

**INVENTORY OF AMPHIBIANS AND REPTILES AT
HUBBELL TRADING POST NATIONAL HISTORIC SITE**

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ABSTRACT

The Navajo Natural Heritage Program of the Navajo Nation Department of Fish and Wildlife completed two years of amphibian and reptile inventories at Hubbell Trading Post National Historic Site as part of the National Park Service Inventory and Monitoring Program. The goals of this study were to document at least 90% of the extant herpetofauna through visual observations, photographs, and/or specimen collection; and to provide baseline information, and make recommendations, as warranted, for development of future management of zoological resources within the Monument. Prior to field studies, we estimated that 5 amphibian and 13 reptile species had high potential to occur at the Site, and that there was a remote possibility for 1 other reptile species to occur. Field inventories extended from 14 June to 19 August 2002, and 11 June to 27 August 2003. We performed triple-replicate, time-constrained surveys at 7 plots, each 1 ha (2.5 ac) in size, in at least 2 distinct habitat types, and performed 75.5 hours of nocturnal and diurnal general surveys. We documented a total of eight reptile species (five lizards, three snakes) and three amphibian species. Our survey efforts documented 61.1% of those species with high potential to occur, and 57.9% including the 1 species with remote potential to exist. The Sagebrush Lizard (*Sceloporus graciosus*) and Plateau Striped Whiptail (*Cnemidophorus velox*) were the most common reptiles, and Woodhouse's Toad (*Bufo woodhousii*) was the most common amphibian. No federal or Navajo Tribal-listed endangered species were documented during this study.

Key Words: amphibian, Hubbell Trading Post National Historic Site, inventory, Inventory and Monitoring Program, National Park Service, reptile, time-constrained surveys.

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INTRODUCTION

The National Park Omnibus Management Act, passed by the U.S. Congress in 1998, has provided federal support for a “program of inventory and monitoring of National Park Service (NPS) resources to establish baseline information and to provide information on the long-term trends in the condition of National Park Service resources.” This Act also provides the basis for Congressional funding for the NPS-Servicewide Inventory and Monitoring Program (I&M). This nationwide I&M program is currently compiling and organizing existing resource data for 265 NPS units, and completing inventory and monitoring data to fill data gaps in existing information. The I&M program will provide NPS land managers with comprehensive, scientifically-based information about the nature and status of natural resources within their jurisdictions for the purposes of management decision-making, scientific research, and public education.

The Navajo Natural Heritage Program (NNHP) of the Navajo Nation Department of Fish and Wildlife agreed with the NPS to perform vertebrate and plant inventories of the three national parks that are contained within Navajo Nation lands in Arizona. These parks include Canyon de Chelly National Monument (CACH), Hubbell Trading Post National Historic Site (HUTR) in Apache County, and Navajo National Monument (NAVA) in Navajo and Coconino counties. The Navajo Nation is situated within the south-central part of the Colorado Plateau, and has an elevation range between 853 m (2800 ft) at the mouth of the Little Colorado River, to 3175 m (10416 ft) at the summit of Navajo Mountain. Within this elevation range, there are three recognized ecological zones of (1) cold temperate mountain forest and woodland, (2) intermediate steppe grassland, and (3) arid desert lands. These zones are composed of mosaics of the following biotic communities (Brown 1982): petran sub-alpine and petran montane conifer

forest types; Great Basin desert-scrub and conifer woodlands; and plains and Great Basin grasslands and sub-alpine grasslands. Annual precipitation ranges from an average of 15 cm (6 in) per year in the desert lands to over 61 cm (24 in) per year in the mountainous areas.

Hubbell Trading Post National Historic Site (HUTR) is located within the town of Ganado on the Navajo Nation in northern Apache County, AZ. This National Historic Landmark is a culturally-significant feature in that it is a continuously-operated Native American trading post. It was strategically placed along a major stream, Pueblo Colorado Wash, which drains most of the Defiance Plateau and surrounding areas into the Little Colorado River. This unit encompasses 64.8 ha (160 ac), including the structural components of the Trading Post, NPS buildings and surrounding near-residential habitat, plus an 880-m (2880 feet) section of Pueblo Colorado Wash. The portion of Pueblo Colorado Wash within the HUTR boundaries is undergoing a restoration project which should result in total replacement from non-native to native riparian vegetation. The elevation within the unit boundaries ranges from approximately 1920 to 1940 m (6300 to 6365 ft). The wash and its alluvial banks compose approximately 6.4 ha (16 acres) of HUTR. Because of the cultural preservation focus of the park, little attention has been directed towards natural resources until recent years.

There have been no historic herpetofaunal inventories of HUTR to document occurrences of amphibians and reptiles. A recent study of vertebrates along Pueblo Colorado Wash at HUTR (Shaw and Woodruff 2002) had documented eight herpetofauna species (four lizard, two snake and two toad species) within the riparian corridor. During the planning stages of the I&M inventories, Stuart (2000) predicted that there were 14 herpetofauna species likely to occur at HUTR. We developed a list (Table 1) of species with ‘high’ and ‘remote’ potentials to occur using the known ranges of species and knowledge of habitat types within HUTR. We estimated

that there were 18 species (5 amphibians and 13 reptiles) with a high potential to occur, and 1 other reptile species with remote potential to occur there.

The objectives of this portion of the NPS I & M inventories were to: 1) document at least 90 percent of the amphibian and reptile species occurring within Hubbell Trading Post National Historic Site using existing, verifiable documentation and taxa-specific, field surveys with methodologies consistent with other NPS units in the Southern Colorado Plateau Network; 2) complete and transfer all documentation of species presence, and collected data in hard-copy and digital formats usable by the NPS; complete NPS's database with these data; and 3) identify species of concern, provide baseline information, and make recommendations, as warranted, for development of future management and monitoring schemes of zoological resources within the Site.

METHODS

We employed standardized inventory methods that were used at other NPS units in the Southern Colorado Plateau, following a stratified-sampling scheme (by habitat) as outlined in Stuart (2000). We used the following survey techniques to determine the diversity of amphibians and reptiles at HUTR: diurnal time-constrained surveys (TCSs), and nocturnal and diurnal general surveys. We had planned to use two other methods (pit-fall trapping [Corn 1994] and nocturnal time-constrained surveys), however, delays in fund acquisition and lack of personnel prevented us from pit-fall trapping. We had attempted several nocturnal TCSs early in the 2002 field season, but determined them to be cost- and study-inefficient and shifted more effort to nocturnal general surveys.

Diurnal time-constrained searches (Crump and Scott 1994) are a type of visual encounter survey that produce data on the number of species/individuals encountered per person-hour,

while also standardizing the size of area surveyed. The diurnal TCSs were performed by one person searching systematically for one hour within a square 1-ha (2.5-ac) plot roughly centered on a pre-selected point. All microhabitats and sites likely to harbor amphibians and reptiles were thoroughly searched, including under and within rocks, logs, tree cavities, dense vegetation, and on open ground. Each plot was sampled three times in one year during the months of June, July, and August, to maximize effort in each phase of the breeding cycle. To provide the best chance of detecting reptiles and amphibians if they were present, we made every attempt to avoid performing TCSs during the hottest part of the day (13.00 to 16.00 hrs).

To ensure that the entire plot was surveyed, the 4 corners of each sample plot were determined, using a hand-held global positioning system (GPS) unit (reportedly accurate to < 15 m), and marked with flagging. One corner was located at a randomly-selected compass direction from the center point, while the following 3 corners were determined by projecting lines, 100 m (328 ft) in length, from the first corner. The lines were at the proper azimuths to create a square plot around the center point. Plot centers and corners were marked with red flags and white flagging to ensure all survey effort was contained in the plot. The locations (in Universal Trans Mercator -UTM), of plot centers and corners are provided in Appendix A to allow for possible continuation into a monitoring program using the same plots.

The number of TCS plots needed to detect 90% of the estimated number of species was estimated by the I&M Planning Team (Stuart 2000); a total of 8 TCS plots were determined necessary for the 14 species expected there. A total of seven TCS plots were established (Appendix A, Table 2) at HUTR. We determined the location of plots, and attempted to provide sufficient coverage to both of the major habitat types (riparian and disturbed agricultural lands)

by placing a number of plots in each habitat approximately equal to their proportion of land coverage.

During each TCS, all amphibians and reptiles found within the 1-ha (2.5-ac) plot and 1-hr time period were identified to species (and sex and age group, when possible) and enumerated. Digital photographs were taken when possible and necessary to document their occurrence. Data on the time of survey and ambient weather conditions were also collected.

Nocturnal general surveys were effective at detecting amphibians at various life stages, and were used primarily for collecting presence/absence data and increasing the species list. These surveys were conducted in the early evening until midnight, when amphibians were most active, and especially targeted Pueblo Colorado Wash. Because the riparian area at HUTR was rather small, we conducted nocturnal general surveys throughout the entire site. These surveys were conducted as one person used all means available to detect amphibians and reptiles, including walking the length of the riparian area, and the open fields, searching for amphibians and reptiles at all life stage, and listening for calling adults. The time spent during each survey was variable and was determined mostly by the number of herpetofauna encountered.

Diurnal general surveys were performed within habitats likely to harbor reptiles and amphibians not typically encountered in TCS surveys. We performed these surveys throughout HUTR, including around the housing structures, with the intention of detecting uncommon species that occupy unique habitats. These surveys were typically conducted during the times of day that were unsuitable to perform TCSs, and when TCSs were completed.

A list of amphibian and reptile species expected to occur within HUTR (Table 1) was derived using knowledge of the local herpetofauna, recognized range maps of each species (Stebbins 1985 and Stebbins 2003), and knowledge of habitats found in HUTR. We predicted

that there were 5 species of amphibians, and 13 species of reptiles with ‘high’ potential to occur at HUTR, and 1 other reptile with a ‘remote’ potential to occur there. Table 1 also provides comments on the distribution and abundance of each species on the Navajo Nation.

Digital photographs were taken to document the habitat type at each TCS plot and to document the occurrence of each species identified during all survey types. A database (Appendix B) provides details on each photograph transferred to the NPS. Given the ability of digital photographs to sufficiently document species, and the request by HUTR-NPS staff to not collect live specimens, we only collected amphibians and reptiles found dead. All specimens collected during this inventory were transferred to NPS for inclusion in a reputable museum.

RESULTS

We spent a total of 96.5 person-hours performing surveys for herpetofauna at HUTR; this includes 75.5 hours of general surveys and 21 hours of TCSs. We documented the presence of 11 herpetofauna species (Table 3) within the boundaries of HUTR during 2002 and 2003, which included 3 amphibian (2 spadefoot toads and 1 true toad) and 8 reptile (5 lizards and 3 snakes) species. This inventory detected: 78.6% of the number of species (14) estimated by Stuart (2000) to occur; 61.1% of the number of species (18, from Table 1) we determined to have high potential to occur; and 57.9% of the number of species (19) likely to, and remotely possible to, occur within HUTR. Time-constrained surveys alone detected 7 amphibian and reptile species, which was 50% of the total estimated by Stuart (2000), but only 38.9% of the number we estimated to have high potential to occur.

We derived a species accumulation curve based on the cumulative number of species documented during each day of survey (Figure 1). This graph revealed over half (54.5%) of the total number of species were detected on the first survey day, followed by a gradual increase in

2003 from the 7th to the last (11th) species. The graph also revealed that the last species detected was on the final survey day.

Table 3 summarizes basic information on the species documented during this study. Also included are: the number of plots in which each species was detected; the number of locations that the species was encountered by other survey methods, and the date that the species was first documented in this study. We recorded all locations of detection for each species in this study (Appendix C), except for three lizard species that were too numerous and widespread to provide full encounter-documentation; they included the Plateau Striped Whiptail (*Cnemidophorus velox*), Sagebrush Lizard (*Sceloporus graciosus*), and Eastern Fence Lizard (*Sceloporus undulatus*). Figure 2, a map of the TCS plots and the cumulative list of species found at each, is included to provide a visual reference of the data contained in Appendices A and C. Figure 3 contains the locations of all amphibians and reptiles documented during general surveys or other non-TCS methods, during this inventory (except for the four species listed above).

An analysis of the number of species and number of individuals detected at each TCS plot is provided in Table 2. These results showed that the numbers of species and individuals were rather variable but overall relatively low. Plots in riparian habitats typically had the highest diversity and abundance of herpetofauna; whereas, plots in disturbed agricultural areas had fewer reptiles and amphibians.

All reptile and amphibian species encountered during this study were documented with a total of 99 digital photographs, and we documented the habitat at each TCS plot with 15 digital photographs (both listed in Appendix B). Figures 4 to 15 are representative digital images taken at HUTR of each species found during this study. For herpetofauna found during general surveys, digital photographs were named with the following code: first three letters of the

scientific name, four-letter NPS unit name, date (in month-day-year format), and a unique sequential letter (e.g. BufWooHUTR6-12-03a). Herpetofauna recorded during TCSs were named with: the first three letters of the scientific name, unique TCS plot number, four-letter NPS unit name, date (in month-day-year format), and a unique sequential letter (e.g. CneVel06HUTR8-27-03a). Habitat photographs (Figures 16-20) of TCS plots are named with: four-letter NPS unit name, unique TCS plot number, 'hab' (for habitat photograph), and a unique sequential number (e.g. HUTR01hab1). In addition, we collected a total of four specimens from HUTR (Appendix D).

DISCUSSION

Despite the nearly-100-person-hours of survey, this inventory was not effective at documenting 90% of the herpetofauna species expected at HUTR. At best, three-quarters of the species were documented (using Stuart's (2000) number of 14 expected species). We feel that our list of 18 species may be more reflective of those species expected at HUTR, and if so, then this inventory only documented 61.1% of the number of herpetofaunal species at HUTR.

Time-constrained surveys alone were effective at detecting nearly half of the herpetofauna of HUTR (using 14 expected species), but only 38.9% of our list of expected species. This low rate of success of TCSs is likely due to the monotypic nature of most of the landscape at HUTR, and therefore the TCS plots. Two plots (HUTR01 and HUTR05) enclosed the riparian habitat (and some associated desert-shrub uplands) of Pueblo Colorado Wash that was denuded of woody vegetation for the riparian-restoration project. While the waters, and dense annual vegetation, of the wash provided a significant feature of the riparian habitat, there was little structural habitat diversity to provide cover for reptiles and amphibians. Piles of dead tree trunks, branches, and bark provided some cover for the reptiles in the riparian area. One-

half of a third plot (HUTR02) contained a stand of mature Russian olive, tamarisk, and junipers. This plot provided the greatest number of reptiles counted during TCSs, partly due to the vertical-structural diversity of woody cover for reptiles. The other four plots were within the open fields of HUTR, and these fallow agricultural fields were rather monotypic in vegetation structure and composition. Most reptiles were found within the shrub vegetation, prickly-pear cactus, or around old prairie-dog (*Cynomys gunnisoni*) burrows, when present.

We believe that Table 3 is not an exhaustive list of the species that may occur at HUTR, but rather an exhaustive list of those that we detected. The species accumulation curve (Fig. 1) derived from these data was continuing to increase near the end of the study, suggesting that more species may be detected with further survey effort. This increase in the number of species (days 9 to 11) was likely due to the presence of summer rains that increased herpetofaunal activities, especially the spadefoot toads (*Spea* spp.). The lack of survey effort during the very brief rainy period during 2002 caused us to miss the emergence of adult spadefoot toads; we did however, find evidence of their breeding in the stock/irrigation pond south of the NPS headquarters. Extra survey efforts spent during rainy nights in 2003 allowed detection of both *Spea* species. The other two species only found in 2003 were snakes; both species likely occur at HUTR in low densities, making detection very difficult.

The species not detected by this inventory, but ranked with a ‘high’ potential to occur in Table 1, will likely be found sporadically in the future. Some of these species may occur in the future as natural long-range movements of individuals into HUTR, especially as the riparian habitat begins to rebuild; others may already be present and be detected on an incidental basis. Of those species not found during diurnal TCS surveys, only one Prairie Rattlesnake (*Crotalis viridis*) was found as road-killed on the entry road; one Eastern Collared Lizard (*Crotaphytus*

collaris) was found twice during diurnal general surveys on the southwest end of Hubbell Hill; and the two spadefoot toad species (*Spea multiplicata* and *S. bombifrons*) were detected by nocturnal general surveys.

The most common and widespread reptile species were the Sagebrush Lizard and the Plateau Striped Whiptail, as both species were detected at all seven of the survey plots (Table 3). And both species were commonly found throughout all of HUTR. The Eastern Fence Lizard was detected at only one TCS plot, but was also fairly widespread and common throughout HUTR (especially around structures such as live trees, rocks, tree trunks and brush piles, and housing structures). The Woodhouse's Toad (*Bufo woodhousii*) was the most common and widespread amphibian detected during these surveys. At least one individual was found during most surveys (especially nocturnal general surveys) within Pueblo Colorado Wash on HUTR, and they were occasionally found wandering away from waters after summer rains began. Breeding of this species was documented on, or very near, HUTR by detecting recent metamorphs (toadlets) on 12 June 2003 in Pueblo Colorado Wash.

The results of this study are comparable to the recent vertebrate inventory and monitoring efforts within HUTR's section of Pueblo Colorado Wash (Shaw and Woodruff 2002). They found that the Plateau Striped Whiptail was the most abundant riparian-dwelling lizard, while Sagebrush and Eastern Fence lizards were less abundant. We had similar data for the riparian area, but found that the Sagebrush Lizard was much more abundant than the fence lizard in other areas of HUTR. It was also evident that the Lesser Earless Lizard (*Holbrookia maculata*) was equally rare in Shaw and Woodruff's study as in ours.

One discrepancy between the two studies was that Shaw and Woodruff (2002) determined the garter snakes at HUTR to be Blackneck (*Thamnophis cyrtopsis*) rather than the

Western Terrestrial (*Thamnophis elegans*) as we had. We were initially confused on the species determination of the garter snakes at HUTR, but through consultations with herpetologists from New Mexico and Arizona, had decided that all garter snakes we encountered were most likely *T. elegans*. This species was confusing due to the rather strong, darkly-colored patch posterior to the head. Both species share similar ‘distinguishing’ characteristics of a pale stripe on the 2nd and 3rd scale row, and usually 19 scale rows at mid-body; and the Western Terrestrial is reportedly much more variable in coloration between individuals across its range. However, the Blackneck Garter Snake reportedly has more distinct black patches behind the head and white-colored crescents just anterior to them, and more distinct and linear body coloration; none of the garter snakes we encountered fit these characteristics.

The riparian habitats along Pueblo Colorado Wash provided the highest counts and most diversity of herpetofauna. This was not unexpected, as riparian areas usually provide excellent habitats for amphibians and reptiles as increased moisture levels usually provide: dense ground cover, multiple-layered vegetation, multi-structured ground substrate (trees, rocks, boulders, and creek banks), and water for sustaining life and medium for amphibian breeding. It was interesting to note that plot HUTR02, which had no surface water but did have an intact stand of riparian trees, harbored a comparatively large number of reptiles. This is likely due to the presence of the protection (in terms of shade from the sun and from predators) afforded by the stand of woody vegetation. Conversely, the disturbed agricultural habitat that comprised much of HUTR was monotypic shrub lands, with consistently fewer counts of reptiles and amphibians. These lands had fewer places for herpetofauna to seek refuge from predators and the days’ heat. Therefore it seems clear that the rebuilding of riparian vegetation along Pueblo Colorado Wash at HUTR will greatly benefit the herpetofauna populations. We highly recommended

continuation of amphibian and reptile monitoring, along with other vertebrate monitoring, during the re-establishment of native riparian vegetation in the wash.

It is difficult to determine, and impossible to measure, possible effects that the recent drought conditions had on herpetofaunal populations, daily cycles of individuals, and their detectability by these survey methods. It seemed apparent that in some areas, the extreme hot, dry conditions severely limited their daily activity, perhaps sent some or many into aestivation, or otherwise made them undetectable during surveys. For example, we counted 9 and 11 individual herpetofauna during the June and August 2002 TCSs at HUTR01; however, we found only 1 individual there during the hot, dry month of July. This effect was also found by Shaw and Woodruff (2002, p.20), where they reported lizards to be “especially scarce in July” of 2002. Drought seemed to especially affect the movements, and detectability, of snakes; only the garter snake (*T. elegans*), which prefers wet riparian habitats, was commonly found during surveys. The two other snakes documented by this inventory were only encountered once each, the rattlesnake as a road-kill and the Gopher Snake as a fresh trail running between prairie dog holes.

Although no federal or Navajo Tribally-listed endangered species were identified in this inventory, one interesting discovery was made. We found that there may be a high and varying degree of inter-breeding between the two spadefoot toad species found at HUTR. Hybridization is reportedly not uncommon between these two species in other areas. The adult *Spea* documented in this inventory were confusing when making a species determination as they seemed to have a mixture of characteristics of both species (*S. multiplicata* lacks prominent cranial boss between eyes, uniform dorsal color with small dark spots and small orange or red tubercles; *S. bombifrons* has pug-dog profiled face, irregular light dorsal body stripes defining an hour-glass shape). The *Spea*-species determinations in this inventory may be disputed by others,

but we feel that enough evidence reveals that both species are present at HUTR. This work identified the need to evaluate the *Spea* species across The Navajo Nation.

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Table 1. Amphibians and reptiles considered potential to exist at Hubbell Trading Post National Historic Site, based on whether the species' reported distribution¹ includes the Site, and on the presence of available habitat.

Species ²	Common Name	Species Range ¹ ?	Habitat Present?	Degree of Potential ³	Comments on Distribution and Population on the Navajo Nation
AMPHIBIANS					
<i>Ambystoma tigrinum</i>	Tiger Salamander	Yes	No	-- ⁴	widespread; locally common at permanent ponds
<i>Bufo cognatus</i>	Great Plains Toad	Yes	Yes	High	unclear distribution, few records
<i>Bufo punctatus</i>	Red-Spotted Toad	Yes	Yes	High	widespread; common at still/running waters
<i>Bufo woodhousii</i>	Woodhouse's Toad	Yes	Yes	High	widespread; common at still/running waters
<i>Hyla arenicolor</i>	Canyon Treefrog	Yes	No	--	widespread; locally common
<i>Rana pipiens</i>	Northern Leopard Frog	Yes	No	--	recent precipitous declines; now very rare
<i>Spea bombifrons</i>	Plains Spadefoot	Yes	Yes	High	likely widespread but unclear distribution
<i>Spea multiplicata</i>	New Mexico Spadefoot	Yes	Yes	High	widespread; common but unclear distribution
REPTILES -- Lizards					
<i>Cnemidophorus inornatus</i>	Little Striped Whiptail	No	No	--	mis-identified specimen; range incorrect in Stebbins
<i>Cnemidophorus tigris</i>	Western Whiptail	Yes	Yes	High	widespread; locally common
<i>Cnemidophorus velox</i>	Plateau Striped Whiptail	Yes	Yes	High	widespread; common
<i>Crotaphytus collaris</i>	Eastern Collared Lizard	Yes	Yes	High	widespread; locally common
<i>Eumeces multivirgatus</i>	Many-lined Skink	Yes	No	--	widespread; locally common in riparian habitats
<i>Holbrookia maculata</i>	Lesser Earless Lizard	Yes	Yes	High	widespread; locally common in desert grasslands

<i>Phrynosoma hernandesi</i>	Mountain Short-horned Lizard	Yes	Yes	High	widespread; common in variety of habitats
<i>Sceloporus graciosus</i>	Sagebrush Lizard	Yes	Yes	High	widespread; common
<i>Sceloporus magister</i>	Desert Spiny Lizard	Yes	No	--	only in low-elevation canyons; locally common
<i>Sceloporus undulatus</i>	Eastern Fence Lizard	Yes	Yes	High	widespread; common
<i>Urosaurus ornatus</i>	Tree Lizard	Yes	No	--	widespread; locally common in PJ & rocky habitat
<i>Uta stansburiana</i>	Side-blotched Lizard	Yes	Yes	High	widespread; common in variety of habitats

REPTILES -- Snakes

<i>Arizona elegans</i>	Eastern Glossy Snake	Yes	Yes	High	unclear distribution; few NN records
<i>Crotalus viridis</i>	Prairie Rattlesnake	Yes	Yes	High	widespread; common in variety of habitats
<i>Hypsiglena torquata</i>	Night Snake	Yes ⁶	Yes	Remote	unclear distribution; larger range than Stebbins?
<i>Masticophis taeniatus</i>	Striped Whipsnake	Yes	Yes	High	widespread; locally common in riparian habitats
<i>Pituophis catenifer</i>	Gopher Snake	Yes	Yes	High	widespread; common in several habitats
<i>Thamnophis elegans</i>	West.Terrestrial Garter Snake	Yes	Yes	High	widespread; locally common

¹Stebbins (1985) and Stebbins (2003) used for range maps

²Collins and Taggart (2002) used for species names

³Degree of potential determined by combination of recognized range and presence of quality habitat for the species ('-- ' means 'no' potential to occur)

⁴No breeding habitat within NPS boundaries, requires permanent/near-permanent still water

⁵Range overlap with NPS boundaries is questionable

⁶Range not overlapping NPS boundaries, but has potential habitat corridor to known range

Table 2. Summarized results of 1-hr time-constrained surveys (with 3 repetitions) at seven 1-ha plots at Hubbell Trading Post National Historic Site.

Plot I.D.	Habitat Type	Survey Year	No. Species:			No. Herps.:		
			June	July	Aug.	June	July	Aug.
HUTR01	Riparian	2002	4	1	3	9	1	11
HUTR02	Riparian/ Disturbed Agricultural	2002	1	3	2	9	13	17
HUTR03	Disturbed Agriculture	2002	2	2	1	6	5	7
HUTR04	Disturbed Agriculture/ P-J	2002	2	1	2	4	2	7
HUTR05	Riparian	2003	2	2	2	7	4	5
HUTR06	Disturbed Agriculture	2003	0	2	2	0	3	2
HUTR07	Disturbed Agriculture	2003	1	2	0	1	2	0

Table 3. List of amphibians and reptiles documented at Hubbell Trading Post National Historic Site during 2002 – 03; those found by a recent inventory (Shaw and Woodruff 2002¹); and summarized results of TCSs at seven plots, and other survey methods.

Species ²	Common Name	Shaw & Woodruff 2002	No. Plots Species Occurred	No. Sites Species Found By Other Methods	Date First Documented
<u>AMPHIBIANS</u>					
<i>Bufo woodhousii</i>	Woodhouse's Toad	Yes	1	4	14 June 2002
<i>Spea bombifrons</i>	Plains Spadefoot	No	0	3	01 Aug. 2003
<i>Spea multiplicata</i>	New Mexico Spadefoot	Yes	0	2	27 Aug. 2003
<u>REPTILES -- Lizards</u>					
<i>Cnemidophorus velox</i>	Plateau Striped Whiptail	Yes	7	n/a	14 June 2002
<i>Crotaphytus collaris</i>	Eastern Collared Lizard	No	0	1	14 June 2002
<i>Holbrookia maculata</i>	Lesser Earless Lizard	Yes	1	1	13 July 2002
<i>Sceloporus graciosus</i>	Sagebrush Lizard	Yes	7	n/a	14 June 2002
<i>Sceloporus undulatus</i>	Eastern Fence Lizard	Yes	1	n/a	14 June 2002
<u>REPTILES -- Snakes</u>					
<i>Crotalus viridis</i>	Prairie Rattlesnake	No	0	1	12 June 2003
<i>Pituophis catenifer</i>	Gopher Snake	Yes	1	1	25 July 2003
<i>Thamnophis cyrtopsis</i>	Blackneck Garter Snake	Yes	0	0	see discussion
<i>Thamnophis elegans</i>	W.Terrest. Garter Snake	No	2	2	14 June 2002

¹Shaw, H. G. and P. M. Woodruff. 2002. Vertebrate inventory and monitoring for Pueblo Colorado Wash, Hubbell Trading Post National Historic Site. Unpublished Report. The Juniper Institute, Hillsboro, New Mexico.

²Collins and Taggart (2002) used for species names

Figure 1. Species accumulation curve for herpetofauna documented at Hubbell Trading Post National Historic Site during 2002 and 2003 using all survey types.

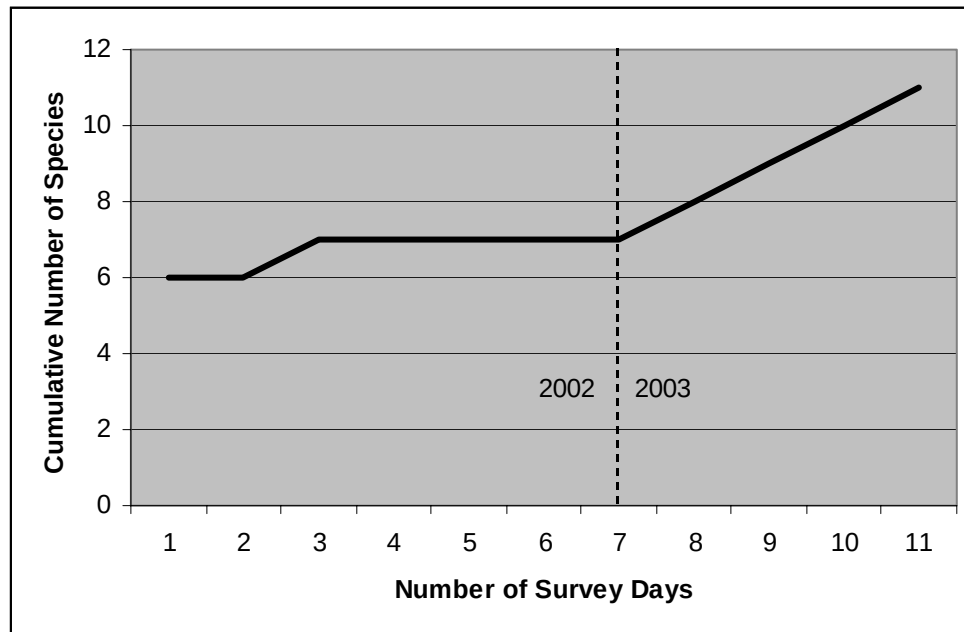


Figure 2. Map of corners and center of 7 TCS-plots and cumulative results of three 1-hr replicate surveys during 2002 and 2003.

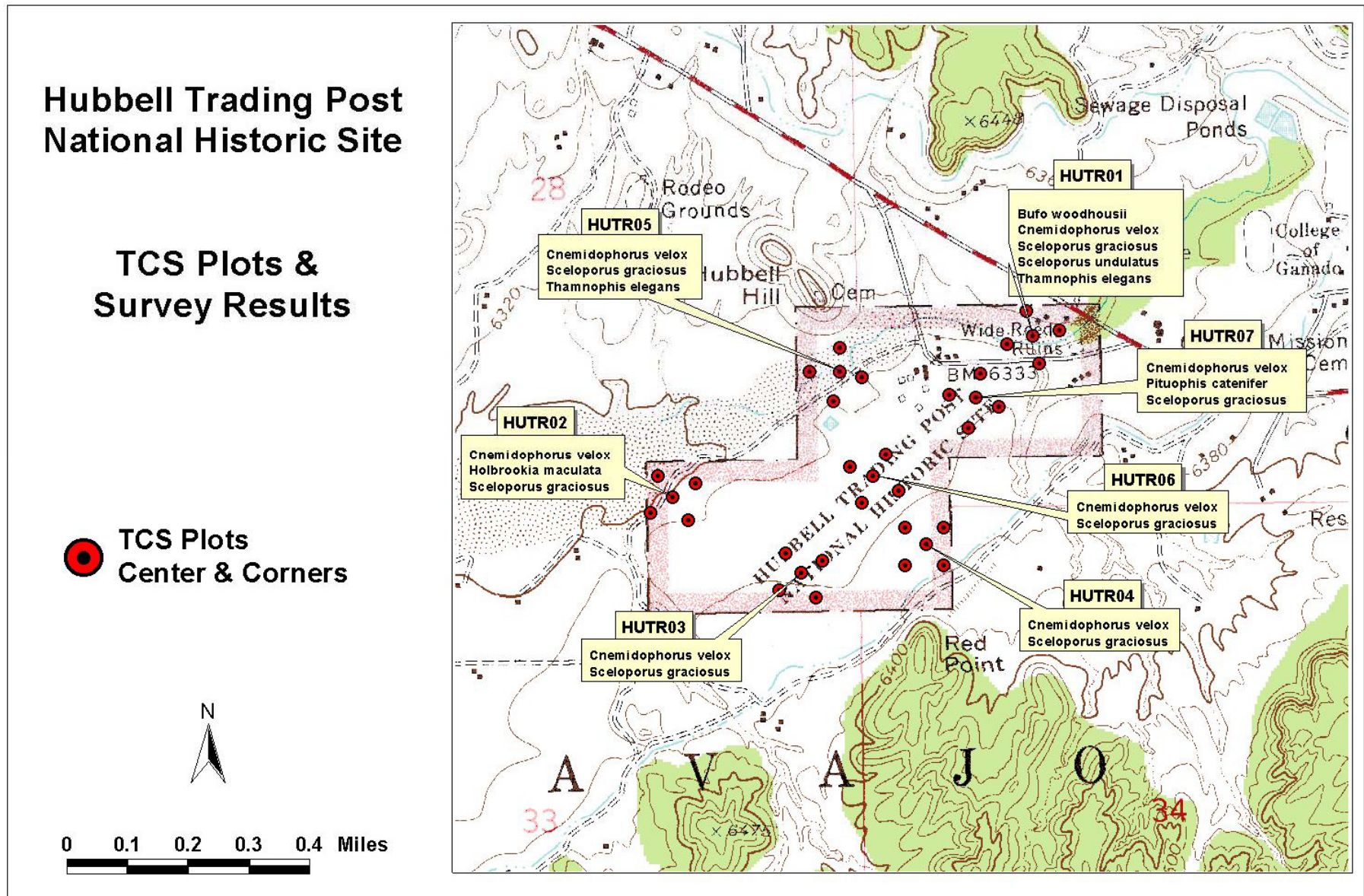


Figure 3. Map of herpetofauna, found by other survey methods, at Hubbell Trading Post National Historic Site in 2002-3.

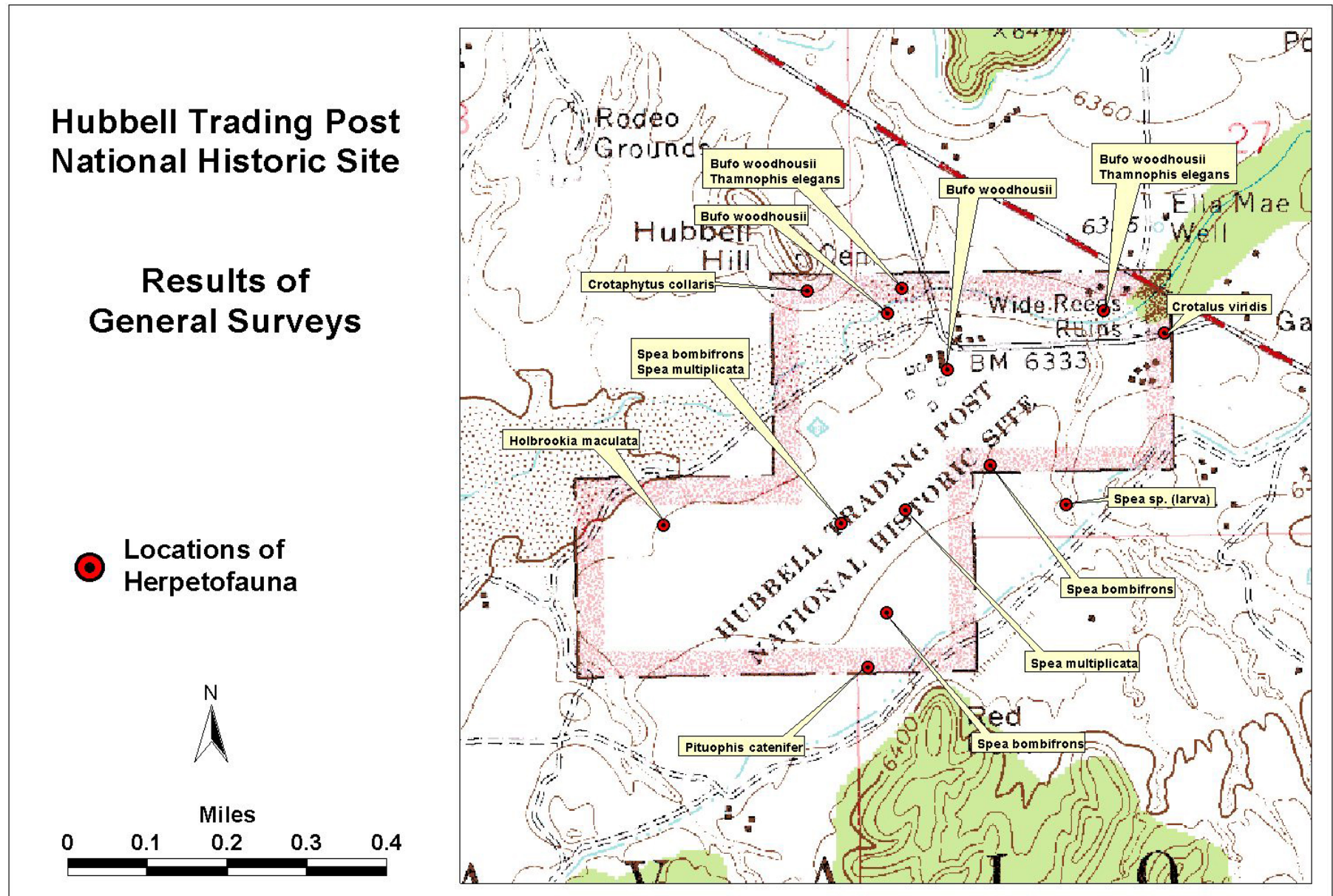


Figure 4. Woodhouse's Toad (*Bufo woodhousii*) –recent metamorph



Photo: BufWooHUTR6-12-03c

Figure 5. Woodhouse's Toad (*Bufo woodhousii*) – adult



Photo: BufWooHUTR6-14-02b

Figure 6. Plains Spadefoot (*Spea bombifrons*) – adult



Photo: SpeBom2HUTR8-01-03d

Figure 7. New Mexico Spadefoot (*Spea multiplicata*) – adult



Photo: SpeMul1HUTR8-01-03c

Figure 8. Plateau Striped Whiptail (*Cnemidophorus velox*) – adult



Photo: CneVelHUTR6-12-03b

Figure 9. Common Collared Lizard (*Crotaphytus collaris*) – adult



Photo: CroColHUTR8-18-02a

Figure 10. Lesser Earless Lizard (*Holbrookia maculatum*) – adult



Photo: HolMacHUTR7-13-02a

Figure 11. Sagebrush Lizard (*Sceloporus graciosus*) – adult



Photo: SceGra03HUTR8-19-02d

Figure 12. Eastern Fence Lizard (*Sceloporus undulatus*) – adult



Photo: SceUndHUTR6-14-02f

Figure 13. Prairie Rattlesnake (*Crotalus viridis*) – juvenile



Photo: CroVirHUTR6-12-03b

Figure 14. Gopher Snake (*Pituophis catenifer*) – adult trail



Photo: PitCae07HUTR7-25-03c

Figure 15. Western Terrestrial Garter Snake (*Thamnophis elegans*)



Photo: ThaEleHUTR6-14-02c

Figure 16. Riparian Habitat at Plot HUTR01



Photo: HUTR01hab1

Figure 17. Riparian Habitat at Plot HUTR05



Photo: HUTR05hab1

Figure 18. Disturbed Agricultural Habitat at Plot HUTR07



Photo: HUTR07hab2

Figure 19. Disturbed Agricultural Habitat at Plot HUTR03



Photo: HUTR03hab3

Figure 20. Disturbed Agricultural / Pinyon-Juniper Habitat at Plot HUTR04



Photo: HUTR04hab2

Appendix A. Locations (in UTM Zone 12) and year of survey for 7 plots for Time-Constrained Surveys of amphibians and reptiles at Hubbell Trading Post National Historic Site, and the associated corner points (A-D), including habitat type for each plot.

ID	Plot	Easting	Northing	Year	Habitat
1	HUTR01	630761	3952556	2002	Riparian
2	HUTR01 A	630831	3952569		
3	HUTR01 B	630779	3952483		
4	HUTR01 C	630692	3952534		
5	HUTR01 D	630745	3952620		
6	HUTR02	629808	3952129	2002	Riparian/ Disturbed Agricultural
7	HUTR02 A	629869	3952165		
8	HUTR02 B	629850	3952067		
9	HUTR02 C	629751	3952086		
1	HUTR02 D	629770	3952184		
1	HUTR03	630148	3951928	2002	Disturbed Agricultural
1	HUTR03 A	630205	3951961		
1	HUTR03 B	630187	3951863		
1	HUTR03 C	630089	3951882		
1	HUTR03 D	630107	3951979		
1	HUTR04	630480	3952003	2002	Disturbed Agricultural / P-J
1	HUTR04 A	630526	3952047		
1	HUTR04 B	630525	3951948		
1	HUTR04 C	630424	3951949		
2	HUTR04 D	630424	3952048		
2	HUTR05	630251	3952461	2003	Riparian
2	HUTR05 A	630250	3952523		
2	HUTR05 B	630310	3952446		
2	HUTR05 C	630234	3952383		
2	HUTR05 D	630171	3952460		
2	HUTR06	630338	3952184	2003	Disturbed Agricultural
2	HUTR06 A	630371	3952241		
2	HUTR06 B	630405	3952146		
2	HUTR06 C	630310	3952113		
3	HUTR06 D	630277	3952208		
3	HUTR07	630610	3952392	2003	Disturbed Agricultural
3	HUTR07 A	630622	3952457		
3	HUTR07 B	630672	3952369		
3	HUTR07 C	630590	3952313		
3	HUTR07 D	630541	3952400		

Appendix B. Summary of documentary digital photographs from Canyon de Chelly National Monument during amphibian and reptile inventory in 2002-3, including photo file name, date taken, and location in UTM zone 12.

ID	Species	Common Name	Photo (File) Name	Date Taken	Easting	Northing	Remarks
1	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWooHUTR6-12-03a	12 JUN 2003	630368	3952553	Hatchling; aprox. TL-10mm; larvae here; UTM approx.
2	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWooHUTR6-12-03b	12 JUN 2003	630368	3952553	Hatchling; aprox. TL-10mm; larvae here; UTM approx.
3	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWooHUTR6-12-03c	12 JUN 2003	630368	3952553	Hatchling; aprox. TL-10mm; larvae here; UTM approx.
4	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWooHUTR6-12-03d	12 JUN 2003	630368	3952553	Hatchling; aprox. TL-10mm; larvae here; UTM approx.
5	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWooHUTR6-14-02a	14 JUN 2002	630396	3952603	Adult; TL-80.4mm; in Pueblo Colo. Wash
6	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWooHUTR6-14-02b	14 JUN 2002	630396	3952603	Adult; TL-80.4mm; in Pueblo Colo. Wash
7	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWooHUTR6-14-02c	14 JUN 2002	630396	3952603	Adult; TL-80.4mm; in Pueblo Colo. Wash
8	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWooHUTR6-14-02d	14 JUN 2002	630396	3952603	Adult; TL-80.4mm; in Pueblo Colo. Wash
9	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWooHUTR7-13-02	13 JUL 2002	630778	3952396	Adult; in Pueblo Colo. Wash; UTM approx.
10	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWooHUTR8-01-03a	01 AUG 2003	630487	3952440	Adult; NPS parking lot; UTM approx.
11	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWooHUTR8-01-03b	01 AUG 2003	630487	3952440	Adult; NPS parking lot; UTM approx.
12	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWooHUTR8-27-03a	27 AUG 2003	630487	3952440	Adult; NPS parking lot; UTM approx.

13	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWooHUTR8-27-03b	27 AUG 2003	630487	3952440	Adult; NPS parking lot; UTM approx.
14	<i>Cnemidophorus velox</i>	Plateau Striped Whiptail	CneVel06HUTR8-27-03a	27 AUG 2003	630338	3952184	Adult; along riparian; on Plot HUTR06
15	<i>Cnemidophorus velox</i>	Plateau Striped Whiptail	CneVel06HUTR8-27-03b	27 AUG 2003	630338	3952184	Adult; along riparian; on Plot HUTR06
16	<i>Cnemidophorus velox</i>	Plateau Striped Whiptail	CneVelHUTR6-12-03a	12 JUN 2003	0	0	Adult; exact location not recorded
17	<i>Cnemidophorus velox</i>	Plateau Striped Whiptail	CneVelHUTR6-12-03b	12 JUN 2003	0	0	Adult; exact location not recorded
18	<i>Cnemidophorus velox</i>	Plateau Striped Whiptail	CneVelHUTR6-14-02a	14 JUN 2002	630426	3952633	Juvenile; SVL-48.4; in Pueblo Colo.Wash
19	<i>Cnemidophorus velox</i>	Plateau Striped Whiptail	CneVelHUTR6-14-02b	14 JUN 2002	630426	3952633	Juvenile; SVL-48.4; in Pueblo Colo.Wash
20	<i>Crotaphytus collaris</i>	Eastern Collared Lizard	CroColHUTR8-18-02a	27 AUG 2003	630205	3952598	Adult; base of Hubbell Hill
21	<i>Crotaphytus collaris</i>	Eastern Collared Lizard	CroColHUTR8-18-02b	27 AUG 2003	630205	3952598	Adult; base of Hubbell Hill
22	<i>Crotalus viridis</i>	Prairie Rattlesnake	CroVirHUTR6-12-03a	12 JUN 2003	630925	3952513	Juvenile; roadkilled at NPS entrance; collected
23	<i>Crotalus viridis</i>	Prairie Rattlesnake	CroVirHUTR6-12-03b	12 JUN 2003	630925	3952513	Juvenile; roadkilled at NPS entrance; collected
24	<i>Crotalus viridis</i>	Prairie Rattlesnake	CroVirHUTR6-12-03c	12 JUN 2003	630925	3952513	Juvenile; roadkilled at NPS entrance; collected
25	<i>Holbrookia maculatum</i>	Lesser Earless Lizard	HolMacHUTR7-13-02a	13 JUL 2002	629915	3952427	Adult; SVL-47.8mm
26	<i>Holbrookia maculatum</i>	Lesser Earless Lizard	HolMacHUTR7-13-02b	13 JUL 2002	629915	3952427	Adult; SVL-47.8mm
27	<i>Holbrookia maculatum</i>	Lesser Earless Lizard	HolMacHUTR7-13-02c	13 JUL 2002	629915	3952427	Adult; SVL-47.8mm
28	<i>Holbrookia maculatum</i>	Lesser Earless Lizard	HolMacHUTR7-13-02d	13 JUL 2002	629915	3952427	Adult; SVL-47.8mm

29	<i>Holbrookia maculatum</i>	Lesser Earless Lizard	HolMacHUTR7-13-02e	13 JUL 2002	629915	3952427	Adult; SVL-47.8mm
30	<i>Pituophis catenifer</i>	Gopher Snake	PitCae07HUTR7-25-03a	25 JUL 2003	630610	3952392	Trail left by large adult Pit.cae.; on Plot HUTR07
31	<i>Pituophis catenifer</i>	Gopher Snake	PitCae07HUTR7-25-03b	25 JUL 2003	630610	3952392	Trail left by large adult Pit.cae.; on Plot HUTR07
32	<i>Pituophis catenifer</i>	Gopher Snake	PitCae07HUTR7-25-03c	25 JUL 2003	630610	3952392	Trail left by large adult Pit.cae.; on Plot HUTR07
33	<i>Pituophis catenifer</i>	Gopher Snake	PitCae07HUTR7-25-03d	25 JUL 2003	630610	3952392	Trail left by large adult Pit.cae.; on Plot HUTR07
34	<i>Pituophis catenifer</i>	Gopher Snake	PitCae07HUTR7-25-03e	25 JUL 2003	630610	3952392	Trail left by large adult Pit.cae.; on Plot HUTR07
35	<i>Pituophis catenifer</i>	Gopher Snake	PitCae07HUTR7-25-03f	25 JUL 2003	630610	3952392	Trail left by large adult Pit.cae.; on Plot HUTR07
36	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra02HUTR6-15-02a	15 JUN 2002	629808	3952129	Juvenile?; SVL-41.6mm; on Plot HUTR02
37	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra02HUTR6-15-02b	15 JUN 2002	629808	3952129	Juvenile?; SVL-41.6mm; on Plot HUTR02
38	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra02HUTR7-13-02a	13 JUL 2002	629808	3952129	Juvenile; SVL-41.4mm; on Plot HUTR02
39	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra02HUTR7-13-02b	13 JUL 2002	629808	3952129	Juvenile; SVL-41.4mm; on Plot HUTR02
40	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra02HUTR7-13-02c	13 JUL 2002	629808	3952129	Juvenile; SVL-41.4mm; on Plot HUTR02
41	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra03HUTR6-15-02a	15 JUN 2002	630148	3951928	Adult; SVL-42.1mm; on Plot HUTR03
42	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra03HUTR6-15-02b	15 JUN 2002	630148	3951928	Adult; SVL-42.1mm; on Plot HUTR03
43	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra03HUTR8-19-02a	19 AUG 2002	630148	3951928	Adult; at treeline/old irrigation; on Plot HUTR03
44	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra03HUTR8-19-02b	19 AUG 2002	630148	3951928	Adult; at treeline/old irrigation; on Plot HUTR03

45	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra03HUTR8-19-02c	19 AUG 2002	630148	3951928	Adult; at treeline/old irrigation; on Plot HUTR03
46	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra03HUTR8-19-02d	19 AUG 2002	630148	3951928	Adult; at treeline/old irrigation; on Plot HUTR03
47	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra03HUTR8-19-02e	19 AUG 2002	630148	3951928	Adult; at treeline/old irrigation; on Plot HUTR03
48	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra03HUTR8-19-02f	19 AUG 2002	630148	3951928	Adult; at treeline/old irrigation; on Plot HUTR03
49	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra03HUTR8-19-02g	19 AUG 2002	630148	3951928	Adult; at treeline/old irrigation; on Plot HUTR03
50	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra03HUTR8-19-02h	19 AUG 2002	630148	3951928	Adult; at treeline/old irrigation; on Plot HUTR03
51	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra03HUTR8-19-02i	19 AUG 2002	630148	3951928	Adult; at treeline/old irrigation; on Plot HUTR03
52	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra03HUTR8-19-02j	19 AUG 2002	630148	3951928	Adult; at treeline/old irrigation; on Plot HUTR03
53	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra03HUTR8-19-02k	19 AUG 2002	630148	3951928	Adult; at treeline/old irrigation; on Plot HUTR03
54	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra03HUTR8-19-02l	19 AUG 2002	630148	3951928	Adult; at treeline/old irrigation; on Plot HUTR03
55	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra03HUTR8-19-02m	19 AUG 2002	630148	3951928	Adult; at treeline/old irrigation; on Plot HUTR03
56	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndHUTR6-14-02a	14 JUN 2002	630464	3952630	Adult female; in Pueblo Colo. Wash
57	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndHUTR6-14-02b	14 JUN 2002	630464	3952630	Adult female; in Pueblo Colo. Wash
58	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndHUTR6-14-02c	14 JUN 2002	630464	3952630	Adult female; in Pueblo Colo. Wash
59	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndHUTR6-14-02d	14 JUN 2002	630464	3952630	Adult female; in Pueblo Colo. Wash
60	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndHUTR6-14-02e	14 JUN 2002	630205	3952598	Adult male; on Hubbell Hill

61	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndHUTR6-14-02f	14 JUN 2002	630205	3952598	Adult male; on Hubbell Hill
62	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndHUTR6-14-02g	14 JUN 2002	630205	3952598	Adult male; on Hubbell Hill
63	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndHUTR8-18-02a	18 AUG 2002	630205	3952598	Adult male; on Hubbell Hill
64	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndHUTR8-18-02b	18 AUG 2002	630205	3952598	Adult male; on Hubbell Hill
65	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndHUTR8-18-02c	18 AUG 2002	630205	3952598	Adult male; on Hubbell Hill
66	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndHUTR8-18-02d	18 AUG 2002	630205	3952598	Adult male; on Hubbell Hill
67	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndHUTR8-18-02e	18 AUG 2002	630205	3952598	Adult male; on Hubbell Hill
68	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndHUTR8-18-02f	18 AUG 2002	630205	3952598	Adult male; on Hubbell Hill
69	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndHUTR8-18-02g	18 AUG 2002	630205	3952598	Adult male; on Hubbell Hill
70	<i>Spea bombifrons</i>	Plains Spadefoot	SpeBom1HUTR8-01-03a	01 AUG 2003	630273	3952130	Adult; 1st found in field near NPS HQ
71	<i>Spea bombifrons</i>	Plains Spadefoot	SpeBom1HUTR8-01-03b	01 AUG 2003	630273	3952130	Adult; 1st found in field near NPS HQ
72	<i>Spea bombifrons</i>	Plains Spadefoot	SpeBom1HUTR8-01-03c	01 AUG 2003	630273	3952130	Adult; 1st found in field near NPS HQ
73	<i>Spea bombifrons</i>	Plains Spadefoot	SpeBom2HUTR8-01-03a	01 AUG 2003	630366	3951950	Adult; 3rd found; in south end HUTR
74	<i>Spea bombifrons</i>	Plains Spadefoot	SpeBom2HUTR8-01-03b	01 AUG 2003	630366	3951950	Adult; 3rd found; in south end HUTR
75	<i>Spea bombifrons</i>	Plains Spadefoot	SpeBom2HUTR8-01-03c	01 AUG 2003	630366	3951950	Adult; 3rd found; in south end HUTR
76	<i>Spea bombifrons</i>	Plains Spadefoot	SpeBom2HUTR8-01-03d	01 AUG 2003	630366	3951950	Adult; 3rd found; in south end HUTR

77	<i>Spea bombifrons</i>	Plains Spadefoot	SpeBom2HUTR8-01-03e	01 AUG 2003	630366	3951950	Adult; 3rd found; in south end HUTR
78	<i>Spea bombifrons</i>	Plains Spadefoot	SpeBomHUTR8-27-03a	27 AUG 2003	630575	3952247	Adult; near prairie dog burrow in open field
79	<i>Spea bombifrons</i>	Plains Spadefoot	SpeBomHUTR8-27-03b	27 AUG 2003	630575	3952247	Adult; near prairie dog burrow in open field
80	<i>Spea multiplicata</i>	New Mexico Spadefoot	SpeMul1HUTR8-27-03a	27 AUG 2003	630273	3952130	Adult; found in prairie dog burrow
81	<i>Spea multiplicata</i>	New Mexico Spadefoot	SpeMul1HUTR8-27-03b	27 AUG 2003	630273	3952130	Adult; found in prairie dog burrow
82	<i>Spea multiplicata</i>	New Mexico Spadefoot	SpeMul1HUTR8-27-03c	27 AUG 2003	630273	3952130	Adult; found in prairie dog burrow
83	<i>Spea multiplicata</i>	New Mexico Spadefoot	SpeMul1HUTR8-27-03d	27 AUG 2003	630273	3952130	Adult; found in prairie dog burrow
84	<i>Spea multiplicata</i>	New Mexico Spadefoot	SpeMul1HUTR8-27-03e	27 AUG 2003	630273	3952130	Adult; found in prairie dog burrow
85	<i>Spea multiplicata</i>	New Mexico Spadefoot	SpeBom2HUTR8-27-03	27 AUG 2003	630409	3952158	Adult; near prairie dog burrow
86	<i>Thamnophis elegans</i>	Western Terrestrial Garter Snake	ThaEleHUTR6-11-03a	11 JUN 2003	630803	3952558	Juv-Adult; TL-485mm
87	<i>Thamnophis elegans</i>	Western Terrestrial Garter Snake	ThaEleHUTR6-11-03b	11 JUN 2003	630803	3952558	Juv-Adult; TL-485mm
88	<i>Thamnophis elegans</i>	Western Terrestrial Garter Snake	ThaEleHUTR6-11-03c	11 JUN 2003	630803	3952558	Juv-Adult; TL-485mm
89	<i>Thamnophis elegans</i>	Western Terrestrial Garter Snake	ThaEleHUTR6-11-03d	11 JUN 2003	630803	3952558	Juv-Adult; TL-485mm
90	<i>Thamnophis elegans</i>	Western Terrestrial Garter Snake	ThaEleHUTR6-11-03e	11 JUN 2003	630803	3952558	Juv-Adult; TL-485mm
91	<i>Thamnophis elegans</i>	Western Terrestrial Garter Snake	ThaEleHUTR6-11-03f	11 JUN 2003	630803	3952558	Juv-Adult; TL-485mm
92	<i>Thamnophis elegans</i>	Western Terrestrial Garter Snake	ThaEleHUTR6-11-03g	11 JUN 2003	630803	3952558	Juv-Adult; TL-485mm

93	<i>Thamnophis elegans</i>	Western Terrestrial Garter Snake	ThaEleHUTR6-11-03h	11 JUN 2003	630803	3952558	Juv-Adult; TL-485mm
94	<i>Thamnophis elegans</i>	Western Terrestrial Garter Snake	ThaEleHUTR6-11-03i	11 JUN 2003	630803	3952558	Juv-Adult; TL-485mm
95	<i>Thamnophis elegans</i>	Western Terrestrial Garter Snake	ThaEleHUTR6-14-02a	14 JUN 2002	630396	3952603	Adult; in Pueblo Colo. Wash
96	<i>Thamnophis elegans</i>	Western Terrestrial Garter Snake	ThaEleHUTR6-14-02b	14 JUN 2002	630396	3952603	Adult; in Pueblo Colo. Wash
97	<i>Thamnophis elegans</i>	Western Terrestrial Garter Snake	ThaEleHUTR6-14-02c	14 JUN 2002	630396	3952603	Adult; in Pueblo Colo. Wash
98	<i>Thamnophis elegans</i>	Western Terrestrial Garter Snake	ThaEleHUTR6-14-02d	14 JUN 2002	630396	3952603	Adult; in Pueblo Colo. Wash
99	<i>Thamnophis elegans</i>	Western Terrestrial Garter Snake	ThaEleHUTR6-14-02e	14 JUN 2002	630396	3952603	Adult; in Pueblo Colo. Wash
100	habitat		HUTR01hab1	14 JUN 2002	630761	3952556	habitat photo of plot HUTR01
101	habitat		HUTR02hab1	15 JUN 2002	629808	3952129	habitat photo of plot HUTR02
102	habitat		HUTR02hab2	15 JUN 2002	629808	3952129	habitat photo of plot HUTR02
103	habitat		HUTR02hab3	15 JUN 2002	629808	3952129	habitat photo of plot HUTR02
104	habitat		HUTR03hab1	15 JUN 2002	630148	3951928	habitat photo of plot HUTR03
105	habitat		HUTR03hab2	15 JUN 2002	630148	3951928	habitat photo of plot HUTR03
106	habitat		HUTR03hab3	15 JUN 2002	630148	3951928	habitat photo of plot HUTR03
107	habitat		HUTR04hab1	14 JUN 2002	630480	3952003	habitat photo of plot HUTR04
108	habitat		HUTR04hab2	14 JUN 2002	630480	3952003	habitat photo of plot HUTR04
109	habitat		HUTR05hab1	12 JUN 2003	630251	3952461	habitat photo of plot HUTR05
110	habitat		HUTR05hab2	12 JUN 2003	630251	3952461	habitat photo of plot HUTR05
111	habitat		HUTR06hab1	12 JUN 2003	630338	3952184	habitat photo of plot HUTR06
112	habitat		HUTR06hab2	12 JUN 2003	630338	3952184	habitat photo of plot HUTR06
113	habitat		HUTR07hab1	12 JUN 2003	630610	3952392	habitat photo of plot HUTR07
114	habitat		HUTR07hab2	12 JUN 2003	630610	3952392	habitat photo of plot HUTR07

Appendix C. Summary of documented locations of amphibians and reptiles at Hubbell Trading Post National Historic Site in 2002-3, including date discovered and UTM data (Zone 12).

ID	Species	Plots	Other Method	Easting	Northing	Plot No	First Date
1	<i>Bufo woodhousii</i>	1	4	630396	3952603	n/a	14 JUN 2002
2	<i>Bufo woodhousii</i>	1	4	630802	3952558	n/a	14 JUN 2002
3	<i>Bufo woodhousii</i>	1	4	630761	3952556	HUTR01	14 JUL 2002
4	<i>Bufo woodhousii</i>	1	4	630368	3952553	riparian	11 JUN 2003
5	<i>Bufo woodhousii</i>	1	4	630487	3952440	park lot	01 AUG 2002
6	<i>Cnemidophorus velox</i>	7	n/a	630761	3952556	HUTR01	14 JUN 2002
7	<i>Cnemidophorus velox</i>	7	n/a	630480	3952003	HUTR04	14 JUN 2002
8	<i>Cnemidophorus velox</i>	7	n/a	630148	3951928	HUTR03	15 JUN 2002
9	<i>Cnemidophorus velox</i>	7	n/a	629808	3952129	HUTR02	13 JUL 2002
10	<i>Cnemidophorus velox</i>	7	n/a	630251	3952461	HUTR05	12 JUN 2003
11	<i>Cnemidophorus velox</i>	7	n/a	630610	3952392	HUTR07	12 JUN 2003
12	<i>Cnemidophorus velox</i>	7	n/a	630338	3952184	HUTR06	25 JUL 2003
13	<i>Crotalus viridis</i>	0	1	630925	3952513	n/a	12 JUN 2003
14	<i>Crotaphytus collaris</i>	0	1	630205	3952598	n/a	14 JUN 2002
15	<i>Holbrookia maculata</i>	1	1	629808	3952129	HUTR02	13 JUL 2002
16	<i>Holbrookia maculata</i>	1	1	629915	3952427	n/a	13 JUL 2002
17	<i>Pituophis catenifer</i>	1	1	630610	3952392	HUTR07	25 JUL 2003
18	<i>Pituophis catenifer</i>	1	1	630328	3951840	n/a	27 AUG 2003
19	<i>Sceloporus graciosus</i>	7	n/a	630761	3952556	HUTR01	14 JUN 2002
20	<i>Sceloporus graciosus</i>	7	n/a	629808	3952129	HUTR02	15 JUN 2002
21	<i>Sceloporus graciosus</i>	7	n/a	630148	3951928	HUTR03	15 JUN 2002
22	<i>Sceloporus graciosus</i>	7	n/a	630480	3952003	HUTR04	14 JUL 2002
23	<i>Sceloporus graciosus</i>	7	n/a	630251	3952461	HUTR05	12 JUN 2003
24	<i>Sceloporus graciosus</i>	7	n/a	630338	3952184	HUTR06	25 JUL 2003
25	<i>Sceloporus graciosus</i>	7	n/a	630610	3952392	HUTR07	25 JUL 2003
26	<i>Sceloporus undulatus</i>	1	n/a	630761	3952556	HUTR01	14 JUN 2002

ID	Species	Plots	Other Method	Easting	Northing	Plot No	First Date
27	<i>Spea</i> sp. (larva)	0	1	630510	3952180	n/a	18 AUG 2002
28	<i>Spea bombifrons</i>	0	3	630273	3952130	n/a	01 AUG 2003
29	<i>Spea bombifrons</i>	0	3	630366	3951950	n/a	01 AUG 2003
30	<i>Spea bombifrons</i>	0	3	630575	3952247	n/a	27 AUG 2003
31	<i>Spea multiplicata</i>	0	2	630273	3952130	n/a	27 AUG 2003
32	<i>Spea multiplicata</i>	0	2	630404	3952158	n/a	27 AUG 2003
33	<i>Thamnophis elegans</i>	2	2	630396	3952603	n/a	14 JUN 2002
34	<i>Thamnophis elegans</i>	2	2	630802	3952558	n/a	14 JUN 2002
35	<i>Thamnophis elegans</i>	2	2	630761	3952556	HUTR01	14 JUN 2002
36	<i>Thamnophis elegans</i>	2	2	630251	3952461	HUTR05	27 AUG 2003

Appendix D. Specimens collected and corresponding pertinent information during 2002 – 03 at Hubbell Trading Post National Historic Site.

Crotalis viridis (juvenile); Apache Co., Hubbell Trading Post National Historic Site, at bridge on entrance road to NPS Hdqs., elev. 6340 ft.; 12-VI-2003, coll./prep.: D.Mikesic; UTM: 12S 630925 3952513.

Pituophis catenifer (shed skin of adult); Apache Co., Hubbell Trading Post National Historic Site, near south-central border of Site, elev. 6340 ft.; 27-VIII-2003, coll./prep.: D.Mikesic; UTM: 12S 630328 3951840.

Spea sp. (5 larva); Apache Co., Hubbell Trading Post National Historic Site., 0.2 mi. southeast of NPS Hdqs., elev. 6340 ft.; 18-VIII-2002, coll./prep.: D.Mikesic; UTM: 12S 630510 3952180.

Thamnophis elegans (shed skin of adult); Apache Co., Hubbell Trading Post National Historic Site., 0.1 mi. southwest of US Hwy 264 in Pueblo Colorado Wash, elev. 6315 ft.; 14-VI-2002, coll./prep.: D.Mikesic; UTM: 12S 630761 3952556.