2003	Sceloporus undulates	Northern Plateau Lizard	Bridge Canyon	673768	4135723
4/25/2003	Sceloporus undulates	Northern Plateau Lizard	Bridge Canyon	673872	4135746
4/25/2003	Crotaphytus collaris	Collared Lizard	Bridge Canyon	673865	4135669
4/25/2003	Sceloporus undulates	Northern Plateau Lizard	Bridge Canyon	673828	4134835
4/25/2003	Sceloporus undulates	Northern Plateau Lizard	Bridge Canyon	673801	4135000
4/26/2003	, 0	Tiger Salamander	Corral Road Stock Pond	675278	4144020
	Crotalus viridis	Western Rattlesnake	Base of Hamilton Mesa	678092	4130112
6/2/2003	Crotaphytus collaris	Collared Lizard	Hamilton Mesa	676578	4131463
6/2/2003	Cnemidophorus tigris	Western Whiptail Lizard	Hamilton Mesa	676632	4131484
6/2/2003	Crotaphytus collaris	Collared Lizard	Base of Hamilton Mesa	678083	4130160
6/2/2003	Sceloporus undulates	Northern Plateau Lizard	Base of Hamilton Mesa	678083	4130160
6/2/2003	Cnemidophorus tigris	Western Whiptail Lizard	Base of Hamilton Mesa Hamilton Mass	678083	4130160
6/2/2003	Cnemidophorus tigris	Western Whiptail Lizard	Hamilton Mesa	676632	4131484

6/2/2003	Crotaphytus collaris	Collared Lizard	Hamilton Mesa	676578	4131463
6/3/2003	Uta stansburiana	Side-Blotched Lizard	Hamilton Mesa	676630	4131510
6/3/2003	Cnemidophorus tigris	Western Whiptail Lizard	Rincon Canyon	676590	4131499
6/3/2003	Uta stansburiana	Side-Blotched Lizard	Rincon Canyon	676590	4131499
6/3/2003	Uta stansburiana	Side-Blotched Lizard	Rincon Canyon	678450	4129985
6/3/2003	Cnemidophorus tigris	Western Whiptail Lizard	Rincon Canyon	678483	4130006
6/3/2003	Cnemidophorus tigris	Western Whiptail Lizard	Rincon Canyon	678496	4129994
6/3/2003	Uta stansburiana	Side-Blotched Lizard	Rincon Canyon	678496	4129994
6/3/2003	Sceloporus undulates	Northern Plateau Lizard	Rincon Canyon	678498	4129983
6/3/2003	Sceloporus undulates	Northern Plateau Lizard	Rincon Canyon	678520	4129979
6/3/2003	Crotaphytus collaris	Collared Lizard	Rincon Canyon	678572	4130040
6/3/2003	Sceloporus undulates	Northern Plateau Lizard	Rincon Canyon	678609	4130019
6/3/2003	Crotaphytus collaris	Collared Lizard	Rincon Canyon	678651	4130014
6/3/2003	Sceloporus undulates	Northern Plateau Lizard	Rincon Canyon	678651	4130007
6/3/2003	Crotaphytus collaris	Collared Lizard	Rincon Canyon	678462	4129941
6/3/2003	Bufo punctatus	Red-Spotted Toad	Stock Pond Rincon	674299	4129941
0/3/2003	Buio puncialus	Red-Spolled Toau	Canyon	074299	4131220
6/3/2003	Ambystoma tigrinum	Tiger Salamander	Stock Pond Rincon Canyon	674299	4131226
6/3/2003	Ambystoma tigrinum	Tiger Salamander	Stock Pond Rincon	675851	4128945
6/4/2003	Cnemidophorus velox	Plateau Striped Whiptail	Canyon McElmo Creek	674158	4132479
6/4/2003	Cnemidophorus tigris	Western Whiptail Lizard	Bridge Canyon	673848	4134796
6/4/2003	Uta stansburiana	Side-Blotched Lizard	Bridge Canyon	673848	4134796
6/4/2003	Sceloporus undulates	Northern Plateau Lizard	Bridge Canyon	673848	4134796
6/4/2003	Uta stansburiana	Side-Blotched Lizard	Bridge Canyon	673845	4134847
6/4/2003	Cnemidophorus tigris	Western Whiptail Lizard	Bridge Canyon	673822	4135045
6/4/2003	Sceloporus undulates	Northern Plateau Lizard	Bridge Canyon	673813	4135059
6/4/2003	Uta stansburiana	Side-Blotched Lizard	Bridge Canyon	673813	4135059
6/4/2003	Sceloporus magister	Desert Spiny Lizard	Bridge Canyon	673812	4135067
6/4/2003	Sceloporus magister	Desert Spiny Lizard	Bridge Canyon	673860	4135196
6/4/2003	Sceloporus undulates	Northern Plateau Lizard	Bridge Canyon	673860	4135196
6/4/2003	Uta stansburiana	Side-Blotched Lizard	Bridge Canyon	673860	4135196
6/4/2003	Cnemidophorus tigris	Western Whiptail Lizard	Bridge Canyon	673721	4133547
6/4/2003	Sceloporus undulates	Northern Plateau Lizard	Bridge Canyon Rim	673300	4135934
6/4/2003	Uta stansburiana	Side-Blotched Lizard	Bridge Canyon Rim	673283	4135765
6/5/2003	Uta stansburiana	Side-Blotched Lizard	Hamilton Mesa	676360	4131098
6/5/2003	Uta stansburiana	Side-Blotched Lizard	Hamilton Mesa	676564	4131045
6/5/2003	Cnemidophorus tigris	Western Whiptail Lizard	Hamilton Mesa	676573	4130864
6/5/2003	Uta stansburiana	Side-Blotched Lizard	Hamilton Mesa	676590	4130770
6/5/2003	Uta stansburiana	Side-Blotched Lizard	Hamilton Mesa	676638	4130695
6/5/2003	Sceloporus undulates	Northern Plateau Lizard	Hamilton Mesa	676496	4130944
6/5/2003	Uta stansburiana	Side-Blotched Lizard	Hamilton Mesa	676497	4130944
	Uta stansburiana	Side-Blotched Lizard	Hamilton Mesa		4130889
6/5/2003 6/5/2003	Uta stansburiana	Side-Blotched Lizard	Hamilton Mesa	676511 676533	
	Uta stansburiana	Side-Blotched Lizard	Hamilton Mesa	676533 676588	4130829
6/5/2003 6/5/2003		Collared Lizard	Hamilton Mesa	676588 676588	4130767
6/5/2003 6/5/2003	Crotaphytus collaris Uta stansburiana	Side-Blotched Lizard	Hamilton Mesa	676588 675890	4130767 4130813
6/5/2003 6/5/2003	Crotaphytus collaris	Collared Lizard	Hamilton Mesa		
	Uta stansburiana	Side-Blotched Lizard	Hamilton Mesa	675533 675484	4131064 4131252
6/5/2003	ola slanspullalla	Side-Diotorieu Lizard		675484	4131232

6/5/2003	Cnemidophorus tigris	Western Whiptail Lizard	Hamilton Mesa	675484	4131252
6/5/2003	Cnemidophorus tigris	Western Whiptail Lizard	Hamilton Mesa	675448	4131246
6/5/2003	Uta stansburiana	Side-Blotched Lizard	Hamilton Mesa	675448	4131246
6/5/2003	Crotaphytus collaris	Collared Lizard	Hamilton Mesa	675448	4131240
6/5/2003	Crotaphytus collaris	Collared Lizard	Hamilton Mesa	675364	4131240
6/5/2003	Bufo Punctatus	Red-Spotted Toad	Stock Pond Rincon	674363	4131225
0/5/2003	Dulo Funcialus	Red-Spolled Toad	Canyon	074303	4131200
6/7/2003	Crotaphytus collaris	Collared Lizard	Cross Canyon	673145	4149440
6/7/2003	Uta stansburiana	Side-Blotched Lizard	Cross Canyon	673100	4149529
6/7/2003	Uta stansburiana	Side-Blotched Lizard	Cross Canyon	673084	4149540
6/7/2003	Uta stansburiana	Side-Blotched Lizard	Cross Canyon	673061	4149556
6/7/2003	Sceloporus undulates	Northern Plateau Lizard	Cross Canyon	673061	4149556
6/7/2003	Crotaphytus collaris	Collared Lizard	Cross Canyon	672976	4149653
6/7/2003	Uta stansburiana	Side-Blotched Lizard	Cross Canyon	672973	4149657
6/7/2003	Uta stansburiana	Side-Blotched Lizard	Cross Canyon	673081	4149547
6/7/2003	Cnemidophorus tigris	Western Whiptail Lizard	Cross Canyon	673081	4149547
6/7/2003	Sceloporus magister	Desert Spiny Lizard	Cross Canyon	673032	4149549
6/11/2003	Crotaphytus collaris	Collared Lizard	Hamilton Mesa	678128	4130138
6/11/2003	Crotaphytus collaris	Collared Lizard	Hamilton Mesa	675551	4130601
6/11/2003		Collared Lizard	Hamilton Mesa	675328	4130724
6/11/2003		Northern Plateau Lizard	Hamilton Mesa	678295	4131313
6/11/2003	Cnemidophorus tigris	Western Whiptail Lizard	Hamilton Mesa	678295	4131313
6/11/2003	Uta stansburiana	Side-Blotched Lizard	Hamilton Mesa	678109	4131390
6/11/2003	Sceloporus undulates	Northern Plateau Lizard	Hamilton Mesa	678120	4131451
6/17/2003	Uta stansburiana	Side-Blotched Lizard	Cannonball Mesa	678157	4134251
6/17/2003	Sceloporus undulates	Northern Plateau Lizard	Cannonball Mesa	682990	4135464
6/17/2003	Crotaphytus collaris	Collared Lizard	Cannonball Mesa	682837	4135519
6/17/2003	Cnemidophorus tigris	Western Whiptail Lizard	Cannonball Mesa	679449	4134685
6/17/2003		Longnose Leopard	Cannonball Mesa	679343	4134677
		Lizard			
6/17/2003	Crotaphytus collaris	Collared Lizard	Cannonball Mesa	683947	4137047
6/17/2003	Crotaphytus collaris	Collared Lizard	Cannonball Mesa	683147	4134911
6/17/2003	Ambystoma tigrinum	Tiger Salamander	Cannonball Mesa	679702	4134920
6/17/2003	Gambelia wislizenii	Longnose Leopard Lizard	Cannonball Mesa	679552	4134717
6/26/2003	Uta stansburiana	Side-Blotched Lizard	Bridge Canyon	673392	4135952
6/26/2003	Sceloporus undulates	Northern Plateau Lizard	Bridge Canyon	673447	4135993
6/26/2003	Uta stansburiana	Side-Blotched Lizard	Bridge Canyon	673567	4136014
6/26/2003	Uta stansburiana	Side-Blotched Lizard	Bridge Canyon	673501	4136216
6/26/2003	Uta stansburiana	Side-Blotched Lizard	Bridge Canyon	673492	4136230
6/26/2003	Cnemidophorus tigris	Western Whiptail Lizard	Bridge Canyon	673458	4136194
6/26/2003	Crotaphytus collaris	Collared Lizard	Bridge Canyon	674587	4139901
6/26/2003	Crotaphytus collaris	Collared Lizard	Bridge Canyon	673276	4135967
7/15/2003	Sceloporus undulates	Northern Plateau Lizard	Cross Canyon	673031	4149559
7/15/2003	Masticophis taeniatus	Striped Whipsnake	Cross Canyon	672838	4149623
7/15/2003	Crotaphytus collaris	Collared Lizard	Cross Canyon	672834	4149703
7/15/2003	Masticophis taeniatus	Striped Whipsnake	Cross Canyon	673015	4149974
7/15/2003	Sceloporus undulates	Fence Lizard	Cross Canyon	673099	4150223
7/15/2003	Bufo Woodhousii	Woodhouse Toad	McElmo Creek	674083	4132513
7/16/2003	Uta stansburiana	Side-Blotched Lizard	Cannonball Mesa	679137	4134509

7/16/2003	Sceloporus undulates	Northern Plateau Lizard	Cannonball Mesa	679737	4134626
7/16/2003	Sceloporus undulates	Northern Plateau Lizard	Cannonball Mesa	679702	4134934
7/16/2003	Ambystoma tigrinum	Tiger Salamander	Cannonball Mesa	679781	4134920
7/16/2003	Crotaphytus collaris	Collared Lizard	Cannonball Mesa	679776	4134897
7/16/2003	Ambystoma tigrinum	Tiger Salamander	Hovenweep	676390	4143821
7/16/2003	Crotalus viridis	Western Rattlesnake	Hackberry Ruins	673992	4141449
7/17/2003	Cnemidophorus tigris	Western Whiptail Lizard	Bridge Canyon	674447	4139601
7/17/2003	Sceloporus undulates	Northern Plateau Lizard	Bridge Canyon	674395	4139467
7/17/2003	Cnemidophorus tigris	Western Whiptail Lizard	Bridge Canyon	674368	4139211
7/17/2003	Cnemidophorus tigris	Western Whiptail Lizard	Bridge Canyon	674340	4139238
7/17/2003	Uta stansburiana	Side-Blotched Lizard	Bridge Canyon	674253	4139171
7/18/2003	Ambystoma tigrinum	Tiger Salamander	Bridge Canyon	675073	4139732
7/18/2003	Uta stansburiana	Side-Blotched Lizard	Hackberry Ruins	674171	4141887
7/18/2003	Uta stansburiana	Side-Blotched Lizard	Hackberry Ruins	674189	4141884
7/18/2003	Uta stansburiana	Side-Blotched Lizard	Hackberry Ruins	674283	4141820
7/18/2003	Uta stansburiana	Side-Blotched Lizard	Hackberry Ruins	674472	4141870
7/18/2003	Uta stansburiana	Side-Blotched Lizard	Hackberry Ruins	674511	4141876
7/18/2003	Uta stansburiana	Side-Blotched Lizard	Hackberry Ruins	674560	4141878
7/18/2003	Uta stansburiana	Side-Blotched Lizard	Hackberry Ruins	674783	4141777
7/18/2003		Northern Plateau Lizard	Hackberry Ruins	674887	4141773
7/18/2003	Ambystoma tigrinum	Tiger Salamander	Hackberry Ruins	674871	4141750
7/22/2003	Sceloporus undulates	Northern Plateau Lizard	Sand Canyon Trail	696982	4141183
7/22/2003	Urosaurus ornatus	Tree Lizard	Sand Canyon Trail	696972	4141175
7/22/2003	Sceloporus undulates	Northern Plateau Lizard	Sand Canyon Trail	696960	4141160
7/22/2003	•	Northern Plateau Lizard	Sand Canyon Trail	696278	4140701
7/22/2003	Sceloporus undulates	Northern Plateau Lizard	Sand Canyon Trail	696269	4140701
7/22/2003	Sceloporus undulates	Northern Plateau Lizard	Sand Canyon Trail	696133	4140622
7/22/2003	Cnemidophorus velox	Plateau Striped Whiptail	Sand Canyon Trail	696137	4140563
7/22/2003	Cnemidophorus velox	Plateau Striped Whiptail	Sand Canyon Trail	696114	4140427
7/22/2003	Cnemidophorus velox	Plateau Striped Whiptail	Sand Canyon Trail	695962	4140044
7/22/2003	Cnemidophorus velox	Plateau Striped Whiptail	Sand Canyon Trail	695903	4139065
7/22/2003	Cnemidophorus velox	Plateau Striped Whiptail	Sand Canyon Trail	695909	4138917
7/22/2003	· · ·	Tree Lizard	Sand Canyon Trail	695946	4138866
	Sceloporus undulates	Northern Plateau Lizard	Sand Canyon Trail	695925	4138810
	-	Plateau Striped Whiptail	Sand Canyon Trail	695650	4138730
7/22/2003		Plateau Striped Whiptail	Sand Canyon Trail	695631	4138353
7/22/2003	Cnemidophorus velox	Plateau Striped Whiptail	Sand Canyon Trail	695486	4138095
7/22/2003	Sceloporus undulates	Northern Plateau Lizard	Sand Canyon Trail	695163	4137167
7/22/2003	Cnemidophorus tigris	Western Whiptail Lizard	Sand Canyon Trail	694303	4136053
7/29/2003	Cnemidophorus tigris	Western Whiptail Lizard	Canonball Mesa	679685	4134649
7/29/2003	Cnemidophorus tigris	Western Whiptail Lizard	Canonball Mesa	679597	4134696
7/29/2003	Gambelia wislizenii	Longnose Leopard	Canonball Mesa	679794	4134552
1123/2003		Lizard		013134	+104002
7/29/2003	Uta stansburiana	Side-Blotched Lizard	Canonball Mesa	673754	4135004
7/29/2003	Sceloporus undulates	Northern Plateau Lizard	Canonball Mesa	673817	4134919
9/16/2003	Cnemidophorus velox	Plateau Striped Whiptail	Holly Group Ruins	673872	4140500
9/16/2003	Cnemidophorus velox	Plateau Striped Whiptail	Holly Group Ruins	673840	4140553
9/16/2003	Cnemidophorus velox	Plateau Striped Whiptail	Holly Group Ruins	673836	4140462
9/16/2003	Uta stansburiana	Side-Blotched Lizard	Holly Group Ruins	673985	4140575

9/16/2003	Uta stansburiana	Side-Blotched Lizard	Bridge Canyon Rim	674003	4139184
9/16/2003	Uta stansburiana	Side-Blotched Lizard	Bridge Canyon Rim	673985	4139041
9/16/2003	Uta stansburiana	Side-Blotched Lizard	Bridge Canyon Rim	674008	4139030
9/16/2003	Crotaphytus collaris	Collared Lizard	Bridge Canyon Rim	673957	4138980
9/16/2003	Sceloporus undulates	Northern Plateau Lizard	Bridge Canyon Rim	673991	4138994
9/16/2003	Sceloporus undulates	Northern Plateau Lizard	Bridge Canyon Rim	674095	4139497
9/17/2003	Uta stansburiana	Side-Blotched Lizard	Cannonball Mesa	679628	4134733
9/17/2003	Uta stansburiana	Side-Blotched Lizard	Cannonball Mesa	679356	4134730
9/17/2003	Uta stansburiana	Side-Blotched Lizard	Cannonball Mesa	679244	4134797
9/17/2003	Sceloporus undulates	Northern Plateau Lizard	Cannonball Mesa	679153	4134844
9/17/2003	Sceloporus undulates	Northern Plateau Lizard	Cannonball Mesa	679471	4134636
9/17/2003	Sceloporus undulates	Northern Plateau Lizard	Cannonball Mesa	679585	4134611
9/17/2003	Sceloporus undulates	Northern Plateau Lizard	Sand Canyon	696933	4141163
9/17/2003	Urosaurus ornatus	Tree Lizard	Sand Canyon	696933	4141163