

PROTECTING THE THREATENED DESERT TORTOISE: A PLAN FOR PRIMARY SURVEY, MANAGEMENT AND MONITORING IN PARASHANT NATIONAL MONUMENT AND GRAND CANYON NATIONAL PARK

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Executive Summary

Scat resembling desert tortoise was found by National Park Service biologists at the Whitmore Wash Trailhead on July 8, 2004. A burrow that had definitive desert tortoise characteristics was located on the previous day nearby and north of the Grand Canyon rim. While some of the scat was quickly identified as mammalian, other scat did share typical tortoise characteristics including directional vegetation fragments and general shape. While the scats were small for an adult tortoise they could have been from a juvenile. Photographs of the scats in the original locations later revealed they were unlikely tortoise and were most likely chuckwalla. Taken out of environmental context, the scat from tortoises and chuckwalla can be confused. The fact that the scats were clustered on rocks not likely to be accessible by tortoises strongly suggest the scat was not tortoise. In contrast the burrow did appear to be tortoise shaped and therefore additional surveys were conducted July 31-August 4, 2005. The surveys concentrated in the areas surrounding the burrow location and in areas that appeared to have suitable habitat for desert tortoises. The single dirt road in the area was also monitored for tortoise tracks daily. Approximately 60 ha (~150 acres) were surveyed. Ambient air temperatures were within the range for tortoise surface activity and daily rain events should have drawn tortoises from burrows and resulted in surface activity as well. The original burrow located by NPS biologists was not found despite exhaustive search efforts using GPS and co-location using prominent feature alignment with the original photograph. Heavy rains had occurred between the surveys and the understory had changed considerably in the one year's time. Given the size of the originally photographed burrow and the extent of the disturbed soil surrounding it, had there been a resident tortoise maintaining the burrow it or its evidence (scat, tracks) should have been found. No substantial evidence was found to suggest tortoises occur in the Whitmore Wash area of Parashant National Monument. No additional scat, burrows, tracks, nests, egg fragments or other evidence was located that would indicate tortoise presence.

Background

The desert tortoise is in decline throughout most of its range. A host of causes have been cited for this decline including land development, livestock, wild horse and burro grazing, off-road vehicle use, and other large surface-disturbing activities such as mining, agriculture and military activities (USFWS, 1993). In addition, vandalism, poaching and disease further stress populations faced by periodic drought throughout the southwestern United States. An upper respiratory tract disease (URTD) often associated with captive or recently released animals is believed to be spreading from California across the Colorado River and into Sonoran populations. In addition to these serious threats, in some areas predation by common ravens on juvenile tortoises is thought to be taking a significant toll. Raven populations have increased dramatically in areas of human settlement and in those areas with tortoises the situation has become critical (Knight and Kawashima 1993).

According to the US Fish and Wildlife Service (USFWS) Draft Recovery Plan for the Desert Tortoise, declines of desert tortoises of up to 20% per year have been documented in certain populations in California, Nevada and Arizona (USFWS, 1993). Following emergency listing by U.S. Fish and Wildlife Service in August 1989, the entire Mojave population of desert tortoise was federally listed as threatened in 1990. The “Mojave population” refers to those tortoises occurring north and west of the Colorado River. Lake Mead (LAME) National Recreation Area, adjacent to Grand Canyon National Park (GCNP) on the north and west, contains a Mojave population of desert tortoise. The Sonoran populations of desert tortoise are considered a candidate Category 2 species (i.e., Proposed for listing but with more information needed). “Sonoran population” refers to tortoises south and east of the Colorado River. GCNP, Organ Pipe Cactus (ORPI), Saguaro (SAGU) National Monuments and Lake Mead National Recreation Area each contain Sonoran desert tortoise. Lake Mead is unique in containing both Mojave and Sonoran populations.

Recent scat collected at river mile 188, “Whitmore Wash”, on the north side of the Colorado River and adjacent to Parashant National Monument, suggested that desert tortoises might be present and subsequently that habitat extends farther east than originally recorded. Scat that appeared to be from desert tortoise (*Gopherus agassizii*) was located on July 8th and July 15th, 2004 on the north rim of the Grand Canyon near the Whitmore Canyon trailhead. Additionally, a burrow that was very characteristic of desert tortoise was located just north of the scat. Based on this initial evidence, desert tortoise surveys were conducted from July 31-August 4, 2005 in the greater area adjacent to and north of Whitmore Canyon Trailhead. The original report is attached at the end of this document.

Objectives

The overarching objective of this project to ascertain if tortoises do occur in the Whitmore Wash area of Parashant National Monument on the north rim of the Grand Canyon. The following sub-objectives were tasked for field survey efforts in support of this objective:

1. Assemble available data on and relevant to Mojave Desert tortoise populations within the study area boundary, including existing spatial data layers as available such as ‘suitable desert tortoise habitat’ and ‘vegetation’.

2. Design and oversee field surveys to determine presence or absence of tortoises within the study area.
3. Create maps delineating areas surveyed, location of tortoise sign, and location where no sign was found.
4. Collect landscape/habitat data for all areas surveyed to assess the degree to which tortoise habitat, if tortoises are found to occur, can be differentiated from non-tortoise habitat.

Methods and Results

Data assembly

Vegetation data were provided by the NPS. The 1982 vegetation map does not include the Parashant NM, only areas within the Grand Canyon Park Boundary. Therefore 1976 vegetation polygons were obtained at a scale of 1:126,000. In this vegetation layer the Whitmore Wash and nearby Arizona Strip is classified as Mojave Desert Scrub. Desert tortoise habitat data were downloaded from the Bureau of Land Management (BLM). Figure 1 shows a general location of the area surveyed and the nearest desert tortoise habitat.

Survey Areas

Three biologists walked abreast and within approximately two meters of one another searching in every bush and rock outcrop for tortoise, burrow, scat or other sign of tortoise. A total of 59.8 ha (147.9 ac) in six different areas were surveyed. The areas were selected to focus on existing evidence (scat and a burrow locations previously reported) and areas that were minimally impacted by cattle coupled with potentially suitable habitat (Figure 2). Tortoises in Utah and the Sonoran desert tortoise are known to use rocky habitat and habitat that differs considerably from Mojave desert tortoises in the western extent of its region. Because tortoises had not been found in this area there was no information on whether they might utilize habitat aligned with Sonoran tortoises or Mojave tortoises. Therefore, we targeted washes and rock outcrops as well as areas that more closely resembled terrain and vegetation of the western Mojave Desert tortoise range. Regardless of Mojave or Sonoran, all tortoises need shelter in the form of burrows and suitable grazing habitat.

The vegetation for the survey area is mapped as Mojave Desert Scrub. Much of the Whitmore Canyon area where the original evidence (scat) was located is very rocky with thin soils although the rim is dominated by creosote (*Larrea tridentata*). There are significantly steep slopes and the wash itself has vertical walls that pose a significant barrier to the west (Figure 4) while the Grand Canyon is a barrier to the south (Figure 5). The geomorphology to the east is also significantly steep and close to the Grand Canyon there are cliff barriers (Figure 6). Photographs from the original surveys in July 2004 show little annual grass cover, however after the time period when the original photographs were taken considerable rain fell throughout the area and the greater western region. As a result the understory grass cover was dense and continuous throughout the Arizona Strip during the field surveys. Figure 8 shows the dense grass understory present throughout the area during the 2005 field surveys. The heavy grass vegetation was both helpful and a hindrance in surveys. Grass made it slightly more difficult to locate burrows and disturbed earth sites under shrubs from a distance however it facilitated determining activity levels in that active burrows exhibited trampled grass and freshly excavated dirt was easy to see.

Locator Map of Area

July 31 - August 4, 2005

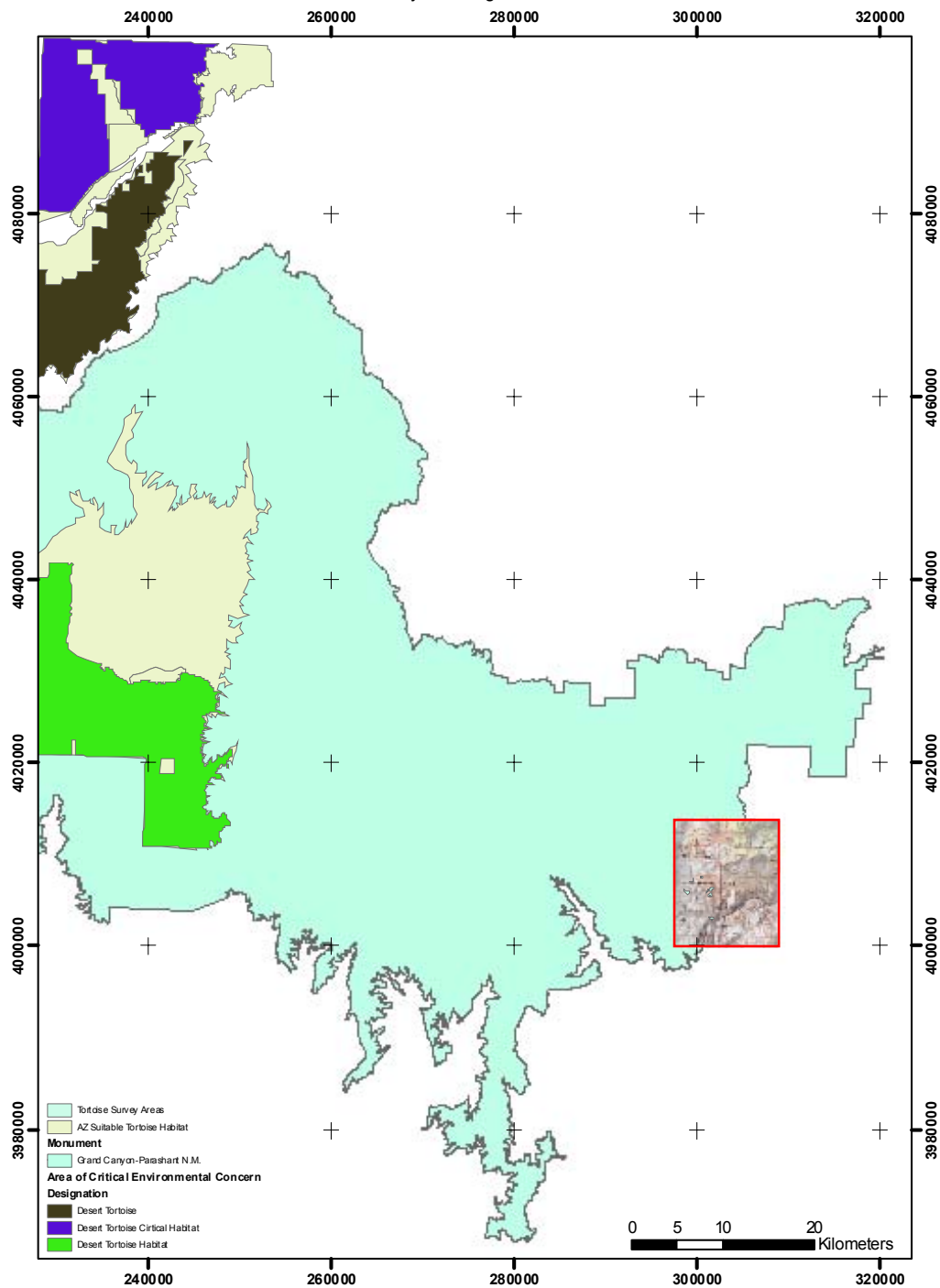


Figure 1. Overview of location of Whitmore Wash area (red box inset) surveyed for tortoises. The closest known tortoise habitat/populations are west and northwest of the study area.

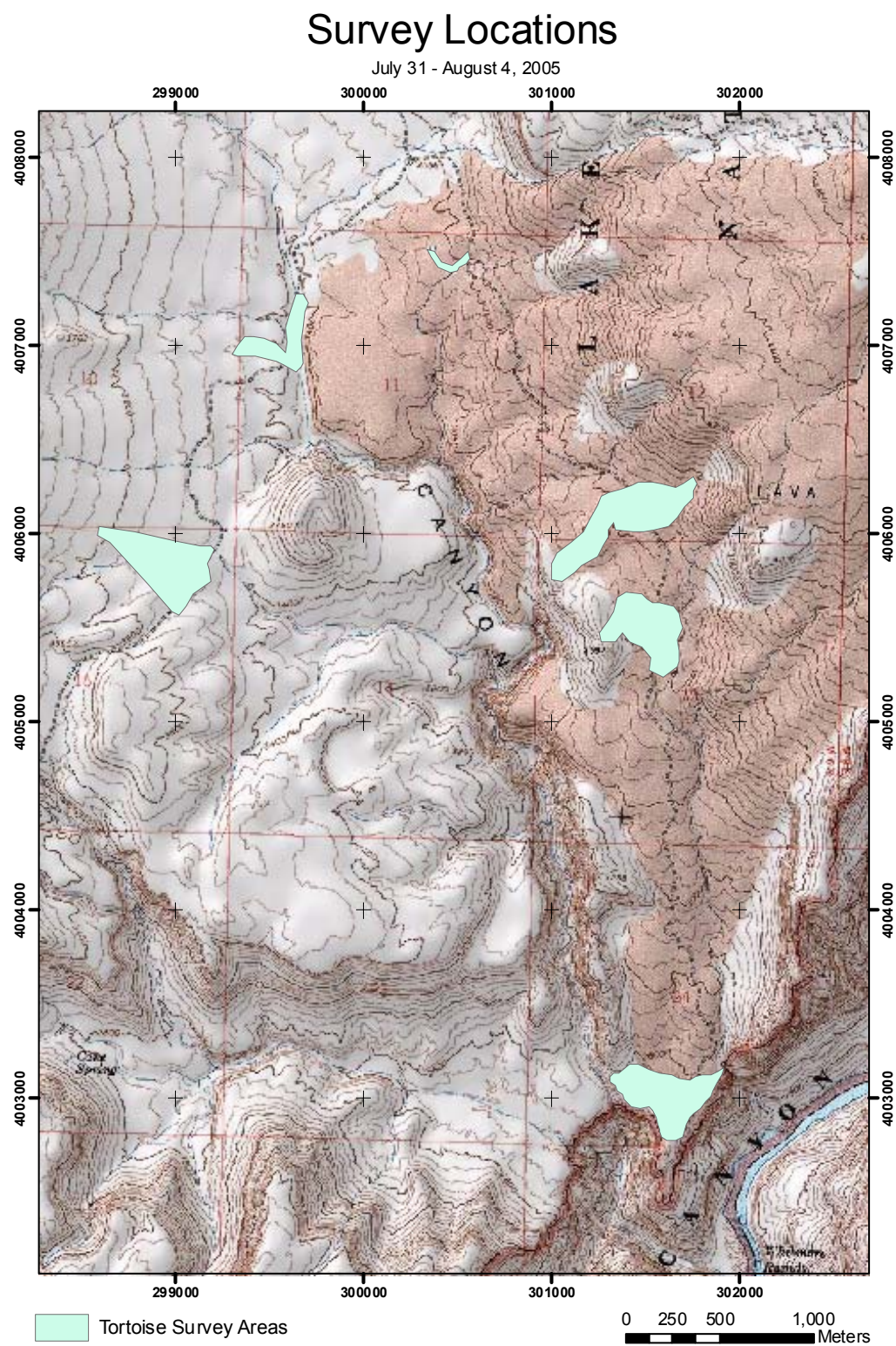


Figure 2. Areas surveyed for desert tortoise focused on locations of potential tortoise evidence (scat and a burrow) and areas that appeared to be potentially suitable tortoise habitat.



Figure 3. The rim of the Grand Canyon is rocky and has shallow soils.



Figure 4. Whitmore Wash itself poses a significant barrier to movement for tortoises. The area where the original evidence was located is therefore relatively small to support tortoises.



Figure 5. The Grand Canyon and Colorado River are a barrier to tortoise movement and serves as the dividing line between Sonoran and Mojave Desert Tortoises.



Figure 6. Cliffs to the east near the Grand Canyon Rim also serve as a barrier and a constraint to the size of the area where the original evidence was located.



Figure 7. A view of the study area with afternoon storms on the horizon. The heavy grass understory was not present the previous year.

Tortoise evidence

No tortoises were located in any of the survey areas. No tracks were found nor were carcasses or other direct evidence that tortoises were present. A guest ranch in the Whitmore Wash area takes tourists to the canyon rim on ATVs and also in vehicles. We inquired about the wildlife that the guest ranch workers saw and were familiar with in their years of operating the business. They did not report ever having seen a tortoise although they did report bighorn sheep, snakes and lizards. It is possible that nests would have hatched by the time of our survey and that nests could have been recently laid. We found no evidence of nests, eggs, or hatchling tortoises.

Scat evidence

No tortoise scat was located in any of the surveyed areas. The original scats collected in 2004 appeared to be tortoise upon initial inspection by three independent tortoise biologists. However, further inspection by additional tortoise biologists revealed that the scat were most likely chuckwalla. Chuckwalla scat is very similar to tortoise scat in appearance. The main difference is size, where chuckwalla scat is smaller than tortoise scat. Chuckwalla scat is also typically found in rocky locations such as where the scats were originally collected. The location where scat was originally collected on the rim near Whitmore Wash was not suitable tortoise habitat, which became obvious upon seeing the entire landscape. One scat was large enough to potentially be tortoise however the location of that scat makes it highly suspect. Furthermore, photographs of the scat in its original location at the trailhead show numerous scats in a pile on a rock ledge. Tortoises are not known to mark and the collection of scats in the particular location is unlikely for tortoises. While this scat cannot be ruled out completely as not tortoise based on its morphology the location precludes it from being tortoise. Other scats were readily identified as mammalian.

Burrow evidence

We were unable to locate the original burrow photographed in the original survey in 2004. The entire area surrounding the original recorded burrow location was searched. The original coordinate location was searched assuming the reported datum (NAD27) was the actual datum of the potential burrow location. The same coordinates were searched for NAD83 datum as well. The photograph of the potential burrow included a prominent landscape feature that was readily identifiable in the background. The images in Figure 8 show the original burrow location and the same area surveyed in 2005, co-locatable due to the red sandstone formation in the upper right and the large crater in the image center. We were able to find the area based on the original burrow photo using a combination of GPS coordinates and co-location of the unique landscape feature. The burrow originally photographed did not exist when we visited the site. Much of the landscape was rocky and was not conducive to digging burrows (Figure 9). The rock formations did not provide suitable cover for tortoises; they were too shallow.



Figure 8. The upper image is the original burrow digital image. The lower image was taken in the area where the original burrow was recorded at the base of steep escarpments shown in Figure 10. These images were taken looking west and the prominent features co-locatable are the red sandstone upper right and the crater in image center (see arrows). The entire area from the escarpment base to the road was surveyed but this burrow was not located. The difference in understory between the two years is also apparent.



Figure 9. Much of the land surface was rocky as shown in this image. These areas are not suitable for digging burrows nor does it support suitable vegetation cover.

Environmental Data

Temperature and humidity was recorded using a Kestrel 4000 weather instrument. Rain fell each day of the survey period in the late afternoon and early evening. Temperatures during surveys ranged from 77.1 F – 100.2 F (25.1 C – 37.9 C) and relative humidity was as low as 25%. This range of temperatures are within the range that tortoises are active. These temperatures coupled with the rainfall should have drawn tortoises out if they were present.

Terrain/Road Features

Tortoises tend to like roads for a number of reasons. The variable compaction of road surfaces collects water when it rains and this is a draw to tortoises. The berms of dirt roads are also suitable locations to build burrows. We did not find evidence of tortoises on the main roads of the Whitmore Wash. Had tortoises been present they would have likely been seen at least once if not many times by the ranch hands and/or tourists. Figure 10 shows the main road running north-south that ends at the canyon rim. This image was taken near to the road that runs through the areas shown in Figure 8, but looking east. Between the road and the escarpments shown is where the original burrow evidence was located. It is clear that there are physical constraints to the area based on terrain.

The road was monitored daily for any and all tortoise sign. The image shown in Figure 11 does appear to be a tortoise burrow in shape and size. This image was taken along the road shown in Figure 10. This burrow is the proper shape for tortoise however it is only 6" deep. We observed its morphogenesis over time because it was dug in the road berm and was thus openly visible each day. Figure 12 shows the burrow in landscape context. There are actually three burrows visible from the road, looking east. It is readily discernable that this "tortoise" shaped burrow on the viewer's right contains soil piled just inside the mouth. What is not discernible from this image is that it is, in fact, physically connected to the middle burrow. The "tortoise" shaped burrow began as a small mammal burrow very similar in appearance to the other two shown in the image. We observed only small mammal tracks (with tail marks) when these burrows were first seen. After continued excavation by the small mammals and several afternoon rain storms, the burrow washed out to the shape shown in the image. It is possible, therefore, that the original burrow found in 2004 was also small mammal that morphed due to animal and environmental factors.



Figure 10. A view of the study area from the main access road towards the original burrow location. This image was taken near where the original burrow evidence was located. The aspect of this image is southeast.



Figure 11. This does appear to be a tortoise burrow based on shape of entrance. However, it is only about 6" deep. We observed this burrow take form into the present shape over time. It began as a small mammal burrow and with afternoon rains and excavation, came to this shape and size. This is not a tortoise burrow.



Figure 12. This is the same burrow shown in Figure 11 in landscape context. The image was taken from the road looking east. There are two smaller burrows, also made by small mammals adjacent to it. The middle burrow and the large "tortoise" burrow are actually physically connected which most likely contributed to the morphogenesis of what began as a round hole to the characteristic "tortoise" shape shown here.

Summary of Findings

Survey efforts were conducted first by NPS biologists from July 6-8, 2004 when scat that appeared to be that of desert tortoise was found. Results from these initial 2004 surveys reported no additional scat but did report a burrow that appeared to be both size and shape for tortoise. Unfortunately the burrow depth was indeterminate but given a reported indeterminate depth it was likely deeper than a few inches. Further inspection of the photographs of some of the scats revealed that the scat was more likely chuckwalla and was not likely desert tortoise. Additional field surveys were conducted in the area July 31 – August 4, 2005 because a burrow located and photographed did have desert tortoise burrow characteristics. This burrow was not found after an exhaustive search of the recorded location. No evidence of tortoise presence was recorded.

The geography of the Whitmore Wash area is not conducive to support a tortoise population due to the physical barriers that constrain the geography and the general lack of suitable habitat. To the south is the precipitous north rim of the Grand Canyon and Colorado River. The Whitmore Wash is a similarly steep barrier to the west. The eastern flank of the area is also steep and rocky. In combination, the landscape is fairly constrained where the original evidence was located. While the rock formations do create caves and crevices large enough to harbor tortoises, we did not find cover in the rock features that was suitable for tortoises. The crevices were simply not deep enough to provide thermal cover either from heat or cold. Burrow construction in the thin rocky soils would be very unlikely due to the surface imperviousness and subsequent lack of suitable vegetation for forage in the area.

Tortoises prefer to forage on annuals. In 2004 the photographs indicate low annual cover however in this year there was a dense cover of grasses and forbs which might have provided forage. At the same time, the dense herbaceous understory readily revealed where animals trafficked in and out of shrub cover. The fact that we found no burrows, pellets, tracks, or trampled vegetation that would indicate tortoise coupled with the complete lack of any physical evidence of tortoise (an animal, carcass, or scat) leads us to believe that the likelihood of tortoises in the Whitmore Wash area is very low. It is possible that a captive tortoise could have been released by its owner in this area. There is ready vehicle access right up to the rim of the canyon and the climate conditions of the area as well as the vegetation type may support a tortoise for a time. Tortoises that were captive pets do not comprise a wild population that would warrant management, particularly if only one animal was released.

The fewer the resources, the larger the area needed to support a tortoise. The area of the rim adjacent to Whitmore Wash where potential tortoise evidence was located in 2004 is small. If there were a tortoise in this area, it would require interaction with other tortoises, specifically another of the opposite sex for breeding purposes. Without at least one tortoise of each sex there is no reproduction and without reproduction there is no future to the population. If there were multiple tortoises in the Whitmore Wash area some sign would have been expected either in the form of burrows, scat, tortoises, or tracks. It is unclear what happened to the burrow that was photographed in 2004, which clearly existed at that time but was not present in 2005. The heavy rainfall that brought about the extensive annual understory may have impacted that burrow. If the photographed burrow were a tortoise burrow, however, the resident tortoise would need either that burrow or a different burrow. With the loss of the original burrow presumably from the heavy rainfall, another burrow in the vicinity would be needed, however we found no evidence of additional burrows nor did we find tracks in the road indicating tortoise travel across or through it.

The nearest BLM mapped critical desert tortoise habitat, designated as an area of critical environmental concern, is more than 101 km (63 mi) away and the nearest area mapped as suitable tortoise habitat is 53 km (33 mi) away. Between these areas and the Whitmore Wash are significant terrain barriers to dispersal further decreasing the likelihood of a range extension to a disjunct population or producing a source-sink between the two. It is possible that a captive tortoise was released in the area in the recent past and may have survived over the winter. The release of captive (pet) tortoises into this area is not ideal and should not be encouraged. Without

substantial evidence to suggest tortoises in the Whitmore Wash area of the Parashant NM, there are no management recommendations related specifically to tortoises presented at this time.

Acknowledgements

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Whitmore Canyon Desert Tortoise Surveying Trip Report

July 6 – July 8, 2004

Sophie Osborn and Zachary Kincaid

Desert Tortoise Surveying – Areas Surveyed:

6 July 2004

We began surveying for desert tortoises on the evening of 6 July 2004 upon arriving at the Whitmore Canyon trailhead (UTM: 301657, 4002740) (Fig. 1; trail portion of polygon #3). We hiked approximately 25 minutes down the trail leading to the Colorado River, going out onto every possible flat area adjacent to the trail to look for burrows or scat. We found no sign of Desert tortoises.

7 July 2004

While processing the small mammals that we trapped on the morning of 7 July, we surveyed an area just north of the trailhead and east of the rim (Starting UTM: 301677, 4002930). We saw no sign of desert tortoises (Figure 1, polygon #3)

We then moved up the road approximately 3 km from our camp at the trailhead to survey an area of predominantly creosote bush (*Larrea tridentata*) growing on a sandy and gravelly substrate (Starting UTM: 301389, 4006248). This survey area, located in the Lake Mead National Recreation Area was approximately 1.8 km from the closest Grand Canyon National Park boundary (Fig. 1, polygon #1). Within 45 minutes of beginning our transects through this area, we located a desert tortoise burrow (see description below).

After locating the tortoise burrow, we continued to survey the surrounding area (on each side of the dirt road), but found no more signs of desert tortoise. We surveyed three more creosote plots of varying sizes during the rest of day (starting UTM's for each area: 300995, 4006441; 301598, 4005867; 301380, 4005695) (Fig. 1, polygons #1, #2 and #4). (We selected the survey plots by driving along the road until we saw creosote bush on rubble/sand substrate as opposed to lava rock substrate). We typically walked transects through the area, walking until the rubble/sand substrate changed to large lava rocks. We walked up along each desert wash we encountered. We saw no more signs of desert tortoise on 7 July.

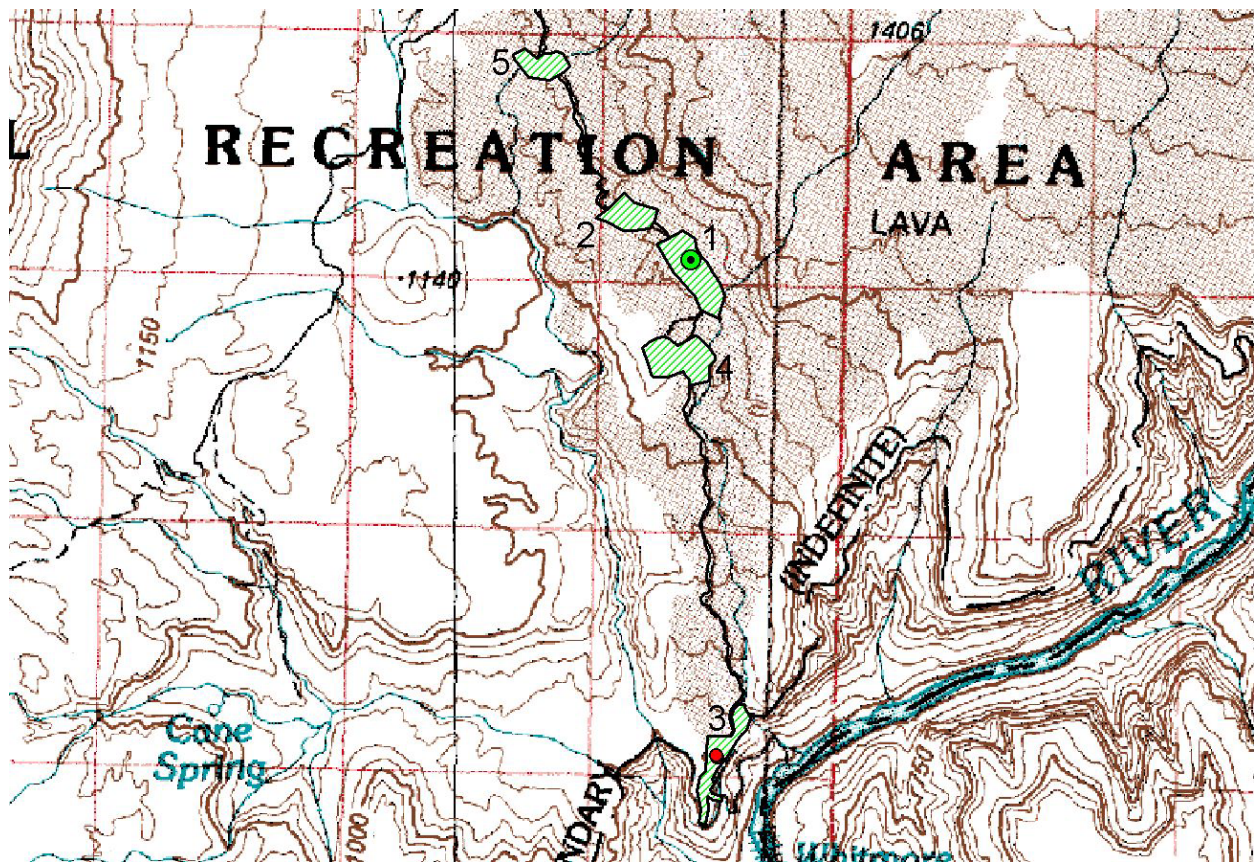
8 July 2004

On 8 July, we surveyed the rim area by the confluence of Whitmore Canyon and the Colorado (i.e., the area surrounding the trailhead) (Fig. 1, polygon #3). This area had many overhanging rocks where desert tortoises presumably could seek shelter, but we saw no indications of obvious tortoise burrows.

We continued surveying along the rim, moving upriver (east). In the first small wash upriver of the trailhead/camping area, we found desert tortoise scat in two locations (see descriptions and photos below). We continued surveying along the rim moving upriver until we reached a large

Figure 1. Survey polygons for Whitmore Canyon rim and surrounding area Desert Tortoise survey – July 2004. Green circle represents tortoise burrow located on 7 July 2004. Red circle represents tortoise scat located 8 July 2004.

Desert Tortoise Survey Area – July 2004



wash at the base of a large section of cliff. We walked up the wash for several hundred meters, but found no more signs of desert tortoise burrows or scat.

On our drive out from Whitmore Canyon, we surveyed one last parcel of creosote bush (starting UTM 300544, 4007412). We only surveyed an area within ~ 200 m from the road. Creosote bush habitat on the west side of the road was extensive and may be a promising area to begin surveying in the future.

Desert Tortoise Burrow description:

The burrow that we located on 7 July 2004 was shaped like a half-moon and located under and beside creosote bushes (Fig. 2). Creosote bush was the predominant vegetation in the area and was interspersed with barrel cactus (*Ferocactus cylindraceus*) and yucca (*Yucca sp.*) (Fig. 3). The burrow opening was approximately 200 mm (8") wide by 120 mm (5") tall (although in our excitement at finding the burrow, we forgot to measure it!). The burrow was dug out of sandy, gravelly substrate. The burrow's apron (excavated soil in front of burrow opening) consisted of sand. The roof of the burrow was smooth. We found no scat or tracks in the area. The burrow had no spider webs or debris that might indicate it had not been used for a while. The aspect of the burrow opening was approximately 50 degrees (northeast), but the burrow then turned at an angle of approximately 316 degrees (northwest). We could not determine the burrow's depth.

Figure 2. Close-up of Desert Tortoise Burrow found in Lake Mead National Recreation area on 7 July 2004.



Figure 3. Habitat surrounding desert tortoise burrow.



Desert Tortoise Burrow location:

GPS location: East: 301543, North: 4006116. (NAD 27)

Directions to burrow: On dirt road between Bar 10 Ranch and Whitmore trailhead, stop at East 301488 and North 4006084. Walk ~48 degrees for approximately 60 m.

Desert Tortoise Scat:

GPS location of first scat: East: 301720, North: 4002873. (NAD 27).

The first scat was on a flat-topped boulder about 0.75 m off the ground in a small wash east of the Whitmore trailhead and parking/camping area (Figs. 4 and 5). The scat was ~ 10-15 m from the mouth of the wash (which opens out over the Colorado River corridor). We collected the scat for analysis.

GPS location of second scat: East: 301715, North: 4002891. (NAD 27). The second scat was located near the head of the wash (closer to the road to the trailhead parking area). It was on the ground next to small boulders ~0.25 m below the rim of the wash (Fig. 6). The scat consisted of multiple pieces scattered over a ~ 1.5 m area. We collected some of the scat for analysis.

Figure 4. Desert tortoise scat located in small wash east of trailhead/camping area at Whitmore Canyon.

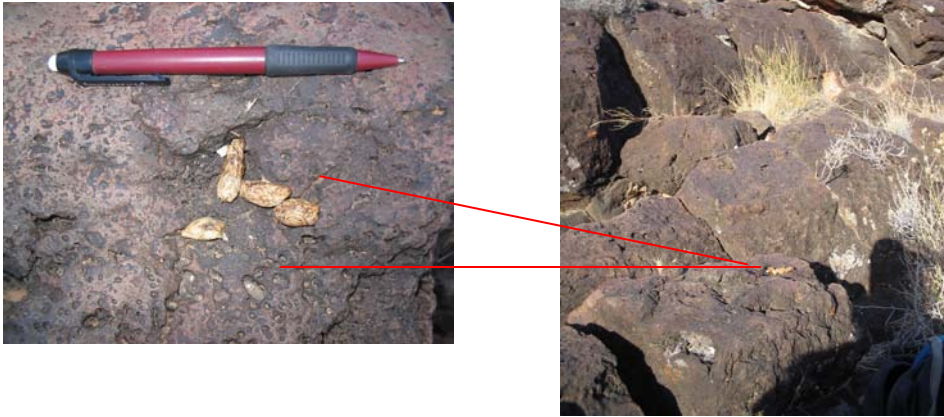


Figure 5. Two views of small wash east of Whitmore Canyon trailhead parking/camping area where two sets of scat were found.



Figure 6. Second desert tortoise scat, found near the top of a small wash east of the Whitmore trailhead parking area.

