# Fort Union National Monument
# Reptile, Amphibian, and Mammal Inventory
## Final Report

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## Introduction

The mission of the National Park Service (NPS) is to conserve national parks unimpaired. In keeping with this mission, NPS policy and recent legislation (National Parks Omnibus Management Act of 1998) require that park managers know the condition of natural resources under their stewardship and that they monitor long-term trends in those resources. The purpose of this project was to conduct inventories for reptiles, amphibians, and mammals at Fort Union National Monument (FOUN). The study provides baseline data for future inventory and monitoring efforts. The intention was to locate and identify as many species as possible within park boundaries. Methods were standard natural history surveys, based on subjective searches in the major habitats. All occurrence data are being provided to NPS for inclusion in the NPSpecies database.

FOUN contains 720 acres of prairie in two separate parcels in northeastern New Mexico, midway between Santa Fe and Raton. The monument is on the southwestern fringe of the Great Plains short-grass prairie, at an elevation of 6,800 ft. For forty years (1851-1891), Fort Union served the region as a military supply depot, arsenal, and frontier military post. During its active period, three successive forts were constructed in the area. Most of the remains of each fort are contained within the monument boundaries. Fort Union is surrounded by a 96,000 ac cattle ranch that pre-dates the abandonment of the post in 1891. The monument has been fenced from grazing since its establishment in 1956. It contains the largest group of adobe ruins in the United States and sits astride the Mountain Branch of the Santa Fe Trail. Many trail swales are preserved within the monument. Since its establishment, the park has focused on the preservation and interpretation of cultural and historical resources. Before this study, almost no scientific studies or inventories of the plant and animal resources of the park had been conducted.

The park is covered in grassland habitat. Additional habitat for herpetofauna and mammals is provided by the adobe ruins for which the park was established. A small wet area on the west side of the park contains riparian vegetation. As part of this contract, Natural Heritage New Mexico has completed a vascular plant inventory and will be creating a vegetation map of the park. No threatened, endangered, or exotic animal species have been identified in the park; however, invasive plants may be detected by the Natural Heritage NM vegetation survey and mapping study.

## Methods

### *Reptiles and Amphibians*

Prior to the field study, we created a target list of species expected to occur at the park (Table 1). Species were added to the list based on historical records (Degenhardt et al., 1996), Museum of Southwestern Biology (MSB) records, and expert opinion (Ted Brown, Charles Painter).

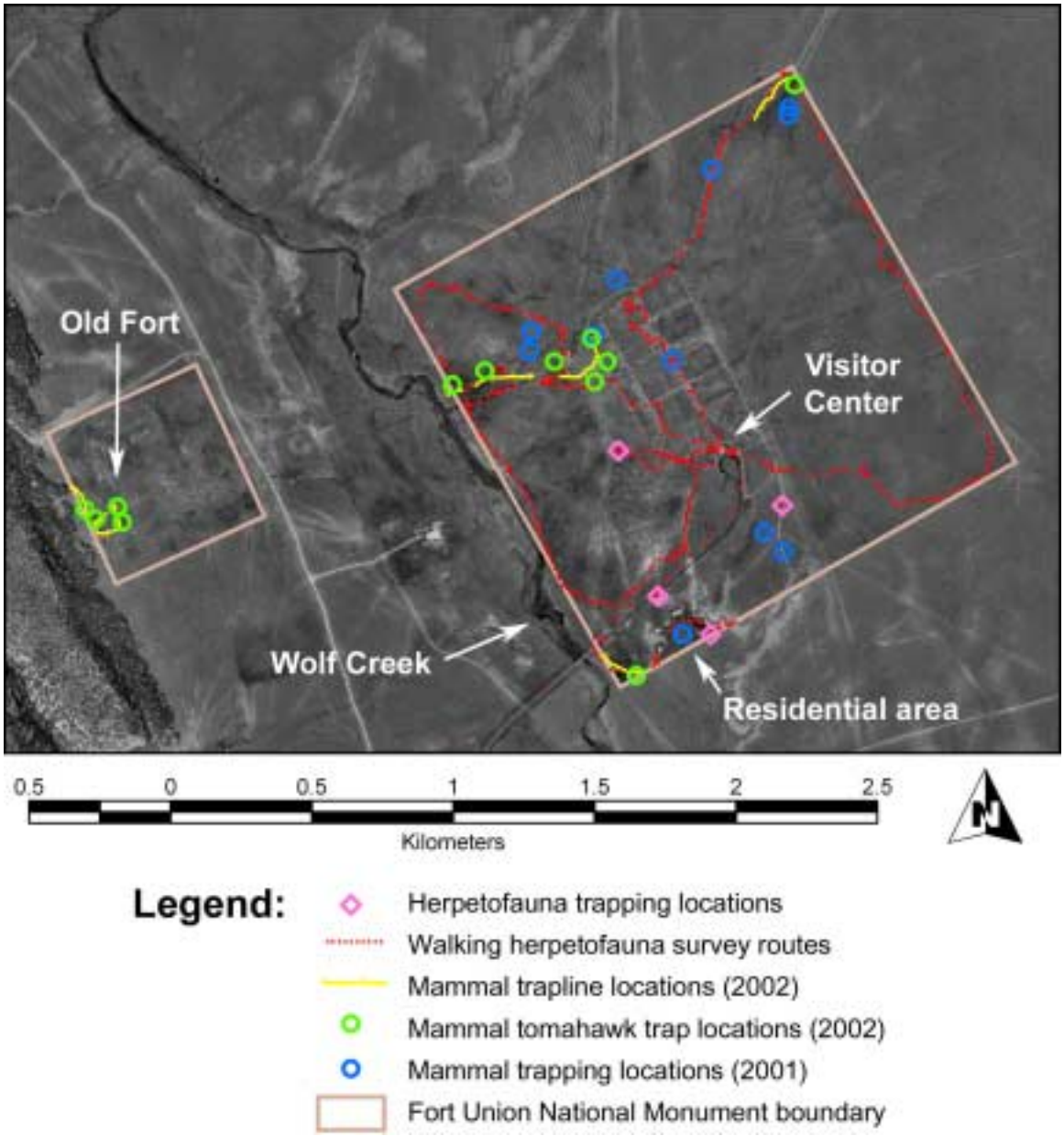


**Figure 1. Herpetofauna and mammal trapping locations, 2001 and 2002.**

Due to the archaeological sensitivity of the park, we were unable to use pitfall traps with drift-fence arrays. Thus, sampling was limited to active-search hikes and funnel traps set near natural and man-made features. In addition, FOUN is situated near a semi-permanent stream, Wolf Creek, where we listened for amphibian calls.

We conducted active-search hikes in all habitat types. Lizards were caught live using a noose-and-pole capture method to insure positive identification and released unharmed. Non-venomous snake species were caught by hand, inspected for sex, and then released. Amphibians were handled in a similar manner. Venomous species were gently hooked and visually inspected, then released. To calculate the duration of active-search hikes, we

recorded beginning and ending times and doubled time periods if two individuals were present. Active-search hikes are recorded as person-hours.

Using the GPS, we recorded the paths walked during active-search hikes (track records) and recorded the locations of reptiles and amphibians observed. Incidental observations were recorded separately. We also searched at night from a vehicle for amphibians (during periods of high humidity or rain) or reptiles when conditions permitted. Observations of species that could not be identified were not recorded. Additionally, abundant species were recorded at least twice and more often if an individual observation was noteworthy, but every occurrence was not necessarily noted.

We conducted limited surveys in 2001 (Figure 1). Active-search hikes occurred on 7-9 August 2001 and 19-20 October 2001. In 2002 we visited the park on 2-4 July and 29 July – 1 August. We spent seven hours in active-search hikes on 7/2/2002 (2100h-2330h), 7/3/2002 (1430h-1730h), and 7/4/2002 (1045h-1245h). Active searches occurred mainly in shortgrass prairie habitat and around the ruins, over a distance of 6.7 mi (10.8 km). Four funnel traps were set out from 29 July to 1 August (16 trap-days, Figure 2). We conducted a night search on 2 July 2002.

### *Mammals*

We created a target list of mammal species expected to occur at FOUN (Table 2). We included species based on historical accounts (Findley et al., 1975), MSB records, and expert opinion. Species such as the black-tailed prairie dog and the mink were excluded from the list because, although historical records exist for the area, recent information suggested they would be very unlikely to be detected, even with increased survey effort. Shrews (Soricidae) were not included, because they are typically captured using pitfall traps, which were not allowed at Fort Union. Bats (Chiroptera, three potential species) were not included in the list, because mist netting for bats was beyond the scope of this project. Two potential gopher species (Geomyidae) were also not included, because the trapping method involves digging holes to bury traps. The final target list contains 28 species.

**Figure 2. Western harvest mouse, *Reithrodontomys megalotis*.**

Mammal surveys took place on three occasions: 6-9 August 2001, 18-20 October 2001, and 19-23 September 2002. Geoff Carpenter surveyed the mammals at the park in 2001 and Gábor R. Rácz in 2002. Mammal surveys involved live trapping of various-sized mammals, observing animals directly, or

finding unmistakable signs of their presence. During the 2001 surveys, six lines of Sherman traps were set exclusively on the main park area (Figure 1). During the 2002 survey, we set 160 Sherman traps in four trap-lines at the main park area and 80 traps in two trap-lines around the ruins of the old fort (Figure 1). Sherman traps were baited with a mixture of oatmeal and peanut butter. In addition, we set Tomahawk-type traps baited with canned tuna for small and medium-sized carnivores, eight at the main area, and four at the old fort. We checked traps in the morning and before sunset. If a trap caught an animal, we removed it from the trap, identified it to species, and sexed, weighed, and measured it (Figure 2). After this one-minute procedure, the animal was immediately released at the same spot where it was caught. We recorded the animal data and the GPS coordinates of the capture site and re-baited and reset traps.

While walking to check traps, we surveyed visually for additional mammals. We checked the traps just before or after peak times for mammal activity. Most mammals are crepuscular, and their most intense activity takes place just before sunrise and after sunset.

## Results

### *Reptiles and Amphibians*

Our surveys documented eight of 33 amphibian and reptile target species (24%, Table 3). Counting the coachwhip observed by park staff, the total comes to nine, or 27% of expected species. Only one species, the racer (*Coluber constrictor,* Figure 3*)*, was caught with the funnel traps in 16 trap days.

During active-search hikes in early July and early August 2002, we encountered no amphibians or reptiles during daylight hours. Aside from the racer, 2002 species reported are amphibians encountered while night driving during what little rain occurred (three species) and opportunistic encounters by bird and mammal researchers (two species, Figure 4).

**Figure 3. Racer, *Coluber constrictor*.**

**Figure 4. Short-horned lizard, *Phrynosoma douglasii*.**

Other species are undoubtedly present, based on the descriptions of park staff and given Museum of Southwestern Biology records. These include *Masticophis flagellum* and *Holbrookia maculata*. One very common species, *Sceloporus undulatus*, which was found in abundance even during adverse environmental conditions (i.e. cool weather, high wind) at Pecos National Historical Park and Capulin Volcano National Monument (Johnson et al. 2003), was absent. Therefore, we excluded it from the target list.

***Mammals***

We detected 16 mammal species, 59.3% of the target list (Table 4).

Insectivores: No insectivores were captured during our survey. Shrews are very difficult to capture with Sherman traps and are usually caught with pitfall traps, which were not allowed at Fort Union. Shrews avoid the metal plates of the traps, and their weights (4-6 g) can be too low to trigger a trap's closing mechanism. Thus, they are rarely caught, even though they might be quite common.

Chiroptera: Bats were not targeted by our survey. Bats are typically captured in mist nets. Some species can be identified by analyzing their ultrasonic sound patterns, but this method requires special hardware and computer software.

After sunset we observed bats as they were flying among the ruins of Fort Union. Based on their hunting style (aerial hawkers: hunting high in the air, catching insects in flight), we tentatively identified them as Mexican free-tailed bats (*Tadarida brasiliensis*), a common species in New Mexico.

Carnivora: Most carnivores were detected based on sign, either tracks or scat. Badger (*Taxidea taxus*) digging was found at one location. Marks of the long, strong claws were clearly visible in the soft dirt. We heard coyotes (*Canis latrans*) in the evening, and their scat was found on the park in both 2001 and in 2002.

Leporidae: Cottontails (*Sylvilagus* spp.) are quite common at the park. One specimen was seen in the bushes around the visitor center. The individuals we observed were likely mountain cottontails (*Sylvilagus nuttallii*). Desert cottontail (*Sylvilagus audubonii*) was identified in 2001.

Rodentia
Sciuridae: Thirteen-lined ground squirrels (*Spermophilus tridecemlineatus*) were captured in 2001 at various locations, mainly around the ruins. We did not observe these animals during the 2002 trapping period, but park rangers told us that they had been active earlier and had disappeared a couple of weeks before the survey was conducted. Rock squirrel (*Spermophilus variegatus*) was on the target list but was not observed. This species requires more topographic variation and prefers rocky areas. A small area close to the old fort ruins looks perfect for this species, and the presence of pinyon-juniper habitat near the park suggests that the species may occur in or near the park.

Heteromyidae: These species are typical North American dry habitat specialists. Ord's kangaroo rats (*Dipodomys ordii*, Figure 5) were frequently caught in the open grassland areas. This species is probably the dominant granivorous species in the grassland. In addition, a single specimen of silky pocket mouse (*Perognathus flavus*) was caught in the southeastern part of the park. This species is much smaller than kangaroo rats and stays inactive for most of the year, through the cold winter months and dry summer months.

**Figure 5. Ord's Kangaroo Rat, *Dipodomys ordii.***

Geomyidae: Gophers can only be captured using special traps that require digging. We did observe ground disturbance characteristic of gophers. The most likely suspect is *Thomomys bottae*.

Muridae: We captured several species of deer mouse (*Peromyscus* spp.): the North American deermouse (*P. maniculatus*), white-footed deermouse (*P. leucopus*), and northern rock deermouse (*P. nasutus*). The main park was occupied by two grassland species (*P. maniculatus* and *P. leucopus*). At the old fort, the northern rock deermouse was captured among the juniper brushes. In addition to deermice, the western grasshopper mouse (*Onychomys leucogaster*) was captured in high numbers in the open grassland. Unlike most other rodents, this species eats insects, thus avoiding competition with seed-eating rodents.

Additional species were captured in areas of more varied topography and vegetation. Western harvest mouse (*Reithrodontomys megalotis*, Figure 2) was caught in the northwestern corner of the main area, among the small willow trees in the arroyo. Two species of woodrat (*Neotoma albigula, N. micropus*) were caught at several locations where trees or bushes were present: in the northeastern corner around the water tank, in the northwestern corner by the creek, in the southwestern corner among the trees encircling the sewage pond, and among the junipers at the old fort.

Ungulates

A few species of ungulates were observed. One of us spotted two elk bulls (*Cervus elaphus*) near the southwestern fenceline of the park one morning. Large herds of pronghorns (*Antilocapra americana*) were observed outside the park in 2002 and a few specimens were observed inside the northern part of the park in 2001. While mule deer (*Odocoileus hemionus*) were not observed during the survey, there were several signs that they pass through the park. Deer droppings were found more frequently on the old fort area, suggesting that deer might prefer this less-disturbed area.

## Conclusions

### *Reptiles and Amphibians*

Our final species list contains only 27% of the species that potentially occur at Fort Union. One probable reason is weather. According to the National Weather Service web site, Las Vegas, NM, the closest station to FOUN, received only 57% of normal precipitation from January to September 2002. This reduction in moisture probably affected activity of both reptiles (by reducing populations of their food species) and amphibians (by reducing the number of wet days in which they would be active). In addition, we did not see any whiptail lizards (*Cnemidophorus* spp.), which should be abundant in the park. Relatively cool temperatures (below $80^0$F) during our active-search hikes probably account for the absence of this typically-common species.

The 720 ac of Fort Union National Monument is dominated by short-grass prairie. For reptiles and amphibians, this excludes many desert, shrub, pinyon-juniper and mesic forest species. The small size of the monument and its proximity to grazed rangeland may also reduce the number of species that permanently inhabit the monument. Several species are probably transients that move freely in and out of the park.

Fort Union is primarily a cultural park. Sampling was therefore limited to methods that do not involve ground disturbance. This probably reduced the number of reptile and amphibian species detected. For example, based on habitat requirements and MSB records, we expect the lesser earless lizard (*Holbrookia maculata*) to occur at the park, but it would typically be captured in pitfall traps. We suspect that several other target list species could be detected under appropriate weather conditions, using pitfall traps and drift fences, or with more funding for a larger survey effort.

The national monument is not home to any threatened or endangered species of amphibians and reptiles, and there are none on the target list. The proximity to Wolf Creek provides potential habitat for *Rana blairi*, the plains leopard frog, and *Pseudacris triseriata*, the western chorus frog; however, the small riparian area is dominated by *Rana catesbeiana*, the bullfrog. This large, predatory frog may cause local extinctions of other frog species (Degenhardt et al., 1996). It is not known whether the bullfrog is native to New Mexico. Because Wolf Creek proper does not lie within the boundaries of Fort Union National Monument, there is little opportunity for management there. However, if ranch managers were interested in managing for wildlife, bullfrog management could encourage the persistence of other amphibian species in Wolf Creek.

### *Mammals*

Although only 55% of species from the target list were detected, we believe our survey was reasonably complete. Some of the species on the target list were not highly possible. Also, species composition in an area can vary greatly among seasons and years. For example, the thirteen-lined ground squirrel was very common during the August 2001 survey and before the 2002 surveys but was completely absent during 2002 surveys.

Other species show similar temporal variation in activity and could have gone undetected, even if they were present.

While 16 different mammalian species may not sound like high diversity, under the circumstances, this number is high. The small size of the park and predominance of grassland habitats act to limit species richness. Due to some topographic variation, however, the area provides habitat for some non-grassland mammal species.
While most of the species found at FOUN are very common in New Mexico, they are representatives of a variety of habitats. Typical grassland species were the most abundant at the park. As expected, four common species (*Dipodomys ordii, Peromyscus maniculatus, P. leucopus, Onychomys leucogaster*) were caught in the highest numbers. Some less-abundant species are also typical grassland occupants (*Spermophilus tridecemlineatus, Perognathus flavus*). Variation in topography and vegetation encourages other species. For example, several species use shrubs for cover (*Neotoma albigula, N. micropus, Reithrodontomys megalotis*), and the rock mouse (*Peromyscus nasutus*) depends on the pinyon-juniper habitats close to the old fort.

No threatened, endangered, or exotic mammal species were detected during this survey, and none is expected in the park. The park is already encouraging grassland small mammals by protecting the grassland habitats from grazing. However, fire suppression could allow shrub encroachment, which could eventually alter the small mammal community. Although fire suppression is essential to conservation of the adobe ruins, in the absence of grazing, controlled burning of grassy areas could help maintain the grassland habitats.

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**Table 1. Fort Union National Monument reptile and amphibian target species.**

| Common Name | Scientific Name | Observed ? |
|---|---|---|
| Tiger Salamander | *Ambystoma tigrinum* | Yes |
| New Mexico Spadefoot | *Spea multiplicata* | |
| Great Plains Toad | *Bufo cognatus* | Yes |
| Red-spotted Toad | *Bufo punctatus* | |
| Woodhouse toad | *Bufo woodhousii* | Yes |
| Western Chorus Frog | *Pseudacris triseriata* | |
| Bullfrog | *Rana catesbeiana* | Yes |
| Ornate Box Turtle | *Terrapene ornata* | |
| Collared Lizard | *Crotaphytus collaris* | |
| Lesser Earless Lizard | *Holbrookia maculata* | |
| Short-horned Lizard | *Phrynosoma douglasii* | Yes |
| Chihuahuan Spotted Whiptail Lizard | *Cnemidophorus exsanguis* | |
| Plateau Striped Whiptail Lizard | *Cnemidophorus velox* | |
| Great Plains Skink | *Eumeces obsoletus* | |
| Many-lined Skink | *Eumeces multivirgatus* | |
| Texas Blind Snake | *Leptotyphlops dulcis* | |
| Glossy Snake | *Arizona elegans* | |
| Racer | *Coluber constrictor* | Yes |
| Ringneck Snake | *Diadophis punctatus* | |
| Corn Snake | *Elaphe guttata* | |
| Western Hognose Snake | *Heterodon nasicus* | |
| Desert King Snake | *Lampropeltis getula* | |
| Milk Snake | *Lampropeltis triangulum* | |
| Coachwhip | *Masticophis flagellum* | Yes |
| Striped Whipsnake | *Masticophis taeniatus* | |
| Bullsnake, Gopher Snake | *Pituophis catenifer* | Yes |
| Ground Snake | *Sonora semiannulata* | |
| Plains Black-headed Snake | *Tantilla nigriceps* | |
| Blackneck Garter Snake | *Thamnophis cyrtopsis* | |
| Western Terrestrial Garter Snake | *Thamnophis elegans* | |
| Plains Garter Snake | *Thamnophis radix* | |
| Lined Snake | *Tropidoclonion lineatum* | |
| Western Rattlesnake | *Crotalus viridis* | Yes |

**Table 2. Fort Union National Monument mammal target species.**

| Common Name | Scientific Name | Observed? |
|---|---|---|
| Nuttall's Cottontail | *Sylvilagus nuttallii pinetis* | X |
| Desert Cottontail | *Sylvilagus audubonii* | X |
| Least Chipmunk | *Tamias minimus* | |
| Rock Squirrel | *Spermophilus variegatus* | |
| Thirteen-lined Ground Squirrel | *Spermophilus tridecemlineatus* | X |
| Ord's Kangaroo Rat | *Dipodomys ordii* | X |
| Silky Pocket Mouse | *Perognathus flavus* | X |
| Hispid Pocket Mouse | *Chaetodipus hispidus* | |
| Northern Grasshopper Mouse | *Onychomys leucogaster* | X |
| Western Harvest Mouse | *Reithrodontomys megalotis* | X |
| Deer Mouse | *Peromyscus maniculatus* | X |
| White-footed Mouse | *Peromyscus leucopus* | X |
| Brush Mouse | *Peromyscus boylii* | |
| Rock Mouse | *Peromyscus nasutus* | X |
| White-throated Woodrat | *Neotoma albigula* | X |
| Southern Plains Woodrat | *Neotoma micropus* | X |
| Prairie Vole | *Microtus ochrogaster* | |
| Meadow Vole | *Microtus pennsylvanicus* | |
| Swift Fox | *Vulpes velox velox* | |
| Common Gray Fox | *Urocyon cinereoargenteus* | |
| Coyote | *Canis latrans* | X |
| Raccoon | *Procyon lotor* | |
| Badger | *Taxidea taxus* | Tracks only |
| Striped Skunk | *Mephitis mephitis* | |
| Pronghorn | *Antilocapra americana* | X |
| Mule Deer | *Odocoileus hemionus* | |
| Elk | *Cervus elaphus* | X |

**Table 3. Fort Union National Monument reptile and amphibian species detected.**

| Common Name | Scientific Name | Habitat | Observer | On target list? |
|---|---|---|---|---|
| Tiger salamander | *Ambystoma tigrinum* | grassland | G. Carpenter 2001 | X |
| Great Plains toad | *Bufo cognatus* | grassland | J. Butler | X |
| Woodhouse's toad | *Bufo woodhousii* | grassland | J. Butler | X |
| Bullfrog | *Rana catesbeiana* | creek | J. Butler | X |
| Lesser Earless Lizard | *Holbrookia maculata* | ? | ? | X |
| Short-horned lizard | *Phrynosoma douglasii* | grassland | G. Racz | X |
| Racer | *Coluber constrictor* | grassland | J. Butler | X |
| Coachwhip | *Masticophis flagellum* | grassland | Park staff | X |
| Gopher snake | *Pituophis catenifer* | grassland | G. Sadoti | X |
| Prairie rattlesnake | *Crotalus viridis* | grassland | G. Carpenter 2001 | X |

**Table 4. Fort Union National Monument mammal species detected.**

| Common Name | Scientific Name | Habitat | Observer, if other than NMNHP staff | On target list? |
|---|---|---|---|---|
| Mountain Cottontail | *Sylvilagus nuttallii* | Grassland | | X |
| Desert Cottontail | *Sylvilagus audubonii* | Grassland | | X |
| Thirteen-lined Ground Squirrel | *Spermophilus tridecemlineatus* | Grassland | | X |
| Ord's Kangaroo Rat | *Dipodomys ordii* | Grassland | | X |
| Silky Pocket Mouse | *Perognathus flavus* | Grassland | | X |
| Northern Grasshopper Mouse | *Onychomys leucogaster* | Grassland | | X |
| Western Harvest Mouse | *Reithrodontomys megalotis* | Grassland/arroyo | | X |
| Deer Mouse | *Peromyscus maniculatus* | Grassland | | X |
| White-footed Mouse | *Peromyscus leucopus* | Grassland | | X |
| Rock Mouse | *Peromyscus nasutus* | Grassland/PJ woodland transition | | X |
| White-throated Woodrat | *Neotoma albigula* | Grassland/PJ woodland transition, Grassland with bushes or trees | | X |
| Southern Plains Woodrat | *Neotoma micropus* | Grassland with scattered bushes | | X |
| Coyote | *Canis latrans* | Grassland | | X |
| Badger | *Taxidea taxus* | Grassland (near arroyo) | | X |
| Pronghorn | *Antilocapra americana* | Grassland | | X |
| Elk | *Cervus elaphus* | Grassland | | X |