

**INVENTORY OF AMPHIBIANS AND REPTILES AT
NAVAJO NATIONAL MONUMENT**

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3 May 2004



ABSTRACT

The Navajo Natural Heritage Program of the Navajo Nation Department of Fish and Wildlife completed two years of amphibian and reptile inventories at Navajo National Monument 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 7 amphibian and 15 reptile species had high potential to occur at the Monument, and that there was a remote possibility for 8 other species to occur. Field inventories for amphibians and reptiles extended from 10 June to 16 August 2002, and 16 June to 05 September 2003. We performed triple-replicate, time-constrained surveys at 7 plots, each 1 ha (2.5 ac) in size, in at least 3 distinct habitat types, and spent more than 200 hours performing nocturnal and diurnal general surveys. We documented a total of 10 reptile species (7 lizards, 3 snakes) and 5 amphibian species (frogs and toads) within the boundaries of the Monument, and 1 other reptile species nearby. Our survey efforts documented 68.2% of those species with high potential to occur, 72.7% including 1 additional species documented in previous inventories, but only 50.0% when including species with remote potential to exist in the Monument. The Plateau Striped Whiptail (*Cnemidophorus velox*) and Sagebrush Lizard (*Sceloporus graciosus*) were the most common reptiles, and Woodhouse's Toad (*Bufo woodhousii*) was the most common amphibian. One Navajo Tribal-listed endangered species, the Northern Leopard Frog (*Rana pipiens*), was found during this study.

Key Words: amphibian, Navajo National Monument, 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.

Navajo National Monument (NAVA) was established to preserve three of the largest 13th-century cliff dwellings in northern Arizona. It is composed of 3 disjunct 'sub-units' that are 64.8 ha (213 ac) each for Keet Seel Ruin and Betatakin Ruin, and 16.2 ha (40 ac) for Inscription House Ruin. Each subunit is fairly isolated from excessive human intrusions due to their remote locations on the Navajo Nation within deep sandstone canyon lands. Each of the three NAVA subunits are composed of the following habitat components: sheer-cliff Navajo Sandstone walls with overhung alcoves, Great Basin conifer woodlands, riparian, and Great Basin desertscrub (Brown 1982).

The Betatakin Ruin subunit is within Betatakin Canyon of the Tsegi Canyon complex, approximately 24 km (15 mi) west of Kayenta. The elevation ranges from 1790 m (5870 ft) to 2210 m (7250 ft) within this subunit. The Betatakin subunit is adjacent to the Monument headquarters, with a 97-ha (240 ac) area leased from the Navajo Nation providing land for a visitor center, campgrounds, overlooks, staff housing and administrative facilities. This subunit is mostly (~95%) composed of Great Basin conifer woodland. The sandstone bluff extends approximately 140 m (450 ft) above the main ruins. Betatakin Canyon contains a unique relict riparian community composed of aspen (*Populus tremuloides*), box elder (*Acer negundo*), water birch (*Betula occidentalis*), Gambel oak (*Quercus gambelii*) and Douglas fir (*Pseudotsuga menziesii*), with an understory of false Solomonseal (*Maianthemum stellatum*), snowberry (*Symphoricarpos oreophilus*) and *Equisetum hyemale*.

Keet Seel Ruin is located 22.5 km (14 mi) west of Kayenta within upper Keet Seel Canyon of the Tsegi Canyon complex. The range of elevations within the subunit's boundaries

is from 2050 to 2280 m (6725 to 7480 ft). Approximately 45 ha (111 ac, or ~70%) of the area within the Keet Seel unit is Great Basin conifer woodland , located above Keet Seel Canyon on an inaccessible part of Skeleton Mesa. The canyon walls are 85 m (280 ft) high at the ruins. The flat area in front of the ruin is dominated by Gambel oak with an extensive understory of annual exotic plants. The perennial creek flowing through the eastern portion of the subunit is highly incised with walls up to 15 m (50 ft) high.

Inscription House Ruin is approximately 52 km (32 mi) west of Kayenta, and located within Nitsin Canyon of the Navajo Creek complex. Approximately 11 ha (27 ac, or ~70%) of the land contained within Inscription House Ruin unit is a nearly-inaccessible sandstone bluff, which is approximately 100 m (328 ft) high at the main ruins. Because of its inaccessibility to livestock, this bluff contains the most intact vegetation community outside of Betatakin Canyon. Sandy pockets on slick-rock Navajo Sandstone support a community of Great Basin conifer woodland mixed with a healthy stand of native grasses and forbs. The remaining area is dominated by heavily-grazed desertscrub with sparse rabbitbrush (*Chrysothamnus* spp). A perennial tributary of Navajo Creek flows through the southern portion of the area. This creek has deeply-incised banks up to 10 m (33 ft) high, with riparian vegetation dominated by the exotics Russian olive (*Elaeagnus angustifolia*) and tamarisk (*Tamarix chinensis*); some relict cottonwoods (*Populus fremonti*) and willows (*Salix* sp.) are also present.

At least three published faunal inventories of the northwestern region of the Navajo Nation provided documentation on amphibians and reptiles at NAVA; results of these reports are in Table 1. One report (Clark 1935) presented a list of amphibians and reptiles from Navajo Mountain and Rainbow Bridge in northern Arizona, but did not examine the fauna at NAVA. During vertebrate inventories in northern Navajo Country, Eaton (1937) documented six

herpetofauna species from Betatakin and/or Keet Seel canyons, presumably these records included specimens taken within, or near, NAVA. Woodbury (1963) listed 4 amphibian and 13 reptile species “expected” to occur at Betatakin of NAVA, but no documentation of specimen collections or sight records were included. The goal of his work was “...to define the biological and ecological potentials of Betatakin Canyon in Navajo National Monument...” rather than to provide full vertebrate inventories. Brotherson and Fairchild (1977) provided the first attempt at comprehensive inventories, and documented nine herpetofauna species during field studies from May to October, 1977. Drost (2000) conducted surveys within NAVA for federally-, state- and Navajo Tribally-listed plants and animals, including one amphibian and three reptiles. One species which was formerly a candidate for federal listing, the Sagebrush Lizard (*Sceloporus graciosus*), was found at each of the three NAVA subunits.

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 Navajo National Monument 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 Monument.

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 NAVA: diurnal time-constrained surveys (TCSs), nocturnal and diurnal general surveys (especially at temporary and permanent water sources), and random road-cruising at the Betatakin Ruin sub-unit. 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-September, 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 10 TCS plots were determined necessary for the 15 species expected there. A total of seven TCS plots were established (Appendix A and Table 3) at NAVA. We selected a fewer number of plots than recommended by Stuart (2000) because significant portions of Inscription House and Keet Seel ruins had inaccessible lands, which reduced the area that was possible to survey and within which to establish plots. We determined the location of plots, and attempted to provide sufficient coverage to each major habitat type (pinyon-juniper woodland, desertscrub and riparian) 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 at temporary and permanent water sources 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 targeted water sources found within or near NAVA. Surveys were conducted as one person used all means available to detect

amphibians, including walking the perimeter of water, and through the riparian area, searching for amphibians at all life stage and listening for calling adults. The time spent at each water source was variable and was determined by the size of the water and the number of amphibians 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 each NAVA subunit, including around the housing structures at Betatakin Ruin, 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.

Random road-cruising is our term for a method involving driving roads, at times likely to encounter amphibians and reptiles. These surveys were considered ‘random’ because they were conducted for an unspecified distance, amount of time, and they were not replicated (unlike in Shaffer and Juterbock 1994). And they were conducted solely at Betatakin Ruin, because of the lack of vehicular access at the other two subunits, to detect individuals with the goal of increasing the total species list.

A list of amphibian and reptile species expected to occur within NAVA (Table 2) 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 NAVA. We predicted that there were 7 species of amphibians, and 15 species of reptiles with ‘high’ potential to occur in NAVA, and another 8 reptiles with a ‘remote’ potential to occur there. Table 2 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. We had begun collecting specimens during the 2002 field season; however, given the ability of digital photographs to sufficiently document species, we shifted to only collecting amphibians and reptiles found dead. All specimens collected during this inventory were transferred to NPS for inclusion in a reputable museum.

RESULTS

We documented the presence of 15 herpetofauna species (Table 4) within the boundaries of NAVA during 2002 and 2003, which included 5 amphibian (frogs and toads) and 10 reptile (7 lizards and 3 snakes) species; 1 other lizard species (*Crotaphytus collaris*) was found 2.3 km (1.4 mi) west of Inscription House Ruin (this species was not documented with photographs). Without including *C. collaris*, this inventory detected: 100% of the number of species (15) estimated to occur by Stuart (2000); 68.2 % of the number of species (22) we determined to highly likely occur there (Table 2); and 50.0% of the number of species (30) likely to, and remotely possible to, occur within NAVA. Time-constrained surveys alone detected 10 amphibian and reptile species, which was 45.5% of the number we estimated to have high potential to occur.

Brotherson & Fairchild's inventory in 1977 documented the presence of one species within NAVA that was not encountered in this study; that being the Canyon Treefrog (*Hyla arenicolor*). Including this species in our tally, results in documentation of: 106.7% of the number of species estimated to occur there by Stuart (2000); 72.7% of the number of species we

determined highly likely to occur there; and 53.3% of the number of species likely to, and remotely possible to, occur there.

We derived a species accumulation curve based on the cumulative number of species documented during each day of survey (Figure 1). This graph revealed a rather quick documentation of the first 9 species (6 survey-days), which was also the maximum for 2002. Two more species were acquired early in 2003, and then the last 4 species were documented on the 19th survey-day.

Table 4 summarizes basic information on the species documented during this study, and includes the one species detected by Brotherson and Fairchild (1977) that was not found by us. Also included in the summary are: the subunit(s) of NAVA in which each species was found, 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 four lizard species that were too numerous and widespread to provide full encounter-documentation; they include Plateau Striped Whiptail (*Cnemidophorus velox*), Sagebrush Lizard (*Sceloporus graciosus*), Eastern Fence Lizard (*Sceloporus undulatus*) and Side-blotched Lizard (*Uta stansburiana*). Figures 2-4 , maps of the TCS plots and cumulative lists of species found at each plot of the NAVA subunits, are included to provide a visual reference of the data contained in Appendices A and C. Figures 5-7 contain 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 3. All reptile and amphibian species encountered during this study

were documented with a total of 151 digital photographs, and we documented the habitat at each TCS plot with 19 digital photographs (both listed in Appendix B). Figures 8-22 are representative digital images taken at NAVA 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 sub-unit name, date (in month-day-year format), and a unique sequential letter (e.g. BufPunINSC7-24-02a). Herpetofauna recorded during TCSs were named with: the first three letters of the scientific name, unique TCS plot number, four-letter NPS sub-unit name, date (in month-day-year format), and a unique sequential letter (e.g. BufWoo01INSC6-11-02a). Habitat photographs (Figures 23-28) of TCS plots are named with: four-letter NPS sub-unit name, unique TCS plot number, 'hab' (for habitat photograph), and a unique sequential number (e.g. BETA01hab1). In addition, we collected a total of six specimens from NAVA (Appendix D).

DISCUSSION

This inventory was effective at documenting between 100 and 68.2 % of the number of expected species at NAVA, depending on whether the expected number is that of Stuart (2000) or ours (Table 2), respectively. We documented five species not found by earlier inventories, but also failed to detect one species previously documented; we also found a previously-undocumented species within 2.3 km (1.4 mi) of NAVA. When combining the results of all inventories, between 106.7 and 72.7% (again depending on expected number of Stuart (2000) or us) of the species highly likely to occur at NAVA have been documented.

The most common and widespread reptile species were the Plateau Striped Whiptail, Sagebrush Lizard and Eastern Fence Lizard. Each of these lizards were documented at all three NAVA subunits, the whiptail was found at all seven TCS plots, and the two *Sceloporus* were at

six of the seven plots. Each of these species existed throughout the elevation ranges of NAVA, and in all habitat types represented there. The fence lizard seemed to be the least common of the three species, while the Sagebrush Lizard tended to be most abundant species. The Woodhouse's Toad (*Bufo woodhousii*) was the most widespread amphibian detected during these surveys as it was the only one found at all three NAVA subunits. It was found breeding within small pools and backwaters within the drainages at Keet Seel and Inscription House ruins, and likely does so also within Betatakin Canyon when conditions allow.

Five species were detected at only one location during the two years of survey (Table 4), these species included: Northern Leopard Frog (*Rana pipiens*), Plains Spadefoot (*Spea bombifrons*), Mountain Short-horned Lizard (*Phrynosoma hernandesi*), Prairie Rattlesnake (*Crotalus viridis*) and Striped Whipsnake (*Masticophis taeniatus*). Two other species were only found within one of the NAVA subunits, but at two different locations, including the Western Whiptail (*Cnemidophorus tigris*) and Gopher Snake (*Pituophis catenifer*). This shows that nearly half of the species of amphibians and reptiles at NAVA occur in low numbers and/or with limited distributions, or were difficult to detect and perhaps negatively influenced in movements and availability by recent drought condition.

The riparian habitat within Inscription House Ruin (plot INSC01) provided the highest counts and most diversity of herpetofauna (Table 3); the riparian area within Betatakin Canyon (plot BETA02), while lower in species diversity, was also well-populated with herpetofauna during TCSs. This was not unexpected, as riparian areas usually provide excellent habitats for amphibians and reptiles as increased moisture levels usually provide: dense ground, and 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 rather

surprising that the other two habitats, pinyon-juniper woodlands and desert-scrub, provided, in some cases, nearly equal counts of individuals even though species diversity was low. This was likely due to healthy woodlands and desert-scrub habitat conditions that were un-grazed and relatively free of other human disturbances. In pinyon-juniper woodlands, there were ample sites for herpetofauna to seek refuge, including within cavities in live and dead junipers, under dead/down trees, within and under rock piles and human structures, and in holes in the sandy substrate.

Only one amphibian species documented by previous investigators, the Canyon Treefrog, was not detected by us. This species prefers perennial or intermittent waters with still backwaters, and especially those with rocky substrates and stream banks. These conditions do exist at the various NAVA subunits, so we are unsure the reason the species was not found. One of the most likely locations to find the treefrog, extreme upper Betatakin Canyon, actually experienced extreme dryness during the springs of 2002 and 2003, which likely accounts for their absence there. But we did fail to find the species along the perennial waters of Inscription House and Keet Seel ruins, which were also likely areas to find them. We suspect that this species does exist in NAVA; however, the drought conditions or some other factor prevented us from documenting it.

Other species not detected by this inventory, still may exist at NAVA. This would include: the Eastern Collared Lizard which was found near NAVA; species not found during this work, but ranked as 'high' potential; and those that we ranked with 'remote' potential to occur (Table 2). These would especially include several snake species such as: Eastern Glossy Snake (*Arizona elegans*), Night Snake (*Hypsiglena torquata*), and Longnose Snake (*Rhinocheilus lecontei*). Because the NAVA subunits are remotely connected to the San Juan River ecosystem

via a network of canyons, a number of other species that specialized in low-elevation canyon habitats seem possible to be found at NAVA

One Navajo Tribally-listed endangered species, the Northern Leopard Frog was documented at Inscription House Ruin during this inventory. The frog has suffered precipitous declines in population and distribution across the Navajo Nation in more recent years. For example, the entire population of *R. pipiens* was lost from the Chuska Mountains in the last 10 years, from what was a seemingly healthy meta-population of more than 10 breeding locations. Small isolated breeding locations are usually more prone to extinction, and this one population should be considered highly at-risk of being lost.

Adult leopard frogs were documented in the drainage at Inscription House, more specifically, at a small back-water area fed by a small seep and just below the main ruins. While the adults were regularly sighted during our work, there were never more than four individuals seen, and we failed to detect evidence of breeding at this location. Equally alarming was the fact that the habitat is subject to regular catastrophic flooding during the summer-rainy period. The leopard frog habitat is no larger than 3 m by 5 m (10 by 16 ft) in size, and is located at the confluence of an adjacent wash with Inscription House Wash. In fact, the habitat is just below a 5 m (16 ft) 'waterfall' that likely flows hard during the summer rains, resulting in total 'restructuring' and sedimentation of the frog habitat with each rain. Curiously, Drost (2000) did not detect leopard frogs, or potential habitat for them, during his surveys. However, given the high capacity for natural habitat alteration at this site, it is not unlikely that this site was unsuitable for leopard frogs, and that their presence now is the result of a local movements within the watershed.

It cannot be stated strongly enough that there is an urgent need to examine this habitat and the offending drainage and devise a plan to reduce its devastating effects, to hopefully allow the leopard frogs to persist at this site. Further, we recommend that the Inscription House Ruin subunit be given a high-priority status for conservation concern because: this subunit had a high diversity of herpetofauna (12 species documented there, which was 80% of the total – Table 4); and has obvious threats to its natural resources mainly from local livestock grazing in the surrounding areas causing incised stream banks, increased erosion and water-flow rates, and loss of native upland and riparian vegetation.

Time-constrained surveys alone detected 10 amphibian and reptile species, which was 66.7% of the total number of documented species, and 45.5% of the number we ranked as highly likely to occur. Overall, we found that the TCS-plot method was minimally effective at increasing the species list for herpetofauna of NAVA. While a rather high percentage of species (10 out of 15) were detected at least once during a TCS, this result is a little misleading. This is because one TCS plot (INSC01) actually accounted for the majority of these records. Throughout the three surveys at INSC01, we accumulated a total of eight herpetofauna species at this plot alone, which included four species that were not found on any other plot, and two that were not found anywhere else in NAVA. Of those species not found during diurnal TCS surveys: the Red-Spotted Toad (*Bufo punctatus*) and Plains Spadefoot were only found during nocturnal general surveys at Inscription House and Betatakin Ruin, respectively; the Mountain Short-horned Lizard and Gopher Snake were only found by diurnal general surveys; and the Prairie Rattlesnake was encountered once while performing random road-cruising surveys at Betatakin Ruin.

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, during our work at Inscription House Ruin during the hotter, dryer year of 2002, we encountered no Western Whiptails during the entire year. However, during June 2003, we encountered a number of these whiptails throughout the Inscription House area, but again very few during the July and September surveys. We feel very confident that this species would have been detected in 2002 if these individuals would have been active in that year. Drought also likely affected amphibian populations in Betatakin Canyon, as this spring-fed stream was completely dry, except for a small stagnant pool near the restroom facility, and unavailable for amphibian breeding. Realizing the possible negative influences of drought, one should recognize that this inventory was performed during two years of drought conditions, and the results may not be directly comparable to herpetofaunal monitoring in the same sites under different conditions.

During our work at the three NPS units, we found that there may be a high and varying degree of inter-breeding between the two spadefoot toad species found across the Navajo Nation, although this was not as evident at NAVA. Hybridization is reportedly not uncommon between these two species in other areas. Only a small number of adult *Spea* were found during this inventory, and they seemed to fit either the characteristics of *S. multiplicata* (e.g. lack of prominent cranial boss between eyes, uniform dorsal color with small dark spots and small orange or red tubercles) or *S. bombifrons* (e.g. pug-dog profiled face, bony boss between the

eyes, irregular light dorsal body stripes defining an hour-glass shape) fairly well. This work identified the need to evaluate the *Spea* species across The Navajo Nation.

ACKNOWLEDGEMENTS

We first thank Anne Cully and Ron Hiebert of the National Park Service for negotiations and assistance with NNHP being awarded this work. Eddie Perry volunteered to assist with the inventory during 2002, and his help was invaluable. James Charles and Roger Moder and the NPS staff at NAVA were very helpful in providing us access to the Monument. Lastly, Jim Stewart and Charlie Painter of New Mexico Department of Game and Fish, and Trevor Persons and Charles Drost of Colorado Plateau Research Station provided helpful advice on species identification of several difficult species.

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Table 1. Amphibian and reptile species previously documented (¹Brotherson & Fairchild, 1977; ²Drost, 2000; ³Eaton, 1937; and, ‘expected’ to occur (⁴Woodbury, 1963), within Navajo National Monument.

Species	Common Name	Brotherson & Fairchild	Drost 2000	Eaton 1937	Woodbury 1963	Comments
<u>AMPHIBIANS</u>						
<i>Ambystoma tigrinum</i>	East. Tiger Salamander				expected	
<i>Bufo punctatus</i>	Red-Spotted Toad				expected	
<i>Bufo woodhousii</i>	Woodhouse’s Toad	known		known	expected	recorded as <i>Bufo woodhousei</i> ³
<i>Hyla arenicolor</i>	Canyon Treefrog	known				
<i>Spea multiplicata</i>	New Mexico Spadefoot			known	expected	recorded as <i>Scaphiopus hammondi</i> ^{3,4}
<u>REPTILES – Lizards</u>						
<i>Cnemidophorus tigris</i>	Western Whiptail				expected	
<i>Cnemidophorus velox</i>	Plateau Striped Whiptail	known		known	expected	recorded as <i>C. sacki</i> ⁴ , <i>C. sexlineatus</i> ³
<i>Crotaphytus collaris</i>	Eastern Collared Lizard				expected	
<i>Gambelia wislizenii</i>	Longnose Leopard Lizard				expected	recorded as <i>Crotaphytus wislizenii</i> ⁴
<i>Holbrookia maculata</i>	Lesser Earless Lizard				expected	
<i>Phrynosoma hernandesi</i>	Mtn. Short-horned Lizard	known			expected	recorded as <i>P. douglassi</i> ^{1,4}
<i>Sceloporus graciosus</i>	Sagebrush Lizard	known	known	known	expected	
<i>Sceloporus undulatus</i>	Eastern Fence Lizard	known		known	expected	recorded as <i>S. elongatus</i> ³
<i>Urosaurus ornatus</i>	Tree Lizard			known		recorded as <i>Uta ornata</i> ³
<i>Uta stansburiana</i>	Side-blotched Lizard	known				
<u>REPTILES – Snakes</u>						
<i>Crotalus viridis</i>	Prairie Rattlesnake	known			expected	⁴ listed <i>C. v. nuntius</i> & <i>C. v. viridis</i>
<i>Lampropeltis getula</i>	Common Kingsnake				expected	recorded as <i>L. getulus</i> ⁴
<i>Masticophis taeniatus</i>	Striped Whipsnake	known			expected	
<i>Pituophis catenifer</i>	Gopher Snake				expected	recorded as <i>P. melanoleucus</i> ¹
<i>Thamnophis elegans</i>	Western Terrestrial Garter Snake				expected	

¹ Brotherson, J. D. and J. A. Fairchild. 1977. Ecological studies at Navajo National Monument, Part I. National Park Service, Southwest Region. 100+ p.

² Drost, C. A. 2000. Inventory of threatened, endangered, and candidate species at Navajo National Monument. Flagstaff AZ: US Geological Survey Forest and Rangeland Ecosystem Science Center, Colorado Plateau Field Station. 76 p.

³ Eaton, T.H. Jr. 1937. Amphibians and reptiles of the Navajo Country. National Youth Admin. (Project 6677-V), Berkeley, CA. 33 p.

⁴ Woodbury, A. M. 1963. Biological-ecological aspects of Betatakin Canyon Navajo National Monument Arizona. Institute of Environmental Biological Research, Univ. Utah Division of Biological Sciences; 56 p.

Table 2. Amphibians and reptiles considered potential to exist at Navajo National Monument, based on whether the species' reported distribution¹ includes the Monument 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	Yes?	-- 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	Yes	High	widespread; locally common
<i>Rana pipiens</i>	Northern Leopard Frog	Yes	Yes	High	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 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	Yes	High	widespread; locally common in riparian habitats
<i>Gambelia wislizenii</i>	Longnose Leopard Lizard	Yes ⁶	No	Remote	widespread; common in low desert lands
<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>Sauromalus obesus</i>	Chuckwalla	Yes ⁶	Yes	Remote	only in low-elevation canyons; uncommon
<i>Sceloporus graciosus</i>	Sagebrush Lizard	Yes	Yes	High	widespread; common
<i>Sceloporus magister</i>	Desert Spiny Lizard	Yes ⁶	Yes	Remote	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	Yes	High	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	Yes	Remote	unclear distribution; larger range than Stebbins?
<i>Lampropeltis getula</i>	Common Kingsnake	Yes ⁶	Yes	Remote	only in low-elevation canyons; 1 NN record
<i>Masticophis flagellum</i>	Coachwhip	Yes ⁶	Yes	Remote	only in low-elevation canyons; 1 NN record
<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>Rhinocheilus lecontei</i>	Longnose Snake	Yes ⁶	Yes	Remote	only in low-elevation canyons; 0 NN record
<i>Salvadora hexalepis</i>	Western Patchnose Snake	Yes ⁶	Yes	Remote	only in low-elevation canyons; 0 NN record
<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 3. Summarized results of 1-hr time-constrained surveys (with 3 repetitions) at seven 1-ha plots at Navajo National Monument during 2002 and 2003.

Plot I.D.	Habitat Type	Survey Year	No. Species:			No. Herps.:		
			June	July	Aug.	June	July	Aug.
BETA01	Pinyon-Juniper Woodland	2002	2	1	3	6	14	8
BETA02	Riparian	2002	3	2	3	15	16	7
BETA03	Pinyon-Juniper Woodland	2003	2	1	1	13	13	9
BETA04	Pinyon-Juniper / Rocky Slope	2003	2	2	3	5	9	9
INSC01	Riparian	2002	7	8	5	19	29	15
INSC02	Desert scrub	2003	4	5	3	8	11	4
KEET01	Pinyon-Juniper / Gambel Oak	2002	2	3	3	12	17	25

Table 4. List of amphibians and reptiles documented at Navajo National Monument during 2002 – 03, those previously documented within the NPS unit (Table 1); and summarized results of TCSs at 7 plots, and other survey methods.

Species ¹	Common Name	NAVA Sub-unit At Which Species Document			Previously Documented?	No. Plots Species Occurred	No. Sites Species Found By Other Methods	Date First Documented
<u>AMPHIBIANS</u>								
<i>Bufo punctatus</i>	Red-Spotted Toad	Insc			No	0	2	24 July 2002
<i>Bufo woodhousii</i>	Woodhouse's Toad	Beta	Insc	Keet	Yes	1	2	11 June 2002
² <i>Hyla arenicolor</i>	Canyon Treefrog				Yes	----	----	-----
<i>Rana pipiens</i>	Northern Leopard Frog	Insc			No	1	0	11 June 2002
<i>Spea bombifrons</i>	Plains Spadefoot	Beta			No	0	1	29 July 2003
<i>Spea multiplicata</i>	New Mexico Spadefoot	Beta	Insc		Yes	1	2	29 July 2003
<u>REPTILES -- Lizards</u>								
<i>Cnemidophorus tigris</i>	Western Whiptail	Insc			No	1	1	25 June 2003
<i>Cnemidophorus velox</i>	Plateau Striped Whiptail	Beta	Insc	Keet	Yes	7	n/a	11 June 2002
³ <i>Crotaphytus collaris</i>	Eastern Collared Lizard	Insc			No	0	1	30 July 2003
<i>Phrynosoma hernandesi</i>	Mtn. Short-horned Lizard	Beta			Yes	0	1	29 July 2003
<i>Sceloporus graciosus</i>	Sagebrush Lizard	Beta	Insc	Keet	Yes	6	n/a	10 June 2002
<i>Sceloporus undulatus</i>	Eastern Fence Lizard	Beta	Insc	Keet	Yes	6	n/a	10 June 2002
<i>Urosaurus ornatus</i>	Tree Lizard	Beta			Yes	1	2	25 July 2002
<i>Uta stansburiana</i>	Side-blotched Lizard	Beta	Insc		Yes	3	n/a	11 June 2002
<u>REPTILES -- Snakes</u>								
<i>Crotalus viridis</i>	Prairie Rattlesnake	Beta			Yes	0	1	29 July 2003
<i>Masticophis taeniatus</i>	Striped Whipsnake	Insc			Yes	1	0	11 June 2002
<i>Pituophis catenifer</i>	Gopher Snake	Insc	Keet		No	0	2	23 June 2003

¹Collins and Taggart (2002) used for species names

²Species not documented during this inventory in 2002-03

³Only documented once outside of, but nearby, boundaries of Navajo National Monument

Figure 1. Species accumulation curve for herpetofauna documented at Navajo National Monument during 2002 and 20003 using all survey types.

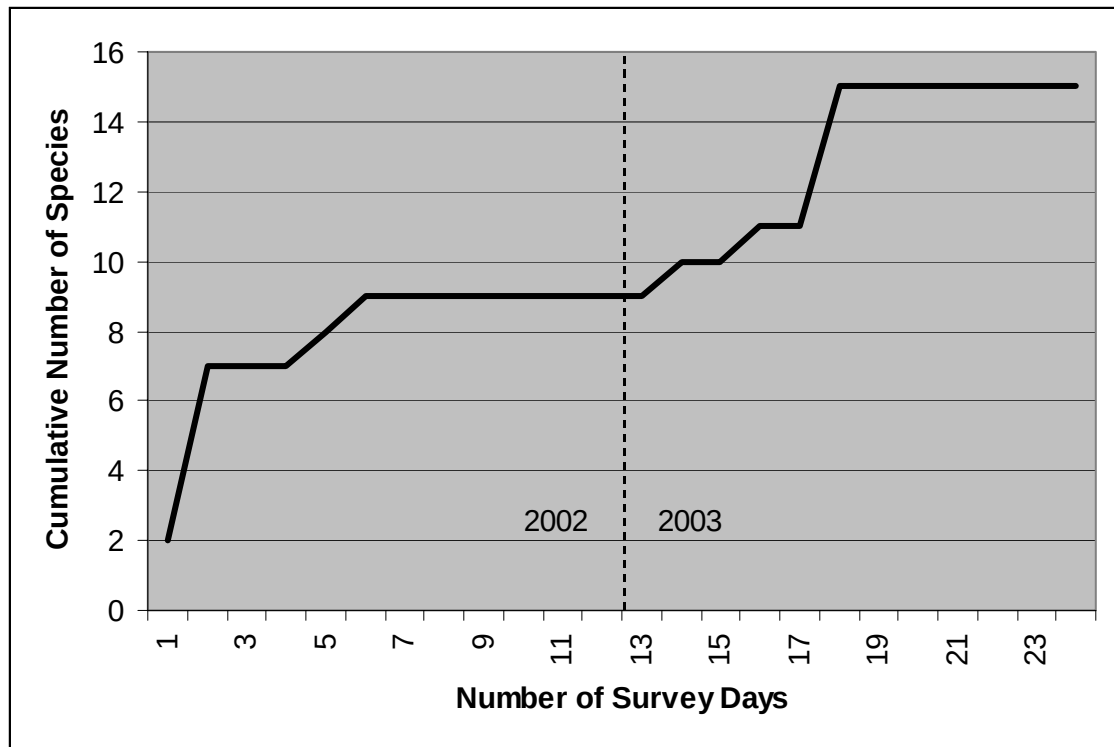


Figure 2. Map of TCS-plots and results of three 1-hr replicate surveys in 2002 and 2003 at Betatakin Ruin of Navajo National Monument.

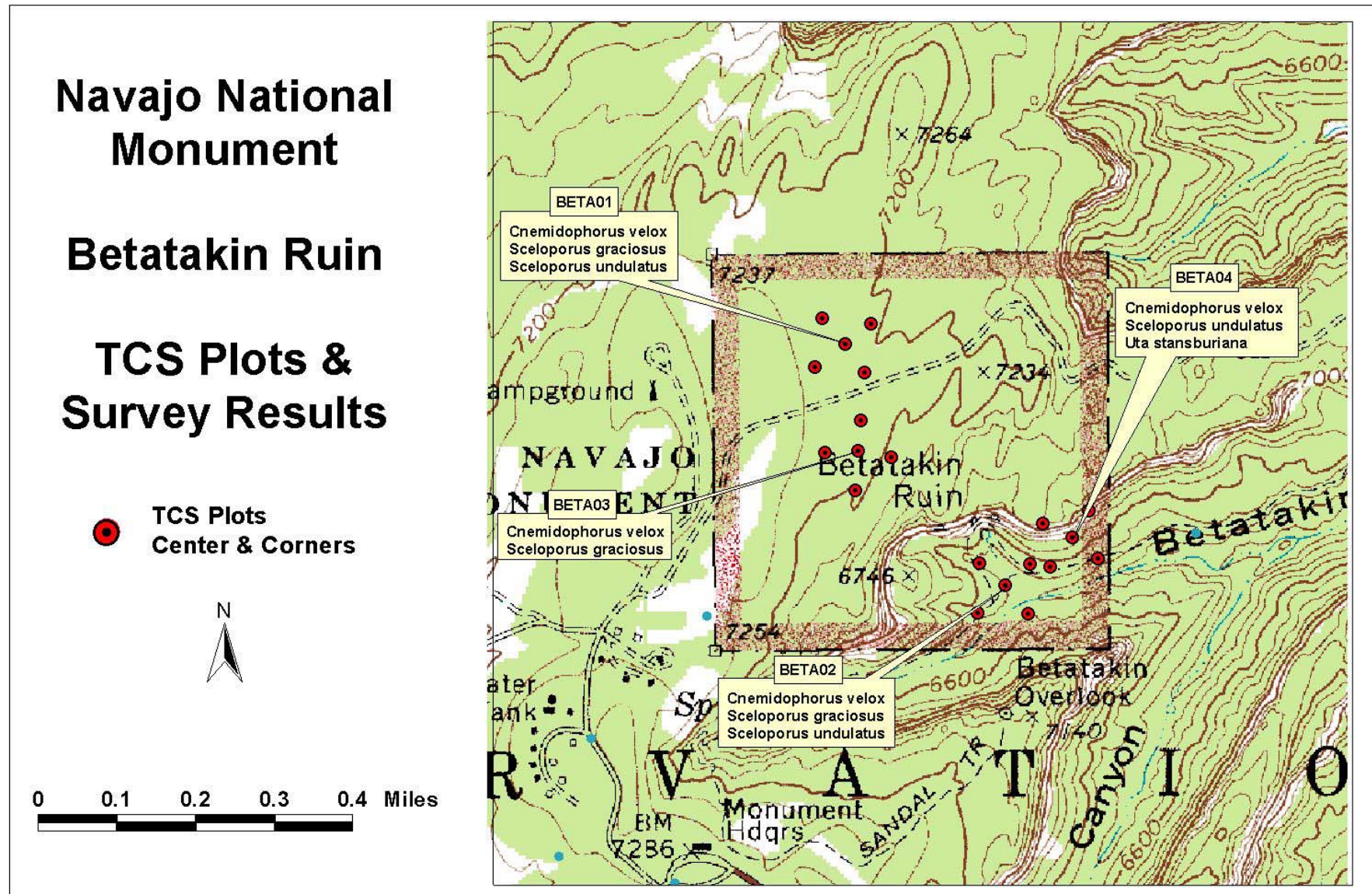


Figure 3. Map of TCS-plots and results of three 1-hr replicate surveys in 2002 and 2003 at Inscription House of Navajo National Monument.

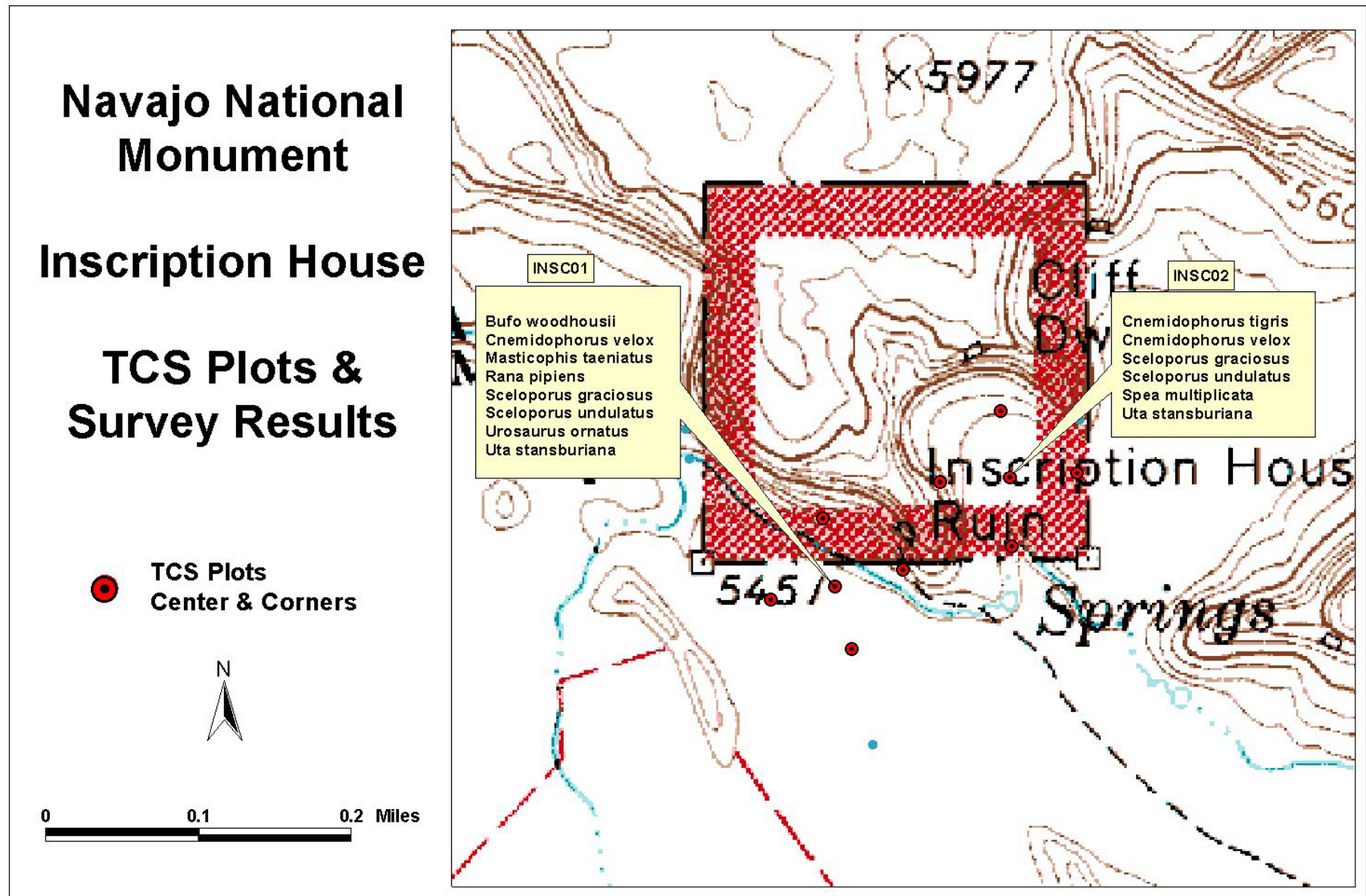


Figure 4. Map of TCS-plots and results of three 1-hr replicate surveys in 2002 and 2003 at Keet Seel Ruin of Navajo National Monument.

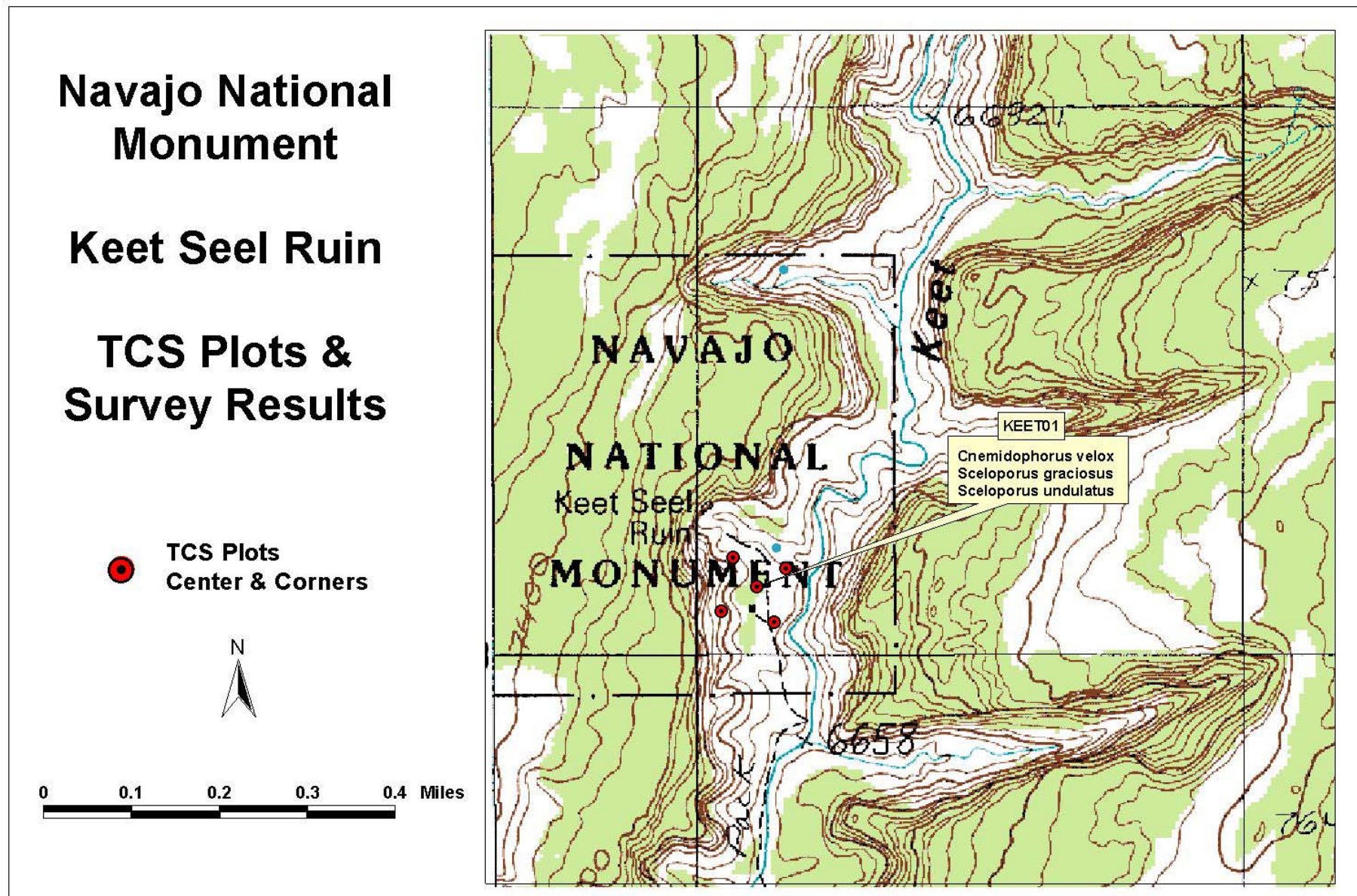


Figure 5. Map of herpetofauna, found by other survey methods, at Betatakin Ruin of Navajo National Monument in 2002 and 2003.

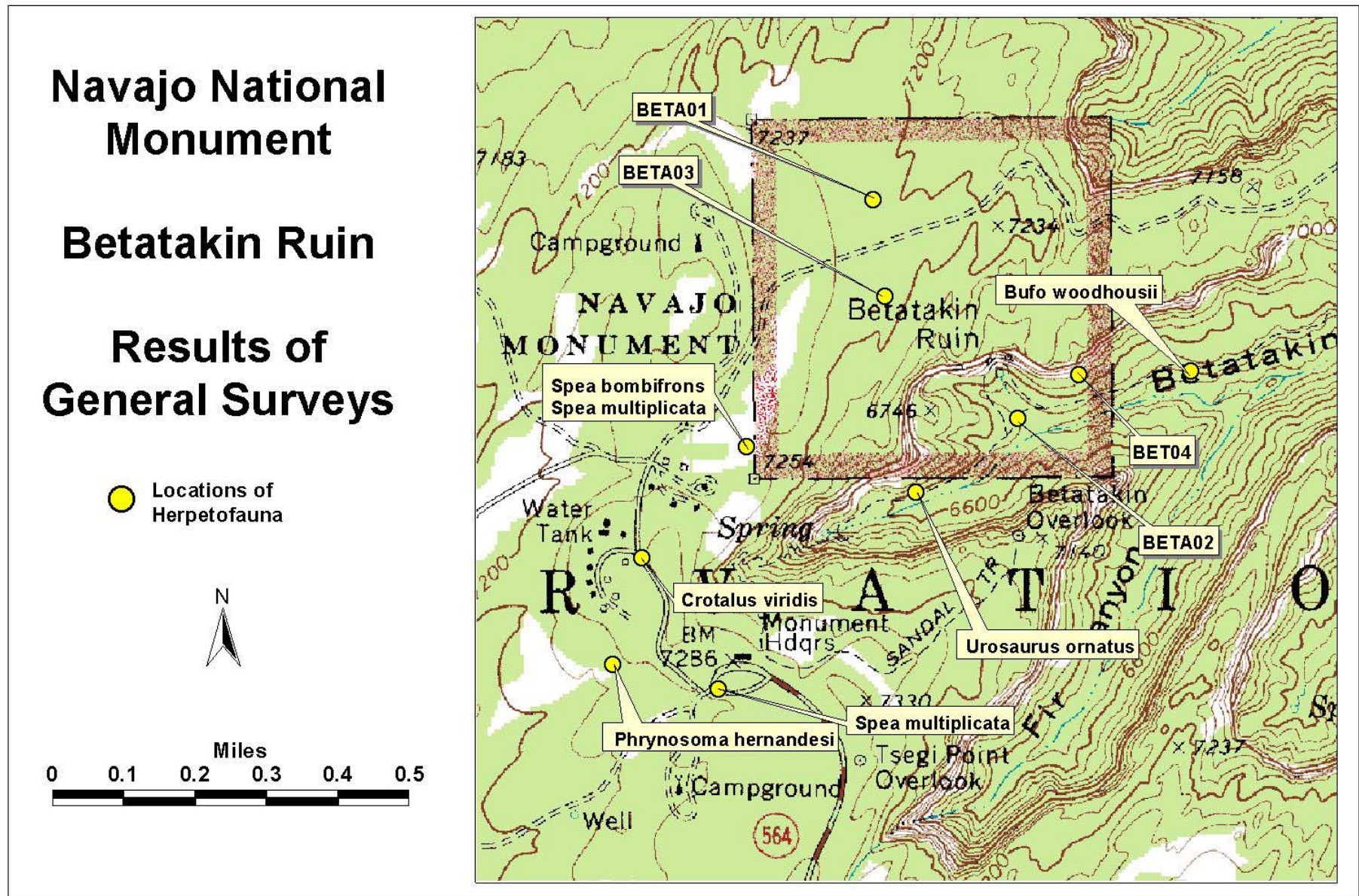


Figure 6. Map of herpetofauna, found by other survey methods, at Inscription House Ruin of Navajo National Monument in 2002 and 2003.

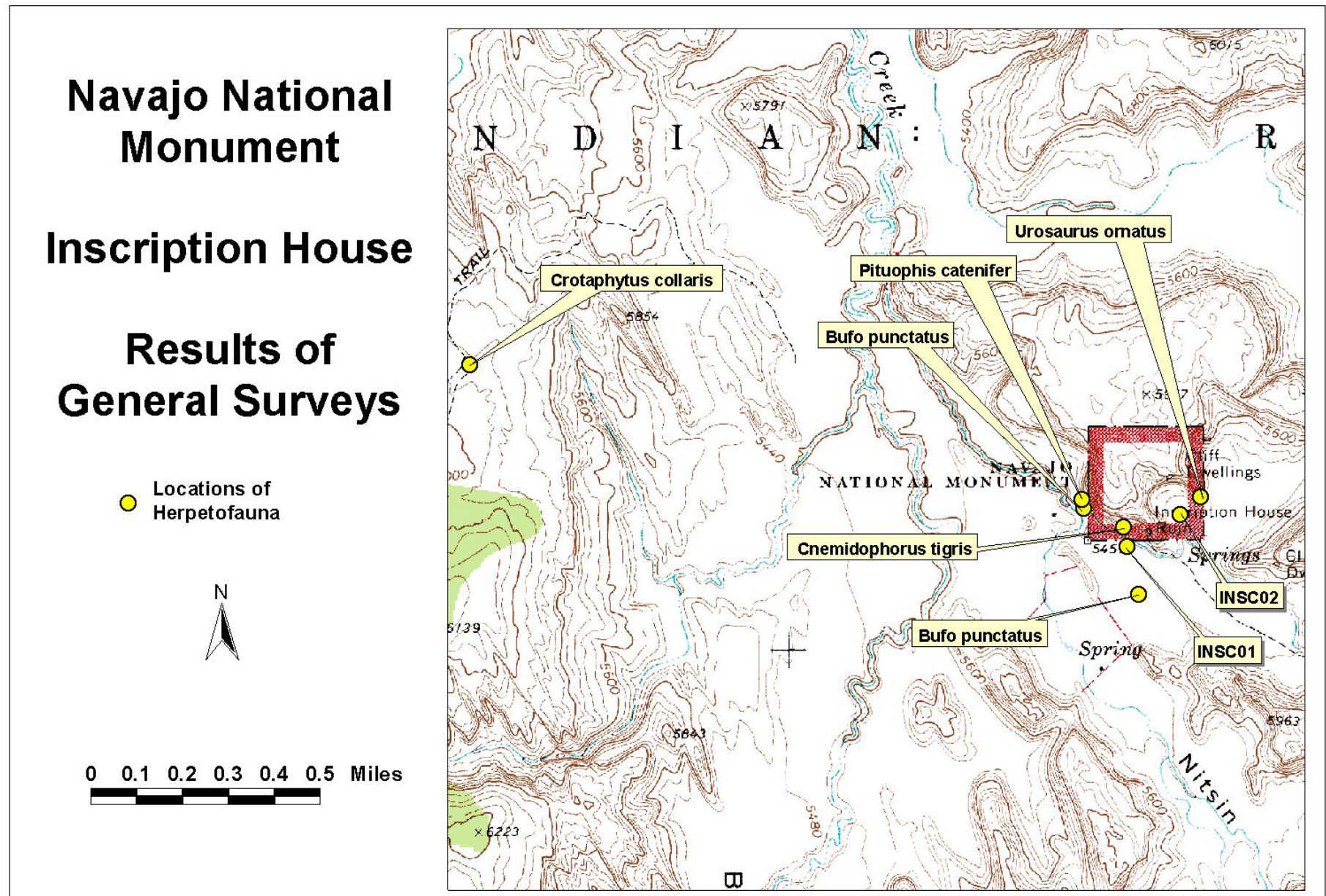


Figure 7. Map of herpetofauna, found by other survey methods, at Keet Seel Ruin of Navajo National Monument in 2002 and 2003.

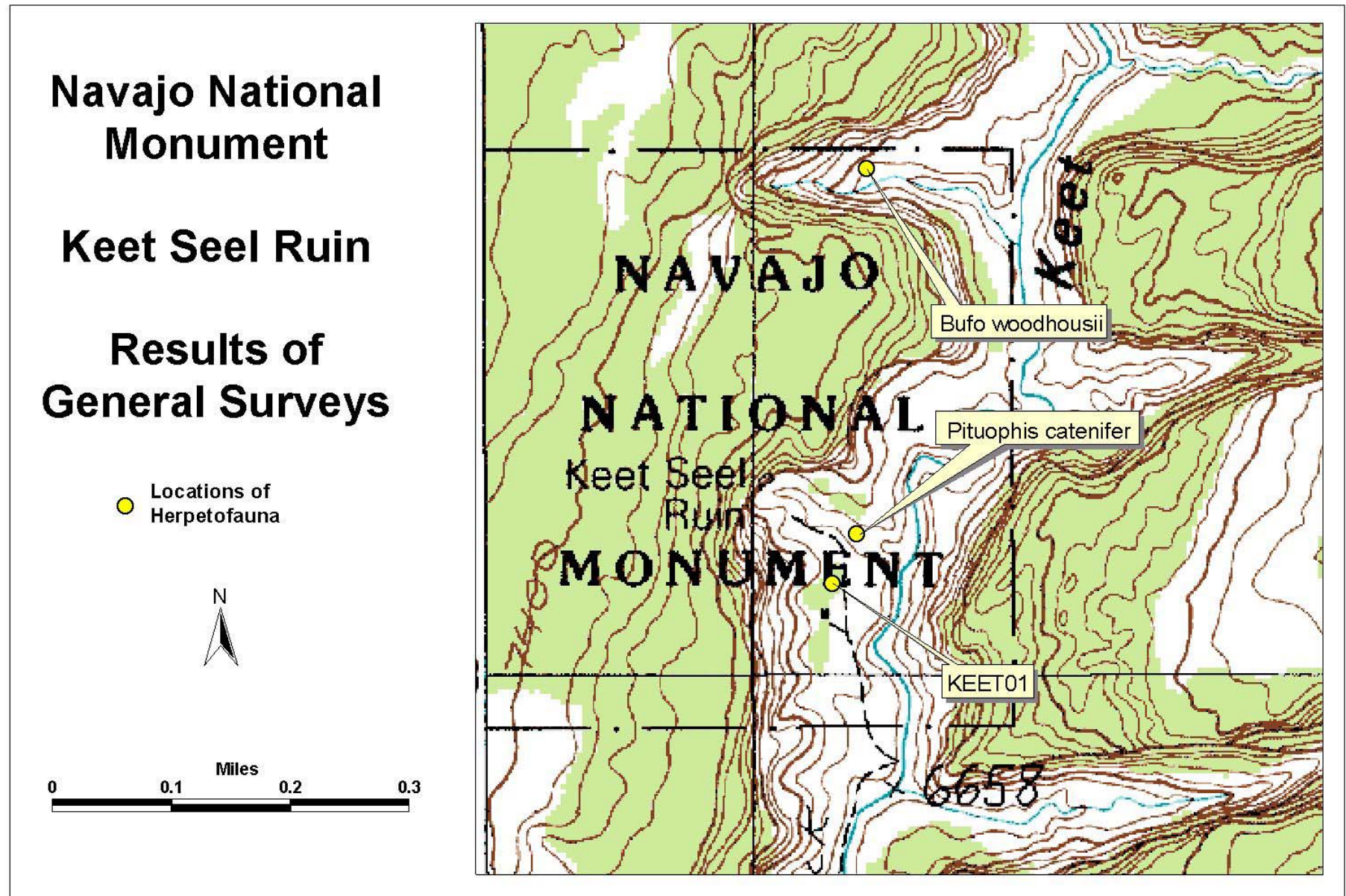


Figure 8. Red-spotted Toad (*Bufo punctatus*) -- adult



Photo: BufPunINSC8-14-02d

Figure 9. Woodhouse's Toad (*Bufo woodhousii*) -- adult



Photo: BufWoolINSC6-25-03b

Figure 10. Northern Leopard Frog (*Rana pipiens*) – adult

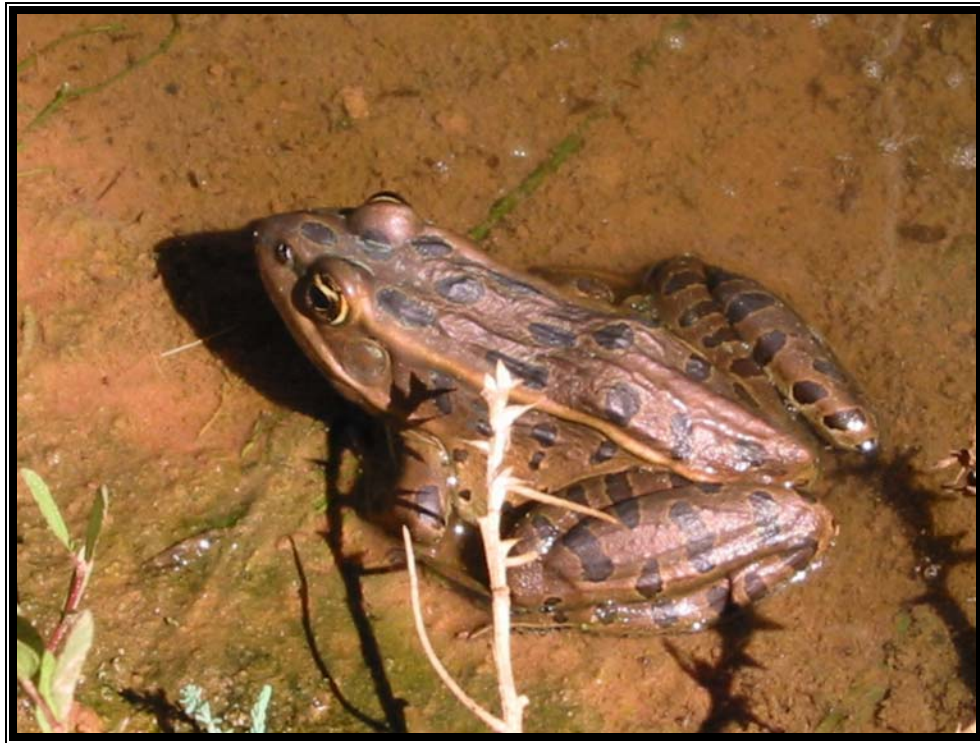


Photo: RanPip01INSC7-25-02c

Figure 11. Plains Spadefoot (*Spea bombifrons*) – adult



Photo: SpeBomBETA7-29-03a

Figure 12. New Mexico Spadefoot (*Spea multiplicata*) – adult



Photo: SpeMul1BETA7-29-03b

Figure 13. Western Whiptail (*Cnemidophorus tigris*) – adult



Photo: CneTigINSC6-26-03f

Figure 14. Plateau Striped Whiptail (*Cnemidophorus velox*) – adult



Photo: CneVelBETA7-30-03

Figure 15. Mountain Short-horned Lizard (*Phrynosoma hernandesi*)

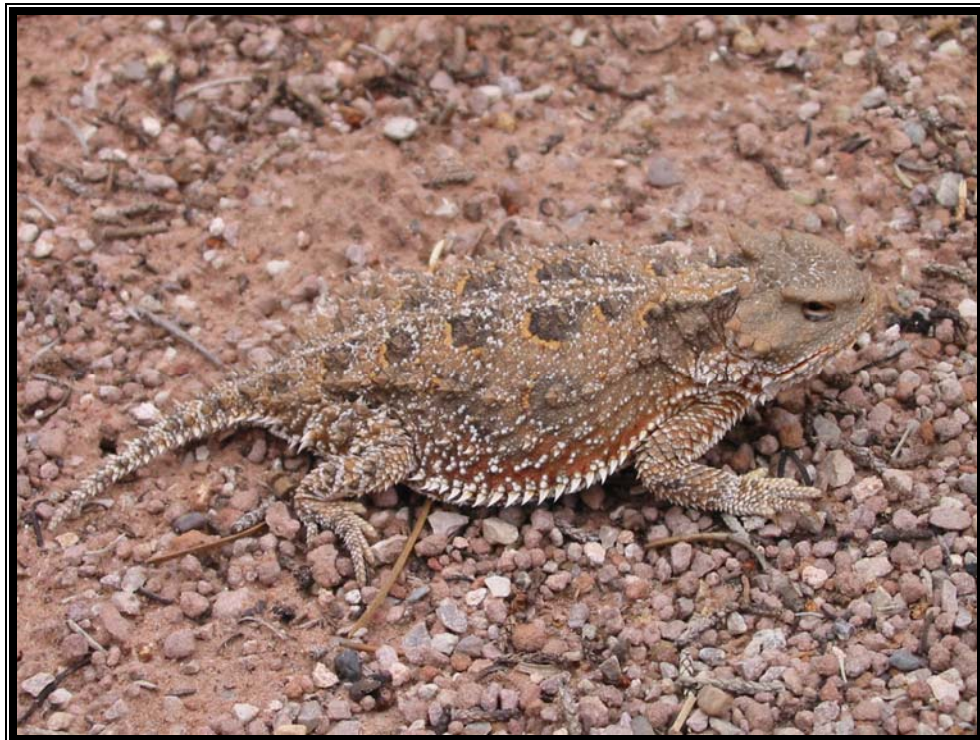


Photo: PhrHerBETA7-29-03

Figure 16. Sagebrush Lizard (*Sceloporus graciosus*) – adult



Photo: SceGra01KEET7-27-02

Figure 17. Eastern Fence Lizard (*Sceloporus undulatus*) – adult



Photo: SceUndBETA6-24-03a

Figure 18. Tree Lizard (*Urosaurus ornatus*) – adult



Photo: UroOrnINSC6-26-03b

Figure 19. Side-blotched Lizard (*Uta stansburiana*) - adult



Photo: UtaStalNSC7-30-03b

Figure 20. Prairie Rattlesnake (*Crotalus viridis*) – adult



Photo: CroVirBETA7-29-03e

Figure 21. Striped Whipsnake (*Masticophis taeniatus*) – adult



Photo: MasTae01INSC6-25-03b

Figure 22. Gopher Snake (*Pituophis catenifer*) – adult



Photo: PitCaeINSC6-26-03f

Figure 23. Desert-scrub Habitat at Plot INSC02



Photo: INSC02hab2

Figure 24. Pinyon-Juniper Habitat at Plot BETA03



Photo: BETA03hab1

Figure 25. Pinyon-Juniper Habitat at BETA04



Photo: BETA04hab2

Figure 26. Pinyon-Juniper / Gambel Oak Habitat at KEET01



Photo: KEET01hab2

Figure 27. Riparian Habitat at BETA02



Photo: BETA02hab2

Figure 28. Riparian Habitat at INSC01



Photo: INSC01hab2

Appendix A. Locations (in UTM Zone 12) and year of survey for seven pre-selected plots for Time-Constrained Surveys of amphibians and reptiles at Navajo National Monument, and the associated corner points (A-D).

ID	Plot Number	Easting	Northing	Year	Habitat
1	BETA01	541364	4060095	2002	Pinyon-Juniper
2	BETA01 A	541417	4060136		
3	BETA01 B	541403	4060037		
4	BETA01 C	541302	4060049		
5	BETA01 D	541317	4060147		
6	BETA02	541691	4059603	2002	Riparian
7	BETA02 A	541741	4059646		
8	BETA02 B	541737	4059546		
9	BETA02 C	541635	4059548		
10	BETA02 D	541639	4059648		
11	BETA03	541391	4059877	2003	Pinyon-Juniper
12	BETA03 A	541396	4059940		
13	BETA03 B	541457	4059864		
14	BETA03 C	541385	4059797		
15	BETA03 D	541322	4059874		
16	BETA04	541827	4059701	2003	Pinyon-Juniper
17	BETA04 A	541862	4059756		
18	BETA04 B	541881	4059658		
19	BETA04 C	541782	4059641		
20	BETA04 D	541767	4059729		
21	INSC01	516085	4058062	2002	Riparian
22	INSC01 A	516072	4058133		
23	INSC01 B	516156	4058080		
24	INSC01 C	516102	4057996		
25	INSC01 D	516017	4058048		

ID	Plot Number	Easting	Northing	Year	Habitat
26	INSC02	516269	4058176	2003	Desert-shrub
27	INSC02 A	516259	4058247		
28	INSC02 B	516339	4058181		
29	INSC02 C	516271	4058104		
30	INSC02 D	516195	4058172		
31	KEET01	545112	4068123	2002	Pinyon-Juniper / Oak
32	KEET01 A	545068	4068176		
33	KEET01 B	545166	4068156		
34	KEET01 C	545144	4068058		
35	KEET01 D	545047	4068078		

Appendix B. Summary of documentary digital photographs Navajo 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	NPS SubUnit	Date Taken	Easting	Northing	Remarks
1	<i>Bufo punctatus</i>	Red-Spotted Toad	BufPunINSC7-24-02a	Inscription House	24 JUL 2002	516062	4058101	Adult calling; TL-52.1mm
2	<i>Bufo punctatus</i>	Red-Spotted Toad	BufPunINSC7-24-02b	Inscription House	24 JUL 2002	516062	4058101	Adult calling; TL-52.1mm
3	<i>Bufo punctatus</i>	Red-Spotted Toad	BufPunINSC7-24-02c	Inscription House	24 JUL 2002	516062	4058101	Adult calling; TL-52.1mm
4	<i>Bufo punctatus</i>	Red-Spotted Toad	BufPunINSC7-24-02d	Inscription House	24 JUL 2002	516062	4058101	Adult calling; TL-52.1mm
5	<i>Bufo punctatus</i>	Red-Spotted Toad	BufPunINSC8-14-02a	Inscription House	14 AUG 2002	515931	4058196	Adult; 3 found, TLs-41.3-44.6mm
6	<i>Bufo punctatus</i>	Red-Spotted Toad	BufPunINSC8-14-02b	Inscription House	14 AUG 2002	515931	4058196	Adult; 3 found, TLs-41.3-44.6mm
7	<i>Bufo punctatus</i>	Red-Spotted Toad	BufPunINSC8-14-02c	Inscription House	14 AUG 2002	515931	4058196	Adult; 3 found, TLs-41.3-44.6mm
8	<i>Bufo punctatus</i>	Red-Spotted Toad	BufPunINSC8-14-02d	Inscription House	14 AUG 2002	515931	4058196	Adult; 3 found, TLs-41.3-44.6mm
9	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWoo01INSC6-11-02a	Inscription House	11 JUN 2002	516085	4058062	Juvenile; on Plot INSC01
10	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWoo01INSC6-11-02b	Inscription House	11 JUN 2002	516085	4058062	Juvenile; on Plot INSC01
11	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWoo01INSC7-25-02a	Inscription House	25 JUL 2002	516085	4058062	Hatchling; TL-7-10mm; on Plot INSC01
12	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWoo01INSC7-25-02b	Inscription House	25 JUL 2002	516085	4058062	Hatchling; TL-7-10mm; on Plot INSC01
13	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWooINSC6-25-03a	Inscription House	25 JUN 2003	515966	4058189	Adult; TL-49.2mm; UTM approx.
14	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWooINSC6-25-03b	Inscription House	25 JUN 2003	515966	4058189	Adult; TL-49.2mm; UTM approx.
15	<i>Bufo</i>	Woodhouse's	BufWooINSC7-24-02a	Inscription	24 JUL	516232	4057414	Adult; TL-51.4 mm

ID	Species	Common Name	Photo (File) Name	NPS SubUnit	Date Taken	Easting	Northing	Remarks
	<i>woodhousii</i>	Toad		House	2002			
16	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWooINSC7-24-02b	Inscription House	24 JUL 2002	516232	4057414	Adult; TL-51.4 mm
17	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWooINSC7-24-02c	Inscription House	24 JUL 2002	516232	4057414	Adult; TL-51.4 mm
18	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWooINSC8-14-02a	Inscription House	14 AUG 2002	515858	4058252	Adult; 17found, 4 were 46.0-71.8mm; UTM approx.
19	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWooINSC8-14-02b	Inscription House	14 AUG 2002	515858	4058252	Adult; 17found, 4 were 46.0-71.8mm; UTM approx.
20	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWooKEET7-27-02	Keet Seel Ruin	27 JUL 2002	544962	4067212	Hatchling; TL-16.2mm
21	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWooKEET8-16-02a	Keet Seel Ruin	16 AUG 2002	545160	4068700	Hatchling; TL-27.2mm; N.edge KEET
22	<i>Bufo woodhousii</i>	Woodhouse's Toad	BufWooKEET8-16-02b	Keet Seel Ruin	16 AUG 2002	545160	4068700	Hatchling; TL-27.2mm; N.edge KEET
23	<i>Cnemidophorus tigris</i>	Western Whiptail	CneTig02INSC5-25-03	Inscription House	25 MAY 2003	516269	4058176	Adult; dead in NPS lockbox; on Plot INSC02
24	<i>Cnemidophorus tigris</i>	Western Whiptail	CneTig02INSC7-30-03a	Inscription House	30 JUL 2003	516269	4058176	Adult; SVL-83.2mm; drowned; on Plot INSC02
25	<i>Cnemidophorus tigris</i>	Western Whiptail	CneTig02INSC7-30-03b	Inscription House	30 JUL 2003	516269	4058176	Adult; SVL-83.2mm; drowned; on Plot INSC02
26	<i>Cnemidophorus tigris</i>	Western Whiptail	CneTig02INSC7-30-03c	Inscription House	30 JUL 2003	516269	4058176	Adult; SVL-83.2mm; drowned; on Plot INSC02
27	<i>Cnemidophorus tigris</i>	Western Whiptail	CneTigINSC6-26-03a	Inscription House	26 JUN 2003	516269	4058176	Adult; on/near INSC02; UTM approx.
28	<i>Cnemidophorus tigris</i>	Western Whiptail	CneTigINSC6-26-03b	Inscription House	26 JUN 2003	516269	4058176	Adult; on/near INSC02; UTM approx.
29	<i>Cnemidophorus tigris</i>	Western Whiptail	CneTigINSC6-26-03c	Inscription House	26 JUN 2003	516269	4058176	Adult; on/near INSC02; UTM approx.
30	<i>Cnemidophorus tigris</i>	Western Whiptail	CneTigINSC6-26-03d	Inscription House	26 JUN 2003	516269	4058176	Adult; on/near INSC02; UTM approx.
31	<i>Cnemidophorus tigris</i>	Western Whiptail	CneTigINSC6-26-03e	Inscription House	26 JUN 2003	516269	4058176	Adult; on/near INSC02; UTM approx.

32	<i>Cnemidophorus tigris</i>	Western Whiptail	CneTigINSC6-26-03f	Inscription House	26 JUN 2003	516269	4058176	Adult; on/near INSC02; UTM approx.
33	<i>Cnemidophorus tigris</i>	Western Whiptail	CneTigINSC6-26-03g	Inscription House	26 JUN 2003	516269	4058176	Adult; on/near INSC02; UTM approx.
34	<i>Cnemidophorus velox</i>	Plateau Striped Whiptail	CneVelBETA7-26-02	Betatakin Ruin	26 JUL 2002	540907	4059353	Adult; near NPS Maintenance Bldg.
35	<i>Cnemidophorus velox</i>	Plateau Striped Whiptail	CneVelBETA7-29-03	Betatakin Ruin	29 JUL 2003	540779	4059050	Adult; near <i>Phr.her.</i> record; UTM approx.
36	<i>Cnemidophorus velox</i>	Plateau Striped Whiptail	CneVelBETA7-30-03	Betatakin Ruin	30 JUL 2003	540779	4059050	Adult; near <i>Phr.her.</i> record; UTM approx.
37	<i>Cnemidophorus velox</i>	Plateau Striped Whiptail	CneVelINSC6-26-03a	Inscription House	26 JUN 2003	516269	4058176	Adult; on/near INSC02; UTM approx.
38	<i>Cnemidophorus velox</i>	Plateau Striped Whiptail	CneVelINSC6-26-03b	Inscription House	26 JUN 2003	516269	4058176	Adult; on/near INSC02; UTM approx.
39	<i>Cnemidophorus velox</i>	Plateau Striped Whiptail	CneVelINSC6-26-03c	Inscription House	26 JUN 2003	516269	4058176	Adult; on/near INSC02; UTM approx.
40	<i>Crotalus viridis</i>	Prairie Rattlesnake	CroVirBETA7-29-03a	Betatakin Ruin	29 JUL 2003	540844	4059289	Adult; crossing road near NPS housing
41	<i>Crotalus viridis</i>	Prairie Rattlesnake	CroVirBETA7-29-03b	Betatakin Ruin	29 JUL 2003	540844	4059289	Adult; crossing road near NPS housing
42	<i>Crotalus viridis</i>	Prairie Rattlesnake	CroVirBETA7-29-03c	Betatakin Ruin	29 JUL 2003	540844	4059289	Adult; crossing road near NPS housing
43	<i>Crotalus viridis</i>	Prairie Rattlesnake	CroVirBETA7-29-03d	Betatakin Ruin	29 JUL 2003	540844	4059289	Adult; crossing road near NPS housing
44	<i>Crotalus viridis</i>	Prairie Rattlesnake	CroVirBETA7-29-03e	Betatakin Ruin	29 JUL 2003	540844	4059289	Adult; crossing road near NPS housing
45	<i>Crotalus viridis</i>	Prairie Rattlesnake	CroVirBETA7-29-03f	Betatakin Ruin	29 JUL 2003	540844	4059289	Adult; crossing road near NPS housing
46	<i>Masticophis taeniatus</i>	Striped Whipsnake	MasTae01INSC6-25-03a	Inscription House	25 JUN 2003	516085	4058062	Adult; hill above wash/below ruin; on Plot INSC01
47	<i>Masticophis taeniatus</i>	Striped Whipsnake	MasTae01INSC6-25-03b	Inscription House	25 JUN 2003	516085	4058062	Adult; hill above wash/below ruin; on Plot INSC01
48	<i>Masticophis taeniatus</i>	Striped Whipsnake	MasTae01INSC6-25-03c	Inscription House	25 JUN 2003	516085	4058062	Adult; hill above wash/below ruin; on Plot INSC01
49	<i>Phrynosoma</i>	Mtn Short-horned	PhrHerBETA7-29-03	Betatakin	29 JUL	540779	4059050	Adult

	<i>hernandesi</i>	Lizard		Ruin	2003			
50	<i>Pituophis catenifer</i>	Gopher Snake	PitCaeINSC6-26-03a	Inscription House	26 JUN 2003	515927	4058228	Adult; in wash downstream of Plot INSC01
51	<i>Pituophis catenifer</i>	Gopher Snake	PitCaeINSC6-26-03b	Inscription House	26 JUN 2003	515927	4058228	Adult; in wash downstream of Plot INSC01
52	<i>Pituophis catenifer</i>	Gopher Snake	PitCaeINSC6-26-03c	Inscription House	26 JUN 2003	515927	4058228	Adult; in wash downstream of Plot INSC01
53	<i>Pituophis catenifer</i>	Gopher Snake	PitCaeINSC6-26-03d	Inscription House	26 JUN 2003	515927	4058228	Adult; in wash downstream of Plot INSC01
54	<i>Pituophis catenifer</i>	Gopher Snake	PitCaeINSC6-26-03e	Inscription House	26 JUN 2003	515927	4058228	Adult; in wash downstream of Plot INSC01
55	<i>Pituophis catenifer</i>	Gopher Snake	PitCaeINSC6-26-03f	Inscription House	26 JUN 2003	515927	4058228	Adult; in wash downstream of Plot INSC01
56	<i>Rana pipiens</i>	Northern Leopard Frog	RanPip01INSC6-11-02a	Inscription House	11 JUN 2002	516085	4058062	Adult; springfed pool below ruin; on Plot INSC01
57	<i>Rana pipiens</i>	Northern Leopard Frog	RanPip01INSC6-11-02b	Inscription House	11 JUN 2002	516085	4058062	Adult; springfed pool below ruin; on Plot INSC01
58	<i>Rana pipiens</i>	Northern Leopard Frog	RanPip01INSC6-11-02c	Inscription House	11 JUN 2002	516085	4058062	Adult; springfed pool below ruin; on Plot INSC01
59	<i>Rana pipiens</i>	Northern Leopard Frog	RanPip01INSC6-11-02d	Inscription House	11 JUN 2002	516085	4058062	Adult; springfed pool below ruin; on Plot INSC01
60	<i>Rana pipiens</i>	Northern Leopard Frog	RanPip01INSC6-26-03a	Inscription House	26 JUN 2003	516085	4058062	Adult; springfed pool below ruin; on Plot INSC01
61	<i>Rana pipiens</i>	Northern Leopard Frog	RanPip01INSC6-26-03b	Inscription House	26 JUN 2003	516085	4058062	Adult; springfed pool below ruin; on Plot INSC01
62	<i>Rana pipiens</i>	Northern Leopard Frog	RanPip01INSC7-25-02a	Inscription House	25 JUL 2002	516085	4058062	Adult; springfed pool below ruin; on Plot INSC01
63	<i>Rana pipiens</i>	Northern Leopard Frog	RanPip01INSC7-25-02b	Inscription House	25 JUL 2002	516085	4058062	Adult; springfed pool below ruin; on Plot INSC01
64	<i>Rana pipiens</i>	Northern Leopard Frog	RanPip01INSC7-25-02c	Inscription House	25 JUL 2002	516085	4058062	Adult; springfed pool below ruin; on Plot INSC01
65	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra01BETA6-10-02a	Betatakin Ruin	10 JUN 2002	541364	4060095	Juvenile; on Plot BETA01
66	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra01BETA6-10-02b	Betatakin Ruin	10 JUN 2002	541364	4060095	Juvenile; on Plot BETA01

67	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra01KEET6-12-02	Keet Seel Ruin	12 JUN 2002	545112	4068123	Juvenile; on Plot KEET01
68	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra01KEET7-27-02	Keet Seel Ruin	27 JUL 2002	545112	4068123	Adult; on Plot KEET01
69	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra02BETA6-11-02a	Betatakin Ruin	11 JUN 2002	541364	4060095	Adult; Female; SVL-57.4mm; on Plot BETA02
70	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra02BETA6-11-02b	Betatakin Ruin	11 JUN 2002	541364	4060095	Adult; Female; SVL-57.4mm; on Plot BETA02
71	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra02BETA6-11-02c	Betatakin Ruin	11 JUN 2002	541364	4060095	Adult; Male; SVL-59.7mm; on Plot BETA02
72	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra02BETA6-11-02d	Betatakin Ruin	11 JUN 2002	541364	4060095	Adult; Male; SVL-59.7mm; on Plot BETA02
73	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra02BETA6-11-02e	Betatakin Ruin	11 JUN 2002	541364	4060095	Adult; Male; SVL-59.7mm; on Plot BETA02
74	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra03BETA6-17-03	Betatakin Ruin	17 JUN 2003	541391	4059877	Adult; on Plot BETA03
75	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra03BETA9-5-03a	Betatakin Ruin	05 SEP 2003	541391	4059877	Hatchling; on Plot BETA03
76	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra03BETA9-5-03b	Betatakin Ruin	05 SEP 2003	541391	4059877	Hatchling; on Plot BETA03
77	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGra03BETA9-5-03c	Betatakin Ruin	05 SEP 2003	541391	4059877	Hatchling; on Plot BETA03
78	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGraBETA6-13-02a	Betatakin Ruin	13 JUN 2002	541040	4059826	Adult; SVL-58.8mm, collected; at Rear Campground
79	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGraBETA6-13-02b	Betatakin Ruin	13 JUN 2002	541040	4059826	Adult; SVL-58.8mm, collected; at Rear Campground
80	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGraBETA6-13-02c	Betatakin Ruin	13 JUN 2002	541040	4059826	Adult; SVL-58.8mm, collected; at Rear Campground
81	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGraBETA7-26-02a	Betatakin Ruin	26 JUL 2002	0	0	Adult; exact location not recorded
82	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGraBETA7-26-02b	Betatakin Ruin	26 JUL 2002	0	0	Adult; exact location not recorded

83	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGraBETA7-26-02c	Betatakin Ruin	26 JUL 2002	0	0	Adult; exact location not recorded
84	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGraBETA7-30-03a	Betatakin Ruin	30 JUL 2003	0	0	Adult; exact location not recorded
85	<i>Sceloporus graciosus</i>	Sagebrush Lizard	SceGraBETA7-30-03b	Betatakin Ruin	30 JUL 2003	0	0	Adult; exact location not recorded
86	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUnd01INSC8-14-02a	Inscription House	14 AUG 2002	516085	4058062	Adult; on Plot INSC01
87	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUnd01INSC8-14-02b	Inscription House	14 AUG 2002	516085	4058062	Adult; on Plot INSC01
88	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUnd01INSC8-14-02c	Inscription House	14 AUG 2002	516085	4058062	Adult; on Plot INSC01
89	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUnd01KEET6-12-02	Keet Seel Ruin	12 JUN 2002	545112	4068123	Juvenile; on Plot KEET01
90	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUnd01KEET7-27-02a	Keet Seel Ruin	27 JUL 2002	545112	4068123	Adult; on Plot KEET01
91	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUnd01KEET7-27-02b	Keet Seel Ruin	27 JUL 2002	545112	4068123	Adult; on Plot KEET01
92	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUnd01KEET7-27-02c	Keet Seel Ruin	27 JUL 2002	545112	4068123	Adult; on Plot KEET01
93	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUnd01KEET7-27-02a	Keet Seel Ruin	27 JUL 2002	545112	4068123	Adult; on Plot KEET01
94	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUnd01KEET8-16-02a	Keet Seel Ruin	16 AUG 2002	545112	4068123	Hatchling; SVL-30.6mm; on Plot KEET01
95	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUnd01KEET8-16-02b	Keet Seel Ruin	16 AUG 2002	545112	4068123	Adult;; on Plot KEET01
96	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUnd01KEET8-16-02c	Keet Seel Ruin	16 AUG 2002	545112	4068123	Adult; on Plot KEET01
97	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUnd01KEET8-16-02d	Keet Seel Ruin	16 AUG 2002	545112	4068123	Adult; on Plot KEET01
98	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUnd01KEET8-16-02e	Keet Seel Ruin	16 AUG 2002	545112	4068123	Hatchling; SVL-27.5mm; on Plot KEET01
99	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUnd02INSC6-25-03	Inscription House	25 JUN 2003	516269	4058176	Juvenile?; on Plot INSC02
100	<i>Sceloporus</i>	Eastern Fence	SceUnd02INSC6-26-03a	Inscription	26 JUN	516269	4058176	Juvenile?; on Plot INSC02

	<i>undulatus</i>	Lizard		House	2003			
101	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUnd02INSC6-26-03b	Inscription House	26 JUN 2003	516269	4058176	Juvenile?; on Plot INSC02
102	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndBETA6-11-02a	Betatakin Ruin	11 JUN 2002	542784	4060212	Adult; Male; SVL-62.2; Trail to BETA ruins
103	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndBETA6-11-02b	Betatakin Ruin	11 JUN 2002	0	0	Adult; Male; SVL-62.2; Trail to BETA ruins
104	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndBETA6-11-02c	Betatakin Ruin	11 JUN 2002	0	0	Adult; Male; SVL-62.2; Trail to BETA ruins
105	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndBETA6-11-02d	Betatakin Ruin	11 JUN 2002	0	0	Adult; Male; SVL-62.2; Trail to BETA ruins
106	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndBETA6-24-03a	Betatakin Ruin	24 JUN 2003	0	0	Adult; exact location not recorded
107	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndBETA6-24-03b	Betatakin Ruin	24 JUN 2003	0	0	Adult; exact location not recorded
108	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndBETA7-26-02a	Betatakin Ruin	26 JUL 2003	0	0	Juvenile; exact location not recorded
109	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndBETA7-26-02b	Betatakin Ruin	26 JUL 2003	0	0	Juvenile; exact location not recorded
110	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndBETA7-26-02c	Betatakin Ruin	26 JUL 2003	0	0	Juvenile; exact location not recorded
111	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndBETA9-4-03	Betatakin Ruin	04 SEP 2003	541364	4060095	Juvenile; at Restroom Facility at ruins & BETA02
112	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndINSC9-3-03a	Inscription House	03 SEP 2003	516341	4058237	Adult; base of cliff NE of INSC02; UTM approx.
113	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndINSC9-3-03b	Inscription House	03 SEP 2003	516341	4058237	Adult; base of cliff NE of INSC02; UTM approx.
114	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndINSC9-3-03c	Inscription House	03 SEP 2003	516341	4058237	Adult; base of cliff NE of INSC02; UTM approx.
115	<i>Sceloporus undulatus</i>	Eastern Fence Lizard	SceUndINSC9-3-03d	Inscription House	03 SEP 2003	516341	4058237	Adult; base of cliff NE of INSC02; UTM approx.
116	<i>Spea</i> sp.	larval spadefoot	SpealarvaBETA7-29-03	Betatakin Ruin	29 JUL 2003	541081	4059539	Larva; in small pool at earthen dam
117	<i>Spea bombifrons</i>	Plains Spadefoot	SpeBombBETA7-29-03a	Betatakin Ruin	29 JUL 2003	541081	4059539	Adult; on sandstone bedrock near breeding pool

118	<i>Spea bombifrons</i>	Plains Spadefoot	SpeBombBETA7-29-03b	Betatakin Ruin	29 JUL 2003	541081	4059539	Adult; on sandstone bedrock near breeding pool
119	<i>Spea bombifrons</i>	Plains Spadefoot	SpeBombBETA7-29-03c	Betatakin Ruin	29 JUL 2003	541081	4059539	Adult; on sandstone bedrock near breeding pool
120	<i>Spea bombifrons</i>	Plains Spadefoot	SpeBombBETA7-29-03d	Betatakin Ruin	29 JUL 2003	541081	4059539	Adult; on sandstone bedrock near breeding pool
121	<i>Spea multiplicata</i>	New Mexico Spadefoot	SpeMul02INSC7-30-03a	Inscription House	30 JUL 2003	516269	4058176	Adult; TL46.6mm; drowned; on Plot INSC02
122	<i>Spea multiplicata</i>	New Mexico Spadefoot	SpeMul02INSC7-30-03b	Inscription House	30 JUL 2003	516269	4058176	Adult; TL46.6mm; drowned; on Plot INSC02
123	<i>Spea multiplicata</i>	New Mexico Spadefoot	SpeMul1BETA7-29-03a	Betatakin Ruin	29 JUL 2003	541067	4059508	Adult; on sandstone bedrock near breeding pool
124	<i>Spea multiplicata</i>	New Mexico Spadefoot	SpeMul1BETA7-29-03b	Betatakin Ruin	29 JUL 2003	541067	4059508	Adult; on sandstone bedrock near breeding pool
125	<i>Spea multiplicata</i>	New Mexico Spadefoot	SpeMul1BETA7-29-03c	Betatakin Ruin	29 JUL 2003	541067	4059508	Adult; on sandstone bedrock near breeding pool
126	<i>Spea multiplicata</i>	New Mexico Spadefoot	SpeMul1BETA7-29-03d	Betatakin Ruin	29 JUL 2003	541067	4059508	Adult; on sandstone bedrock near breeding pool
127	<i>Spea multiplicata</i>	New Mexico Spadefoot	SpeMul1BETA7-29-03e	Betatakin Ruin	29 JUL 2003	541067	4059508	Adult; on sandstone bedrock near breeding pool
128	<i>Spea multiplicata</i>	New Mexico Spadefoot	SpeMul1BETA7-29-03f	Betatakin Ruin	29 JUL 2003	541067	4059508	Adult; on sandstone bedrock near breeding pool
129	<i>Spea multiplicata</i>	New Mexico Spadefoot	SpeMul2BETA7-29-03a	Betatakin Ruin	29 JUL 2003	541067	4059508	Adult; on sandstone bedrock near breeding pool
130	<i>Spea multiplicata</i>	New Mexico Spadefoot	SpeMul2BETA7-29-03b	Betatakin Ruin	29 JUL 2003	541067	4059508	Adult; on sandstone bedrock near breeding pool
131	<i>Spea multiplicata</i>	New Mexico Spadefoot	SpeMul2BETA7-29-03c	Betatakin Ruin	29 JUL 2003	541067	4059508	Adult; on sandstone bedrock near breeding pool
132	<i>Spea multiplicata</i>	New Mexico Spadefoot	SpeMul2BETA7-29-03d	Betatakin Ruin	29 JUL 2003	541067	4059508	Adult; on sandstone bedrock near breeding pool
133	<i>Spea multiplicata</i>	New Mexico Spadefoot	SpeMul3BETA7-29-03a	Betatakin Ruin	29 JUL 2003	541016	4058995	Adult; in NPS HQ parking lot
134	<i>Spea multiplicata</i>	New Mexico Spadefoot	SpeMul3BETA7-29-03b	Betatakin Ruin	29 JUL 2003	541016	4058995	Adult; in NPS HQ parking lot
135	<i>Urosaurus</i>	Tree Lizard	UroOrn01INSC7-25-02a	Inscription	25 JUL	516085	4058062	Adult; on cottonwood over

	<i>ornatus</i>			House	2002			Rana pool; on Plot INSC01
136	<i>Urosaurus ornatus</i>	Tree Lizard	UroOrnINSC6-26-03a	Inscription House	26 JUN 2003	516341	4058237	Adult; on base of cliff just NE of INSC02
137	<i>Urosaurus ornatus</i>	Tree Lizard	UroOrnINSC6-26-03b	Inscription House	26 JUN 2003	516341	4058237	Adult; on base of cliff just NE of INSC02
138	<i>Urosaurus ornatus</i>	Tree Lizard	UroOrnINSC6-26-03c	Inscription House	26 JUN 2003	516341	4058237	Adult; on base of cliff just NE of INSC02
139	<i>Uta stansburiana</i>	Side-blotched Lizard	UtaSta01INSC6-11-02a	Inscription House	11 JUN 2002	516085	4058062	Adult; on Plot INSC01
140	<i>Uta stansburiana</i>	Side-blotched Lizard	UtaSta01INSC6-11-02b	Inscription House	11 JUN 2002	516085	4058062	Adult; on Plot INSC01
141	<i>Uta stansburiana</i>	Side-blotched Lizard	UtaSta01INSC6-11-02c	Inscription House	11 JUN 2002	516085	4058062	Adult; on Plot INSC01
142	<i>Uta stansburiana</i>	Side-blotched Lizard	UtaSta01INSC6-11-02d	Inscription House	11 JUN 2002	516085	4058062	Adult; on Plot INSC01
143	<i>Uta stansburiana</i>	Side-blotched Lizard	UtaSta02INSC7-30-03a	Inscription House	30 JUL 2003	516269	4058176	Hatchling; boulder pile on edge of Plot INSC02
144	<i>Uta stansburiana</i>	Side-blotched Lizard	UtaSta02INSC7-30-03b	Inscription House	30 JUL 2003	516269	4058176	Hatchling; boulder pile on edge of Plot INSC02
145	<i>Uta stansburiana</i>	Side-blotched Lizard	UtaSta04BETA6-24-03	Betatakin Ruin	24 JUN 2003	541827	4059701	Adult; on Plot BETA04
146	<i>Uta stansburiana</i>	Side-blotched Lizard	UtaStaINSC6-26-03	Inscription House	26 JUN 2003	516259	4058247	Adult; base of cliff below ruins at INSC02
147	<i>Uta stansburiana</i>	Side-blotched Lizard	UtaStaINSC7-30-03a	Inscription House	30 JUL 2003	516390	4058445	Adult; base of cliff NE of INSC02; UTM approx.
148	<i>Uta stansburiana</i>	Side-blotched Lizard	UtaStaINSC7-30-03b	Inscription House	30 JUL 2003	516390	4058445	Adult; base of cliff NE of INSC02; UTM approx.
149	<i>Uta stansburiana</i>	Side-blotched Lizard	UtaStaINSC7-30-03c	Inscription House	30 JUL 2003	516390	4058445	Adult; base of cliff NE of INSC02; UTM approx.
150	<i>Uta stansburiana</i>	Side-blotched Lizard	UtaStaINSC7-30-03d	Inscription House	30 JUL 2003	516390	4058445	Adult; base of cliff NE of INSC02; UTM approx.
151	<i>Uta stansburiana</i>	Side-blotched Lizard	UtaStaINSC9-3-03	Inscription House	03 SEP 2003	516390	4058445	Adult; base of cliff NE of INSC02; UTM approx.
152	habitat		BETA01hab1	Betatakin Ruin	10 JUN 2002	0	0	habitat photo of plot BETA01

153	habitat		BETA01hab2	Betatakin Ruin	10 JUN 2002	0	0	habitat photo of plot BETA01
154	habitat		BETA02hab1	Betatakin Ruin	11 JUN 2002	0	0	habitat photo of plot BETA02
155	habitat		BETA02hab2	Betatakin Ruin	11 JUN 2002	0	0	habitat photo of plot BETA02
156	habitat		BETA03hab1	Betatakin Ruin	17 JUN 2003	0	0	habitat photo of plot BETA03
157	habitat		BETA03hab2	Betatakin Ruin	17 JUN 2003	0	0	habitat photo of plot BETA03
158	habitat		BETA04hab1	Betatakin Ruin	24 JUN 2003	0	0	habitat photo of plot BETA04
159	habitat		BETA04hab2	Betatakin Ruin	24 JUN 2003	0	0	habitat photo of plot BETA04
160	habitat		INSC01hab1	Inscription House	11 JUN 2002	0	0	habitat photo of plot INSC01
161	habitat		INSC01hab2	Inscription House	11 JUN 2002	0	0	habitat photo of plot INSC01
162	habitat		INSC02hab1	Inscription House	25 JUN 2003	0	0	habitat photo of plot INSC02
163	habitat		INSC02hab2	Inscription House	25 JUN 2003	0	0	habitat photo of plot INSC02
164	habitat		KEET01hab1	Keet Seel Ruin	12 JUN 2002	0	0	habitat photo of plot KEET01
165	habitat		KEET01hab2	Keet Seel Ruin	12 JUN 2002	0	0	habitat photo of plot KEET01
166	habitat		OverlookBETA	Betatakin Ruin	28 JUL 2002	0	0	Betatakin Canyon
167	habitat		RaPiINSC01hab1	Inscription House	11 JUN 2002	0	0	habitat photo of <i>Rana pipiens</i> pool at INSC01
168	habitat		RaPiINSC01hab2	Inscription House	11 JUN 2002	0	0	habitat photo of <i>Rana pipiens</i> pool at INSC01
169	habitat		SpeMulpondBETA7-29-03	Betatakin Ruin	29 JUL 2003	0	0	habitat photo of <i>Spea</i> pond at Betatakin
170	habitat		SpeMulpondINSC7-30-03	Inscription House	30 JUL 2003	0	0	habitat photo of <i>Spea</i> pond at INSC02

Appendix C. Summary of documented locations of amphibians and reptiles at Navajo National Monument in 2002-3, including date discovered and UTM data (Zone 12).

ID	Species	No. Plots	Other Method	NPS Unit-sub	First Date	Plot No	Easting	Northing
1	<i>Bufo punctatus</i>	0	2	NAVA - INSC	24 JUL 2002	n/a	516124	4057896
2	<i>Bufo punctatus</i>	0	2	NAVA - INSC	14 AUG 2002	n/a	515931	4058196
3	<i>Bufo woodhousii</i>	1	2	NAVA - INSC	11 JUN 2002	INSC01	516085	4058062
4	<i>Bufo woodhousii</i>	1	2	NAVA - KEET	14 AUG 2002	n/a	545160	4068700
5	<i>Bufo woodhousii</i>	1	2	NAVA - BETA	15 AUG 2002	n/a	542079	4059709
6	<i>Cnemidophorus tigris</i>	1	1	NAVA - INSC	25 JUN 2003	INSC02	516269	4058176
7	<i>Cnemidophorus tigris</i>	1	1	NAVA - INSC	25 JUN 2003	n/a	516072	4058133
8	<i>Cnemidophorus velox</i>	7	n/a	NAVA - BETA	11 JUN 2002	BETA02	541691	4059603
9	<i>Cnemidophorus velox</i>	7	n/a	NAVA - INSC	11 JUN 2002	INSC01	516085	4058062
10	<i>Cnemidophorus velox</i>	7	n/a	NAVA - KEET	27 JUL 2002	KEET01	545112	4068123
11	<i>Cnemidophorus velox</i>	7	n/a	NAVA - BETA	15 AUG 2002	BETA01	541364	4060095
12	<i>Cnemidophorus velox</i>	7	n/a	NAVA - BETA	17 JUN 2003	BETA03	541391	4059877
13	<i>Cnemidophorus velox</i>	7	n/a	NAVA - INSC	25 JUN 2003	INSC02	516269	4058176
14	<i>Cnemidophorus velox</i>	7	n/a	NAVA - BETA	04 SEP 2003	BETA04	541827	4059701
15	<i>Crotalus viridis</i>	0	1	NAVA - BETA	29 JUL 2003	n/a	540844	4059289
16	<i>Crotaphytus collaris</i>	0	1	NAVA - INSC	30 JUL 2003	Outside NAVA	513777	4058699
18	<i>Masticophis taeniatus</i>	1	0	NAVA - INSC	11 JUN 2002	INSC01	516085	4058062
19	<i>Phrynosoma hernandesi</i>	0	1	NAVA - BETA	29 JUL 2003	n/a	540779	4059050
20	<i>Pituophis catenifer</i>	0	2	NAVA - KEET	23 JUN 2003	n/a	545146	4068192
21	<i>Pituophis catenifer</i>	0	2	NAVA - INSC	26 JUN 2003	n/a	515927	4058228
22	<i>Rana pipiens</i>	1	0	NAVA - INSC	11 JUN 2002	INSC01	516085	4058062

ID	Species	No. Plots	Other Method	NPS Unit-sub	First Date	Plot No	Easting	Northing
23	<i>Sceloporus graciosus</i>	6	n/a	NAVA - BETA	10 JUN 2002	BETA01	541364	4060095
24	<i>Sceloporus graciosus</i>	6	n/a	NAVA - BETA	11 JUN 2002	BETA02	541691	4059603
25	<i>Sceloporus graciosus</i>	6	n/a	NAVA - INSC	11 JUN 2002	INSC01	516085	4058062
26	<i>Sceloporus graciosus</i>	6	n/a	NAVA - KEET	12 JUN 2002	KEET01	545112	4068123
27	<i>Sceloporus graciosus</i>	6	n/a	NAVA - BETA	17 JUN 2003	BETA03	541391	4059877
28	<i>Sceloporus graciosus</i>	6	n/a	NAVA - INSC	25 JUN 2003	INSC02	516269	4058176
29	<i>Sceloporus undulatus</i>	6	n/a	NAVA - BETA	10 JUN 2002	BETA01	541364	4060095
30	<i>Sceloporus undulatus</i>	6	n/a	NAVA - BETA	11 JUN 2002	BETA02	541691	4059603
31	<i>Sceloporus undulatus</i>	6	n/a	NAVA - INSC	11 JUN 2002	INSC01	516085	4058062
32	<i>Sceloporus undulatus</i>	6	n/a	NAVA - KEET	12 JUN 2002	KEET01	545112	4068123
33	<i>Sceloporus undulatus</i>	6	n/a	NAVA - BETA	24 JUN 2003	BETA04	541827	4059701
34	<i>Sceloporus undulatus</i>	6	n/a	NAVA - INSC	25 JUN 2003	INSC02	516269	4058176
35	<i>Spea bombifrons</i>	0	1	NAVA - BETA	29 JUL 2003	n/a	541081	4059539
36	<i>Spea multiplicata</i>	1	2	NAVA - BETA	29 JUL 2003	n/a	541081	4059539
37	<i>Spea multiplicata</i>	1	2	NAVA - BETA	29 JUL 2003	n/a	541016	4058995
38	<i>Spea multiplicata</i>	1	2	NAVA - INSC	30 JUL 2003	INSC02	516269	4058176
39	<i>Urosaurus ornatus</i>	1	2	NAVA - INSC	25 JUL 2002	INSC01	516085	4058062
40	<i>Urosaurus ornatus</i>	1	2	NAVA - INSC	26 JUN 2003	n/a	516341	4058237
41	<i>Urosaurus ornatus</i>	1	2	NAVA - BETA	31 JUL 2003	n/a	541461	4059437
42	<i>Uta stansburiana</i>	3	n/a	NAVA - INSC	11 JUN 2002	INSC01	516085	4058062
43	<i>Uta stansburiana</i>	3	n/a	NAVA - BETA	24 JUN 2002	BETA04	541827	4059701
47	<i>Uta stansburiana</i>	3	n/a	NAVA - INSC	25 JUN 2003	INSC02	516269	4058176

Appendix D. Specimens collected and corresponding pertinent information during 2002 – 03 at Navajo National Monument.

Masticophis taeniatus (shed skin of adult); Coconino Co., Navajo Nat. Monum., Inscription House Ruin, under rock just below Insc.House Ruin; elev. 5460 ft.; 11-VI-2002, coll./prep.: D.Mikesic; UTM: 12S 516102 4051996.

Masticophis taeniatus (shed skin of adult); Coconino Co., Navajo Nat. Monum., Inscription House Ruin, under rock just below Insc.House Ruin; elev. 5460 ft.; 25-VII-2002, coll./prep.: D.Mikesic; UTM: 12S 516102 4051996.

Masticophis taeniatus (shed skin of adult); Coconino Co., Navajo Nat. Monum., Inscription House Ruin, in shrub just below Insc.House Ruin; elev. 5460 ft.; 25-VI-2003, coll./prep.: D.Mikesic; UTM: 12S 516102 4051996.

Pituophis catenifer (shed skin of adult); Navajo Co., Navajo Nat. Monum., Keet Seel Ruin, on rock hillside just east of ruins, elev. 6800 ft.; 23-VI-2003, coll./prep.: D.Mikesic; UTM: 12S 545146 4068192.

Sceloporus graciosus (adult); Navajo Co., Navajo Nat. Monument, Betatakin Ruin, northern campground of NPS complex, 0.6 mi. north of NPS Hdqs., elev. 7280 ft.; 13-VI-2002, coll./prep.: D.Mikesic; SVL 58.8 mm, TL 99.3 mm; UTM: 12S 541040 4059826.

Sceloporus undulatus (adult); Navajo Co., Navajo Nat. Monum., in Betatakin Canyon, 0.1 mi. south of main ruin, elev. 6580 ft.; 15-VIII-2002, coll./prep.: D.Mikesic; SVL 62.1 mm, TL 153.8 mm; UTM: 12S 541591 4059492.