National Park Service
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Natural Resource Program Center

Herpetological Inventory of City of Rocks National Reserve 2001

Upper Columbia Basin Network

Natural Resource Technical Report NPS/UCBN/NRTR—2009/200

ON THE COVER
City of Rocks National Reserve vista
NPS Photo

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Executive Summary

The mission of the National Park Service is “to conserve unimpaired the natural and cultural resources and values of the national park system for the enjoyment of this and future generations” (National Park Service 1999). To uphold this goal, the Director of the NPS approved the Natural Resource Challenge to encourage national parks to focus on the preservation of the nation’s natural heritage through science, natural resource inventories, and expanded resource monitoring (National Park Service 1999). Through the Challenge, 270 parks in the national park system were organized into 32 inventory and monitoring networks.

The Upper Columbia Basin Network (UCBN) has identified 14 priority park vital signs, indicators of ecosystem health, which represent a broad suite of ecological phenomena operating across multiple temporal and spatial scales. Our intent has been to develop a balanced and integrated suite of vital signs that meets the needs of current park management, and that also will accommodate unanticipated environmental conditions and management questions in the future.

The primary objective of this inventory study was to complete field surveys throughout the City of Rocks National Reserve, Idaho with the goal of documenting 90% of all amphibian and reptile species that potentially occur within the park. A second objective was to collect inventory information utilizing a study design which will allow information to be incorporated into a long-term monitoring program. A third objective was to develop distribution maps in a GIS format for Species of Special Concern or Species of Interest to resource mangers in the park. These data will be used to develop current inventory lists for both areas and will also provide baseline data for a region of the state where formal herpetological surveys and observations are lacking. These data will be incorporated into the Northern Intermountain Herpetological Database and will be shared with the Idaho Conservation Data Center to provide current information concerning statewide species distributions.

Based on current range maps and historical observations, we identified 14 species of amphibians and reptiles as potentially present within the study area. We utilized multiple sampling techniques such as visual encounter surveys, road driving, and aquatic funnel traps to maximize the chance of detecting species present within the study area. We also incorporated a systematic sampling scheme which identified “Environmental Types” based on dominant vegetation type, slope, and aspect to provide a less biased sampling strategy for the study area. Site surveys were conducted over 16 total days beginning on June 8, 2001 and ending on July16, 2001. We observed seven species within the study area, none of which are considered Sensitive Species or Species of Special Concern. Only one amphibian species, the boreal chorus frog (*Pseudacris maculata*) was detected. We were denied access to survey the large wetland/pond complex along Circle Creek which lies on the Nicholson property, and further surveys in this area are suggested to determine other amphibian presence. Two species of lizards were observed, including the common sagebrush lizard (*Sceloporus graciosus*) and the western skink (*Eumeces skiltonianus*).

Four species of snakes were observed including the rubber boa (*Charina bottae*), the striped whipsnake (*Masticophis taeniatus*), the gophersnake (*Pituophis catenifer*), and the terrestrial gartersnake (*Thamnophis elegans*).

The common sagebrush lizard was the most widespread and abundant species with 100 observations throughout the study area accounting for 70% of the total observations. terrestrial gartersnakes were the most abundant snake species detected with 33 observations accounting for 23% of the total observations. The boreal chorus frog was the only amphibian species detected with 1 observation accounting for only 0.6% of the total observations.

Acknowledgements

We would like to thank Lisa Garrett (University of Idaho – NPS Upper Columbia Basin Network Coordinator) for the opportunity and financial support for this study. We would like to thank Ned Jackson for providing housing at the Castle Rocks headquarters and the staff at the City of Rocks National Reserve headquarters for all of their assistance. We would like to specifically thank Brad Schilling who provided valuable information concerning reported visitor observations, personal observations, and suggestions for survey sites throughout the study area.

Introduction

The primary objective of this survey is to complete field surveys in the City of Rocks National Reserve (CIRO), Idaho, with the goal of documenting 90% of all amphibian and reptile species potentially present within the park. These data will be used to develop an inventory list reflecting current species presence within the park, and will also provide baseline data for a portion of the state where formal herpetological surveys are few (McDonald 1996; Makela 1998; Shive and Peterson 2001) and amphibian and reptile observations are scarce. The second objective of the survey is to gather inventory information using a study design that will allow information to be incorporated into a long-term monitoring program. The third objective is to develop distribution maps in GIS (Geographic Information System) format for species of special concern or species of interest to resource managers in the park. The collected data will be shared with the Idaho Conservation Data Center and will be incorporated into the Northern Intermountain Herpetological Database (NIHD) of the Idaho Museum of Natural History (IMNH), where it will provide a more complete understanding of current statewide species distributions.

Study Area

City of Rocks National Reserve and Castle Rocks are located in the southcentral region of Idaho in Cassia County (Figure 1, page 21) along the southeast slope of the Albion Range. Although CIRO is cooperatively managed by the National Park Service and the Idaho Department of Parks and Recreation, a substantial portion of the area within the park is actually privately owned (Figure 2, page 22). Castle Rocks has been placed under the management of the Idaho Department of Parks and Recreation and is bordered to the north and northwest by Bureau of Land Management (BLM) public lands. The property lines are not fenced or marked, and consequently a few of our survey observations fall on BLM lands (e.g., Comp Wall Area). Elevations within both parks generally fall around 1829 m (6000 feet) in the lowlands ranging to around 2439 m (8000 feet) in the uplands. The lowland areas of the parks are generally dominated by xeric sage-steppe communities with species such as Wyoming big sagebrush (*Artemesia tridentata* ssp. *Wyomingensis*), gray rabbitbrush (*Chrysothamnus nauseosus*), green rabbitbrush (*Chrysothamnus viscidiflorus*), and crested wheatgrass (*Agropyron cristatum*) dominating. As you proceed to higher elevations there is a replacement with larger woody species such as Utah juniper (*Juniperus osteosperma*), pinyon pine (*Pinus monophylla*), and mountain mahogany (*Cercocarpus montanus*) dominating. Riparian lowland areas are generally dominated by willows (*Salix sp*.) and prickly rose (*Rosa acicularis*) with the uplands becoming increasingly populated with quaking aspen (*Populus tremuloides*).

Methods

Sampling Site Selection

We chose survey sites based upon the locations of historic observations, suggestions from CIRO personnel concerning areas of interest, and various regions of the park where suitable habitat was present (i.e., south-facing aspects, talus slopes, riparian areas). Any wetland site that was identified within the park was also surveyed. It is important to recognize that the delineation of a site is not restricted to a single particular area, but may consist of areas associated with trails which cover a large expanse of the park (e.g., North Fork Circle Creek site). Photographs were taken of many of the survey sites to provide a representation of the habitats encountered (Appendix B).

To help ensure that potentially important habitat was not overlooked by our site selection process, we also incorporated a systematic sampling scheme to survey all major "Environmental Types" located within the park. We defined Environmental Types based on vegetation cover type, aspect, and slope. Geographic Information System (GIS)-based vegetation maps for CIRO were provided by the National Park Service. With this information, we compiled the vegetation cover types and/or vegetation associations into eight vegetation type categories based upon groupings of species with similar physiological requirements and community associations (Table 1, page 29). Using a GIS, these categories were overlaid on a topographic map for the study area to identify potential survey sites throughout the park, which were later assigned aspect and slope category classifications based on field observations where direction was assigned with a compass and slope was visually estimated. Digital Elevation Models (DEMs) were not used to assign aspect and slope designations because each pixel in the DEM represents 30 m^2 and the topography within the study area is so variable within a 30 m^2 area, it is likely that many of the classifications would be incorrect. Aspect was classified as either north-facing for all directions falling between 315° through 135°, and south-facing for all directions falling between 135° through 315°. Slope was classified as either flat, representing habitat that has <5% slope, or as >5% representing all habitats which have a slope of 5% or greater. This designation scheme creates 24 different potential Environmental Types throughout the study area. We collected Universal Transverse Mercator (UTM) coordinates and the total elapsed time along the path of sampling in each Environmental Type to quantify observation rates. We imported the coordinates collected while walking the survey path into a GIS and measured the overall distance.

We ignored small patches of habitat where species observations may be reflecting movements through an area, and identified large-scale (i.e., 1000+m^2) patches that likely represent selected habitat.

Site Coordinates

We collected UTM coordinates (Zone 12, North American Datum 1927) at all survey sites, locations of species observations, and at points of incidental observations. A Garmin eTrex handheld GPS receiver (Garmin International, Inc., Olathe, KS) was used throughout the study to collect location coordinates and provide an estimate of elevation.

Coordinates were usually collected when the displayed navigational accuracy was 10 m or less. The topography within the study area is dominated by granite spires, domes, and walls which can disrupt signal reception and communication with satellites, consequently there were times when the 10 m accuracy limit was not met and coordinates were collected with the smallest amount of navigational error possible. Navigational error is reported when coordinates are listed (Appendix C). Since the Department of Defense turned off Selective Availability in 2000, handheld GPS receivers are capable of accurate positioning (+/- 10 m) and subsequently we did not differentially correct any of the collected coordinates.

Site Characteristics and Environmental Measurements

We collected a variety of habitat and environmental measurements at all of the survey sites and locations of species observations (Appendix B) using a standard form for amphibian and reptile surveys (Peterson 1997; Appendix D). Environmental conditions such as radiation, cloud cover, precipitation, wind, and air temperature were recorded at each survey site. Radiation, cloud cover, and wind measurements were visually estimated while air temperature measurements were taken at a shaded height of 1 m using a digital thermometer (Taylor, Model 9841, Oak Brook, IL).

Vegetation cover type classification was assigned to all survey sites to provide an estimate of the dominant vegetation at that site. The classification scheme follows the system developed for the Idaho GAP Analysis (Redmond et al. 1996; Homer et al. 1998). Land cover classification is divided into nine major categories: Urban or Developed Land (1000), Agricultural (2000), Non-Forested Lands (3000), Forest Uplands (4000), Water (5000), Riparian and Wetland Areas (6000), Barren Land (7000), Alpine Meadow (8000), and Snow, Ice, Cloud or Cloud Shadows (9000). Within each of these major categories are sub-categories which further specify distinct habitat types, and these codes are explained when reported.

At wetland sites we collected data such as length, width, maximum depth, water temperature, water chemistry (pH and conductivity), color, turbidity, origin, drainage, site type, and National Wetlands Inventory (NWI) classification (Cowardin et al. 1979). Site length and width were visually estimated, while maximum depth was categorized as either <1 m, 1-2 m, or >2 m. We made water temperature measurements at a depth of 1cm approximately 1m from the shoreline using the same thermometer used for air temperature measurements. We used a TDSTester 3 ATC for all conductivity measurements and an Oakton pHTester 2 ATC pocket meter (Forestry Supply, Jackson, MS) for all pH measurements. Various other wetland habitat characteristics such as primary substrate, dominant vegetation, and relative percent of shoreline with emergent vegetation were recorded following visual encounter surveys.

We calibrated pH and conductivity meters prior to the first survey date and a second time on June 13, 2001 using standard buffer solutions. In conjunction with equipment calibration, we cleaned and sterilized waders, dipnets, and aquatic funnel traps using a dilute bleach solution (approximately 10%) to decrease the chances of transmitting disease or pollutants among wetland survey sites.

Amphibian and Reptile Sampling

Examining range maps in Stebbins (1985) and records from the Northern Intermountain Herpetological Database, 14 species (1 amphibian and 13 reptiles) were identified as potentially occurring within the study area (Tables 2-4, pages 30-32).

We conducted field surveys on a number of days throughout the late spring and early summer of 2001. Surveys were conducted on June 8th through June 10th, June 14th through June 16th, June 18th, June 27th through June 29th, July 2nd, July 11th, July 13th through July 16th. Summaries of the days when surveys were conducted and the corresponding sampling techniques utilized on each day are shown in Figure 3, page 23.

Visual Encounter Surveys

This survey method was the most frequently used technique throughout the survey period. Using this method, we walked within an identified survey area visually searching for amphibian and reptile species. This method was also used extensively around the perimeter and through waded portions of wetland habitats. In addition to any species detected, we collected shed snake skins whenever encountered to identify species based on distinct scalation patterns.

Dipnetting and cover turning are complementary techniques to visual encounter surveys and we frequently employed these methods throughout the survey period. These additional sampling components were implemented to maximize the potential of detecting species that remain hidden in vegetation (e.g., boreal chorus frog) or underneath cover objects (e.g., western skink).

1. Dipnetting - Historically, this method has been proven effective at locating amphibian species hidden in submerged vegetation (Crisafulli 1997). We used a fine-mesh dipnet and dipped approximately every five steps around wetland perimeters. In shallow wetlands where the interior could be accessed, we also waded and dipped at similar intervals paying particular attention to areas which provide cover protection.

2. Cover turning - This method involves the physical lifting and turning of cover objects, such as rocks or logs, to locate and identify species hidden beneath. This component was the primary method used for terrestrial surveys, especially due to the numerous rocks and boulders located throughout the study area. All objects that were disturbed using this method were returned to their original placement to minimize the impacts of surveying.

Road Driving

We drove roads in the evenings and identified any amphibian or reptile species observed on the road (Figure 4, page 24; Shaffer and Jutterbock 1994). Roads provide a relatively sustained thermal environment that ectothermic species can utilize at times of day when air temperatures are dropping. We constantly surveyed roads while in transit to survey sites throughout the study area. Species observations made while road driving were recorded using a standard form for amphibian and reptile multiple observations (Appendix E). The dates and corresponding results for all days when this method was incorporated into the study are reported in Appendix F.

Aquatic Funnel Trapping

We used standard minnow traps to perform aquatic funnel trapping in wetland survey sites. These traps incorporate a central holding chamber with two tapered openings that direct organisms towards the traps interior. This method has proven effective for capturing amphibian larvae, but also for some adults of smaller species (Adams et al. 1997). The number of traps placed in a wetland was determined based on the general size of the wetland, and the relative area of shallow shorelines. We placed traps in a generally even distribution around a site whenever possible, and specifically in locations that contained emergent vegetation or submerged aquatic vegetation with depths deep enough

to cover the openings of the traps but not completely submerge them. We also placed a few traps in open water areas so that these locations were not excluded from sampling. Traps were placed and left out for one or two nights to collect animals. The listing of dates, locations, and trapping results collected from the Aquatic Funnel Trapping surveys are reported in Appendix G.

Incidental Observations

We made incidental observations any time a species was located in an area that was not actively being surveyed (e.g., observations made while approaching specific survey sites). UTM coordinates were collected at the location of the observation, and some general descriptions of the species and habitat were made as well. Any confirmed observations that were contributed from an outside source were considered incidental observations.

Data Management

We entered the data into a Microsoft Excel spreadsheet for management and analysis. The data were also incorporated into the NIHD of the IMNH. Maps of species distributions were developed using ArcView 3.2 (ESRI Redlands, California) Geographic Information System. The topographic maps used in the creation of the species distribution maps were acquired from the Idaho All Topo Maps: Idaho software (iGage, Salt Lake City, UT.).

Results and Discussion

Site Characteristics and Environmental Measurements

The spring and summer seasons have been characteristically warm throughout southeast Idaho over the last few years, and 2001 followed this pattern. The warm and dry weather during the spring and summer of 2001 may have negatively influenced the abundance of local species. Over the course of the survey, the mean monthly air temperature was above the average calculated from 37 years of reported monthly averages (Figure 5, page 25). The average monthly precipitation was below the average calculated from 37 years of reported monthly averages (Figure 6, page 25). The weather data were obtained from the Western Regional Climate Center for the Malta 2 E, Idaho weather station (#105563) (NCDC 2001). Throughout the study area, shaded air temperatures ranged from 16.8°C to 31.1°C with an average temperature of 25.4°C. Water temperatures taken at 1cm depth ranged from 12.2°C to 30.6°C with an average of 18.6°C. Water chemistry measurements collected from aquatic sites showed some variation with conductivity values ranging from 70mg/L to 490 mg/L and pH values ranging from 6.2 to 8.8.

Occurrence

We detected seven (1 amphibian, 2 lizards, and 4 snakes) of the 14 potentially occurring species within our study area (Figure 7, page 26; Tables 2-4, pages 30-32). Specifically, at CIRO we detected six species (1 amphibian, 2 lizards, and 3 snakes) and we observed four species (2 lizards and 2 snakes) at Castle Rocks (Figure 8, page 27). There were no species detected that are considered Sensitive (Bureau of Land Management) or Species of Special Concern (Idaho Fish and Game). We only sampled each site one time throughout the survey period, and it is important to recognize that the failure to detect a particular species does not indicate that it is absent from the study area.

Distribution

Throughout the entire study area we surveyed a total of 25 sites; two sites were aquatic and 23 were terrestrial (Appendix H). Seven of the terrestrial sites were located on the Castle Rocks property and we detected species at six (86%) of those sites. Within the boundaries of CIRO, we made observations in one of the two (50%) aquatic sites and at 13 of the 16 (81%) terrestrial sites.

Relative Abundance

Common sagebrush lizards (*Sceloporus graciosus*) exhibited the highest relative abundance for lizards and for all species, with 100 observations accounting for 70% of total observations made throughout the survey period (Figure 7, page 26). Terrestrial gartersnakes (*Thamnophis elegans*) had the highest relative abundance of any snake species with 33 observations accounting for 23% of the total observations. The boreal chorus frog (*Pseudacris maculata*) was the only detected amphibian species within the study area and consequently had the lowest relative abundance with a single observation representing 0.6% of the total.

Habitat Relationships

Of the nine major vegetation and cover classification categories developed for Idaho GAP analysis, we identified five (Agricultural, Non-Forested Lands, Forest Uplands, Riparian and Wetland Areas, Barren Land) of these categories within the sites surveyed (Table 5, page 33). The Non-Forested Lands category was the most frequently encountered classification category throughout the surveyed sites, and correspondingly the greatest number of observations were made within this category (Table 6, page 34). Sagebrush lizards utilized the greatest variety of classification categories occurring in four of the six types identified throughout the survey sites.

Environmental Types

Of the 24 potential Environmental Types, we identified 11 present within the study area (Table 7, page 34; Appendix A). Assuming a 5 m scanning range (2.5 m on each side of the survey path) along the total length of the sampling path we calculated total area surveyed, an observation rate, and quantified observations/area for each Environmental Type surveyed (Table 8, page 35). All reported data for the Environmental Types reflect observations made only while conducting these surveys and not observations made surveying other regions of the study area outside of the Environmental Types.

Common sagebrush lizards were the most widespread species, and we observed them in 7 of the 11 (64%) Environmental Types surveyed (Table 8, page 35). Terrestrial gartersnakes were detected in 1 Environmental Type (Riparian_Flat), and represent the only other species observed during the Environmental Type surveys.

We calculated the highest observation rate with 2.76 observations/hr in the Sagebrush_Flat Environmental Type, although species richness is low with only 1 species observed. The second highest observation rate, made in the Juniper_North-Facing >5% Environmental Type, was substantially lower with only 1.77 observations/hr. On an area basis, Mt. Mahogany_North-Facing >5% provided the greatest number of observations with 1.08 observations/km^2. Juniper_North-Facing >5% and Mt. Mahogany_South-Facing >5% exhibited similar values with 1.06 observations/km^2 and 1.03 observations/km^2 respectively.

Species Accounts

Boreal Chorus Frog (*Pseudacris maculata*)

The boreal chorus frog was the only amphibian species located within the study area (Appendix A). The single observation was made in the late spring when visiting the City of Rocks, and an adult male was heard calling from the vicinity of Flaming Rock. Upon further investigation the individual was not observed but determined to have been calling from the South Fork Circle Creek drainage in the Center City area. This observation was made west of a large wetland/pond complex that lies on private property owned by Albert Nicholson. Following multiple requests to survey these wetland sites, we were denied access and future surveys in this area are suggested to document amphibian presence.

Pigmy Short-horned Lizard (*Phrynosoma douglassi*) / Desert Horned Lizard (*Phrynosoma platyrhinos*)

There have been two observations reported by visitors of horned lizards near the Twin Sisters area (Brad Schilling pers. comm.). Two species of horned lizards, the pigmy short-horned lizard and the desert horned lizard possibly occur within the study area (Stebbins 1985). There are historic records from 1955-58 for both species occurring within 3 miles of Malta, which is located about 35 miles northeast of the study area (NIHD). One or both of these species may be present within the study area but neither of the reports has been confirmed.

Western Fence Lizard (*Sceloporus occidentalis*)

The western fence lizard was observed within the study area during the summer of 2000 (Shive and Peterson 2001; Appendix A). The study area also lies within this species' predicted range (Stebbins 1985). It is likely that this species is rare and our inability to detect this species during the surveys of 2001 does not suggest this species is now absent from the park.

Common Sagebrush Lizard (*Sceloporus graciosus*)

The common sagebrush lizard was the most widespread and abundant species observed within the study area with 43 juveniles and 53 adults detected. This species was found in 18 of the 23 total terrestrial sites surveyed and did not occur in any of the aquatic sites. This species utilized the greatest variety of cover type categories and was typically found in sagebrush or mountain mahogany dominated habitats, but also in forested upland habitats dominated by pinyon pine or aspen (Table 6, page 26).

Western Skink (*Eumeces skiltonianus*)

The Western Skink exhibited a widespread distribution despite only four individuals observed. Only one individual was observed along the North Fork Circle Creek trail during the site surveys (Appendix A). The three remaining observations were made incidentally with two of them occurring at the Upper Breadloaves area (Appendix A), and a single observation from the Comp Wall Area on the Castle Rock property (Appendix A).

Rubber Boa (*Charina bottae*)

The rubber boa was found to have a limited distribution and abundance based on our surveys. A single observation of this species was made near Elephant Rock while road driving (Appendix A). Historical casual observations from park personnel and visitors have documented this species being present along Circle Creek in the Inner City as well as along the North Fork Circle Creek trail, but we were not able to detect this species in either area.

Striped Whipsnake (*Masticophis taeniatus*)

The striped whipsnake was limited in distribution and abundance based on our surveys. One adult individual was observed incidentally near the North Fork Overlook trailhead (Appendix A).

Gophersnake (*Pituophis catenifer*)

The gophersnake distribution was limited to the Castle Rocks property with a low observed abundance of only three individuals (Appendix A). A single adult individual was observed along Almo Creek during site surveys. One adult was observed near Castle Rocks headquarters during preliminary scouting of the area before the formal survey began. A second juvenile individual was incidentally observed near the Comp Wall area. There are a number of historical observations made by CIRO park personnel of this species along roads (usually roadkills), particularly in the spring and early summer, but we failed to detect this species within CIRO boundaries during this survey period. We did however, detect this species near the Twin Sisters during a herpetological survey of south-central Idaho in 2000 (Shive and Peterson 2001; Appendix A), and it is likely that this species is present in greater abundance than our data reflect.

Terrestrial Gartersnake (*Thamnophis elegans*)

The terrestrial gartersnake was the most widespread and abundant snake species observed within the study area with 22 juveniles and 11 adults detected. There were four observations made along roads which occurred outside of both CIRO and Castle Rocks (Appendix A). This species was frequently found in riparian areas along sections of surveyed streams especially along Almo Creek on the Castle Rock property (Appendix A).

Western Rattlesnake (*Crotalus viridis*)

There have been a number of casual observations reported from park visitors of western rattlesnakes present within the study area (Brad Schilling pers. comm.). The study area also lies within this species' predicted range (Stebbins 1985). Although these observations within the study area are not confirmed, rattlesnakes are easily identified and distinguished from other species, and we believe this species is present even though we did not detect it during the survey.

Unobserved Species

It is important to recognize that simply because we did not detect a species during our survey, does not mean that this species is not present within the study area. We performed our sampling over a very limited temporal scale, and did not revisit any sites throughout the duration of the survey. Below we provide some information that can be used to assess the probability of predicted potential species occurrence throughout the study area.

We considered four factors to evaluate potential species occurrence: (1) does the study area fall within the species predicted range; (2) where are the closest current/historic observation records; (3) is there appropriate habitat in the study area, and is the elevation similar to observations made in other parts of the state; (4) are there life history characteristics that make particular species difficult to detect. In most cases, a species is predicted as "likely" if at least three of these factors support presence within the study area. However, we did not consider western toads and common garter snakes as likely to occur because they have disappeared from most historical sites in southeastern Idaho. A species is predicted as "possible" if at least two of these factors support species presence within the study area. A species is predicted as "unlikely" if only one or none of these factors support species presence within the study area. If none of these factors were met than that species was left off of our potential species list.

Tiger Salamander (*Ambystoma tigrinum*)

The study area does not fall within this species' predicted range (Stebbins 1985), however recent observations (Shive and Peterson 2001) have suggested a westward extension of the known range documented through reported observations. There were two observations made in 2000 from locations west of the study area in Twin Falls county near the Cassia county border (Shive and Peterson 2001), although these individuals may be a remnant population that was introduced historically as fishing bait. Tiger salamanders are most commonly detected in various wetland habitats, such as ponds, of which there are very few within the study area. We were denied access to the large wetland complex that lies on the property of Albert Nicholson and future surveys in this area are needed to document this species' presence or absence. Given that we know this species is distributed to the east and west of the study area, we believe that tiger salamanders may be potentially present but it is unlikely.

Western Toad (*Bufo boreas*)

The study area is located within this species' predicted range (Stebbins 1985). There is an unconfirmed observation of a single adult from the Big Cottonwood Wildlife Management Area in 2000 located in Cassia county to the west of the study area (Shive and Peterson 2001). The closest historical observation dates back to 1894 from a location near the border of the Twin Falls-Jerome county border to the northwest (NIHD). Western toads are usually detected in lakes or ponds as adults in spring and summer during breeding periods, or as larvae or metamorphs in large aggregations. Further

surveys on the Nicholson property would be beneficial for determining this species' current status, but it seems unlikely that western toads are present within the study area.

Great Basin Spadefoot Toad (*Spea intermontana*)

The study area is located within this species' predicted range (Stebbins 1985). The closest historical observation was made in 1962 from a location near Burley in Cassia county to the north (NIHD). The study area does rest at an elevation greater than any elevation where this species has been observed in the state. This species is generally found in dry, sandy, soils where they may aestivate for a few years at a time. Spadefoot toads are opportunistic breeders and may emerge from the soil after a heavy storm to breed in temporary pools. Detectability for this species is difficult without breeding locations present, and given the dry and hot conditions during the survey in 2001, it is possible that this species is present but may have gone undetected underground.

Pacific Treefrog (*Pseudacris regilla*)

The study area falls outside this species' predicted range (Stebbins 1985), but recent observations suggest an alteration to the known range (Shive and Peterson 2001). This species was detected in Independence Lakes in 2000 near Cache Peak which lies about 10 miles north of the study area, and also on a private ranch near Goose Creek Reservoir to the west of the study area (Shive and Peterson 2001). Further surveys on the Nicholson property would be beneficial for determining this species' current status, but multiple observations within the vicinity of the study area suggests that Pacific treefrogs may be possibly present but undetected.

Northern Leopard Frog (*Rana pipiens*)

The study area is located within this species' predicted range (Stebbins 1985). The closest historical observations were made in 1955 from locations near Elba and Malta both of which are located in Cassia county about 15 and 30 miles to the northeast respectively (NIHD). The closest current observation was made in 2000 at Murtaugh Lake in Elmore county to the northwest. Further surveys on the Nicholson property would be beneficial for determining this species' current status. This species has been found to be declining from many locations in southern Idaho, and although this species is predicted to be present it is unlikely that northern leopard frogs occur within the study area. Any observations of this species within the study area would be a surprise.

Columbia Spotted Frog (*Rana luteiventris*)

The study area is located within this species' predicted range (Stebbins 1985). The closest historical observation was made in 1975 from Fish Creek Reservoir in Blaine county (NIHD). Most of the historical observations of Columbia spotted frogs are from locations far to the west and north, and there have been a few records reported from just south of the Idaho-Utah border. It is unlikely that this species is present within the study area, and any reported observations would be an important discovery.

Longnose Leopard Lizard (*Gambelia wislizenii*)

The study area is located within this species' predicted range (Stebbins 1985). The closest historical record was made in 1894 near Cottonwood Creek in Cassia county to the west

of the study area (NIHD). The study area does provide suitable habitat and there have been observations made at similar elevations in the state. This species is likely present within the study area, but it would be a rare observation.

Common Side-blotched Lizard (*Uta stansburiana*)

The study area falls outside this species' predicted range (Stebbins 1985), but recent observations suggest an alteration to the known range (Shive and Peterson 2001). The closest recent observation was made in 2000 near Big Cedar Canyon in Cassia county to the northwest (Shive and Peterson 2001). This observation was made in similar habitat to what is present within the study area, and given the close vicinity, it is possible that this species may be present and undetected.

Tiger Whiptail (*Cnemidophorus tigris*)

The study area is located within this species' predicted range (Stebbins 1985). There have been recent observation in Cassia county made in 2000 from Little Cedar Canyon located to the west, and near McClendon Springs located to the east of the study area (Shive and Peterson 2001) in similar habitat. Given that there have been current observations made east and west of the study area, it seems likely that tiger whiptails may be present but undetected within the park.

Eastern Racer (*Coluber constrictor*)

The study area is located within this species' predicted range (Stebbins 1985). Recent observations have been made in 2000 near Sublett Reservoir located in Cassia county northeast of the study area, and also in Big Cottonwood Canyon which lies northwest of the study area (Shive and Peterson 2001). Racers share many of the same habitat requirements as terrestrial gartersnakes, and consequently these species coexist in many locations in the state. Considering the number of terrestrial gartersnakes we observed, and the fact the racers occur to the east and west of the study area, it seems likely that this species exists within the study area but in possibly low abundance.

Ringnecked Snake (*Diadophis punctatus*)

The study area does not fall within this species' predicted range (Stebbins 1985). The closest historical record was made in 1983 near Pocatello, and many of the remaining observations in the NIHD are reports from the northern panhandle region (NIHD). We did not know a lot about habitat requirements for this species and because observation data for much of the state is lacking, the known distribution is only an estimate. We feel that ringnecked snakes are potentially present but it is unlikely, and a confirmed observation would be an important contribution to our current understanding of this species' statewide distribution.

Nightsnake (*Hypsiglena torquata*)

The study area is located within this species' predicted range (Stebbins 1985). The closest historical observation was made in 1962 from Pocatello located east of the study area (NIHD). The majority of observations of this species occur west of the study area near Boise (NIHD). Terrestrial funnel trapping is the best way to detect this species, but due to the large amount of time and effort to install traps, we did not employ this method. Our

current understanding of this species statewide distribution is limited due to the low number of reported observation. Since there are historical observations that fall to the east and west of the study area, we do feel that this species may possibly occur and a confirmed observation would broaden our current understanding of this species' statewide distribution.

Common Gartersnake (*Thamnophis sirtalis*)

The study area is located within this species' predicted range (Stebbins 1985). The closest historical record was made in 1965 along Deep Creek in Twin Falls county (NIHD). This species is commonly associated with the presence of northern leopard frogs and are normally detected in or near wetlands and riparian areas. We were not allowed access to the large wetland complex on the Nicholson property, and consequently our uncertainty about this species presence is increased. It is possible that this species is present within the study area, but it may occur in very low abundance.

Literature Cited

Adams, M.J., K.O. Richter and W.P. Leonard. 1997. Surveying and monitoring amphibians using aquatic funnel traps. In, Olson, D.H., W.P. Leonard and R.B. Bury. (ed.) *Sampling Amphibians In Lentic Habitats*. Society For Northwestern Vertebrate Biology. 47-54.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. United States Fish and Wildlife Service Bulletin OBS-79/31.

Crisafulli, C.M. 1997. A habitat-based method for monitoring pond-breeding amphibians. In, Olson, D.H. and W.P. Leonard and R.B. Bury. (ed.) *Sampling Amphibians In Lentic Habitats*. Society For Northwestern Vertebrate Biology. 94-96.

Crother, B.I. 2000. Scientific and standard English names of amphibians and reptiles of North America North of Mexico, with comments regarding confidence in our understanding. SSAR Herpetological Circular No. **29**. iv + 1-82.

Homer et al. 1998. Idaho GAP Analysis. Online. (www.wildlife.uidaho.edu/idgap/idgap_lccode.asp) Accessed 2001.

Makela, P.D. 1998. A survey for northern leopard frogs (*Rana pipiens*) in the Snake River Resource Area 1997. U.S. Bureau of Land Management Idaho Technical Bulletin No. **98**: 8-55.

McDonald, M. 1996. Amphibian survey of the Jarbidge and Snake River Resource Areas. U.S. Bureau of Land Management Idaho Technical Bulletin No. **96**: 13-22.

National Park Service (NPS) 1999. Natural resource challenge: the National Park Service's action plan for preserving natural resources. US Department of the Interior National Park Service, Washington D.C. Online (http://www.nature.nps.gov/challencedoc.html). Accessed 2006.

Peterson, C.R. 1997. Checklist for amphibian survey reports. In, Olson, D.H. and W.P. Leonard and R.B. Bury. (ed.) Sampling Amphibians In Lentic Habitats. Society For Northwestern Vertebrate Biology. 113.

Redmond et al. 1996. Idaho GAP Analysis. Online. (www.wildlife.uidaho.edu/idgap/idgap_lccode.asp) Accessed 2001.

Shaffer, H.B. and J.E. Juterbock. 1994. Night driving. In, Heyer, W.R., M.A. Donnelly, R.W. McDiarmid, L.C. Hayek, and M.S. Foster. (ed.) Measuring and Monitoring Biological Diversity Standard Methods for Amphibians. 163-166.

Shive, J.P. and C.R. Peterson. 2001. Herpetological survey of southcentral Idaho. Final report for a FY 2000 Challenge Cost-Share Agreement between the U.S. Bureau of Land Management, Burley Field Office, Idaho Department of Fish and Game, Magic Valley Region; Idaho State University, and U.S. Fish and Wildlife Service Minidoka Wildlife Refuge.

Stebbins, R.C. 1985. A field guide to western reptiles and amphibians: The Peterson Field Guide Series. Houghton Mifflin Company, Boston.

National Climatic Data Center (NCDC), Regional Climate Centers (RCC), and State Climate Offices. 2001. Western Regional Climate Center and associated reference pages available from www.wrcc.dri.edu (accessed 2001).

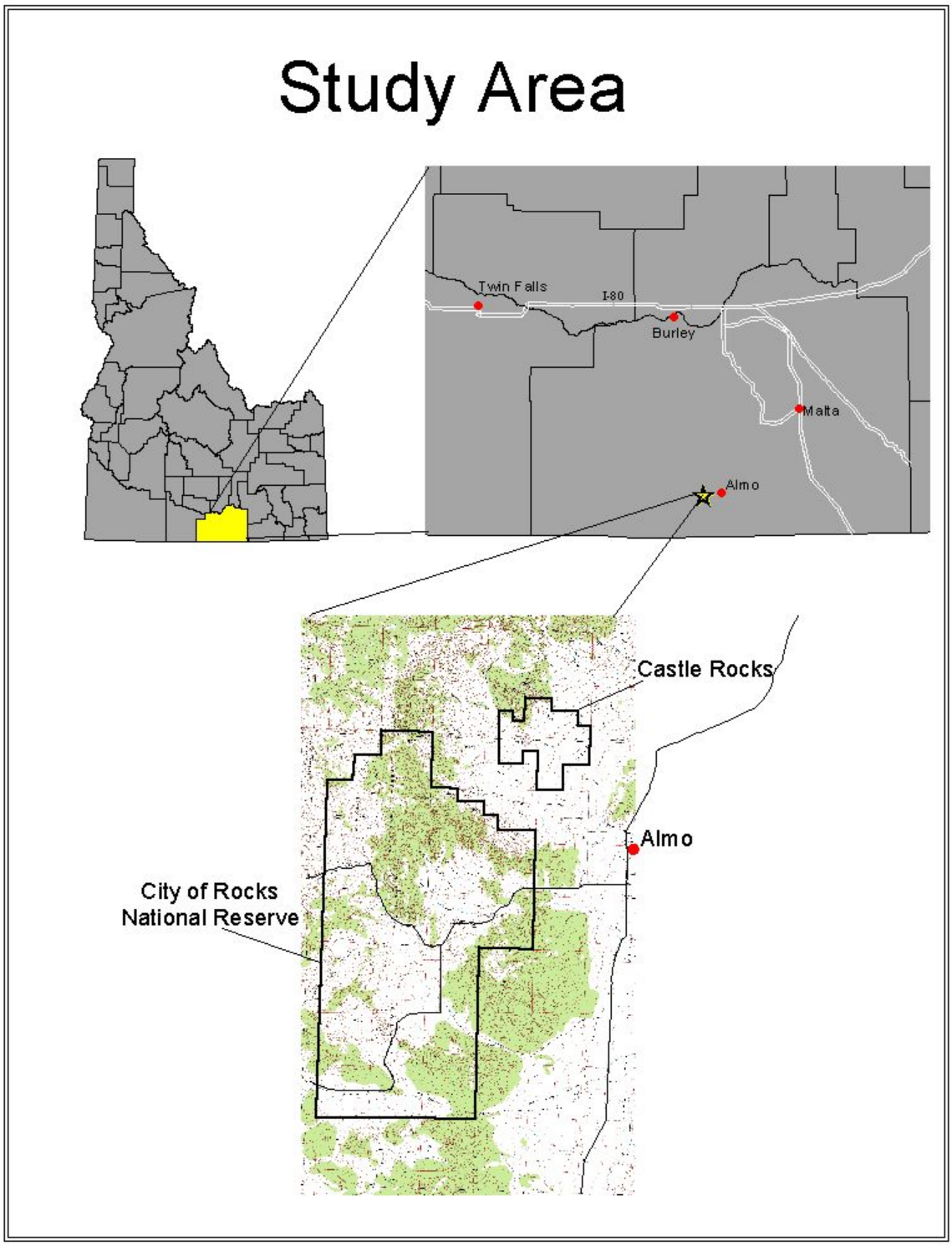


Figure 1. Study area map showing the southcentral region of Idaho: Cassia county, local cities, and the study area at the City of Rocks National Reserve and Castle Rocks.

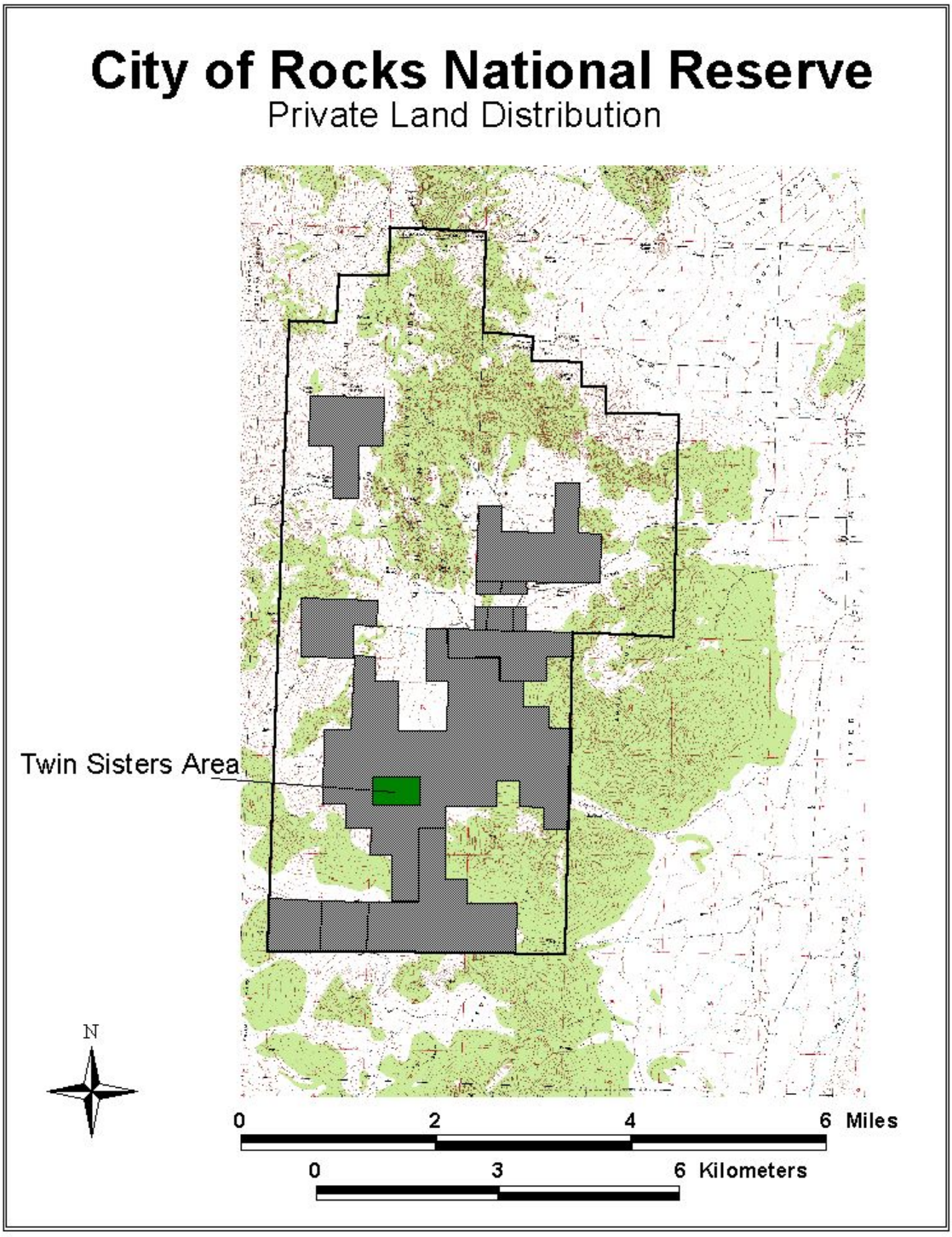


Figure 2. Private land distribution within the City of Rocks National Reserve. The Twin Sisters (denoted in dark green) is a public portion of the park that is surrounded by private lands.

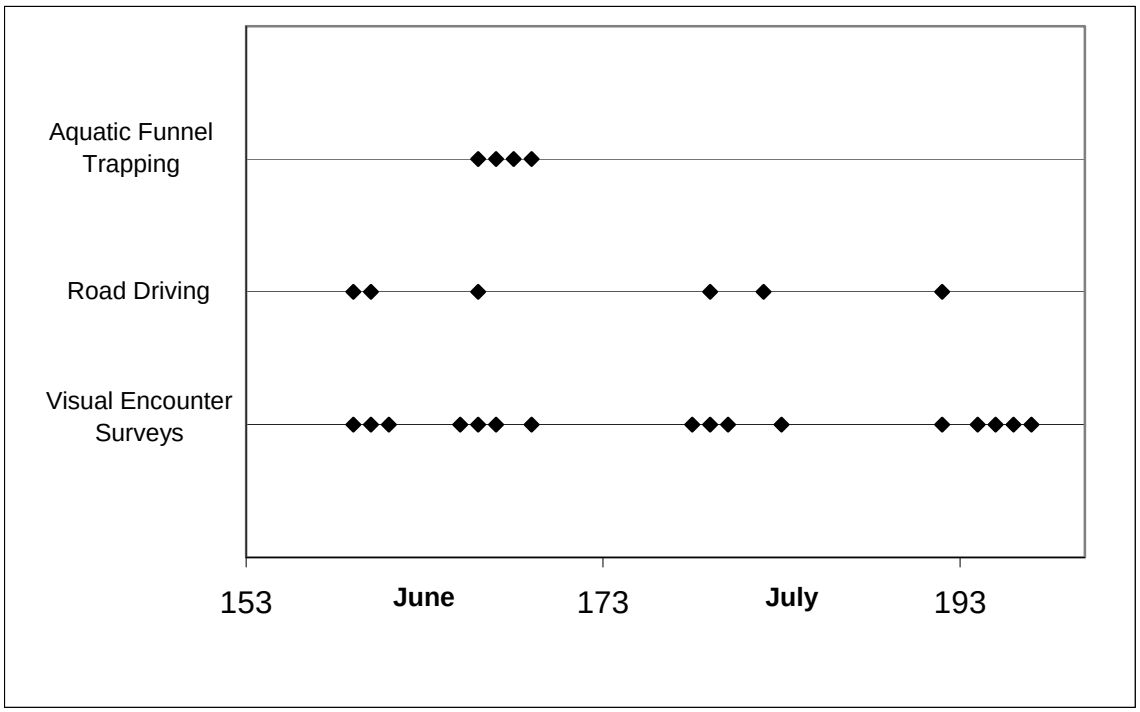


Figure 3. Days of the year when we sampled and the corresponding sampling techniques used on each day. For reference: June 1 = Day 152, July 1 = Day 182, and August 1 = Day 213.

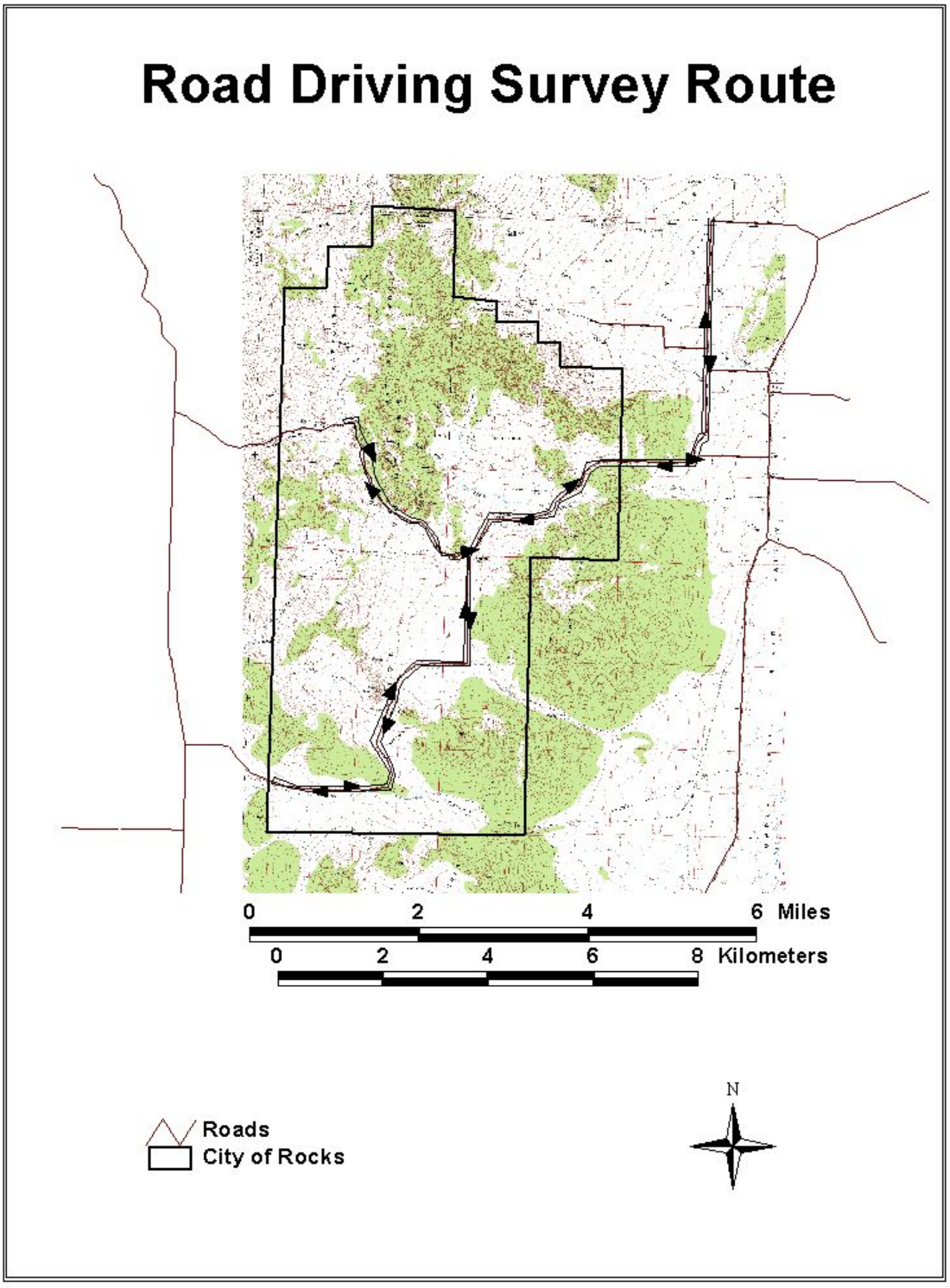


Figure 4. Road driving survey route. The route enters the park from the east and makes an internal loop exiting again in the east. The same route was driven during each road driving survey.

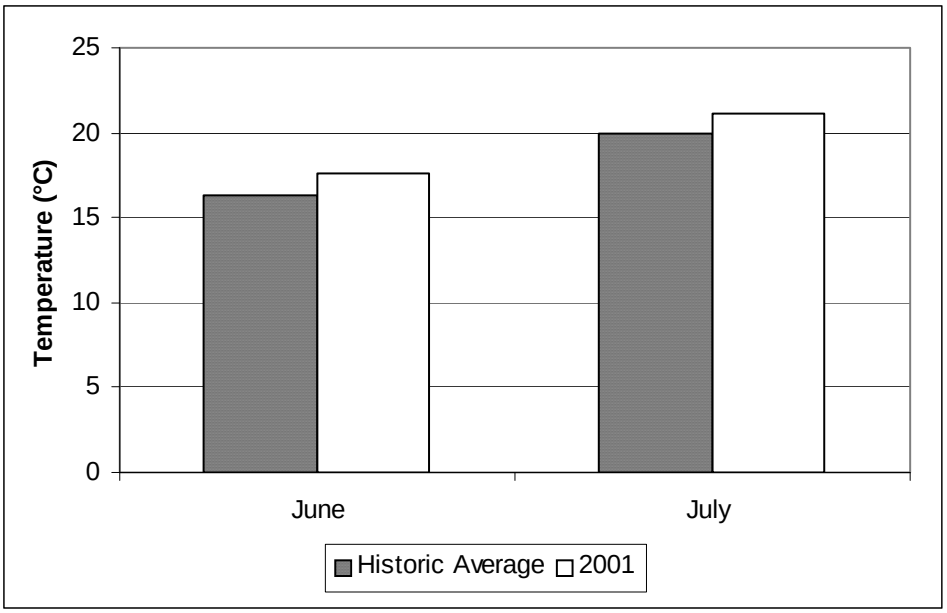


Figure 5. Mean monthly temperature comparison between the historic overall average of 37 years calculated from reported monthly averages over that time period and the monthly means for 2001. Weather data were obtained from the Western Regional Climate Center (www.wrcc.dri.edu) for the Malta 2 E, Idaho weather station (#105563).

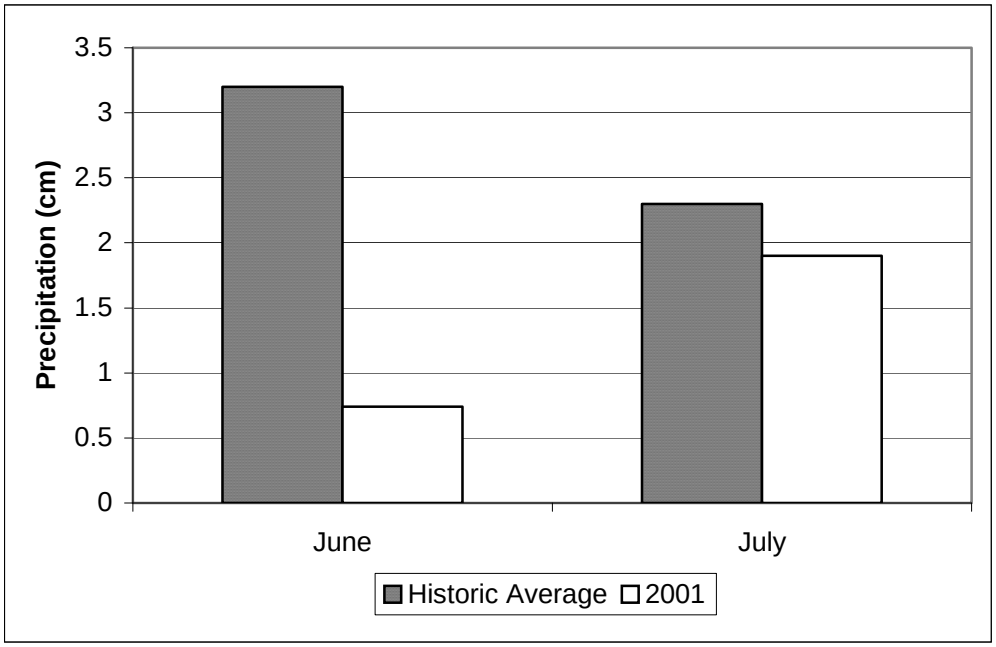
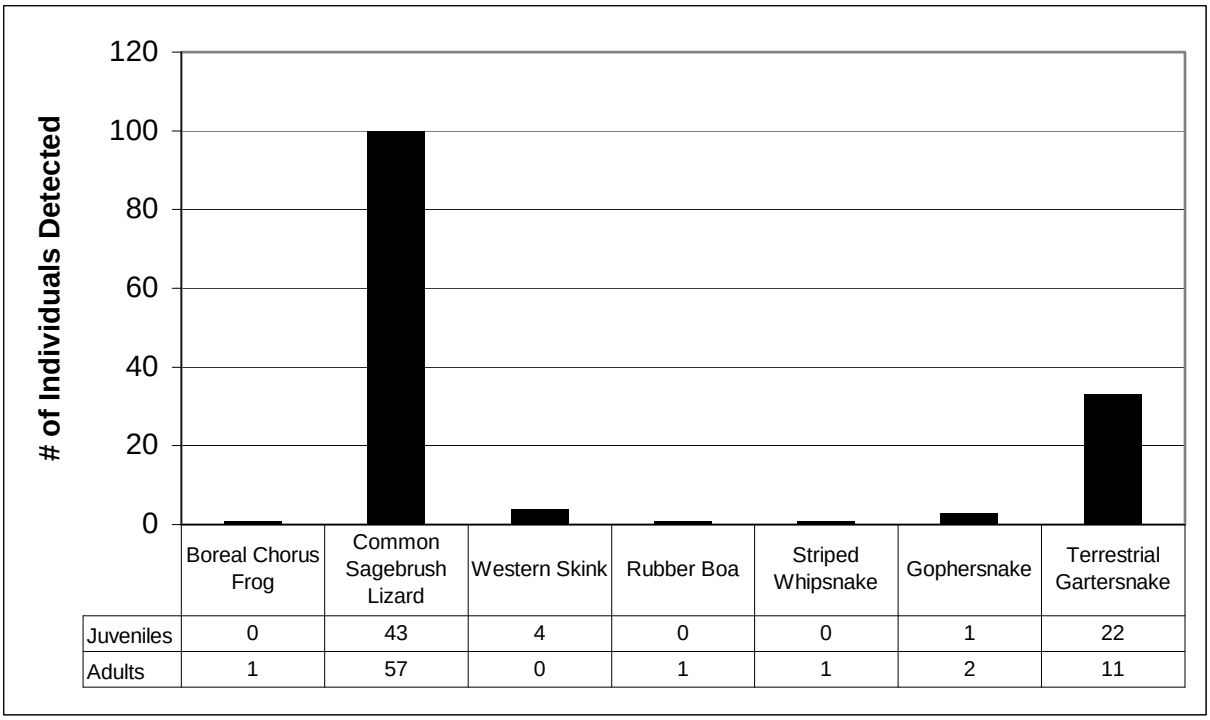
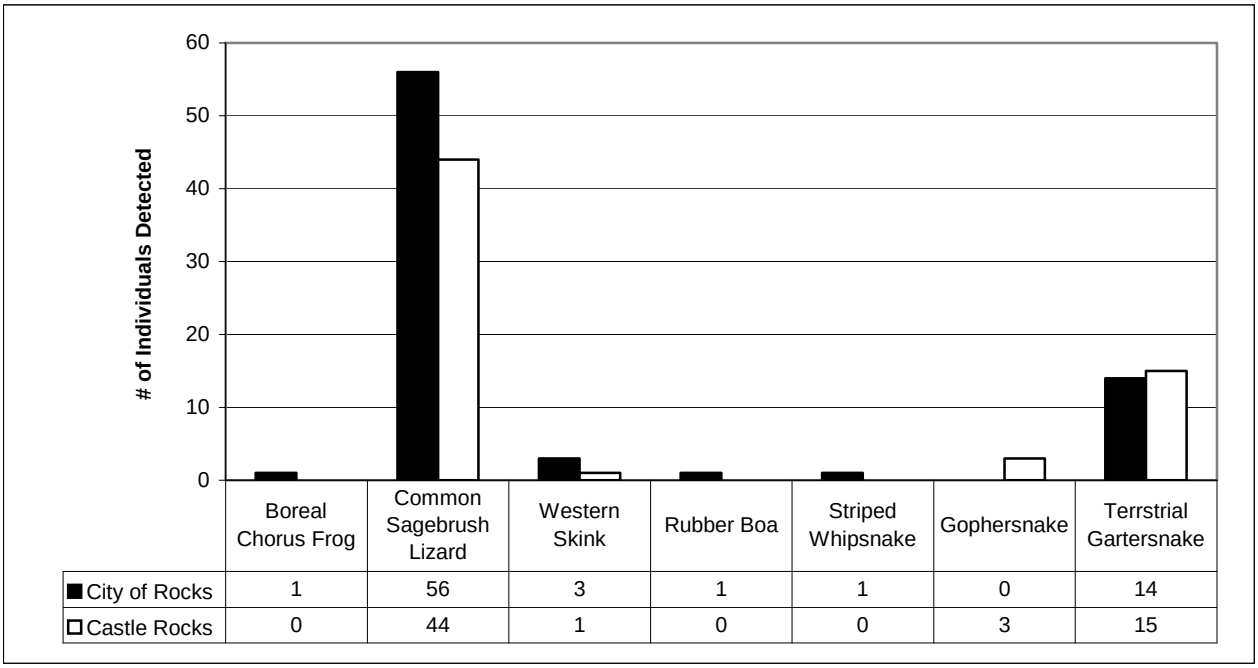


Figure 6. Mean monthly total precipitation comparison between the historic overall average of 37 years calculated from reported monthly averages over that time period and the monthly means for 2001. Weather data were obtained from the Western Regional Climate Center (www.wrcc.dri.edu) for the Malta 2 E, Idaho weather station (#105563).



	Boreal Chorus Frog	Common Sagebrush Lizard	Western Skink	Rubber Boa	Striped Whipsnake	Gophersnake	Terrestrial Gartersnake
Juveniles	0	43	4	0	0	1	22
Adults	1	57	0	1	1	2	11

Figure 7. Species occurrence, abundance, and corresponding life stage that were observed throughout the survey period. The data represent total observations from both parks surveyed. The numbers above each bar represent the total number of individuals.



	Boreal Chorus Frog	Common Sagebrush Lizard	Western Skink	Rubber Boa	Striped Whipsnake	Gophersnake	Terrstrial Gartersnake
■ City of Rocks	1	56	3	1	1	0	14
□ Castle Rocks	0	44	1	0	0	3	15

Figure 8. Species occurrence and abundance that were observed throughout the survey period at the City of Rocks National Reserve and Castle Rocks.

Table 1. Vegetation type categories. The column on the right lists the various vegetation cover types/associations that were mapped for the study area and provided by the National Park Service. The column on the left lists the vegetation type categories that we used to identify Environmental Types.

Subalpine fir	*Abies lasiocarpa*
Sagebrush	*Artemisia arbuscula/Agropyron spicatum, Artemisia nova/Agropyron spicatum, Artemisia tridentata tridentata/Agropyron cristatum, Artemisia tridentata tridentata/Agropyron spicatum, Artemisia tridentata vaseyana/Agropyron cristatum, Artemisia tridentata vaseyana/Agropyron spicatum, Artemisia tridentata vaseyana/Symphoricapos oreophilis/Agropyron cristatum, Artemisia tridentata vaseyana/Symphoricapos oreophilis/Festuca idahoensis, Ceanothus velutinus*
Mountain mahogany	*Cercocarpus ledifolius/Agropyron spicatum*
Juniper	*Juniperis osteosperma, Juniperis osteosperma/Pinus monphylla*
Pinyon pine	*Pinus flexilis/Cercocarpus ledifolius, Pinus monophylla/Juniperis osteosperma, Pinus monophylla/Juniperis osteosperma/Cercocarpus ledifolius*
Aspen	*Populus tremuloides*
Douglas fir	*Pseudotsuga menziesii/Osmorhiza chilensis*
Riparian	Riparian-*Artemisia*, Riparian-*Juncus*, Riparian-*Poa*

Table 2. Amphibian species summary table. This table provides concise information about probable and observed amphibian species with their corresponding legal status, and summarizes the study results by distribution, estimated abundance, type of voucher taken, successful survey techniques (ranked), and the observed life stages. See Appendix I for species that we judged not likely to occur in the park unit.

Common Name[1]	Species Status	Scientific Name	Conservation Status[2]	Distribution[3]	Estimated Abundance[4]	Voucher (museum specimen or photograph)	Successful Sampling Techniques[5]	Life Stages[6]
Boreal chorus frog	Confirmed	*Pseudacris maculata*		Limited	Rare		Calling (incidental)	Adult (male)

[1] Names based on Crother, 2000.
[2] Based on Rankings from the Idaho Conservation Data Center, 2002: S (Bureau of Land Management) = Sensitive species, SC (Idaho Fish and Game) = Species of Special Concern.
[3] Based on this survey.
[4] Based on this survey.
[5] Techniques employed: visual encounters, road driving, funnel traps, incidental observation and contributed observation (ranked by success in this survey).
[6] Life Stages include: egg mass, larvae, metamorph, juvenile and adult.

Table 3. Lizard species summary table. This table provides concise information about potential and observed lizard species with their corresponding legal status, and summarizes the study results by distribution, estimated abundance, type of voucher taken, successful survey techniques (ranked), and the observed life stages. See Appendix I for species that we judged not likely to occur in the park unit.

Common Name[7]	Species Status	Scientific Name	Conservation Status[8]	Distribution[9]	Estimated Abundance[10]	Voucher (museum specimen or photograph)	Successful Sampling Techniques[11]	Life Stages
Common sagebrush lizard	Confirmed	*Sceloporus graciosus*		Widespread	Abundant		Visual encounters, incidental observations	Juveniles, adults
Western fence lizard	Confirmed	*Sceloporus occidentalis*		Limited	Rare		Incidental observation	Adult
Western skink		*Eumeces skiltonianus*		Widespread	Rare		Incidental observations, visual encounters	Juveniles
Pigmy short-horned lizard	Unconfirmed	*Phrynosoma douglassii*		Limited (?)	Rare (?)		Contributed observation	Only horned lizard reported
Desert horned lizard	Unconfirmed	*Phrynosoma platyrhinos*		Limited (?)	Rare (?)		Contributed observation	Only horned lizard reported
Longnose leopard lizard	Probably present but not detected	*Gambelia wislizenii*						
Tiger whiptail	Probably present but not detected	*Cnemidophorus tigris*						

[7] Names based on Crother, 2000.
[8] Based on Rankings from the Idaho Conservation Data Center, 2002: S (Bureau of Land Management) = Sensitive species, SC (Idaho Fish and Game) = Species of Special Concern.
[9] Based on this survey.
[10] Based on this survey.
[11] Techniques employed: visual encounters, road driving, funnel traps, incidental observation and contributed observation (ranked by success in this survey).

Table 4. Snake species summary table. This table provides concise information about potential and observed snake species with their corresponding legal status, and summarizes the study results by distribution, estimated abundance, type of voucher taken, successful survey techniques (ranked), and the observed life stages. See Appendix I for species that we judged not likely to occur in the park unit.

Common Name[12]	Species Status	Scientific Name	Conserv. Status[13]	Distribution[14]	Estimated Abundance[15]	Voucher (museum specimen or photograph)	Successful Sampling Techniques[16]	Life Stages
Rubber boa	Confirmed	*Charina bottae*		Limited	Rare		Road driving	Adult
Striped whipsnake	Confirmed	*Masticophis taeniatus*		Limited	Rare		Incidental observation	Adult
Gophersnake	Confirmed	*Pituophis catenifer*		Intermediate	Uncommon		Visual encounters, incidental observations	Juveniles, adults
Terrestrial gartersnake	Confirmed	*Thamnophis elegans*		Widespread	Abundant		Visual encounters, funnel traps, road driving	Juveniles, adults
Western rattlesnake	Confirmed	*Crotalus viridis*		Limited	Rare		Contributed observation	Adults
Eastern racer	Probably present but not detected	*Coluber constrictor*						

[12] Names based on Crother, 2000.
[13] Based on Rankings from the Idaho Conservation Data Center, 2002: S (Bureau of Land Management) = Sensitive species, SC (Idaho Fish and Game) = Species of Special Concern.
[14] Based on this survey.
[15] Based on this survey.
[16] Techniques employed: visual encounters, road driving, funnel traps, incidental observation and contributed observation (ranked by success in this survey).

Table 5. Idaho Gap Analysis categories found within the study area. The row headings represent the survey sites sampled during this study. The column headings denote the major land cover classifications from the Idaho Gap Analysis that were present in the study area. The numbers in each cell represent the sub-categories in each of the major land classifications that were observed in each surveyed area (2000= Agricultural, 33XX= Xeric shrublands, 41XX= Broadleaf forest, 42XX= Needleleaf forest, 61XX= Forested riparian, 62XX= Non-forested riparian, 63XX= Wetlands, 7300= Exposed rock).

Survey Sites	Agricultural	Non-Forested Lands	Forest Uplands	Riparian and Wetland Areas	Barren Land
Lone Rock area		33XX	42XX		
Comp Wall area		33XX	42XX		
Castle entrance	2000				
Almo Creek 1	2000				
Almo Creek 2	2000				
Stines Creek		33XX			
Almo Creek 3	2000				
SE Pond				63XX	
Riparian Flat		33XX			
Sagebrush Flat		33XX			
Hidden Pond		33XX			
Twin Sisters area		33XX			
Twin Sisters 2		33XX			
Inner City			42XX	61XX	
North Fork Circle Cr		33XX		61XX, 62XX	
Graham Creek trail		33XX	41XX		
Apen N>5			41XX		
Pinyon pine S>5			42XX		
Pinyon pine N>5			42XX		
Juniper S>5			42XX		7300
Juniper N>5			42XX		
Mt mahogany N>5		33XX			
Sagebrush S>5		33XX			
Mt mahogany S>5		33XX			
Sagebrush N>5		33XX			

Table 6. Species occurrence by Idaho Gap Analysis categories. The row headings represent all species that were observed in our surveys. The column headings denote the major land cover classifications from the Idaho Gap Analysis that were present in the study area. The numbers in each cell represent the sub-category code for each of the major land classifications where those species were observed (2000 = Agricultural, 33XX = Xeric shrublands, 41XX = Broadleaf forest, 42XX = Needleleaf forest, 61XX = Forested riparian, 62XX = Non-forested riparian, 63XX = Wetlands, 7300 = Exposed rock).

Common Name	Agricultural	Non-Forested Lands	Forest Uplands	Riparian and Wetland Areas	Barren Land
Boreal chorus frog				61XX	
Common sagebrush lizard	2000	33XX	41XX, 42XX		7300
Western skink		33XX		61XX	
Rubber boa		33XX			
Striped whipsnake		33XX			
Gophersnake	2000	33XX			
Terrestrial gartersnake	2000	33XX		62XX, 63XX	

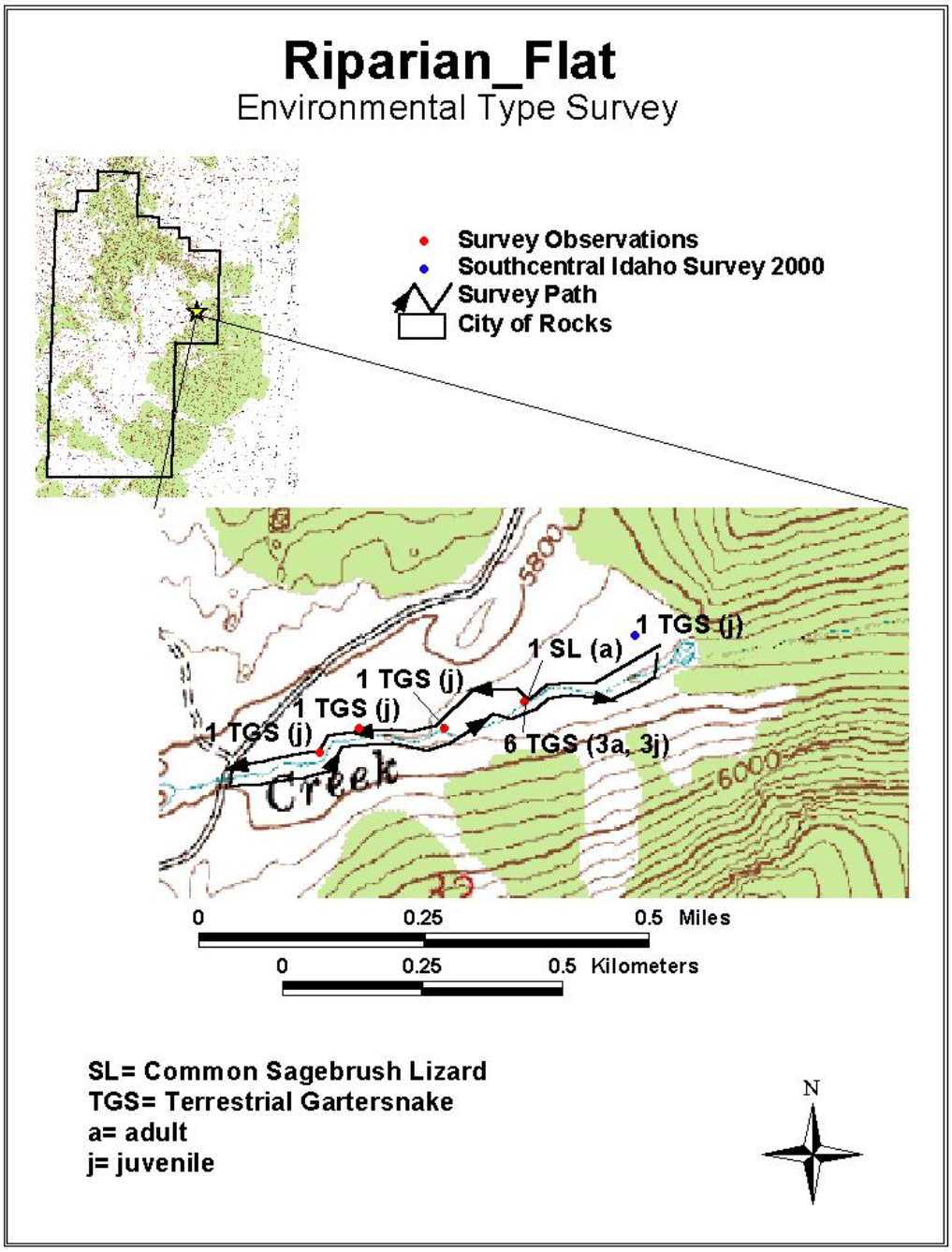
Table 7. Environmental Types identified and surveyed within the study area. The row headings represent the vegetation types we determined based on existing cover type maps. Slope was categorized as either flat (aspect was not assigned to this categories) when the slope was <5% or as >5% for all slopes 5% or greater. Direction was classified as either North-Facing, representing all directions from 315º through 135º, or South-Facing for all directions 135º through 315º.

Vegetation Types	Flat	N-Facing >5%	S-Facing >5%
Subalpine fir			
Sagebrush	X	X	X
Mountain mahogany		X	X
Juniper		X	X
Pinyon pine		X	X
Aspen		X	
Douglas fir			
Riparian	X		

Table 8. Environmental Type survey results. The dates of all identified Environmental Types that were surveyed, the time spent surveying in each area, the overall area covered (based on a 5 m scanning range along the total distance of the sampling path), the number of observations with species listed (the number in parenthesis represents the number of observed life stages, a = adult and j = juvenile), observation rate, and observation/area.

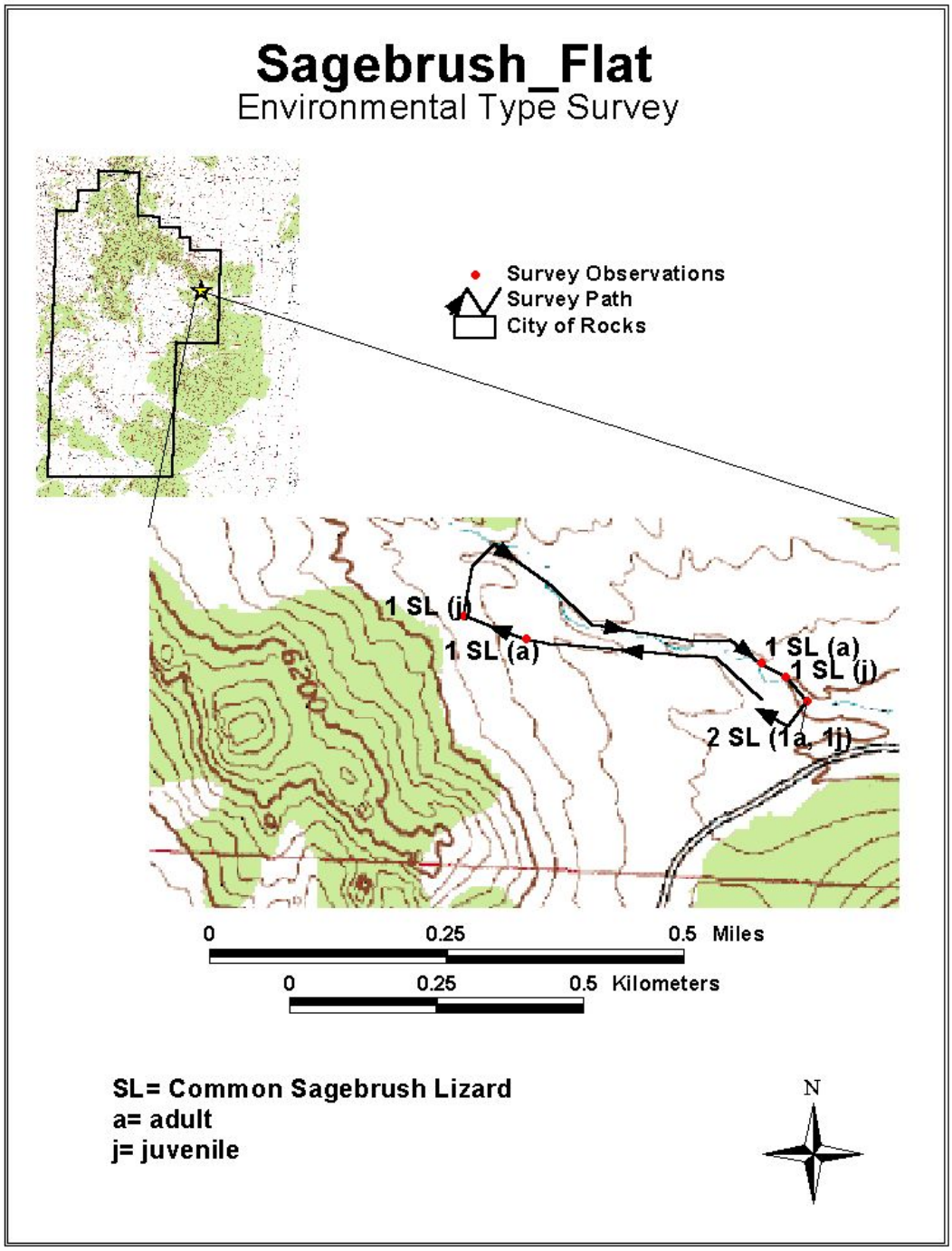
Date	Environmental Type	Time	Area	# of observations	Observation Rate	Observations/Area
16-Jun-01	Riparian flat	3:40	8.8 km^2	3 Terrestrial gartersnakes (3j)	0.82/hr	0.34/km^2
16-Jun-01	Sagebrush flat	2:10	7.0 km^2	6 Common sagebrush lizards (3a, 3j)	2.76/hr	0.86/km^2
2-Jul-01	Aspen N>5%	4:50	6.9 km^2	Nothing observed	0/hr	0/km^2
11-Jul-01	Pinyon pine S>5%	4:05	7.0 km^2	1 Common sagebrush lizard (a)	0.25/hr	0.14/km^2
13-Jul-01	Pinyon pine N>5%	2:40	5.6 km^2	2 Common sagebrush lizard (2a)	0.75/hr	0.36/km^2
13-Jul-01	Juniper S>5%	2:50	5.8 km^2	3 Common sagebrush lizards (1a, 2j)	1.06/hr	0.52/km^2
14-Jul-01	Juniper N>5%	2:50	4.7 km^2	5 Common sagebrush lizards (2a, 3j)	1.77/hr	1.06/km^2
15-Jul-01	Mt mahogany N>5%	2:45	3.7 km^2	4 Common sagebrush lizards (3a, 1j)	1.45/hr	1.08/km^2
15-Jul-01	Sagebrush S>5%	1:25	1.9 km^2	Nothing observed	0/hr	0/km^2
16-Jul-01	Mt mahogany S>5%	2:35	3.9 km^2	4 Common sagebrush lizards (3a, 1j)	1.55/hr	1.03/km^2
16-Jul-01	Sagebrush N>5%	1:25	3.1 km^2	Nothing observed	0/hr	0/km^2

Appendix A. Site survey maps.



A portion of the Almo Quadrangle, Idaho 7.5 minute series (Topographic) that shows the observed species and their distributions. The label numbers represent the number of individuals observed, the letters represent species identification codes reported in the legend, and the letters in parenthesis identify the observed life stages.

Appendix A. Site survey maps (continued).



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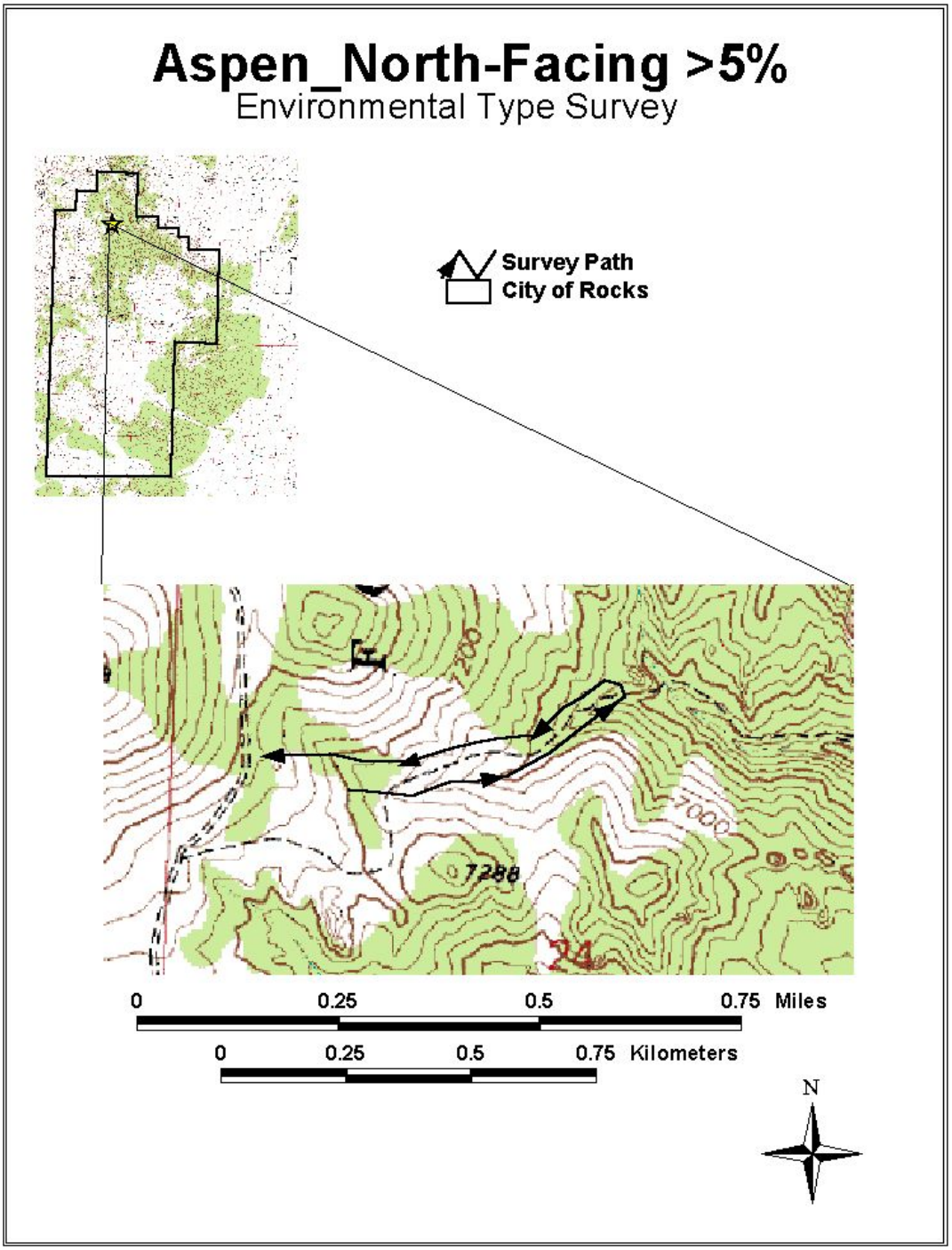
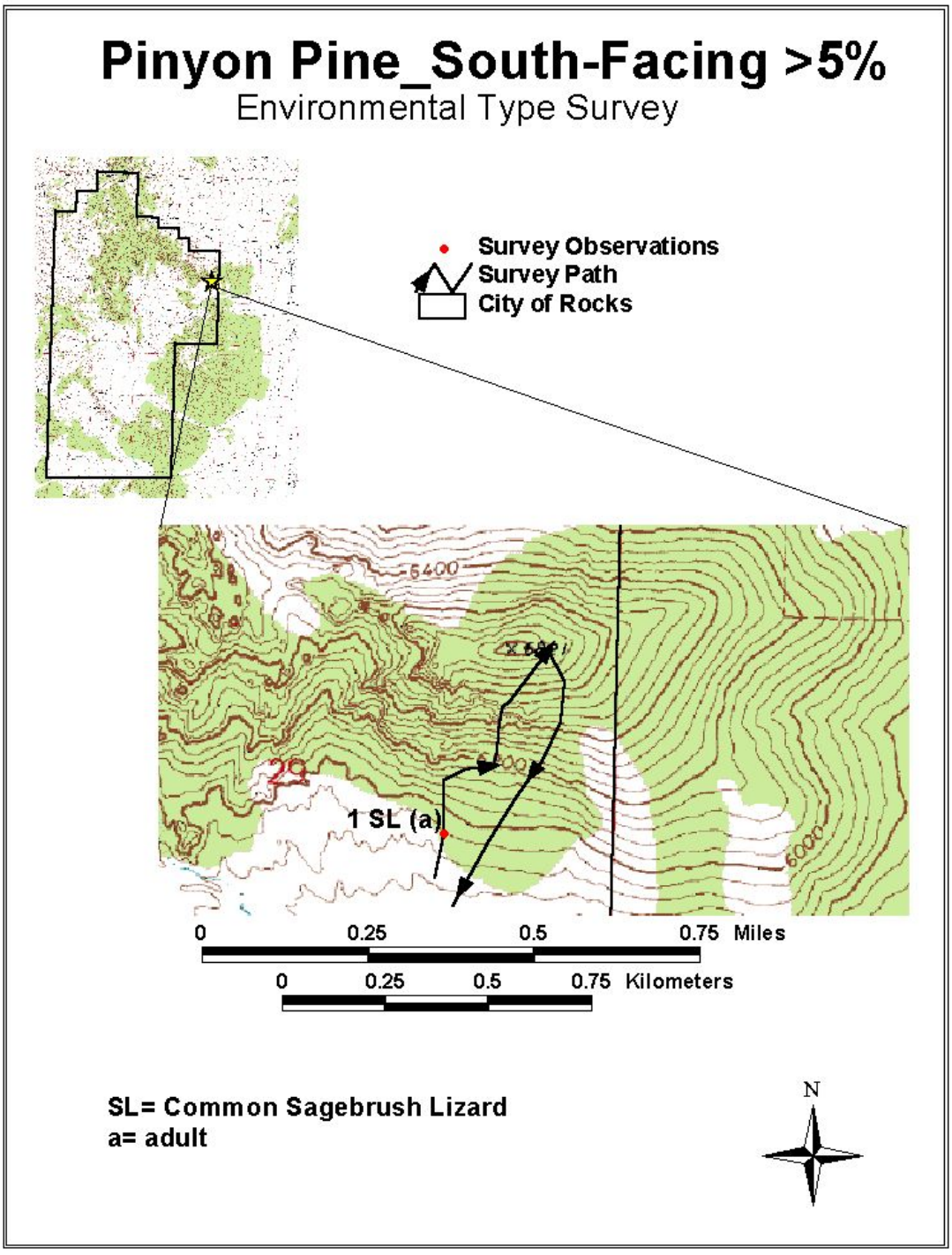
Appendix A. Site survey maps (continued).



A portion of the Almo Quadrangle, Idaho 7.5 minute series (Topographic) that shows the observed species and their distributions. No species were observed.

Appendix A. Site survey maps (continued).



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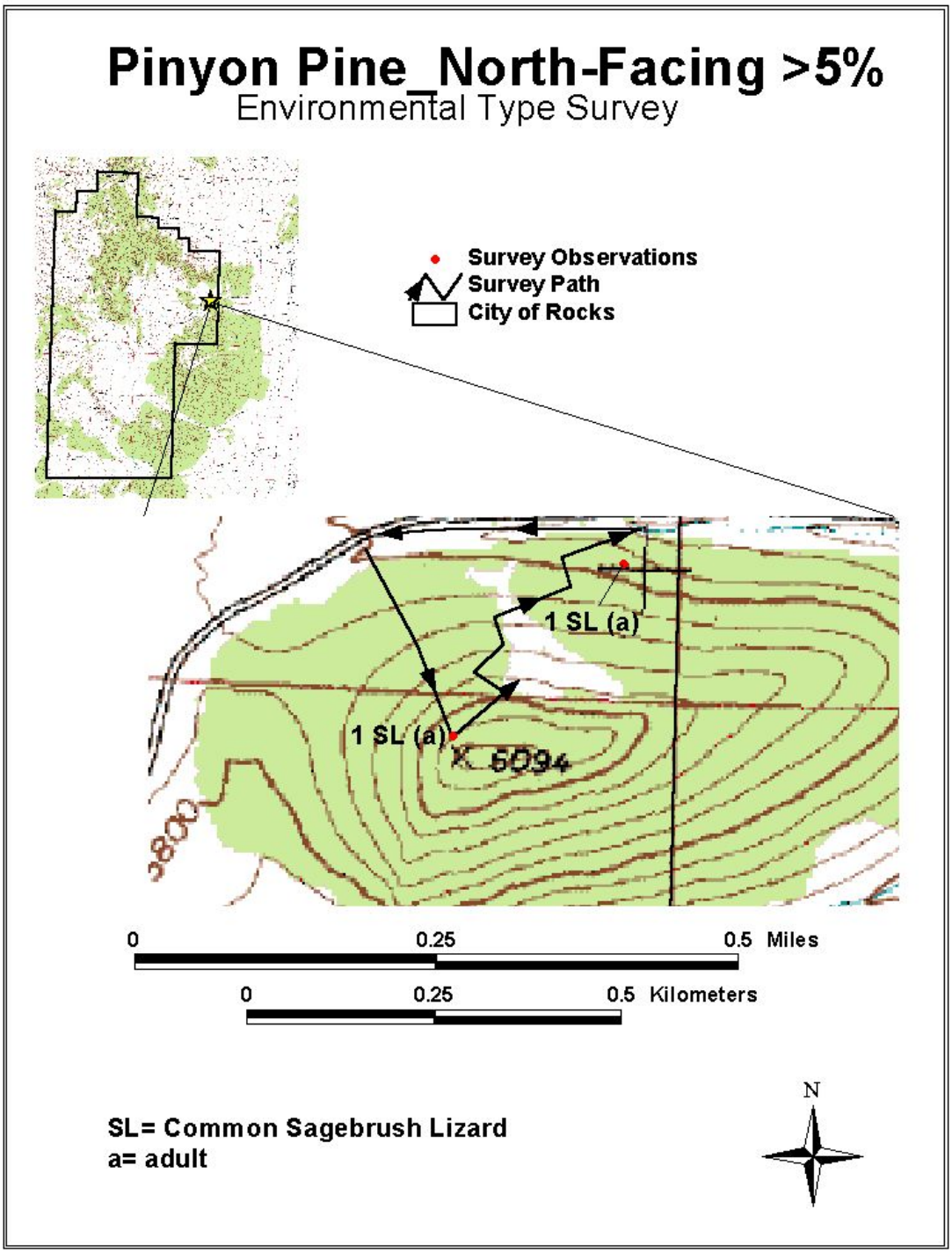
Appendix A. Site survey maps (continued).



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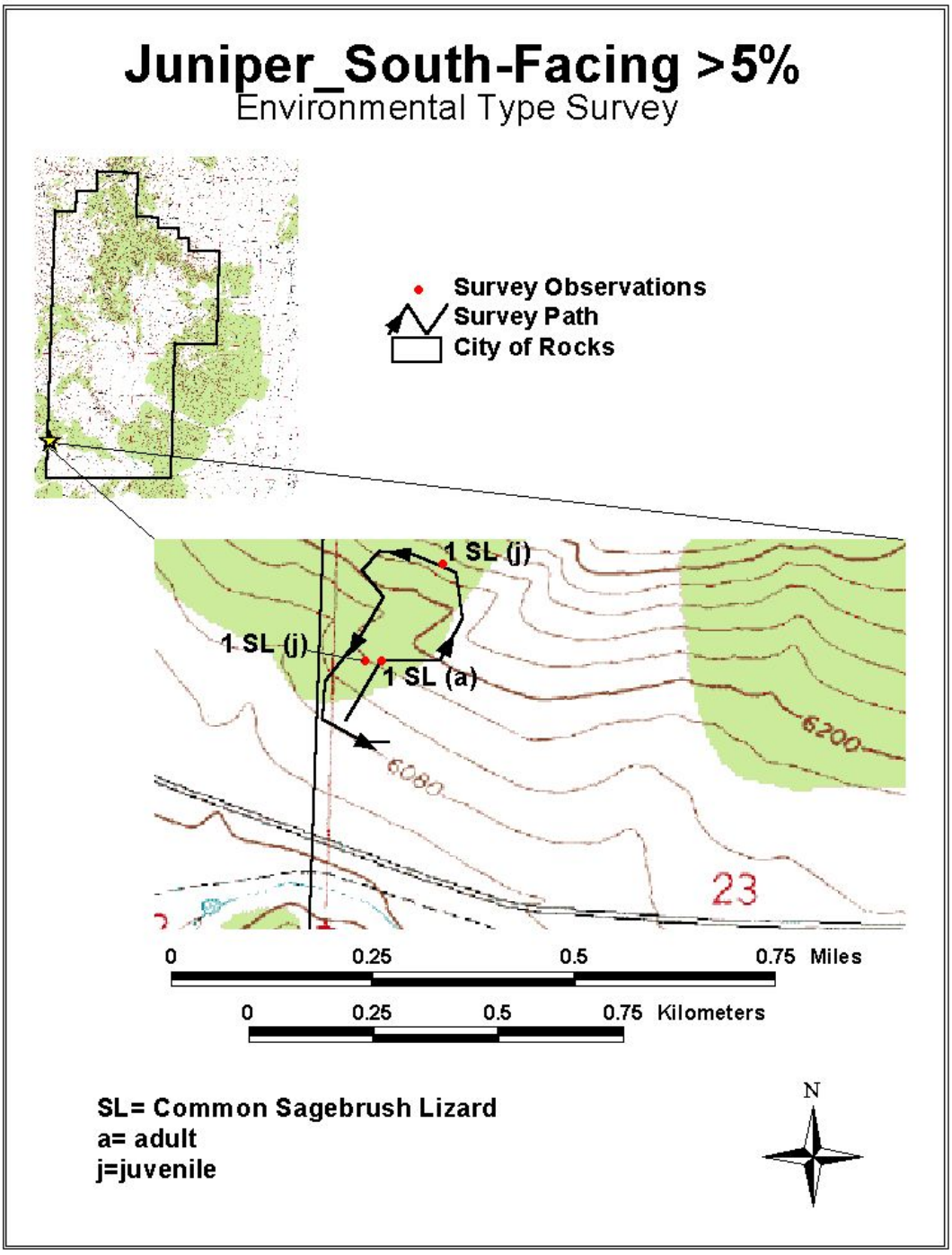
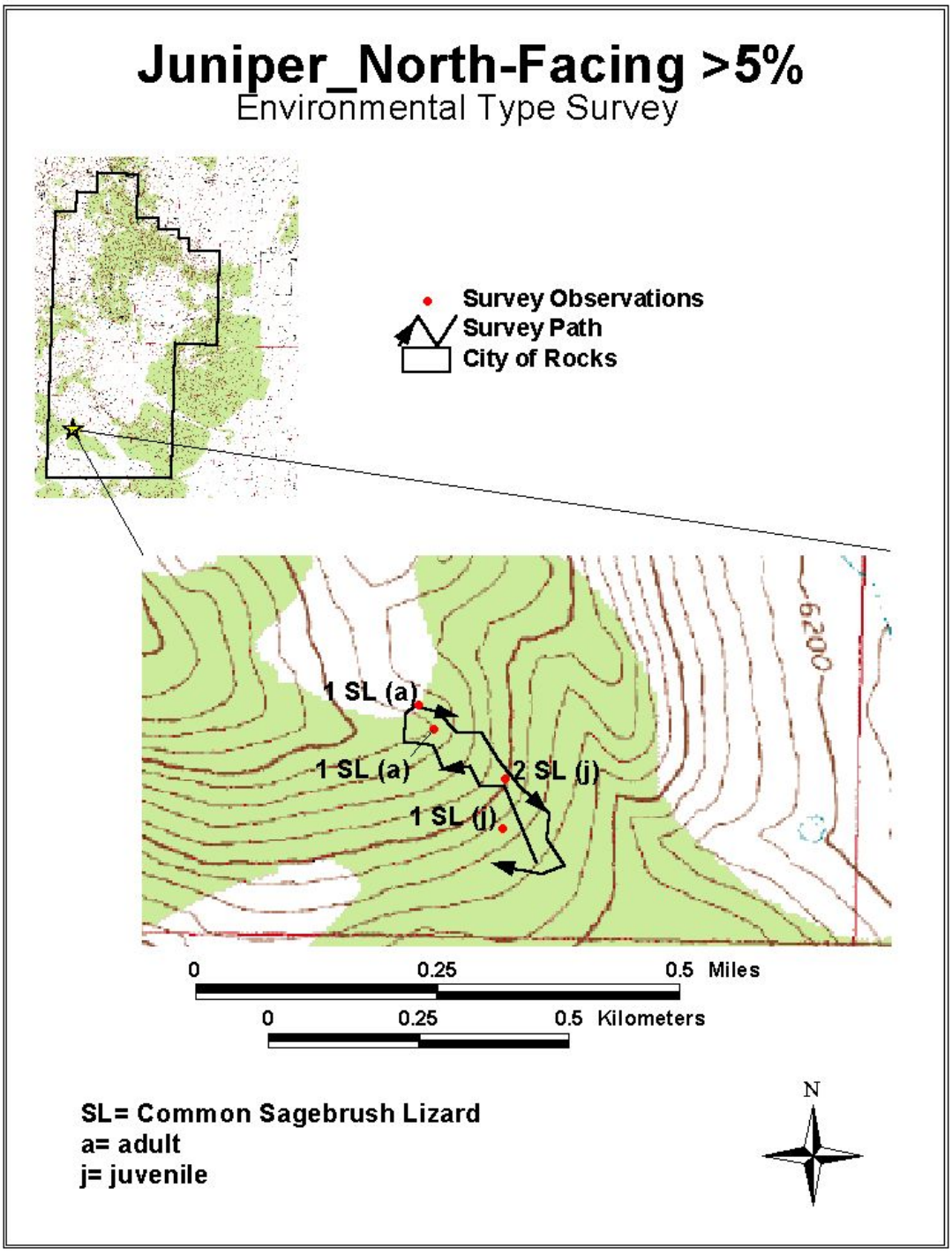
Appendix A. Site survey maps (continued).



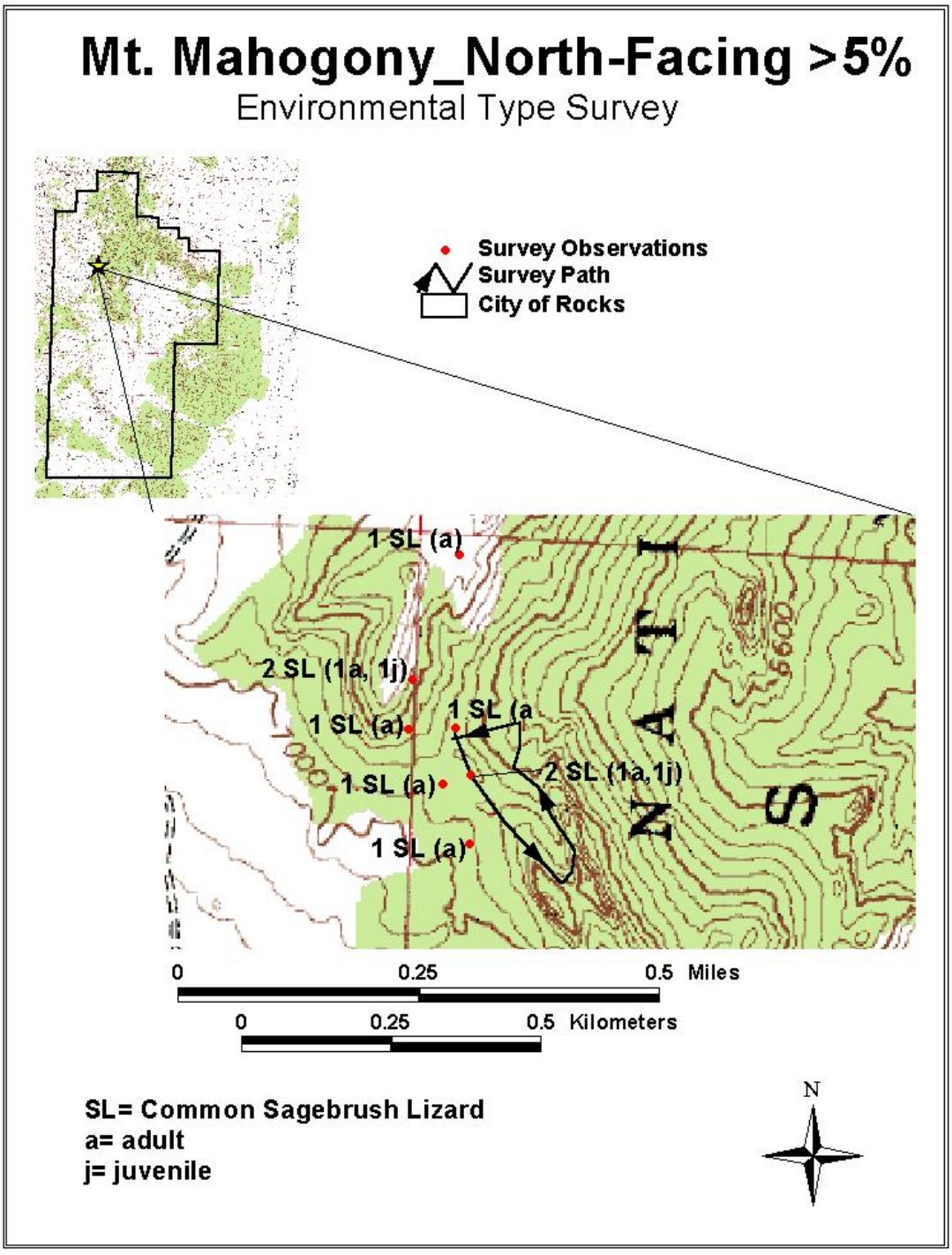
A portion of the Almo Quadrangle, Idaho 7.5 minute series (Topographic) that shows the observed species and their distributions. The label numbers represent the number of individuals observed, the letters represent species identification codes reported in the legend, and the letters in parenthesis identify the observed life stages.

Appendix A. Site survey maps (continued).



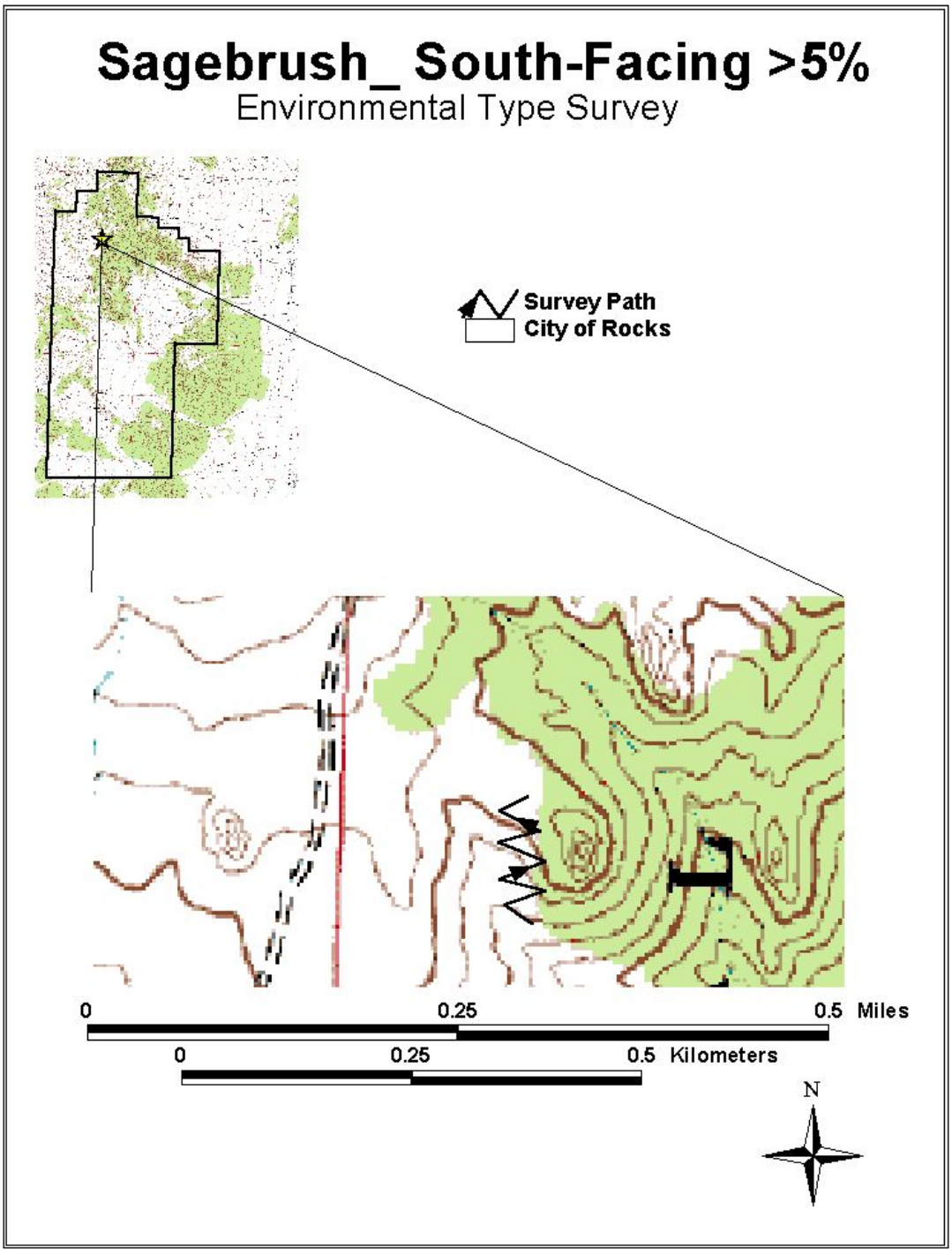
A portion of the Almo Quadrangle, Idaho 7.5 minute series (Topographic) that shows the observed species and their distributions. The label numbers represent the number of individuals observed, the letters represent species identification codes reported in the legend, and the letters in parenthesis identify the observed life stages.

Appendix A. Site survey maps (continued).



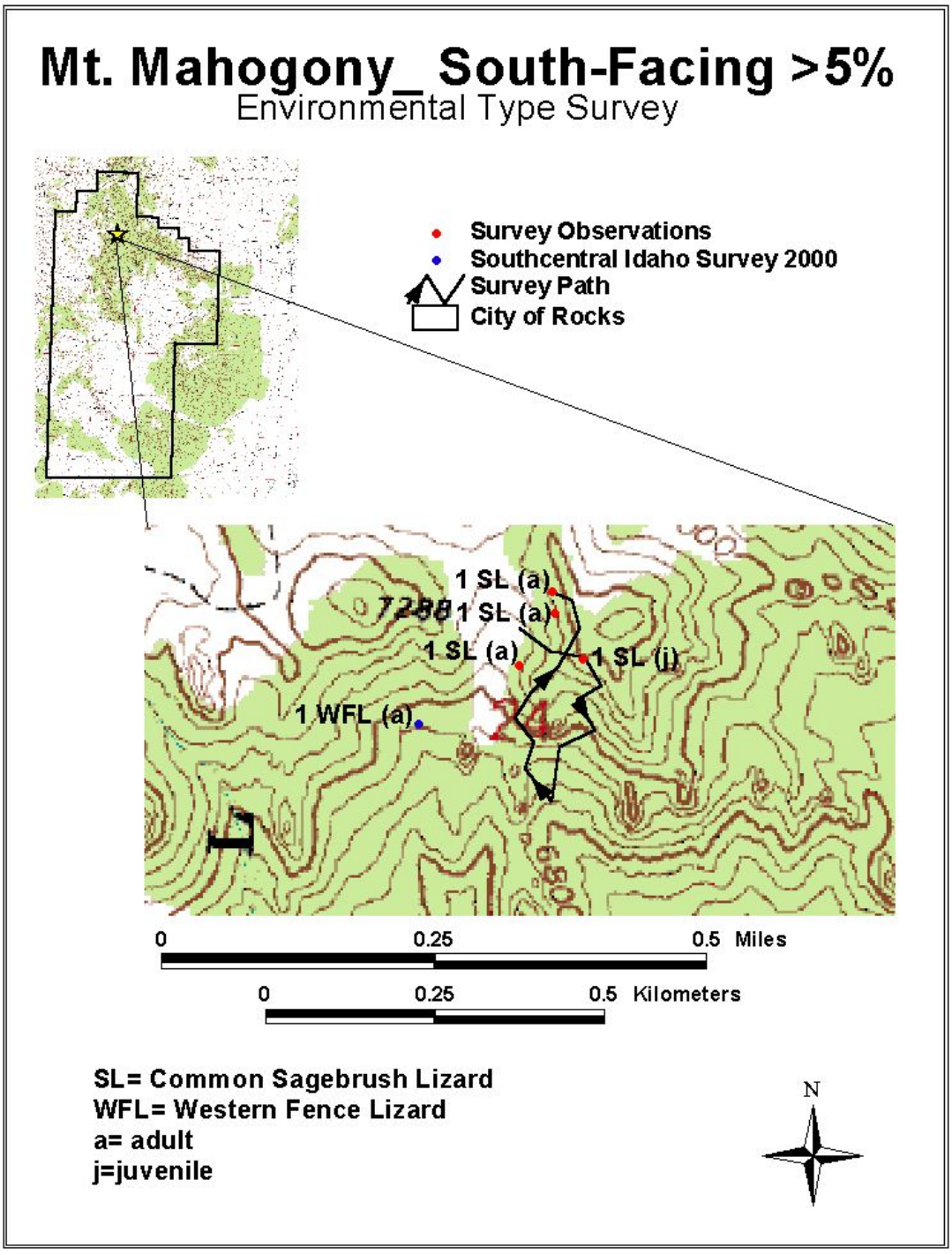
A portion of the Almo Quadrangle, Idaho 7.5 minute series (Topographic) that shows the observed species and their distributions. The label numbers represent the number of individuals observed, the letters represent species identification codes reported in the legend, and the letters in parenthesis identify the observed life stages.

Appendix A. Site survey maps (continued).



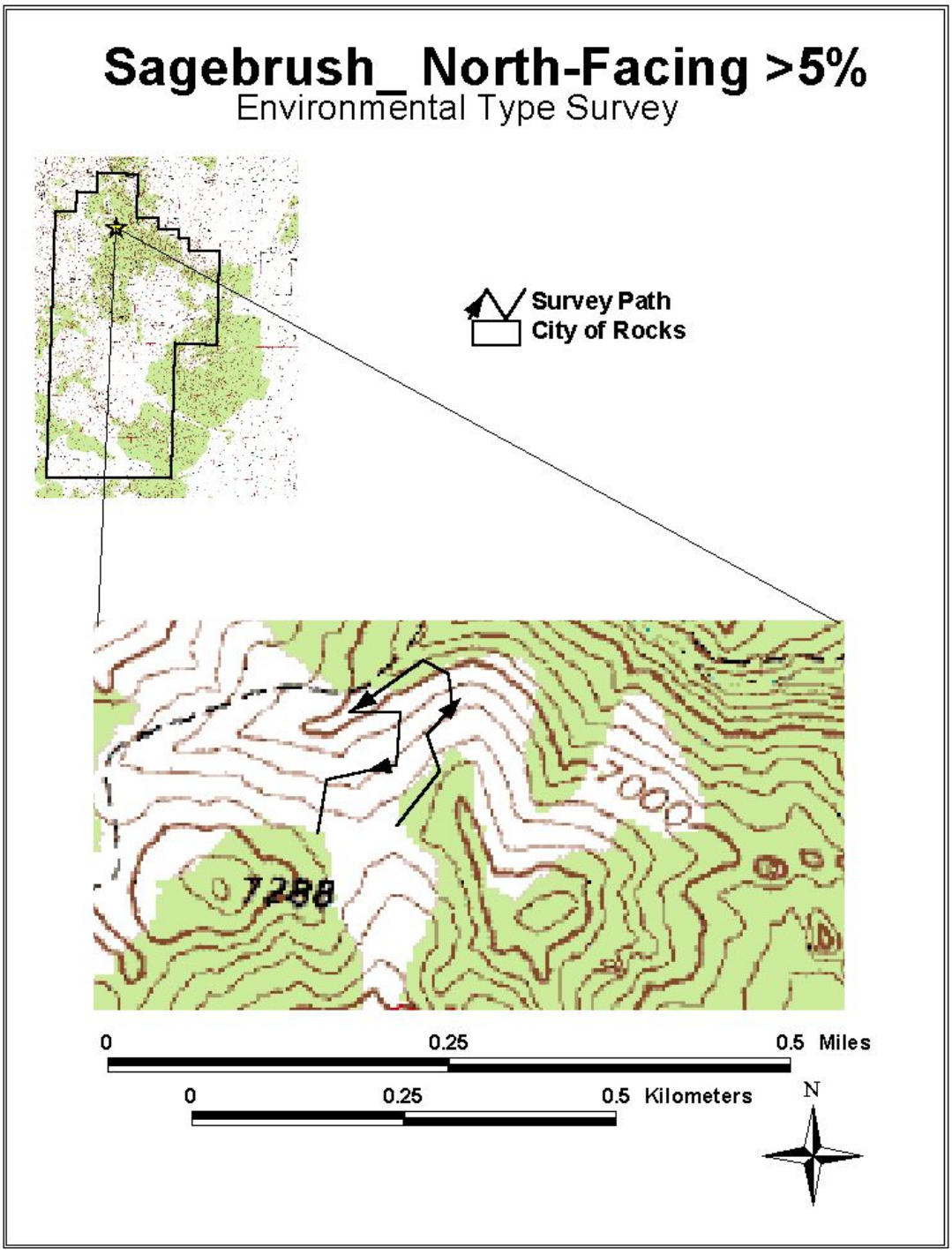
A portion of the Almo Quadrangle, Idaho 7.5 minute series (Topographic) that shows the observed species and their distributions. No species were observed.

Appendix A. Site survey maps (continued).



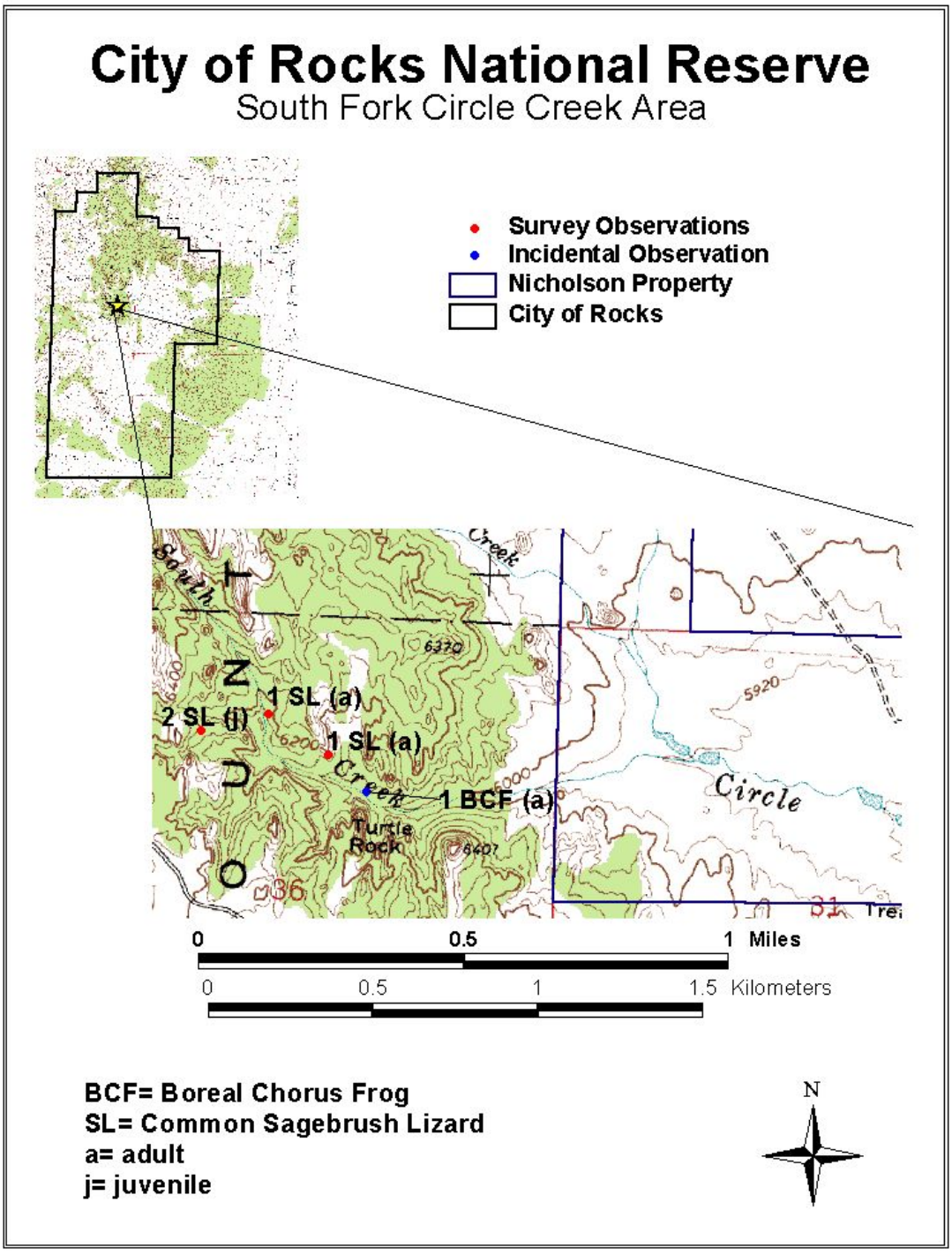
A portion of the Almo Quadrangle, Idaho 7.5 minute series (Topographic) that shows the observed species and their distributions. The label numbers represent the number of individuals observed, the letters represent species identification codes reported in the legend, and the letters in parenthesis identify the observed life stages.

Appendix A. Site survey maps (continued).



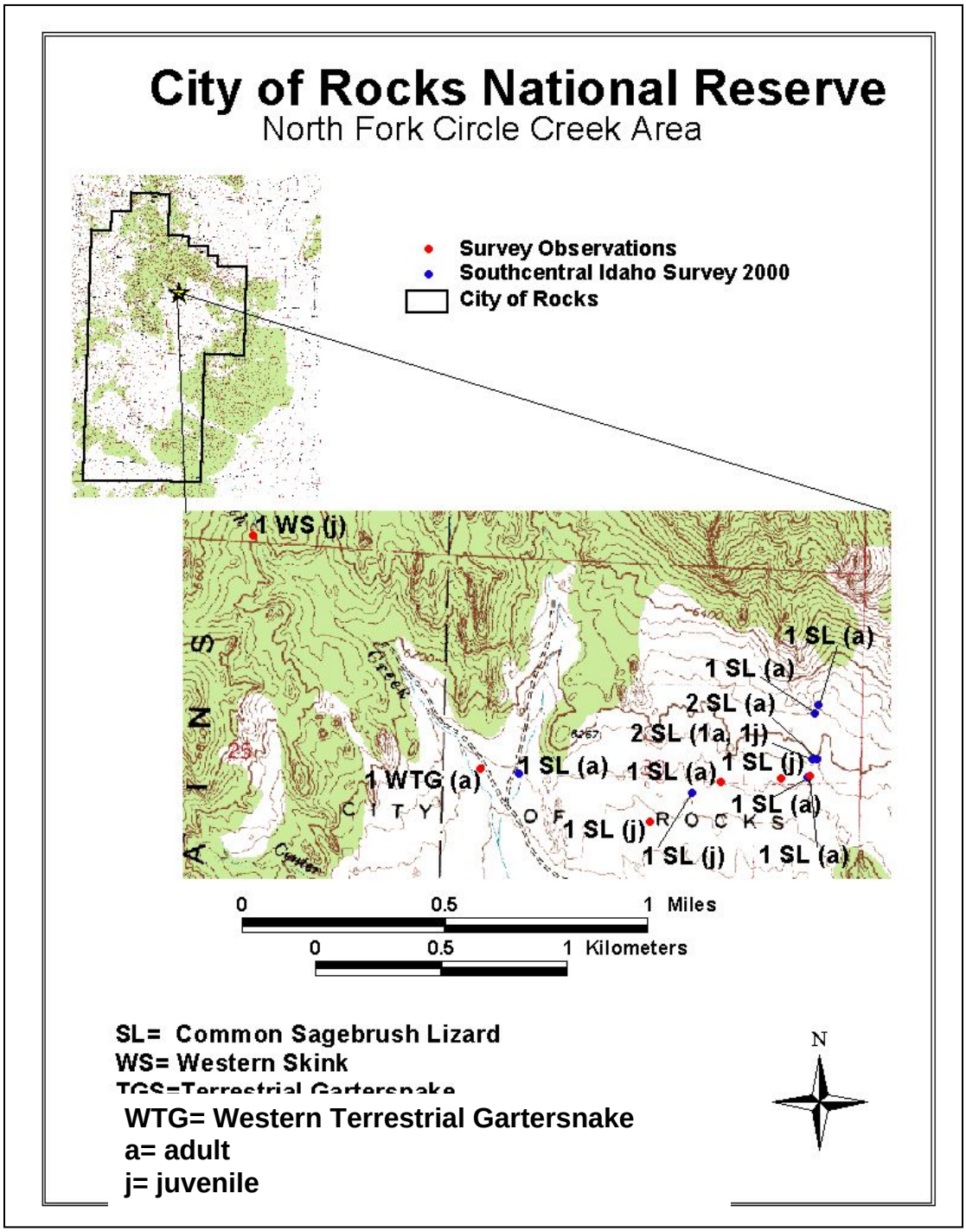
A portion of the Almo Quadrangle, Idaho 7.5 minute series (Topographic) that shows the observed species and their distributions. No species were observed.

Appendix A. Site survey maps (continued).



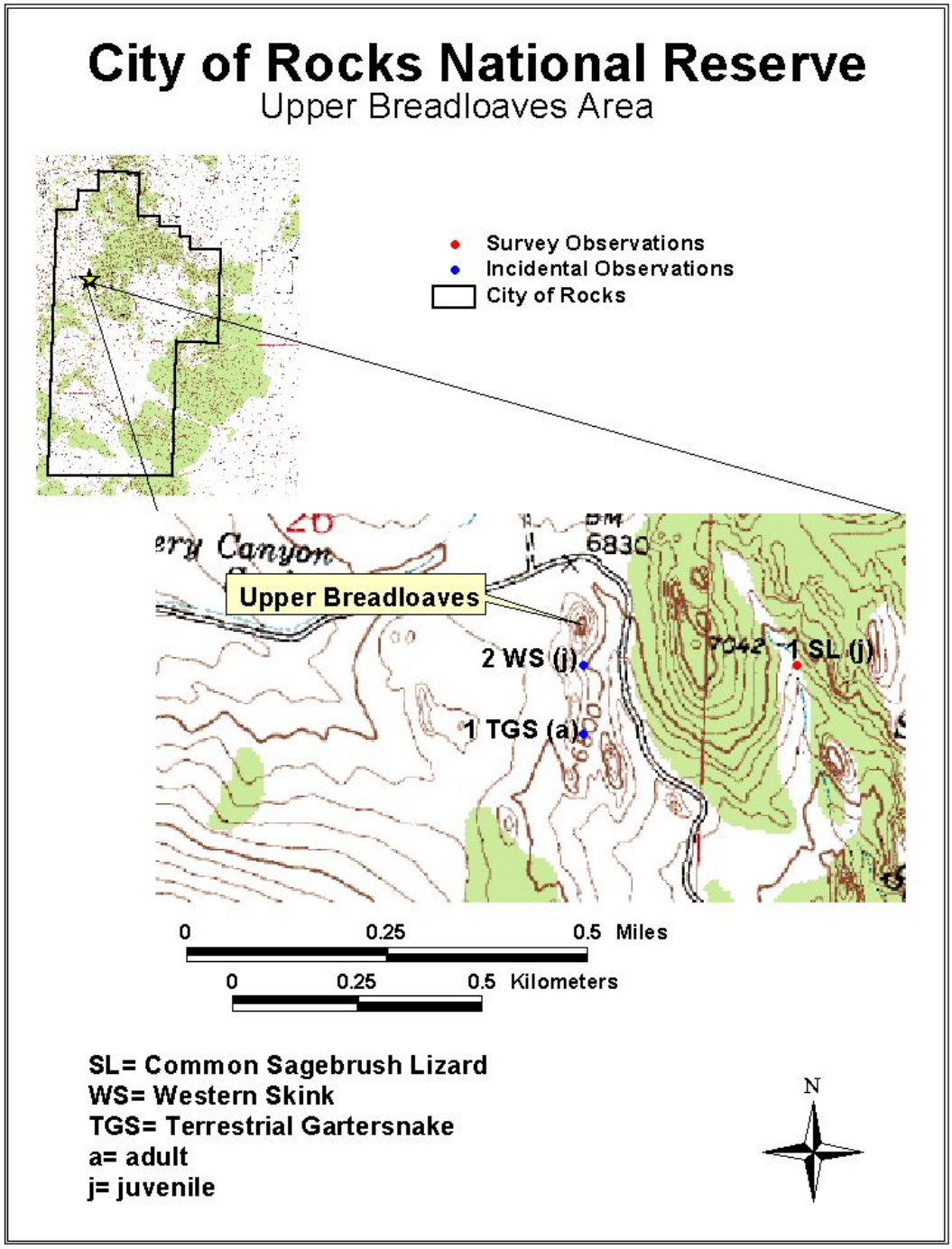
A portion of the Almo Quadrangle, Idaho 7.5 minute series (Topographic) that shows the observed species and their distributions. The label numbers represent the number of individuals observed, the letters represent species identification codes reported in the legend, and the letters in parenthesis identify the observed life stages.

Appendix A. Site survey maps (continued).



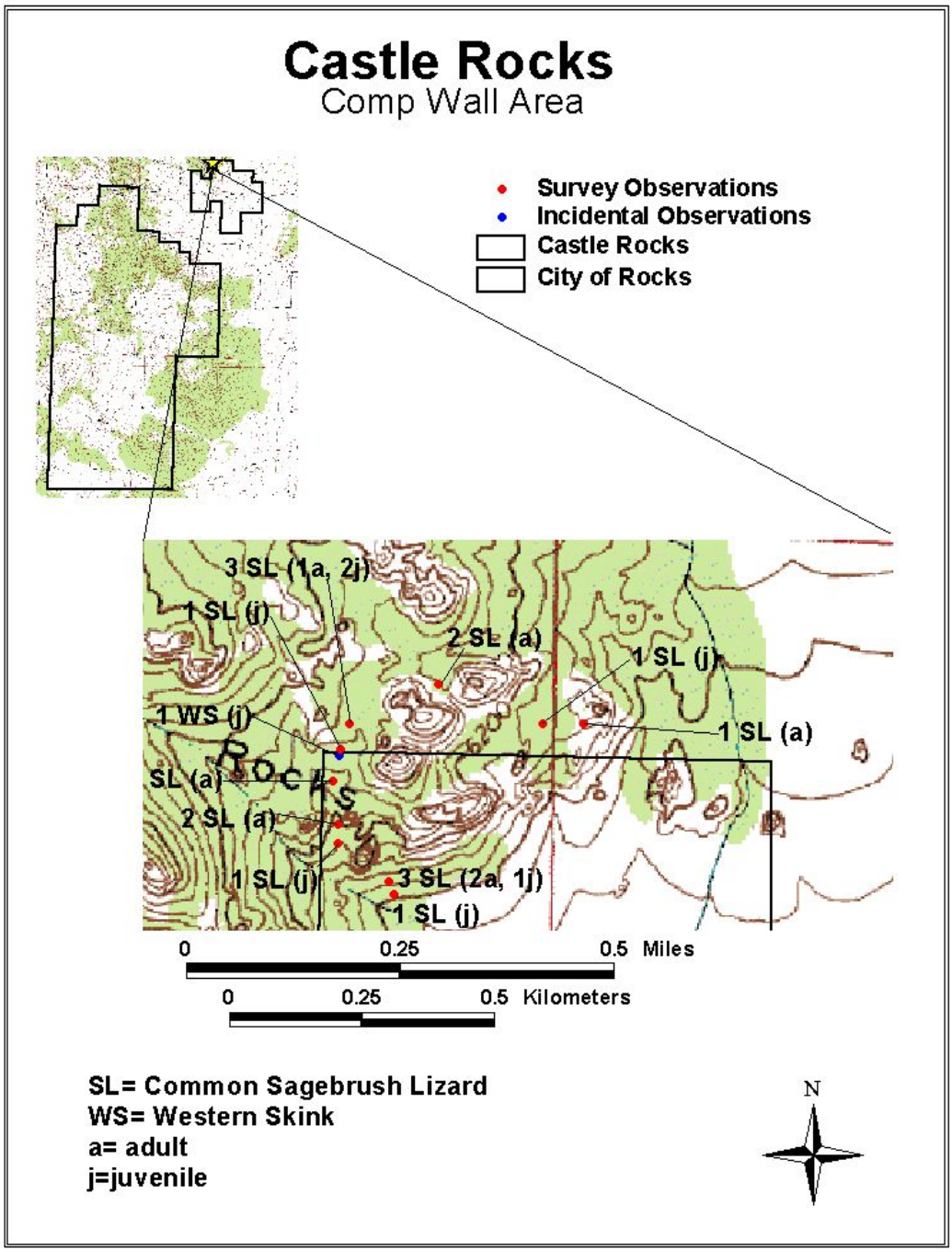
A portion of the Almo Quadrangle, Idaho 7.5 minute series (Topographic) that shows the observed species and their distributions. The label numbers represent the number of individuals observed, the letters represent species identification codes reported in the legend, and the letters in parenthesis identify the observed life stages.

Appendix A. Site survey maps (continued).



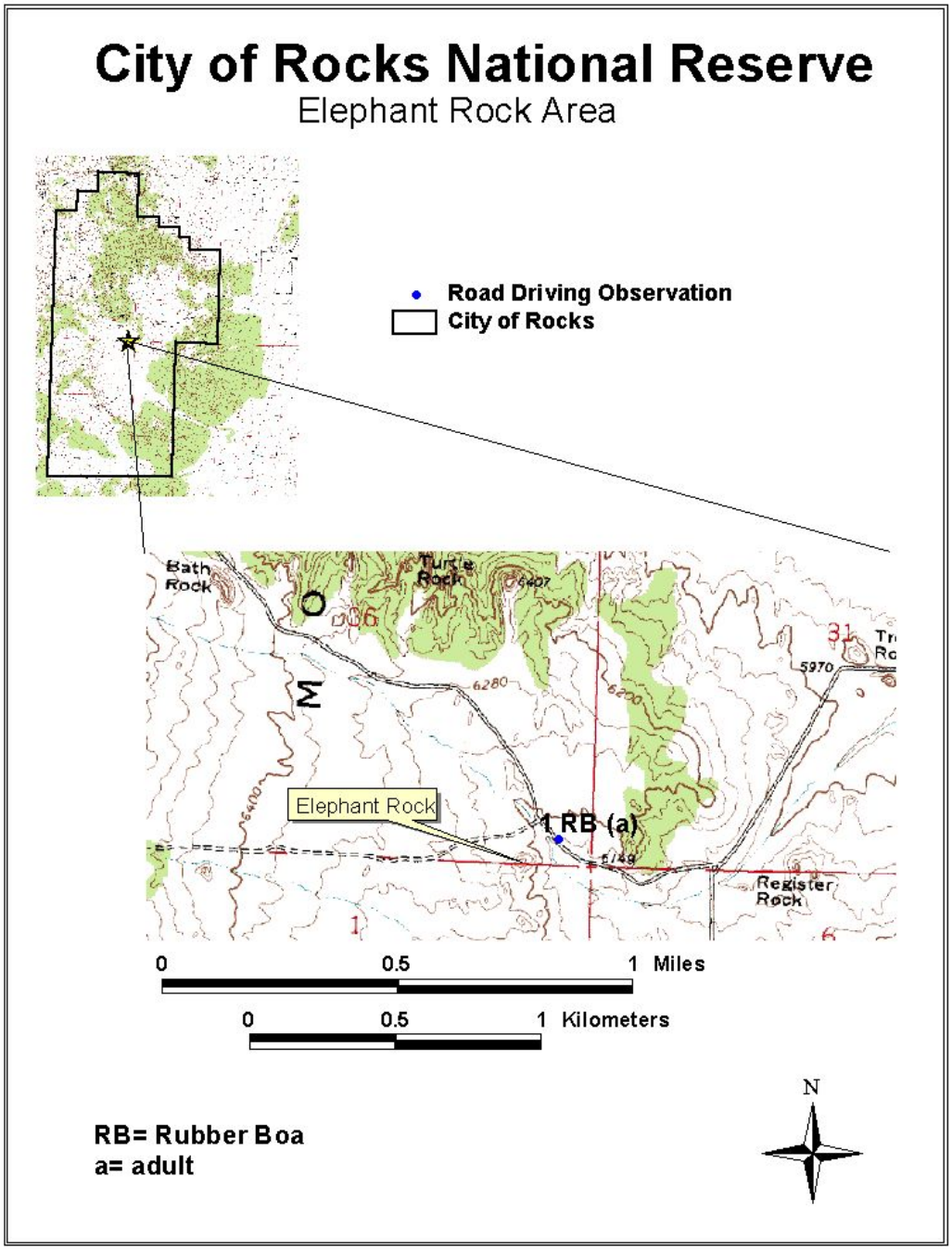
A portion of the Almo Quadrangle, Idaho 7.5 minute series (Topographic) that shows the observed species and their distributions. The label numbers represent the number of individuals observed, the letters represent species identification codes reported in the legend, and the letters in parenthesis identify the observed life stages.

Appendix A. Site survey maps (continued).



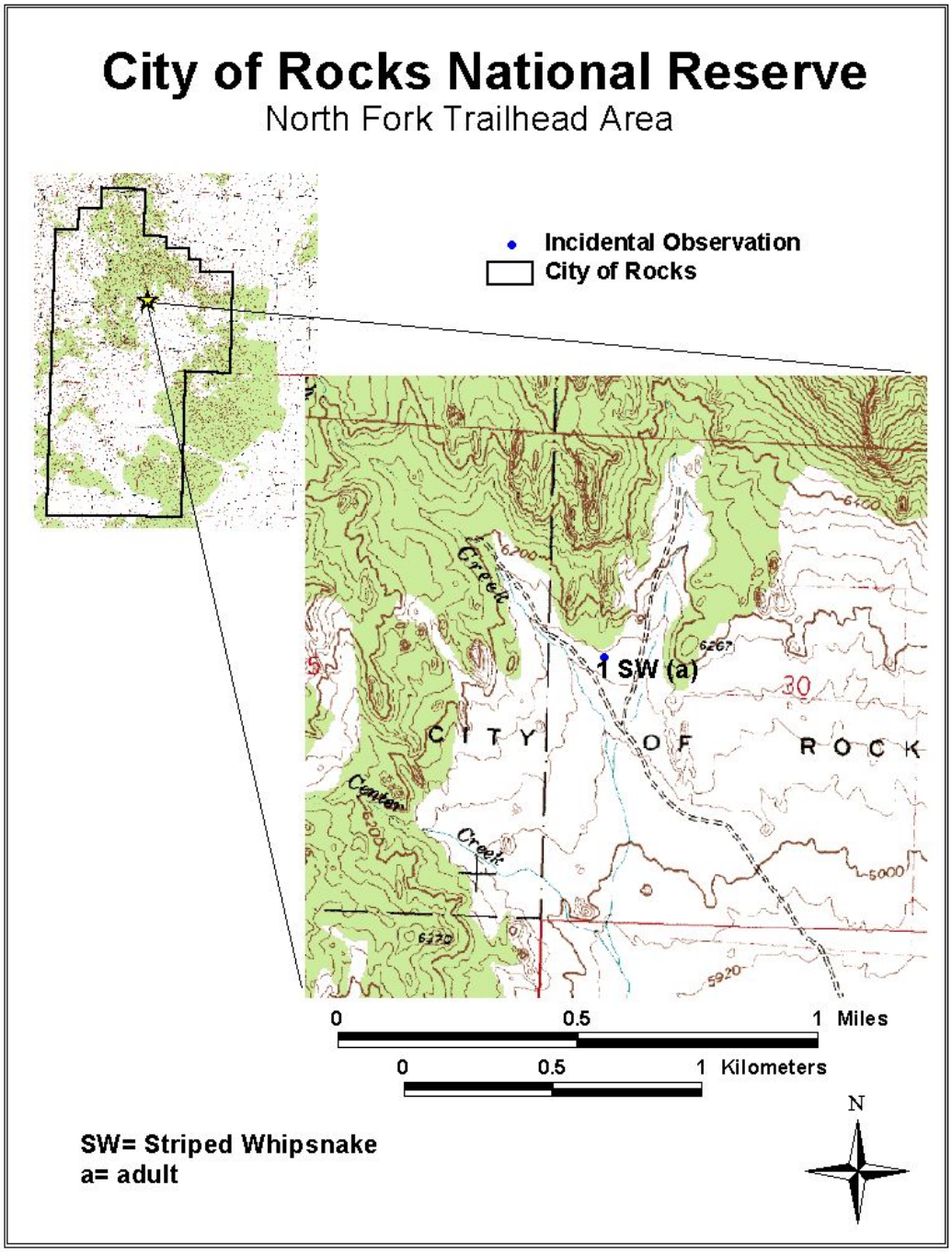
A portion of the Almo and Cache Peak Quadrangles, Idaho 7.5 minute series (Topographic) that shows the observed species and their distributions. The label numbers represent the number of individuals observed, the letters represent species identification codes reported in the legend, and the letters in parenthesis identify the observed life stages.

Appendix A. Site survey maps (continued).



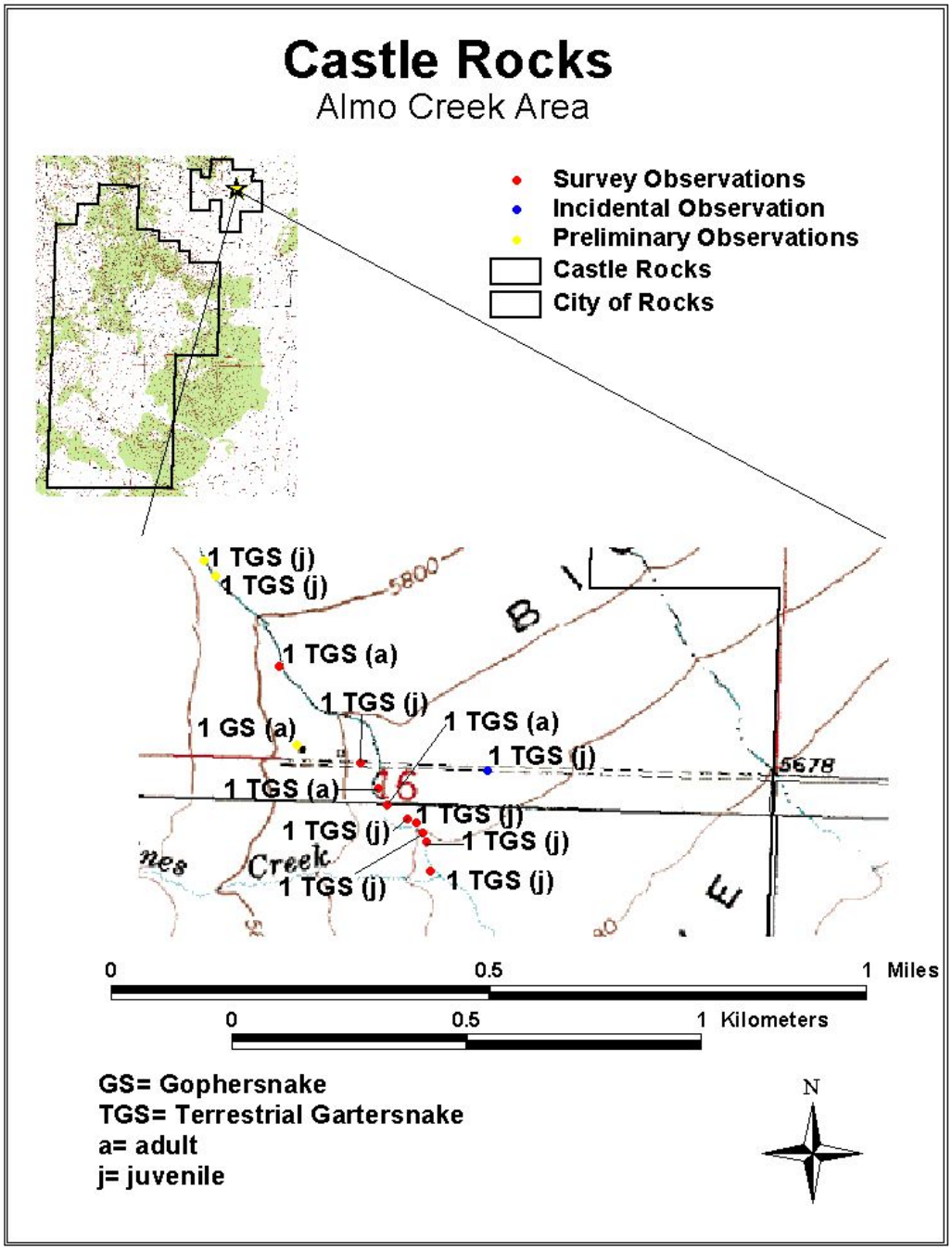
A portion of the Almo Quadrangle, Idaho 7.5 minute series (Topographic) that shows the observed species and their distributions. The label number represents the number of individuals observed, the letters represent species identification codes reported in the legend, and the letter in parenthesis identifies the observed life stage.

Appendix A. Site survey maps (continued).



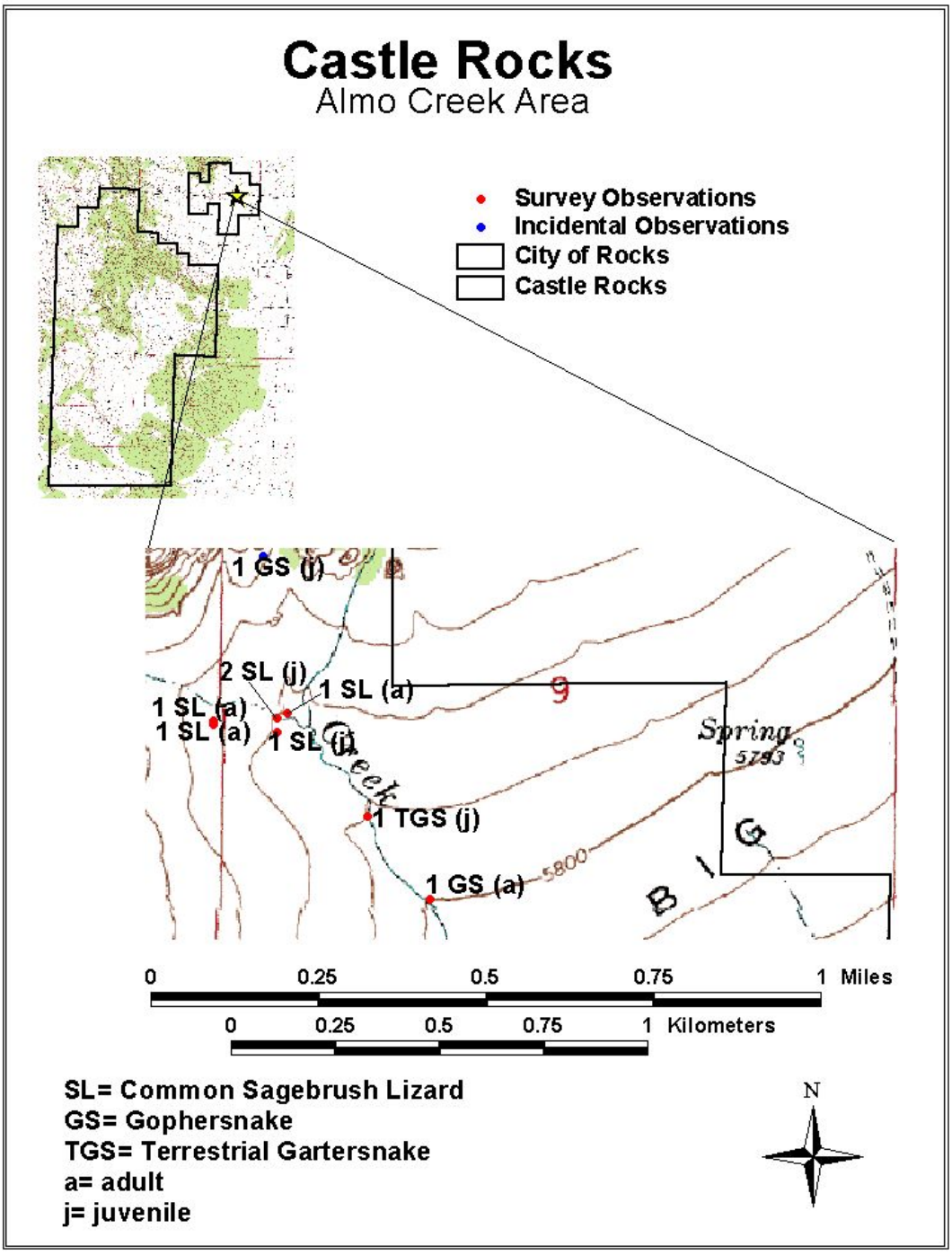
A portion of the Almo Quadrangle, Idaho 7.5 minute series (Topographic) that shows the observed species and their distributions. The label number represents the number of individuals observed, the letters represent species identification codes reported in the legend, and the letter in parenthesis identifies the observed life stage.

Appendix A. Site survey maps (continued).



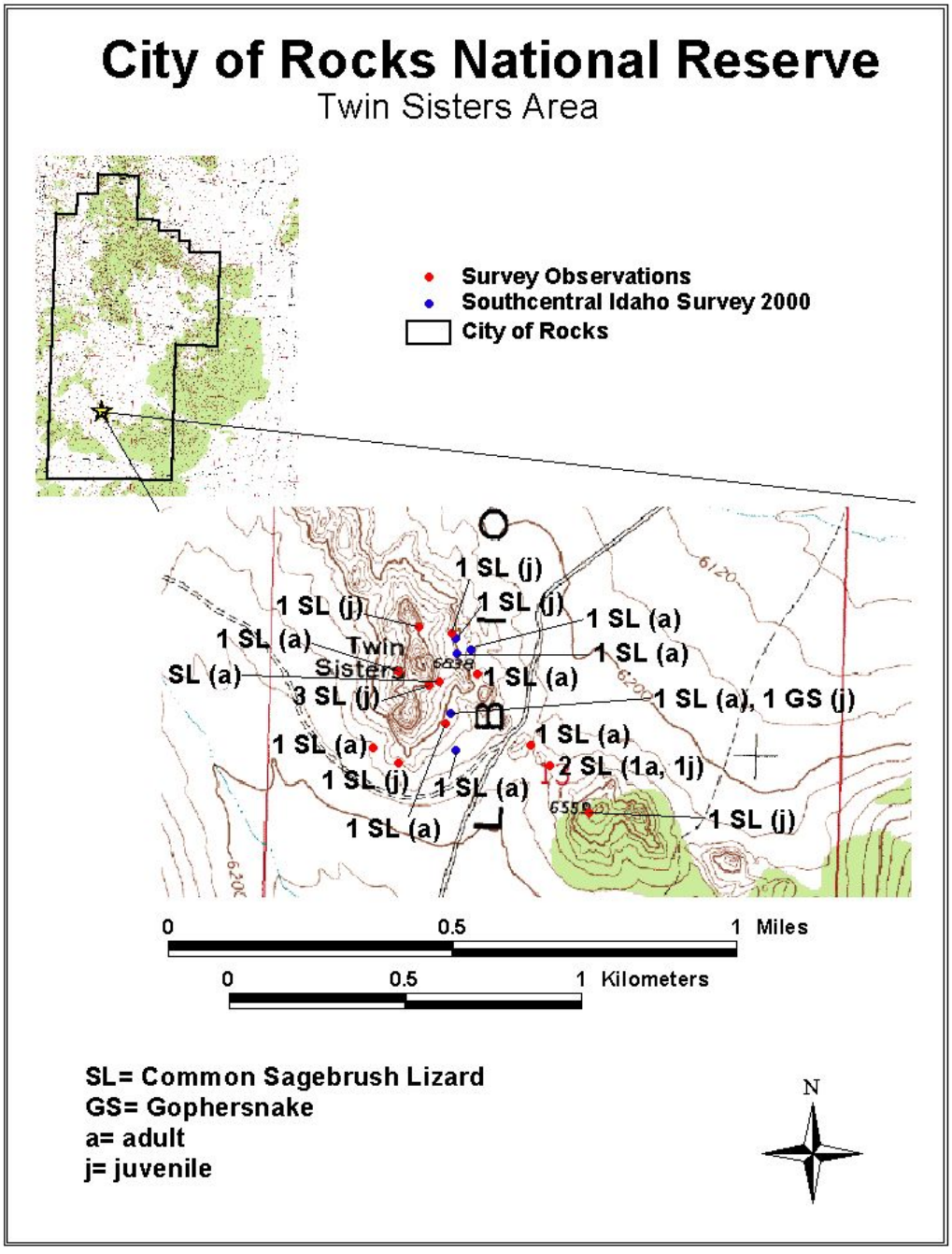
A portion of the Almo and Cache Peak Quadrangles, Idaho 7.5 minute series (Topographic) that shows the observed species and their distributions. The label numbers represent the number of individuals observed, the letters represent species identification codes reported in the legend, and the letters in parenthesis identify the observed life stages.

Appendix A. Site survey maps (continued).



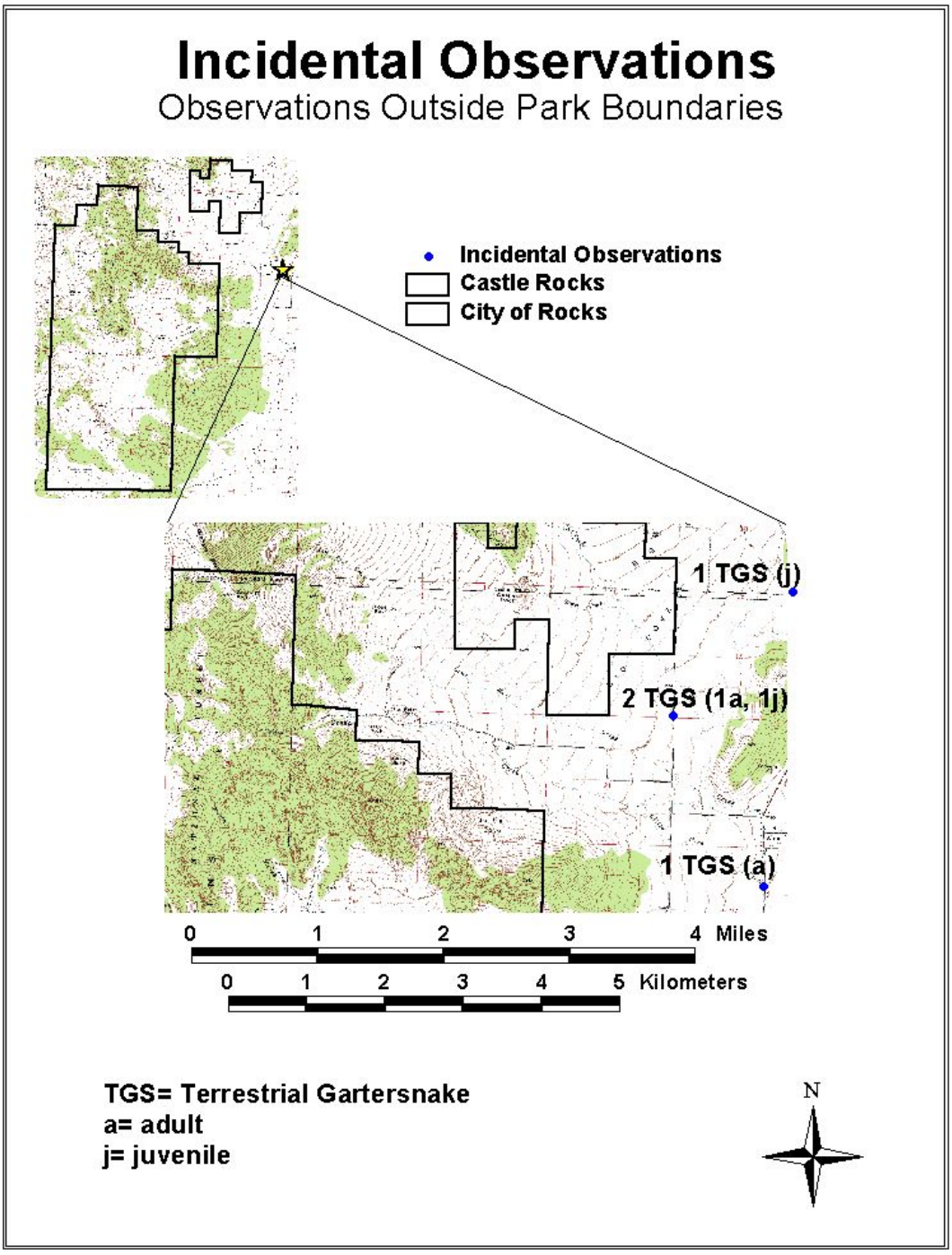
A portion of the Almo and Cache Peak Quadrangles, Idaho 7.5 minute series (Topographic) that shows the observed species and their distributions. The label numbers represent the number of individuals observed, the letters represent species identification codes reported in the legend, and the letters in parenthesis identify the observed life stages.

Appendix A. Site survey maps (continued).



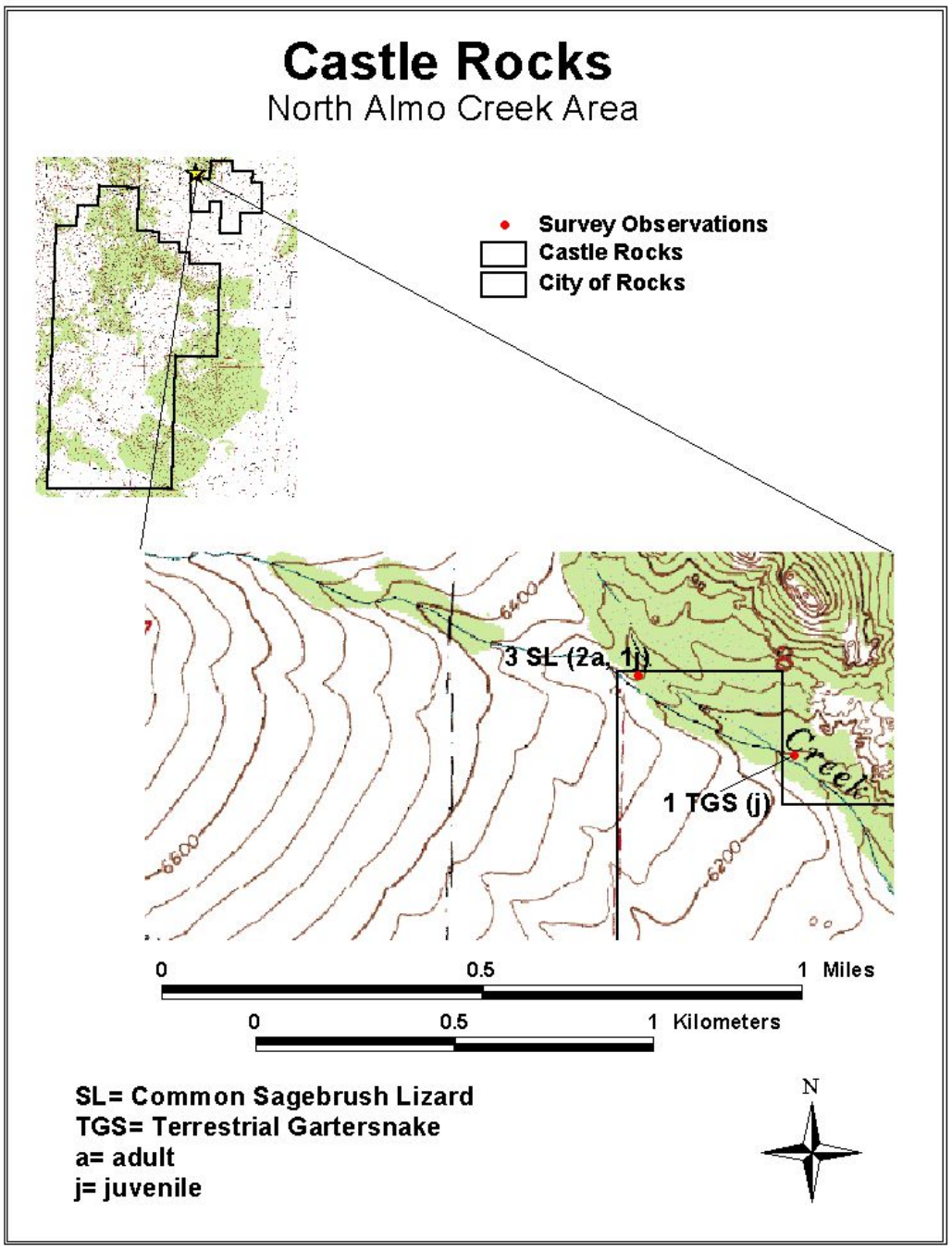
A portion of the Almo Quadrangle, Idaho 7.5 minute series (Topographic) that shows the observed species and their distributions. The label numbers represent the number of individuals observed, the letters represent species identification codes reported in the legend, and the letters in parenthesis identify the observed life stages.

Appendix A. Site survey maps (continued).



A portion of the Almo and Cache Peak Quadrangles, Idaho 7.5 minute series (Topographic) that shows the observed species and their distributions. The label numbers represent the number of individuals observed, the letters represent species identification codes reported in the legend, and the letters in parenthesis identify the observed life stages.

Appendix A. Site survey maps (continued).



A portion of the Almo and Cache Peak Quadrangles, Idaho 7.5 minute series (Topographic) that shows the observed species and their distributions. The label numbers represent the number of individuals observed, the letters represent species identification codes reported in the legend, and the letters in parenthesis identify the observed life stages.

Appendix B. Site photographs.

This site SE Pond which is located along Circle Creek near the eastern border of Bureau of Land Management lands. Due to problems with film processing, this photograph was taken about two and half weeks after I surveyed this site and at the time of survey the entire wetland was submerged by shallow water. No species were observed at this site.

This site is Hidden Pond located along a backwater fork of Circle Creek. Six terrestrial gartersnakes (three juveniles and three adults) were detected at this site.

Appendix B. Site photographs (continued).

This site is the Twin Sisters area. This photograph was taken looking northwest. Sixteen common sagebrush lizards (eight adults and eight juveniles) were observed at this site.

This site is a section of Almo Creek located near the headquarters on the Castle Rocks property. The photograph was taken looking northwest. One juvenile common sagebrush lizard, one adult gophersnake, and eight juvenile and three adult terrestrial gartersnakes were detected in this area.

Appendix B. Site photographs (continued).

This site is the Sagebrush_Flat Environmental Type. This photograph was taken looking west. Three adult and three juvenile common sagebrush lizards were found at this site.

This site is the Sagebrush_North-facing > 5% Environmental Type. This photograph was taken looking northeast. No species were detected at this site.

Appendix B. Site photographs (continued).

This site is the Juniper_South-Facing > 5% Environmental Type. This photograph was taken looking northwest. Two juvenile and one adult common sagebrush lizards were observed at this site.

This is the Mt. Mahogany_North-Facing > 5% Environmental Type. This photograph was taken looking south. No species were detected at this site.

Appendix B. Site photographs (continued).

This site is the Mt. Mahogany_South-Facing > 5% Environmental Type. This photograph was taken looking east. One juvenile and three adult common sagebrush lizards were observed at this site.

Appendix B. Site photographs (continued).

This site is the Pinyon Pine_North-Facing > 5% Environmental Type. This photograph was taken looking south. Two adult common sagebrush lizards were observed at this site.

Appendix B. Site photographs (continued).

This site is the Pinyon Pine_South-Facing > 5% Environmental Type. This photograph was taken looking north. One adult sagebrush lizard was found at this site.

Appendix C. Survey site location data, species observations, site characteristics, and environmental measurements.

Data are taken from a single large spreadsheet and are organized as if they were being read down the first few columns to the bottom of the spreadsheet, and then down the next group of columns. Metadata are provided below to explain abbreviations and various codes reported in the following spreadsheet.

Locality	General description of site location
Date	Date when observations were made
Time	Time at start of survey site, and time of observations made from each site
Observ.	Individuals present at the time of survey
UTM	Universal Transverse Mercator Zone, NAD (North American Datum) 27
Acc.	Reported estimated accuracy of GPS coordinates from the Garmin eTrex unit display in meters
North.	UTM northing coordinate
East.	UTM easting coordinate
Elev.	Elevation reported in kilometers
Species	PSMA = Pseudacris maculata, SCGR= Sceloporus graciosus, EUSK- Eumeces skiltonianus, PICA= Pituophis catenifer, THEL = Thamnophis elegans
Life Stage/Sex	The observed life stage at a site (j= juvenile, a= adult) and sex of individual(s) if determined
Technique	The sampling technique used to make the observation; VE= visual encounter, FT= funnel trapping
Habitat Description	General description of habitat and dominant features/vegetation
GAP	GAP Analysis Land Cover Classification Scheme codes for sites (2000= Agricultural Land, 33XX= Xeric Shrublands, 41XX- Broadleaf Forest, 42XX= Needleleaf Forest, 61XX= Forested Riparian, 62XX= Non-forested Riparian, 7300= Exposed Rock)
Radiation	Clear, partial, or overcast
Wind	Calm, light, medium, or heavy
Ta	Shaded air temperature at 1 meter
Cloud Cover	Visually estimated % cloud cover
Precip.	Precipitation yes (snow or rain) or no
Tw	Water temperature at 1 cm depth
pH	Temperature corrected measure of pH for a site
Conductivity	Conductivity in milligrams/liter
Color	Clear or stained
Turbidity	Clear or cloudy
Origin	Natural, man-made, or man-mod (man modified)
Drainage	None, occasional, permanent
Site Type	Temp. (temporary) or permanent lake/pond, marsh bog, stream, spring/seep, active or inactive beaver pond
NWI	National Wetland Inventory Classification for wetlands: RIS= Riverine, Intermittent, Streambed; PAB= Palustrine, Aquatic Bed; PEW= Palustrine, Emergent Wetland
Length (m)	Estimated longest dimension
Width (m)	Estimated maximum width
Max Depth	<1, ~1 m, > 1 m
Substrate	Silt/mud, sand/gravel, cobble, boulder/bedrock, other
Em. Veg.	Dominant emergent vegetation with most dominant listed first
N. Shoreline	Shallows: absent or present; emergent vegetation: absent or present

Appendix C. Survey site location data, species observations, site characteristics, and environmental measurements (continued).

Locality	Date	Time	Observ.	UTM	Acc.	North.	East.	Elev.
Lone Rock area (Castle)	8-Jun-01	14:44	J. Shive	12	9	4666716	279297	1.83
Lone Rock area (Castle)	8-Jun-01	14:59	J. Shive	12	6	4666739	279288	1.84
Lone Rock area (Castle)	8-Jun-01	15:05	J. Shive	12	6	4666752	279317	1.81
Lone Rock area (Castle)	8-Jun-01	15:15	J. Shive	12	6	4666684	279232	1.83
Lone Rock area (Castle)	8-Jun-01	16:42	J. Shive	12	4	4667678	279586	1.83
Lone Rock area (Castle)	8-Jun-01	17:10	J. Shive	12	4	4667561	279402	1.84
Lone Rock area (Castle)	8-Jun-01	17:18	J. Shive	12	5	4667324	279309	1.84
Lone Rock area (Castle)	8-Jun-01	17:30	J. Shive	12	4	4667233	279205	1.85
Lone Rock area (Castle)	8-Jun-01	18:20	J. Shive	12	7	4667759	278429	1.92
Lone Rock area (Castle)	8-Jun-01	19:11	J. Shive	12	12	4667529	279357	1.85
Comp Wall area (Castle)	9-Jun-01	13:57	J. Shive	12	5	4667697	279762	1.8
Comp Wall area (Castle)	9-Jun-01	15:27	J. Shive	12	6	4668229	279664	1.86
Comp Wall area (Castle)	9-Jun-01	15:55	J. Shive	12	7	4668228	279587	1.87
Comp Wall area (Castle)	9-Jun-01	16:30	J. Shive	12	12	4668302	279392	1.93
Comp Wall area (Castle)	9-Jun-01	17:24	J. Shive	12	6	4668229	279225	1.93
Comp Wall area (Castle)	9-Jun-01	17:40	J. Shive	12	8	4668182	279207	1.94
Comp Wall area (Castle)	9-Jun-01	17:48	J. Shive	12	7	4668122	279193	1.93
Comp Wall area (Castle)	9-Jun-01	18:06	J. Shive	12	14	4668041	279203	1.91
Comp Wall area (Castle)	9-Jun-01	18:16	J. Shive	12	22	4668005	279203	1.93
Comp Wall area (Castle)	9-Jun-01	18:32	J. Shive	12	7	4667909	279307	1.84
Comp Wall area (Castle)	9-Jun-01	18:38	J. Shive	12	7	4667933	279299	1.85
Almo Creek 1	10-Jun-01	15:05	J. Shive	12	6	4667143	280143	1.77
Almo Creek 1	10-Jun-01	15:03	J. Shive	12	5	4667250	280105	1.77
Almo Creek 2	14-Jun-01	11:35	J. Shive	12	5	4667652	279739	1.78
Almo Creek 2	14-Jun-01	12:22	J. Shive	12	6	4667449	279956	1.79
Stines Creek	14-Jun-01	14:12	J. Shive	12	5	4667684	279739	1.8
Stines Creek	14-Jun-01	14:27	J. Shive	12	5	4667670	279587	1.81
Stines Creek	14-Jun-01	15:24	J. Shive	12	6	4667558	278820	1.81
Trail	14-Jun-01	17:31	J. Shive	12	7	4667386	279342	1.84

Appendix C. Survey site location data, species observations, site characteristics, and environmental measurements (continued).

Locality	Date	Time	Observ.	UTM	Acc.	North.	East.	Elev.
Almo Creek 3 (S section)	15-Jun-01	10:36	J. Shive	12	6	4666882	280354	1.77
Almo Creek 3 (S section)	15-Jun-01	11:32	J. Shive	12	8	4666705	280464	1.77
Almo Creek 3 (S section)	15-Jun-01	12:43	J. Shive	12	8	4666444	280671	1.77
Almo Creek 3 (S section)	15-Jun-01	13:20	J. Shive	12	6	4666767	280456	1.77
Almo Creek 3 (S section)	15-Jun-01	13:23	J. Shive	12	4	4666786	280447	1.74
Almo Creek 3 (S section)	15-Jun-01	13:31	J. Shive	12	6	4666808	280435	1.74
Almo Creek 3 (S section)	15-Jun-01	13:34	J. Shive	12	5	4666816	280416	1.74
Almo Creek 3 (S section)	15-Jun-01	13:41	J. Shive	12	4	4666846	280372	1.74
Almo Creek 3 (S section)	15-Jun-01	14:04	J. Shive	12	6	4666935	280316	1.74
SE Pond	15-Jun-01	15:00	J. Shive	12	6	4661725	278974	1.76
Riparian_Flat	16-Jun-01	11:35	J. Shive	12	4	4661581	278625	1.76
Riparian_Flat	16-Jun-01	12:24	J. Shive	12	4	4661538	278402	1.76
Riparian_Flat	16-Jun-01	12:37	J. Shive	12	4	4661580	278472	1.76
Sagebrush -Flat	16-Jun-01	14:48	J. Shive	12	5	4662501	278554	1.82
Sagebrush -Flat	16-Jun-01	15:00	J. Shive	12	5	4662541	278448	1.82
Sagebrush -Flat	16-Jun-01	15:51	J. Shive	12	6	4662461	278953	1.78
Sagebrush -Flat	16-Jun-01	16:01	J. Shive	12	6	4662437	278994	1.78
Sagebrush -Flat	16-Jun-01	16:10	J. Shive	12	5	4662397	279029	1.78
Hidden Pond (Circle Creek)	16-Jun-01	17:52	J. Shive	12	9	4661627	278768	1.76
Hidden Pond (Circle Creek)	18-Jun-01	12:00	J. Shive	12	9	4661627	278768	1.76
Trail near pond	18-Jun-01	1:05	J. Shive	12	9	4661627	278768	1.76
Twin Sisters area	27-Jun-01	11:20	J. Shive	12	7	4657960	275047	1.95
Twin Sisters area	27-Jun-01	11:57	J. Shive	12	9	4658074	274975	1.95
Twin Sisters area	27-Jun-01	12:34	J. Shive	12	12	4658092	274882	2.01
Twin Sisters area	27-Jun-01	13:30	J. Shive	12	10	4657967	274826	2
Twin Sisters area	27-Jun-01	14:00	J. Shive	12	9	4657928	274912	1.97
Twin Sisters area	27-Jun-01	14:12	J. Shive	12	9	4657937	274938	1.94
Twin Sisters area	27-Jun-01	15:12	J. Shive	12	5	4657819	274957	1.93
Twin Sisters area	27-Jun-01	15:43	J. Shive	12	7	4657709	274825	1.94
Twin Sisters area	27-Jun-01	16:02	J. Shive	12	6	4657752	274751	1.92
Twin Sisters area 2	28-Jun-01	10:00	J. Shive	12	11	4657757	275200	1.93
Twin Sisters area 2	28-Jun-01	10:21	J. Shive	12	8	4657701	275252	1.93
Twin Sisters area 2	28-Jun-01	11:50	J. Shive	12	10	4657567	275364	1.98
Inner City	28-Jun-01	14:24	J. Shive	12	8	4661812	275496	1.89
Inner City	28-Jun-01	15:00	J. Shive	12	7	4661885	275109	1.92
N. Fork Circle Creek	29-Jun-01	10:00	J. Shive	12	6	4662948	277676	1.88

Appendix C. Survey site location data, species observations, site characteristics, and environmental measurements (continued).

Locality	Date	Time	Observ.	UTM	Acc.	North.	East.	Elev.
N. Fork Circle Creek	29-Jun-01	10:10	J. Shive	12	5	4662941	277563	1.88
N. Fork Circle Creek	29-Jun-01	10:21	J. Shive	12	4	4662928	277324	1.87
N. Fork Circle Creek	29-Jun-01	10:38	J. Shive	12	6	4662769	277042	1.86
N. Fork Circle Creek	29-Jun-01	11:27	J. Shive	12	6	4662977	276370	1.86
N. Fork Circle Creek	29-Jun-01	12:41	J. Shive	12	7	4663905	275467	1.95
N. Fork Circle Creek	29-Jun-01	14:32	J. Shive	12	6	4663894	274716	2.22
N. Fork Circle Creek	29-Jun-01	14:42	J. Shive	12	8	4663687	274636	2.2
N-S Fork Circle Creek	29-Jun-01	15:31	J. Shive	12	7	4662851	274797	2.07
N-S Fork Circle Creek	29-Jun-01	16:18	J. Shive	12	9	4661935	275313	1.9
Graham Creek trail	2-Jul-01	10:15	J. Shive	12	5	4663413	274733	2.17
Graham Creek trail	2-Jul-01	10:28	J. Shive	12	5	4663513	274688	2.16
Graham Creek trail	2-Jul-01	10:40	J. Shive	12	6	4663603	274631	2.18
Aspen_north-facing >5%	2-Jul-01	11:30	J. Shive	12	8	4665027	275047	2.21
P. Pine_south-facing >5%	11-Jul-01	11:20	J. Shive	12	6	4662767	279079	1.82
P. Pine_north-facing >5%	13-Jul-01	10:40	J. Shive	12	5	4662027	279174	1.87
P. Pine_north-facing >5%	13-Jul-01	11:48	J. Shive	12	9	4662256	279401	1.79
Juniper_south-facing >5%	13-Jul-01	13:40	J. Shive	12	6	4656623	272908	1.87
Juniper_south-facing >5%	13-Jul-01	14:50	J. Shive	12	9	4656817	273031	1.92
Juniper_south-facing >5%	13-Jul-01	15:36	J. Shive	12	8	4656622	272875	1.89
Juniper_north-facing >5%	14-Jul-01	10:56	J. Shive	12	9	4657060	273849	1.99
Juniper_north-facing >5%	14-Jul-01	11:39	J. Shive	12	7	4657142	273852	1.99
Juniper_north-facing >5%	14-Jul-01	11:59	J. Shive	12	6	4657224	273735	2.03
Juniper_north-facing >5%	14-Jul-01	12:36	J. Shive	12	10	4657265	273708	2.06
Mt mahogany_n-facing >5%	15-Jul-01	9:24	J. Shive	12	5	4663605	274708	2.17
Mt mahogany_n-facing >5%	15-Jul-01	9:42	J. Shive	12	6	4663527	274735	2.17
Mt mahogany_south-facing >5%	16-Jul-01	11:03	J. Shive	12	7	4664786	275583	2.19
Mt mahogany_south-facing >5%	16-Jul-01	12:38	J. Shive	12	9	4664776	275488	2.18
Mt mahogany_south-facing >5%	16-Jul-01	12:48	J. Shive	12	5	4664854	275541	2.16
Mt mahogany_south-facing >5%	16-Jul-01	12:58	J. Shive	12	8	4664885	275537	2.17

Appendix C. Survey site location data, species observations, site characteristics, and environmental measurements (continued).

Locality	Species	Life Stage/Sex	Technique	Habitat Description
Lone Rock area (Castle)	2 SCGR	1 A male, 1 J female	VE	South-facing hillside, sage steppe intermixed with Mt. Mahogany and Pinyon Pine at the base of Castle Rock
Lone Rock area (Castle)	3 SCGR	2 A females, 1J	VE	South-facing hillside, sage steppe intermixed with Mt. Mahogany and Pinyon Pine at the base of Castle Rock
Lone Rock area (Castle)	1 SCGR	1 J	VE	South-facing hillside, sage steppe intermixed with Mt. Mahogany and Pinyon Pine at the base of Castle Rock
Lone Rock area (Castle)	1 SCGR	1 J	VE	Next to trail at south side of Castle Rock
Lone Rock area (Castle)	1 SCGR	1 A female	VE	Sagebrush dominated lowland w/ intermixed Pinyon Pine and Juniper
Lone Rock area (Castle)	1 SCGR	1 J	VE	Pinyon Pine/ Juniper forested upland interface w/ sagebrush dominated lowlands
Lone Rock area (Castle)	1SCGR	1 A male	VE	Pinyon Pine/ Juniper forested upland interface w/ sagebrush dominated lowlands, more southern facing than previous
Lone Rock area (Castle)	1 SCGR	1 J male	VE	Pinyon Pine/ Juniper forested upland interface w/ sagebrush dominated lowlands
Lone Rock area (Castle)	3 SCGR	2 A (1 male), 1 J	VE	Mixed forested upland, south-facing dried wash
Lone Rock area (Castle)	2 SCGR	1 A male, 1 J	VE	Forested upland, large exposed rock outcrop
Comp Wall area (Castle)	1 SCGR	1 A	VE	Forested upland, large exposed rock outcrop
Comp Wall area (Castle)	1 SCGR	1 A male	VE	Large exposed rocky areas w/ intermixing Mt. Mahogany and Pinyon Pine
Comp Wall area (Castle)	1 SCGR	1 J	VE	Large exposed rocky areas w/ intermixing Mt. Mahogany and Pinyon Pine
Comp Wall area (Castle)	2 SCGR	2 A, 1 female	VE	Large exposed rocky areas w/ intermixing Mt. Mahogany and Pinyon Pine
Comp Wall area (Castle)	3 SCGR	2 J, 1 A male	VE	Large exposed rocky areas w/ intermixing Mt. Mahogany and Pinyon Pine
Comp Wall area (Castle)	1 SCGR	1 J	VE	Large exposed rocky areas w/ intermixing Mt. Mahogany and Pinyon Pine
Comp Wall area (Castle)	1 SCGR	1 A male	VE	Large exposed rocky areas w/ intermixing Mt. Mahogany and Pinyon Pine
Comp Wall area (Castle)	2 SCGR	2 A (1 male)	VE	Large exposed rocky areas w/ intermixing Mt. Mahogany and Pinyon Pine
Comp Wall area (Castle)	1 SCGR	1 J	VE	Large exposed rocky areas w/ intermixing Mt. Mahogany and Pinyon Pine
Comp Wall area (Castle)	1 SCGR	1 J	VE	Large exposed rocky areas w/ intermixing Mt. Mahogany and Pinyon Pine
Comp Wall area (Castle)	3 SCGR	2 A (1 male), 1 J	VE	Large exposed rocky areas w/ intermixing Mt. Mahogany and Pinyon Pine
Almo Creek 1	1 THEL	1 A	VE	Sandy/rocky beach near a willow stand about 2m from the stream
Almo Creek 1	1 PICA	1 A	VE	Lying in the stream surrounded by willows and shrubs
Almo Creek 2	1 SCGR	1 J	VE	Sage steppe lowlands, in sandy wash
Almo Creek 2	1 THEL	1 J	VE	In grasses on shoreline
Stines Creek	2 SCGR	2 J	VE	Sage steppe lowlands, next to a sandy wash
Stines Creek	1 SCGR	1 A	VE	Sage steppe lowlands, next to a sandy wash
Stines Creek	1 THEL	1 J	VE	In grasses on shoreline
Trail	1 SCGR	1 A	VE	Sage steppe lowlands

Appendix C. Survey site location data, species observations, site characteristics, and environmental measurements (continued).

Locality	Species	Life Stage/Sex	Technique	Habitat Description
Almo Creek 3 (S section)	1 THEL	1 A	VE	On shoreline near willows
Almo Creek 3 (S section)	1 THEL	1 J	VE	In tall grasses about 2 m from shoreline
Almo Creek 3 (S section)	1 THEL	1 J	VE	In tall grasses about 1 m from shoreline
Almo Creek 3 (S section)	1 THEL	1 J	VE	In tall grasses about 1 m from shoreline
Almo Creek 3 (S section)	1 THEL	1 J	VE	In tall grasses about 1 m from shoreline
Almo Creek 3 (S section)	1 THEL	1 J	VE	In tall grasses about 1 m from shoreline
Almo Creek 3 (S section)	1 THEL	1 J	VE	In a rosebush about 1 m from shoreline
Almo Creek 3 (S section)	1 THEL	1 A	VE	Lying on exposed ground near shoreline
Almo Creek 3 (S section)	1 THEL	1 J	VE	Lying in the water
SE Pond			VE, FT	Shallow pond dominated by submerged vegetation, extensive trampling
Riparian_Flat	1 THEL	1 J	VE	In grass 1m from shoreline, near sage steppe lowlands
Riparian_Flat	1 THEL	1 J	VE	In water near willow patch
Riparian_Flat	1 THEL	1 J	VE	At edge of water near grasses
Sagebrush -Flat	1 SCGR	1 A female	VE	Sage steppe lowlands
Sagebrush -Flat	1 SCGR	1 J male	VE	Sage steppe lowlands
Sagebrush -Flat	1 SCGR	1 A	VE	Sage steppe lowlands
Sagebrush -Flat	1 SCGR	1 J female	VE	Sage steppe lowlands
Sagebrush -Flat	2 SCGR	1 A female, 1 J	VE	Sage steppe lowlands, near stand of Junipers
Hidden Pond (Circle Creek)	2 THEL	1 A, 1 J	VE	In grasses on shoreline
Hidden Pond (Circle Creek)	4 THEL	2 A, 2 J	FT	In water near shoreline
Trail near pond	1 SCGR	1 A	VE	On eroded bank near pond shoreline
Twin Sisters area	1 SCGR	1 A female	VE	Mt. Mahogany and sagebrush dominated n-facing slope
Twin Sisters area	1 SCGR	1 J	VE	Mt. Mahogany and sagebrush dominated n-facing slope
Twin Sisters area	1 SCGR	1 J	VE	Primarily Mt. Mahogany and sandy/rocky substrate
Twin Sisters area	1 SCGR	1 A	VE	Mt. Mahogany and sagebrush dominated southwest-facing slope
Twin Sisters area	3 SCGR	3 J (1female)	VE	Mt. Mahogany and sagebrush dominated southwest-facing slope
Twin Sisters area	2 SCGR	2 A (1 female)	VE	Mt. Mahogany and sagebrush dominated southwest-facing slope
Twin Sisters area	1 SCGR	1 A female	VE	Mt. Mahogany and sagebrush dominated southwest-facing slope
Twin Sisters area	1 SCGR	1 J	VE	Pinyon Pine and Mt Mahogany dominated south-facing slope
Twin Sisters area	1 SCGR	1 A	VE	Pinyon Pine and Mt Mahogany dominated south-facing slope
Twin Sisters area 2	1 SCGR	1A	VE	Sagebrush and bunchgrass dominated with sandy substrate
Twin Sisters area 2	2 SCGR	1 A female, 1 J	VE	Sandy area near trail with bitterbrush and sagebrush dominating
Twin Sisters area 2	1 SCGR	1 J	VE	Pinyon Pine and Mt. Mahogany dominated w/ sagebrush interspersed
Inner City	1 SCGR	1 A	VE	Aspen dominated w/ thick understory
Inner City	2 SCGR	2 J (1 male)	VE	Pinyon Pine dominated east-facing slope
N. Fork Circle Creek	1 SCGR	1 A male	VE	Sagebrush dominated lowland with sandy/rocky substrate

Appendix C. Survey site location data, species observations, site characteristics, and environmental measurements (continued).

Locality	Species	Life Stage/Sex	Technique	Habitat Description
N. Fork Circle Creek	1 SCGR	1 J male	VE	Sagebrush dominated lowland with sandy/rocky substrate
N. Fork Circle Creek	1SCGR	1 A female	VE	Sagebrush dominated lowland with sandy/rocky substrate
N. Fork Circle Creek	1 SCGR	1 J	VE	Sagebrush dominated lowland with sandy/rocky substrate
N. Fork Circle Creek	1 THEL	1 A	VE	Willow dominated riparian area, snake was about 2 m from shoreline
N. Fork Circle Creek	1 EUSK	1 J	VE	Forested upland w/ Aspen Mt. Mahogany and Pinyon Pine dominating
N. Fork Circle Creek	1 SCGR	1 A	VE	Mt. Mahogany and sagebrush dominating, southeast-facing slope
N. Fork Circle Creek	2 SCGR	1 J, 1 A	VE	Mt. Mahogany and sagebrush dominating, southeast-facing slope
N-S Fork Circle Creek	1 SCGR	1 J	VE	Mt. Mahogany and sagebrush dominating, southeast-facing slope
N-S Fork Circle Creek	1 SCGR	1 A	VE	Mt. Mahogany and sagebrush dominating, southeast-facing slope
Graham Creek Trail	1 SCGR	1 A	VE	Mt Mahogany dominated west-facing slope
Graham Creek Trail	1 SCGR	1 A	VE	Mt Mahogany dominated west-facing slope
Graham Creek Trail	1 SCGR	1 A	VE	Mt Mahogany dominated west-facing slope
Aspen_North-facing >5%				
P. Pine_South-facing >5%	1 SCGR	1 A	VE	Pinyon Pine dominated lowlands
P. Pine_North-facing >5%	1 SCGR	1 A female	VE	Pinyon Pine dominated with Juniper interspersed
P. Pine_North-facing >5%	1 SCGR	1 A	VE	Pinyon Pine dominated with Juniper interspersed
Juniper_South-facing >5%	1 SCGR	1 A	VE	Juniper dominated hillside w/sagebrush and bunchgrasses
Juniper_South-facing >5%	1 SCGR	1 J	VE	Juniper dominated hillside w/sagebrush and bunchgrasses
Juniper_South-facing >5%	1 SCGR	1 J	VE	Exposed rocky area
Juniper_North-facing >5%	1 SCGR	1 J	VE	Juniper dominated hillside w/ Pinyon pine and sagebrush mixed
Juniper_North-facing >5%	2 SCGR	2 J	VE	Juniper dominated hillside w/ Pinyon pine and sagebrush mixed
Juniper_North-facing >5%	1 SCGR	1 A female	VE	Juniper dominated hillside w/ Pinyon pine and sagebrush mixed
Juniper_north-facing >5%	1 SCGR	1 A female	VE	Juniper dominated hillside w/ Pinyon pine and Mt. Mahogany mixed
Mt mahogany_n-facing >5%	2 SCGR	1 A male, 1 J	VE	Mt. Mahogany dominated hillside
Mt mahogany_n-facing >5%	2 SCGR	2 A	VE	Mt. Mahogany dominated hillside
Mt mahogany_south-facing >5%	1 SCGR	1 J	VE	Mt. Mahogany dominated hillside
Mt mahogany_south-facing >5%	1 SCGR	1 A	VE	Mt. Mahogany dominated hillside
Mt mahogany_south-facing >5%	1 SCGR	1 A male	VE	Mt. Mahogany dominated hillside
Mt mahogany_south-facing >5%	1 SCGR	1 A female	VE	Mt. Mahogany dominated hillside

Appendix C. Survey site location data, species observations, site characteristics, and environmental measurements (continued).

Locality	GAP Cover Type	Radiation	Wind	TA	Cloud Cover	Precip.	Tw	pH
Lone Rock area (Castle)	33XX	partial	light	27.5	60	No	--	--
Lone Rock area (Castle)	33XX	partial	light	27.7	60	No	--	--
Lone Rock area (Castle)	33XX	partial	light	31.1	65	No	--	--
Lone Rock area (Castle)	33XX	partial	light	28.1	65	No	--	--
Lone Rock area (Castle)	33XX	partial	medium	30	45	No	--	--
Lone Rock area (Castle)	33XX	partial	light	29.9	50	No	--	--
Lone Rock area (Castle)	33XX	partial	light	28.5	50	No	--	--
Lone Rock area (Castle)	33XX	partial	light	29.1	50	No	--	--
Lone Rock area (Castle)	42XX	clear	calm	25.4	30	No	--	--
Lone Rock area (Castle)	42XX	clear	calm	25.3	25	No	--	--
Comp Wall area (Castle)	42XX	clear	calm	27.6	0	No	--	--
Comp Wall area (Castle)	33XX	clear	light	27.1	5	No	--	--
Comp Wall area (Castle)	33XX	clear	calm	27.9	15	No	--	--
Comp Wall area (Castle)	33XX	clear	calm	24.9	30	No	--	--
Comp Wall area (Castle)	33XX	clear	light	25.4	35	No	--	--
Comp Wall area (Castle)	33XX	clear	light	25.8	35	No	--	--
Comp Wall area (Castle)	33XX	clear	light	25.6	35	No	--	--
Comp Wall area (Castle)	33XX	partial	calm	23.7	30	No	--	--
Comp Wall area (Castle)	33XX	partial	calm	23.5	45	No	--	--
Comp Wall area (Castle)	33XX	partial	calm	24	55	No	--	--
Comp Wall area (Castle)	33XX	clear	light	25.2	55	No	--	--
Almo Creek 1	2000	clear	medium	28.7	70	No	--	--
Almo Creek 1	2000	clear	medium	29.1	60	No	--	--
Almo Creek 2	2000	partial	light	16.8	60	No	13.5	8.1
Almo Creek 2	2000	partial	light	17.7	60	No	13.5	8.1
Stines Creek	33XX	partial	light	18.6	65	No	13.8	8.3
Stines Creek	33XX	partial	light	18.4	65	No	13.8	8.3
Stines Creek	33XX	partial	calm	17.4	65	No	13.8	8.3
Trail	33XX	partial	medium	19.6	75	No	--	--

Appendix C. Survey site location data species observations site characteristics and environmental measurements (continued).

Locality	GAP Cover Type	Radiation	Wind	TA	Cloud Cover	Precip.	Tw	pH
Almo Creek 3 (S section)	2000	clear	light	17.9	5	No	12.2	8.8
Almo Creek 3 (S section)	2000	clear	light	19.2	5	No	12.2	8.8
Almo Creek 3 (S section)	2000	clear	light	19.4	5	No	12.2	8.8
Almo Creek 3 (S section)	2000	clear	light	19.6	5	No	12.2	8.8
Almo Creek 3 (S section)	2000	clear	light	19.6	5	No	12.2	8.8
Almo Creek 3 (S section)	2000	clear	light	19.8	5	No	12.2	8.8
Almo Creek 3 (S section)	2000	clear	light	19.7	5	No	12.2	8.8
Almo Creek 3 (S section)	2000	clear	light	19.5	5	No	12.2	8.8
Almo Creek 3 (S section)	2000	clear	light	20.8	5	No	12.2	8.8
SE Pond	33XX	clear	light	20.6	0	No	30.6	7.9
Riparian_Flat	33XX	clear	light	26.4	5	No	20.5	8.2
Riparian_Flat	33XX	clear	light	28.7	5	No	20.5	8.2
Riparian_Flat	33XX	clear	light	28.9	5	No	20.5	8.2
Sagebrush -Flat	33XX	partial	light	28	50	No	--	--
Sagebrush -Flat	33XX	partial	light	27.6	50	No	--	--
Sagebrush -Flat	33XX	partial	light	30.6	40	No	--	--
Sagebrush -Flat	33XX	partial	light	30.5	40	No	--	--
Sagebrush -Flat	33XX	partial	medium	30.8	40	No	--	--
Hidden Pond (Circle Creek)	33XX	clear	calm	27.3	30	No	--	--
Hidden Pond (Circle Creek)	33XX	clear	calm	27.3	30	No	21.1	6.2
Trail near pond	33XX	clear	calm	27.3	30	No	--	--
Twin Sisters area	33XX	clear	medium	24.8	30	No	--	--
Twin Sisters area	33XX	clear	medium	25.9	30	No	--	--
Twin Sisters area	33XX	clear	medium	25.9	45	No	--	--
Twin Sisters area	33XX	partial	light	25.9	55	No	--	--
Twin Sisters area	33XX	partial	medium	27.4	65	No	--	--
Twin Sisters area	33XX	partial	heavy	27.4	60	No	--	--
Twin Sisters area	33XX	partial	heavy	27.8	50	No	--	--
Twin Sisters area	33XX	partial	medium	28	50	No	--	--
Twin Sisters area	33XX	clear	medium	28.1	50	No	--	--
Twin Sisters area 2	33XX	clear	calm	20.2	20	No	--	--
Twin Sisters area 2	33XX	clear	calm	21.4	20	No	--	--
Twin Sisters area 2	33XX	clear	light	27.1	35	No	--	--
Inner City	61XX	partial	light	25.8	40	No	--	--
Inner City	42XX	partial	light	29.9	50	No	--	--
N. Fork Circle Creek	33XX	overcast	calm	23.7	70	No	--	--

Appendix C. Survey site location data, species observations, site characteristics, and environmental measurements (continued).

Locality	GAP Cover Type	Radiation	Wind	TA	Cloud Cover	Precip.	Tw	pH
N. Fork Circle Creek	33XX	overcast	calm	23.8	70	No	--	--
N. Fork Circle Creek	33XX	partial	calm	27.7	70	No	--	--
N. Fork Circle Creek	33XX	overcast	calm	27.9	70	No	--	--
N. Fork Circle Creek	62XX	partial	calm	26.5	75	No	--	--
N. Fork Circle Creek	61XX	overcast	light	29.7	75	No	--	--
N. Fork Circle Creek	33XX	partial	medium	29.2	60	No	--	--
N. Fork Circle Creek	33XX	partial	light	29.5	70	No	--	--
N-S Fork Circle Creek	33XX	partial	medium	29.4	75	No	--	--
N-S Fork Circle Creek	33XX	overcast	light	27.6	80	No	--	--
Graham Creek trail	33XX	clear	calm	26.4	25	No	--	--
Graham Creek trail	33XX	clear	calm	26.7	25	No	--	--
Graham Creek trail	33XX	clear	calm	27.2	25	No	--	--
Aspen_north-facing >5%	41XX	clear	calm	28	25	No	--	--
P. pine_south-facing >5%	42XX	partial	calm	24.4	60	No	--	--
P. pine_north-facing >5%	42XX	partial	light	26.2	80	No	--	--
P. pine_north-facing >5%	42XX	partial	light	29.9	75	No	--	--
Juniper_south-facing >5%	42XX	partial	light	28.2	80	No	--	--
Juniper_south-facing >5%	42XX	partial	light	29.7	75	No	--	--
Juniper_south-facing >5%	7300	partial	light	31	75	No	--	--
Juniper_north-facing >5%	42XX	overcast	light	25.9	95	No	--	--
Juniper_north-facing >5%	42XX	overcast	calm	27	90	No	--	--
Juniper_north-facing >5%	42XX	overcast	calm	26.4	90	No	--	--
Juniper_north-facing >5%	42XX	overcast	calm	26.1	90	No	--	--
Mt mahogany_n-facing >5%	33XX	partial	light	20.7	40	No	--	--
Mt mahogany_n-facing >5%	33XX	partial	medium	20.9	40	No	--	--
Mt mahogany_south-facing >5%	33XX	partial	medium	20.9	35	No	--	--
Mt mahogany_south-facing >5%	33XX	clear	light	21.3	30	No	--	--
Mt mahogany_south-facing >5%	33XX	clear	medium	21.7	30	No	--	--
Mt mahogany_south-facing >5%	33XX	clear	medium	21.1	40	No	--	--

Appendix C. Survey site location data, species observations, site characteristics, and environmental measurements (continued).

Locality	Conductivity	Color	Turbidity	Origin	Drainage	Site Type	NWI
Lone Rock area (Castle)	--	--	--	--	--	--	--
Lone Rock area (Castle)	--	--	--	--	--	--	--
Lone Rock area (Castle)	--	--	--	--	--	--	--
Lone Rock area (Castle)	--	--	--	--	--	--	--
Lone Rock area (Castle)	--	--	--	--	--	--	--
Lone Rock area (Castle)	--	--	--	--	--	--	--
Lone Rock area (Castle)	--	--	--	--	--	--	--
Lone Rock area (Castle)	--	--	--	--	--	--	--
Lone Rock area (Castle)	--	--	--	--	--	--	--
Lone Rock area (Castle)	--	--	--	--	--	--	--
Comp Wall area (Castle)	--	--	--	--	--	--	--
Comp Wall area (Castle)	--	--	--	--	--	--	--
Comp Wall area (Castle)	--	--	--	--	--	--	--
Comp Wall area (Castle)	--	--	--	--	--	--	--
Comp Wall area (Castle)	--	--	--	--	--	--	--
Comp Wall area (Castle)	--	--	--	--	--	--	--
Comp Wall area (Castle)	--	--	--	--	--	--	--
Comp Wall area (Castle)	--	--	--	--	--	--	--
Comp Wall area (Castle)	--	--	--	--	--	--	--
Comp Wall area (Castle)	--	--	--	--	--	--	--
Comp Wall area (Castle)	--	--	--	--	--	--	--
Almo Creek 1	--	--	--	--	--	--	--
Almo Creek 1	--	--	--	--	--	--	--
Almo Creek 2	70	stained	cloudy	natural	permanent	stream	--
Almo Creek 2	70	stained	cloudy	natural	permanent	stream	--
Stines Creek	110	clear	clear	natural	permanent	stream	--
Stines Creek	110	clear	clear	natural	permanent	stream	--
Stines Creek	110	clear	clear	natural	permanent	stream	--
Trail	--	--	--	--	--	--	--

Appendix C. Survey site location data, species observations, site characteristics, and environmental measurements (continued).

Locality	Conductivity	Color	Turbidity	Origin	Drainage	Site Type	NWI
Almo Creek 3 (S section)	70	clear	clear	natural	permanent	stream	RIS
Almo Creek 3 (S section)	70	clear	clear	natural	permanent	stream	RIS
Almo Creek 3 (S section)	70	clear	clear	natural	permanent	stream	RIS
Almo Creek 3 (S section)	70	clear	clear	natural	permanent	stream	RIS
Almo Creek 3 (S section)	70	clear	clear	natural	permanent	stream	RIS
Almo Creek 3 (S section)	70	clear	clear	natural	permanent	stream	RIS
Almo Creek 3 (S section)	70	clear	clear	natural	permanent	stream	RIS
Almo Creek 3 (S section)	70	clear	clear	natural	permanent	stream	RIS
Almo Creek 3 (S section)	70	clear	clear	natural	permanent	stream	RIS
SE Pond	410	stained	cloudy	man-modified	occasional	temp. pond	PAB
Riparian_Flat	440	clear	clear	man-modified	permanent	stream	RIS
Riparian_Flat	440	clear	clear	man-modified	permanent	stream	RIS
Riparian_Flat	440	clear	clear	man-modified	permanent	stream	RIS
Sagebrush -Flat	--	--	--	--	--	--	--
Sagebrush -Flat	--	--	--	--	--	--	--
Sagebrush -Flat	--	--	--	--	--	--	--
Sagebrush -Flat	--	--	--	--	--	--	--
Sagebrush -Flat	--	--	--	--	--	--	--
Hidden Pond (Circle Creek)	--	--	--	--	--	--	PEM
Hidden Pond (Circle Creek)	490	stained	clear	natural	occasional	temp pond	PEM
Trail near pond	--	--	--	--	--	--	--
Twin Sisters area	--	--	--	--	--	--	--
Twin Sisters area	--	--	--	--	--	--	--
Twin Sisters area	--	--	--	--	--	--	--
Twin Sisters area	--	--	--	--	--	--	--
Twin Sisters area	--	--	--	--	--	--	--
Twin Sisters area	--	--	--	--	--	--	--
Twin Sisters area	--	--	--	--	--	--	--
Twin Sisters area	--	--	--	--	--	--	--
Twin Sisters area	--	--	--	--	--	--	--
Twin Sisters area 2	--	--	--	--	--	--	--
Twin Sisters area 2	--	--	--	--	--	--	--
Twin Sisters area 2	--	--	--	--	--	--	--
Inner City	--	--	--	--	--	--	--
Inner City	--	--	--	--	--	--	--
N. Fork Circle Creek	--	--	--	--	--	--	--

Appendix C. Survey site location data, species observations, site characteristics, and environmental measurements (continued).

Locality	Conductivity	Color	Turbidity	Origin	Drainage	Site Type	NWI
N. Fork Circle Creek	--	--	--	--	--	--	--
N. Fork Circle Creek	--	--	--	--	--	--	--
N. Fork Circle Creek	--	--	--	--	--	--	--
N. Fork Circle Creek	--	--	--	--	--	--	--
N. Fork Circle Creek	--	--	--	--	--	--	--
N. Fork Circle Creek	--	--	--	--	--	--	--
N. Fork Circle Creek	--	--	--	--	--	--	--
N-S Fork Circle Creek	--	--	--	--	--	--	--
N-S Fork Circle Creek	--	--	--	--	--	--	--
Graham Creek trail	--	--	--	--	--	--	--
Graham Creek trail	--	--	--	--	--	--	--
Graham Creek trail	--	--	--	--	--	--	--
Aspen_north-facing >5%	--	--	--	--	--	--	--
P. pine_south-facing >5%	--	--	--	--	--	--	--
P. pine_north-facing >5%	--	--	--	--	--	--	--
P. pine_north-facing >5%	--	--	--	--	--	--	--
Juniper_south-facing >5%	--	--	--	--	--	--	--
Juniper_south-facing >5%	--	--	--	--	--	--	--
Juniper_south-facing >5%	--	--	--	--	--	--	--
Juniper_north-facing >5%	--	--	--	--	--	--	--
Juniper_north-facing >5%	--	--	--	--	--	--	--
Juniper_north-facing >5%	--	--	--	--	--	--	--
Juniper_north-facing >5%	--	--	--	--	--	--	--
Mt mahogany_n-facing >5%	--	--	--	--	--	--	--
Mt mahogany_n-facing >5%	--	--	--	--	--	--	--
Mt mahogany_south-facing >5%	--	--	--	--	--	--	--
Mt mahogany_south-facing >5%	--	--	--	--	--	--	--
Mt mahogany_south-facing >5%	--	--	--	--	--	--	--
Mt mahogany_south-facing >5%	--	--	--	--	--	--	--

Appendix C. Survey site location data, species observations, site characteristics, and environmental measurements (continued).

Locality	Length	Width	Max Depth	Substrate	Em. Veg.	N. Shoreline	Forest
Lone Rock area (Castle)	--	--	--	--	--	--	--
Lone Rock area (Castle)	--	--	--	--	--	--	--
Lone Rock area (Castle)	--	--	--	--	--	--	--
Lone Rock area (Castle)	--	--	--	--	--	--	--
Lone Rock area (Castle)	--	--	--	--	--	--	--
Lone Rock area (Castle)	--	--	--	--	--	--	--
Lone Rock area (Castle)	--	--	--	--	--	--	--
Lone Rock area (Castle)	--	--	--	--	--	--	--
Lone Rock area (Castle)	--	--	--	--	--	--	--
Lone Rock area (Castle)	--	--	--	--	--	--	--
Comp Wall area (Castle)	--	--	--	--	--	--	--
Comp Wall area (Castle)	--	--	--	--	--	--	--
Comp Wall area (Castle)	--	--	--	--	--	--	--
Comp Wall area (Castle)	--	--	--	--	--	--	--
Comp Wall area (Castle)	--	--	--	--	--	--	--
Comp Wall area (Castle)	--	--	--	--	--	--	--
Comp Wall area (Castle)	--	--	--	--	--	--	--
Comp Wall area (Castle)	--	--	--	--	--	--	--
Comp Wall area (Castle)	--	--	--	--	--	--	--
Comp Wall area (Castle)	--	--	--	--	--	--	--
Comp Wall area (Castle)	--	--	--	--	--	--	--
Almo Creek 1	--	--	--	--	--	--	--
Almo Creek 1	--	--	--	--	--	--	--
Almo Creek 2	RIS	--	<1 m	cobble	--	--	
Almo Creek 2	RIS	--	<1 m	cobble	--	--	
Stines Creek	RIS	--	<1 m	cobble	--	--	
Stines Creek	RIS	--	<1 m	cobble	--	--	
Stines Creek	RIS	--	<1 m	cobble	--	--	
Trail	--	--	--	--	--	--	

Appendix C. Survey site location data, species observations, site characteristics, and environmental measurements (continued).

Locality	Length	Width	Max Depth	Substrate	Em. Veg.	N. Shoreline	Forest
Almo Creek 3 (S section)	--	--	<1 m	cobble	--	--	--
Almo Creek 3 (S section)	--	--	<1 m	cobble	--	--	--
Almo Creek 3 (S section)	--	--	<1 m	cobble	--	--	--
Almo Creek 3 (S section)	--	--	<1 m	cobble	--	--	--
Almo Creek 3 (S section)	--	--	<1 m	cobble	--	--	--
Almo Creek 3 (S section)	--	--	<1 m	cobble	--	--	--
Almo Creek 3 (S section)	--	--	<1 m	cobble	--	--	--
Almo Creek 3 (S section)	--	--	<1 m	cobble	--	--	--
Almo Creek 3 (S section)	--	--	<1 m	cobble	--	--	--
SE Pond	40	20	<1 m	silt/mud	grasses	Shallows present, em. veg present	20
Riparian_Flat	--	--	<1 m	sand/gravel	--	--	--
Riparian_Flat	--	--	<1 m	sand/gravel	--	--	--
Riparian_Flat	--	--	<1 m	sand/gravel	--	--	
Sagebrush -Flat	--	--	--	--	--	--	--
Sagebrush -Flat	--	--	--	--	--	--	--
Sagebrush -Flat	--	--	--	--	--	--	--
Sagebrush -Flat	--	--	--	--	--	--	--
Sagebrush -Flat	--	--	--	--	--	--	--
Hidden Pond (Circle Creek)	--	--	--	--	--	--	--
Hidden Pond (Circle Creek)	100+	20	1-2 m	silt/mud	grasses, willows	Shallows present, em. veg present	50
Trail near pond	--	--	--	--	--	--	--
Twin Sisters area	--	--	--	--	--	--	--
Twin Sisters area	--	--	--	--	--	--	--
Twin Sisters area	--	--	--	--	--	--	--
Twin Sisters area	--	--	--	--	--	--	--
Twin Sisters area	--	--	--	--	--	--	--
Twin Sisters area	--	--	--	--	--	--	--
Twin Sisters area	--	--	--	--	--	--	--
Twin Sisters area	--	--	--	--	--	--	--
Twin Sisters area	--	--	--	--	--	--	--
Twin Sisters area 2	--	--	--	--	--	--	--
Twin Sisters area 2	--	--	--	--	--	--	--
Twin Sisters area 2	--	--	--	--	--	--	--
Inner City	--	--	--	--	--	--	--
Inner City	--	--	--	--	--	--	--
N. Fork Circle Creek	--	--	--	--	--	--	--

Appendix C. Survey site location data, species observations, site characteristics, and environmental measurements (continued).

Locality	Length	Width	Max Depth	Substrate	Em. Veg.	N. Shoreline	Forest
N. Fork Circle Creek	--	--	--	--	--	--	--
N. Fork Circle Creek	--	--	--	--	--	--	--
N. Fork Circle Creek	--	--	--	--	--	--	--
N. Fork Circle Creek	--	--	--	--	--	--	--
N. Fork Circle Creek	--	--	--	--	--	--	--
N. Fork Circle Creek	--	--	--	--	--	--	--
N. Fork Circle Creek	--	--	--	--	--	--	--
N-S Fork Circle Creek	--	--	--	--	--	--	--
N-S Fork Circle Creek	--	--	--	--	--	--	--
Graham Creek trail	--	--	--	--	--	--	--
Graham Creek trail	--	--	--	--	--	--	--
Graham Creek trail	--	--	--	--	--	--	--
Aspen_north-facing >5%	--	--	--	--	--	--	--
P. pine_south-facing >5%	--	--	--	--	--	--	--
P. pine_north-facing >5%	--	--	--	--	--	--	--
P. pine_north-facing >5%	--	--	--	--	--	--	--
Juniper_south-facing >5%	--	--	--	--	--	--	--
Juniper_south-facing >5%	--	--	--	--	--	--	--
Juniper_south-facing >5%	--	--	--	--	--	--	--
Juniper_north-facing >5%	--	--	--	--	--	--	--
Juniper_north-facing >5%	--	--	--	--	--	--	--
Juniper_north-facing >5%	--	--	--	--	--	--	--
Juniper_north-facing >5%	--	--	--	--	--	--	--
Mt mahogany_n-facing >5%	--	--	--	--	--	--	--
Mt mahogany_n-facing >5%	--	--	--	--	--	--	--
Mt mahogany_south-facing >5%	--	--	--	--	--	--	--
Mt mahogany_south-facing >5%	--	--	--	--	--	--	--
Mt mahogany_south-facing >5%	--	--	--	--	--	--	--
Mt mahogany_south-facing >5%	--	--	--	--	--	--	--

Appendix D. Standard amphibian and reptile survey form.

AMPHIBIAN SURVEY DATA SHEET - modified after S.P. Corn, NBS, Fort Collins, CO (ver. 1 May 1996)

Herpetology Laboratory, Idaho State University and Idaho Museum of Natural History, Box 8007, Pocatello, ID 83209
(208) 236-3922 voice 236-4570 FAX e-mail: petechar@isu.edu

DATE		**BEGIN TIME**		**END TIME**		**OBSERVERS**		
LOCALITY								
STATE		**COUNTY**		**MAP NAME**		**OWNER**	**ELEVATION**	
T	**R**	**S**		**UTM ZONE/DATUM**		**NORTHING**	**EASTING**	

AMPHIBIAN AND REPTILE SPECIES PRESENT (INDICATE NUMBERS IN CATEGORIES IF POSSIBLE)

SPECIES	ADULT	JUVENILE	METAM.	LARVAE	EGGS	CALLING	TECHNIQUE(S)	VOUCHER

FISH PRESENT	YES ??? NO	**FISH SPECIES:**	
ENTIRE SITE SEARCHED?	YES NO	**IF NO, IDICATE AREA:**	meters of shoreline habitat
WEATHER:	**RADIATION:** CLEAR PARTIAL OVERCAST	**WIND**: CALM LIGHT MEDIUM HEAVY	
AIR TEMPERATURE (1 M SHADED)	**°C OR F**	**% CLOUD COVER:**	**PRECIPTATION:** SNOW RAIN
WATER	**TEMPERATURE (1CM)**	**pH:**	**CONDUCTIVITY** **SAMPLE?**
	COLOR CLEAR STAINED	**TURBIDITY** CLEAR CLOUDY	
SITE DESCRIPTION	PUT SKETCH AND ADDITIONAL COMMENTS ON BACK OF SHEET		
ORIGIN	NATURAL MAN-MADE MAN-MODIFIED	**DRAINAGE**	PERMANENT OCCASIONAL NONE
SITE TYPE	TEMPORARY or PERMANENT LAKE/POND MARSH BOG STREAM SPRING/SEEP ACTIVE or INACTIVE BEAVER POND		
NATIONAL WETLAND INVENTORY CLASIFICATION		**GAP ANALYSIS COVER TYPE (IF KNOWN)**	
STREAM ORDER	1 2 3 4 5 6		
SITE LENGTH m	**SITE WIDTH** m	**MAXIMUM DEPTH**	< 1M 1 - 2 M > 2 M
PRIMARY SUBSTRATE	SILT/MUD SAND/GRAVEL COBBLE BOULDER/BEDROCK OTHER:		
% OF LAKE MARGIN WITH EMERGENT VEGETATION	0 1 - 25 25 - 50 >50		
EMERGENT VEGETATION SPECIES (IN ORDER OF ABUNDANCE)			
NORTH SHORELINE CHARACTERISTICS	SHALLOWS PRESENT	SHALLOWS ABSENT	EMERGENT VEG PRESENT / EMERGENT VEG ABSENT
DISTANCE TO FOREST EDGE m	**FOREST TREE SPECIES**		

Appendix E. Amphibian and reptile multiple observation form.

Name _____

Affiliation _____

Address _____

Phone Number _____

See the instructions for filling out the Amphibian and Reptile Individual Observation Form for details on what information to provide.

SPECIES	DESCRIPTION	DATE & TIME	LOCALITY	HABITAT	REMARKS

Appendix F. The dates and corresponding results from road driving surveys.

Date	Time	Route	Results
8-Jun-01	20:35 - 22:30	Internal loop starting and finishing at the eastern park entrance	1 Adult Rubber Boa
9-Jun-01	20:30 - 22:00	Internal loop starting and finishing at the eastern park entrance	Nothing Observed
15-Jun-01	20:30 - 22:00	Internal loop starting and finishing at the eastern park entrance	Nothing Observed
28-Jun-01	20:30 - 22:15	Internal loop starting and finishing at the eastern park entrance	Nothing Observed
1-Jul-01	20:15 - 22:15	Internal loop starting and finishing at the eastern park entrance	Nothing Observed
11-Jul-01	20:00 - 22:30	Internal loop starting and finishing at the eastern park entrance	Nothing Observed

Appendix G. The dates, locations, number of traps, number of nights traps were left out, and corresponding results from Aquatic Funnel Trapping surveys.

Date	Site	# of traps	# of nights	Results
15-Jun-01	SE Pond	5	1	Nothing caught
16-Jun-01	Hidden Pond	16	2	4 terrestrial gartersnakes (2 juveniles, 2 adults)

Appendix H. The dates, locations, site name and description, site type, and the total elapsed time spent surveying each location.

Date	Location	Site Name	Area Description	Site Type	Start Time	End Time	Elapsed Time
8-Jun-01	Castle Rocks	Lone Rock srea	Trails throughout the interior and around Lone Rock	terrestrial	13:55	19:55	6:00
9-Jun-01	Castle Rocks	Comp Wall srea	Northern region of the park, highest peaks	terrestrial	13:30	19:30	6:00
10-Jun-01	Castle Rocks	Castle entrance	Meadows and spring seeps along entrance road	terrestrial	10:00	13:15	3:15
10-Jun-01	Castle Rocks	Almo Creek 1	Almo Creek, heading northwest from headquarters	terrestrial	14:30	16:15	1:45
14-Jun-01	Castle Rocks	Almo Creek 2	Almo Creek, north of the fenceline near road intersect	terrestrial	11:15	13:50	2:35
14-Jun-01	Castle Rocks	Stines Creek	Stines Creek, two forks	terrestrial	14:50	16:20	1:30
15-Jun-01	Castle Rocks	Almo Creek 3	Almo Creek, southern portion	terrestrial	10:00	14:10	4:10
15-Jun-01	City of Rocks	SE Pond	Large pond near SE corner	aquatic	14:30	16:30	2:00
16-Jun-01	City of Rocks	Riparian_Flat	Riparian_Flat environmental type	terrestrial	10:30	14:10	3:40
16-Jun-01	City of Rocks	Sagebrush_Flat	Sagebrush_Flat environmental type, started at "snakepit"	terrestrial	14:20	16:30	2:10
16-Jun-01	City of Rocks	Hidden Pond	Huge pond along circle creek (north of previous pond)	aquatic	17:30	21:00	3:30
18-Jun-01	City of Rocks	Hidden Pond	Huge pond along circle creek (north of previous pond)	aquatic	10:30	1:00	2:30
27-Jun-01	City of Rocks	Twin Sisters area	Twin Sisters area	terrestrial	10:30	16:40	8:10
28-Jun-01	City of Rocks	Twin Sisters 2	Twin Sisters area, east side of road	terrestrial	9:45	13:15	3:30
28-Jun-01	City of Rocks	Inner City	Inner city, south fork circle creek trail (towards Flaming Rock)	terrestrial	13:30	15:10	1:40
29-Jun-01	City of Rocks	North Fork Circle Cr	North Fork Circle Creek trail	terrestrial	9:50	17:30	7:40
2-Jul-01	City of Rocks	Graham Creek trail	Graham Creek trail near Indian Groves	terrestrial	10:00	11:30	1:30
2-Jul-01	City of Rocks	Apen_north-facing >5%	Apen_north-facing >5% environmental type	terrestrial	11:30	14:20	4:50
11-Jul-01	City of Rocks	Pinyon pine_south-facing >5%	Pinyon pine_south-facing >5% environmental type	terrestrial	10:15	14:20	4:05
13-Jul-01	City of Rocks	Pinyon pine_north-facing >5%	Pinyon pine_north-facing >5% environmental type	terrestrial	9:50	12:30	2:40
13-Jul-01	City of Rocks	Juniper_south-facing >5%	Juniper_south-facing >5% environmental type	terrestrial	13:20	16:10	2:50
14-Jul-01	City of Rocks	Juniper_north-facing >5%	Juniper_north-facing >5% environmental type	terrestrial	10:40	13:30	2:50
15-Jul-01	City of Rocks	Mt mahogany_north-facing >5%	Mt mahogany_north-facing >5% environmental type	terrestrial	9:20	12:05	2:45
15-Jul-01	City of Rocks	Sagebrush_south-facing >5%	Sagebrush_south-facing >5% environmental type	terrestrial	12:45	14:10	1:25
16-Jul-01	City of Rocks	Mt mahogany_south-facing >5%	Mt mahogany_south-facing >5% environmental type	terrestrial	10:30	13:05	2:35
16-Jul-01	City of Rocks	Sagebrush_north-facing >5%	Sagebrush_north-facing >5% environmental type	terrestrial	13:20	14:45	1:25

Appendix I. Summary of information for determining park status of species not detected in the park.

Scientific Name	Common Name	Within Range	Elevation	Closest Record	Habitat	Detectability	Remarks	Park Status
Ambystoma tigrinum	Tiger salamander	Possible	OK	Recent- Twin Falls County (Approximately 40 miles west)	Limited	High	Unlikely	Not present
Spea intermontana	Great basin spadefoot toad	Yes	Too High	Historic- Burley (Approximately 35 miles north)	Yes	Low	Possible	Not present
Bufo boreas	Western toad	Yes	OK	Historic- Twin Falls County (Approximately 65 mile northwest)	Limited	HIgh	Unlikely	Not present
Pseudacris regilla	Pacific treefrog	No	OK	Recent- Independence Lakes/Cache Peak (Approximately 10 miles north)	Limited	High	Possible	Not present
Rana pipiens	Northern leopard frog	Yes	OK	Historic- Elba/Malta (Approximately 20-25 miles northeast)	Limited	Variable	Unlikely	Not present
Rana luitiventris	Columbia spotted frog	Yes	OK	Recent- northeast of Jackpot, NV but in ID (Approximately 50 miles westsouthwest)	Possible	High	Unlikely	Not present
Gambelia wislizenii	Longnose leopard lizard	Yes	OK	Historic- Big Cottonwood Creek (Approximately 30 miles northwest)	Yes	Variable	Likely	Probably Present
Uta stansburiana	Common side-blotched lizard	No	OK	Recent- Big Cedar Canyon (Approximately 30 miles northwest)	Yes	Variable	Possible	Not Present
Cnemidophorus tigris	Tiger whiptail	Yes	OK	Recent- Little Cedar Canyon (Approximately 30 miles northwest)	Yes	Variable	Likely	Probably Present
Coluber constrictor	Eastern racer	Yes	OK	Recent- Sublett Reservoir (Approximately 35 miles east)	Yes	Variable	Likely	Probably Present
Diadophis punctatus	Ringnecked snake	No	OK	Historic- Pocatello (Approximately 90 miles northeast)	Possible	Variable	Unlikely	Not Present
Hypsiglena torquata	Nightsnake	Yes	OK	Historic- Pocatello (Approximately 90 miles northeast)	Possible	Low	Unlikely	Not Present
Thamnophis sirtalis	Common gartersnake	Yes	OK	Historic- Deep Creek (Approximately 50 miles northwest)	Yes	Variable	Possible	Not Present
Phrynosoma douglassi	Pigmy short-horned lizard	Yes	OK	Genus reported by visitors near the Twin Sisters area but not confirmed	Yes	Low	Possible	Unconfirmed
Phrynosoma platyrhinos	Desert horned lizard	Yes	OK	Genus reported by visitors near the Twin Sisters area but not confirmed	Yes	Low	Possible	Unconfirmed

Appendix J. Summary of NPSpecies Codes for potentially occurring reptile and amphibian species at City of Rocks National Reserve.*

Scientific Name	Common Name	Detected during 2001 survey or reliable observation record exists	Park Status	Species Abundance	Residency	Species Nativity	Management Priority	Exploitation Concern
Pseudacris maculata	Boreal chorus frog	Yes	Present	Rare	Breeder	Native	No	No
Phrynosoma douglassi	Pigmy short-horned lizard		Unconfirmed				Yes	
Phrynosoma platyrhinos	Desert horned lizard		Unconfirmed				Yes	
Sceloporus occidentalis	Western fence lizard	Yes	Present	Rare	Breeder	Native	No	No
Sceloporus graciosus	Common sagebrush lizard	Yes	Present	Abundant	Breeder	Native	No	No
Eumeces skiltonianus	Western skink	Yes	Present	Rare	Breeder	Native	No	No
Gambelia wislizenii	Longnose leopard lizard		Probably Present					
Cnemidophorus tigris	Tiger whiptail		Probably Present					
Clarina bottae	Rubber boa	Yes	Present	Rare	Breeder	Native	No	No
Masticophis taeniatus	Striped whipsnake	Yes	Present	Rare	Breeder	Native	No	No
Thamnphis elegans	Terrestrial gartersnake	Yes	Present	Abundant	Breeder	Native	No	No
Pituophis catenifer	Gophersnake	Yes	Present	Uncommon	Breeder	Native	No	No
Crotalus viridis	Western rattlesnake	Yes	Present	Rare	Breeder	Native	No	No
Coluber constrictor	Eastern racer		Probably Present					

* See explanation of NPSpecies Codes in Appendix K.

APPENDIX K. Explanations of NPSpecies Codes.

PARK STATUS

- **Present:**
  Species occurrence in park is documented and assumed to be extant.
- **Historic:**
  Species historical occurrence in the park is documented, but recent investigations indicate that the species is now probably absent.
- **Probably Present:**
  Park is within species range and contains appropriate habitat. Documented occurrences of the species in the adjoining region of the park give reason to suspect that it probably occurs within the park. The degree of probability may vary within this category, including species that range from common to rare.
- **Encroaching:**
  The species is not documented in the park, but is documented as being adjacent to the park and has potential to occur in the park.
- **Unconfirmed:**
  Included for the park based on weak (unconfirmed) record or no evidence, giving minimal indication of the species occurrence in the park.
- **False Report:**
  Species previously reported to occur within the park, but current evidence indicates that the report was based on a misidentification, a taxonomic concept no longer accepted, or some other similar problem of interpretation.

SPECIES ABUNDANCE

- **Abundant:**
  May be seen daily, in suitable habitat and season, and counted in relatively large numbers.
- **Common:**
  May be seen daily, in suitable habitat and season, but not in large numbers.
- **Uncommon:**
  Likely to be seen monthly in appropriate season/habitat. May be locally common.
- **Rare:**
  Present, but usually seen only a few times each year.
- **Occasional:**
  Occurs in the park at least once every few years, but not necessarily every year.
- **Unknown:**
  Abundance unknown.

RESIDENCY

- **Breeder:**
  Population reproduces in the park.
- **Resident:**
  A significant population is maintained in the park for more than two months each year, but it is not known to breed there.

- **Migratory:**
  Migratory species that occurs in park approximately two months or less each year and does not breed there.
- **Vagrant:**
  Park is outside of the species usual range.
- **Unknown:**
  Residency status in park is unknown.

SPECIES NATIVITY

- **Native:**
  The species is native to the park (either endemic or indigenous), or if the Park Status is Probably Present as defined above, the species would be native to the park if it were eventually confirmed in the park.
- **Non-Native (Exotic):**
  The species is not native to the park (neither endemic nor indigenous), or if the Park Status is Probably Present as defined above, the species would not be native to the park if it were eventually confirmed in the park.
- **Unknown:**
  Nativity classification in park is unknown.

SPECIES OF MANAGEMENT PRIORITY

Yes or No
IF YES: Explain management priorities.

SPECIES OF EXPLOITATION CONCERN

Yes or No
IF YES: Explain exploitation concerns.

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS D-30, April 2009

National Park Service
U.S. Department of the Interior

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