LEAD AGENCY
Lake Mead National Recreation Area, National Park Service

Featured Project
Wildlife Inventory Monitoring and Management (project no. 2003-NPS-229-P-2004-07)

Report on Desert Tortoise (*Gopherus agassizii*) Monitoring (2004-2005) within Lake Mead National Recreation Area

Project Description
This monitoring project was conducted in order to assist the University of Nevada, Reno and the U.S. Fish and Wildlife Service in locating and removing transmitters from desert tortoises monitored in a previous study, and to determine survivorship of translocated tortoises. The index of success for this project was the removal of nine non-functioning transmitters from this population and the collection of information that can be used to guide management actions.


Desert tortoise feeding.

Project Status
The most recent two years (2004-2005) of monitoring desert tortoise have been completed.

Partners
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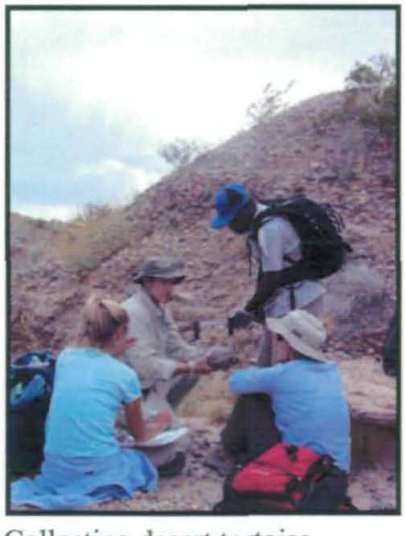
Collecting desert tortoise measurements.

Funding Awarded
$38,867

Funding Spent
$38,867

Completion Date or Status
Project Completed, January 31, 2006

Products Produced from Project
This project consisted of locating and removing radio transmitters attached during a previous study from desert tortoises and determining survivorship of the translocated tortoises. The desert tortoise is a covered species under the Clark County Multiple Species Habitat Conservation Plan (MSHCP), and the Mojave population is listed as

federally threatened under the Endangered Species Act. The search efforts were successful in locating four of the nine tortoises in question, biological data were collected and health assessments were performed on an additional 22 tortoises. These data have been shared with U.S. Fish and Wildlife Service, Ken Nussear (formerly with the University of Nevada, Reno; now with U.S. Geological Survey), and Clark County. The information contained herein represents the final report for work performed on desert tortoise by the National Park Service, Lake Mead National Recreation Area, with funding received from the Clark County MSHCP during 2004 and 2005.

January 2006

Report on Desert Tortoise (*Gopherus agassizii*) Monitoring (2004-2005) within Lake Mead National Recreation Area

Final Report for work performed by the National Park Service, Lake Mead National Recreation Area during 2004 and 2005 with funding from the Clark County Multiple Species Habitat Conservation Plan (Contract reference: 2003-NPS-229-P-2004-07)

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INTRODUCTION

The desert tortoise population in Washington County, Utah, was federally listed as threatened in 1980. Other tortoises north and west of the Colorado River were emergency listed as endangered in 1989, but were subsequently downlisted to threatened by 1990 (USFWS 1994). Declines of tortoise populations were principally attributed to human activities such as urban development, off-road vehicle use, cattle grazing, and increased predation on juveniles by more numerous common ravens (*Corvus corax*). An upper respiratory tract disease, suspected of being an emergent disease, was also identified as a contributor (USFWS 1994; Berry 1997). The threatened status of the desert tortoise forced the implementation of mitigation measures to preserve individual animals. One of these mitigation efforts was the translocation of tortoises displaced by the expanding metropolitan areas in southern Nevada to designated tortoise management areas (USFWS 1994).

In 1999, a study was begun on the lower Mormon Mesa, between the Virgin and Muddy Rivers, within Lake Mead National Recreation Area (LMNRA), to document the effects of translocation on the tortoises being moved and on the receiving tortoise population (Nussear 2004). The study's principle investigator, Kenneth Nussear, marked each individual with a unique three digit number and attached radio transmitters to 30 translocated and 17 resident tortoises, tracking them throughout 1998 and 1999. Prior to the translocation, the area supported a low density resident population of about 5 tortoises per km^2. This work was conducted by the University of Nevada, Reno (UNR), and was partially funded by the U.S. Fish and Wildlife Service, the Clark County Desert Conservation Plan, and the Biological Resources Research Center at UNR.

At the completion of Nussear's study, the researcher attempted to remove radio telemetry units from the tortoise test subjects, but 9 of the 47 transmitters were not removed (and had run out of battery power). Some attempts were made to locate the 9 tortoises with the dysfunctional transmitters, however, these efforts were unsuccessful and the effort ceased in 2000. In the 2004-2005 biennium, the National Park Service

(NPS) was funded in order to renew the search effort to remove the transmitters and to determine the survivorship of the translocated tortoises.

Goals and Deliverables

The Clark County Multiple Species Habitat Conservation Plan (MSHCP) identifies desert tortoise as a covered species, and under the plan the NPS has committed to continued monitoring of this species within LMNRA. For the 2004-2005 biennium, the NPS was requested by Clark County to modify its proposal to continue monitoring long-term study plots in order to assist UNR and the USFWS in an attempt to find tortoises that had been used in a previous radio telemetry study. Information generated by this project has been shared with USFWS, Ken Nussear (formerly with UNR and now with U.S. Geological Survey), and Clark County. The information contained herein represents the final report for work conducted by the NPS on the removal of transmitters from desert tortoises during 2004 and 2005 with funding from the MSHCP (project number 2003-NPS-229-P-2004-07).

Methods and Materials

NPS staff obtained Universal Transverse Mercator (UTM) positions of burrows used by the tortoises in question during the radio tracking study of 1998 and 1999. The UTMs were geo-referenced into a regional map using Geographical Information System (GIS) software and burrows were located during the surveys using Global Positioning System (GPS) receivers. While en route to the targeted burrows, field personnel searched for tortoises, additional burrows, or any recent tortoise evidence. Burrows were examined and data were collected on general condition, occupancy, evidence of nesting, slope, aspect and specific location of the site. Observations of recent sign were followed up with more extensive efforts to find the active tortoise. Each burrow that was determined to be active was searched to determine whether a tortoise was inside.

All tortoises encountered were checked for identifying markings of the previous study, and then measured, weighed, sexed, checked for disease and general condition, and released at the point of capture; all following protocols outlined by the Desert Tortoise Council (USFWS 1999). Any tortoise still carrying a transmitter had the transmitter and any remaining epoxy removed from the carapace before release. Tortoises in the previous study had been marked by carapace notches and Floy tags (small, external, three digit tags glued to the carapace). In many cases, the tags were missing, and in some cases new tags were fitted onto these tortoises (although no attempt was made to match previous numbers). Two of previously unmarked tortoises also received tags.

Results

Four of the 9 tortoises with remaining transmitters were found (Table 1). Three of these tortoises still had transmitters attached. Two healthy females (notched numbers

612, 724) showed no obvious negative effects from the long-term presence of the transmitters. A third targeted female (notched number 712) was located and healthy but the transmitter had previously become dislodged. The fourth transmitter was found on a deceased individual (notched number 609) of undetermined sex.

Throughout the 2004 and 2005 field seasons 22 additional tortoises were found on Mormon Mesa (Table 1). Five of these had not been previously recorded. The previously unrecorded tortoises likely represented either pre-existing residents not detected during the 1998-1999 study or recent immigrants into the area. The other 18 tortoises had all been monitored during the 1998-1999 tracking study and each had been given a three digit identifying number. These consisted of 10 males (7 healthy, 1 unhealthy, 1 unknown, and 1 dead), 5 females (4 healthy, and 1 unknown), and 3 healthy individuals of undetermined sex. Surveyors visited 87 tortoise burrows documented by the Nussear study (Fig. 1) and committed 54 person-days to searches.

Discussion

The rough topography of the lower Mormon Mesa study area hampered the abilities of researchers to access all burrows and potential habitat of the tortoises. The method of revisiting previously occupied burrows was used because the large land area and rugged terrain of the study area, combined with limited personnel, made covering the entire area in regular transects untenable. This method concentrated the surveyors' efforts in areas where the tortoises were previously known to be active and presumably increased the odds of encountering each of the target tortoises, assuming that these tortoises retained a significant level of site fidelity. During his two year study, Nussear (2004) found that by the second year after translocation, the translocated tortoises settled into a site fidelity pattern much like that of the resident tortoises instead of continuing to disperse from the point of release.

The search effort was complicated by the possibility that desert tortoises may alter their home ranges over time, inhabit relatively large territories over time, and utilize several burrows within their home range. Additionally, monitoring desert tortoises is made more difficult because periods of adverse environmental conditions will drive them into burrows where they will lower their metabolism and spend much of their lives underground (Woodburry and Hardy 1948). The amount of time that has passed since the culmination of the Nussear's study increases the chance that the tortoises may have left the study area or that the tortoises may have died and have been either rendered unrecognizable over time, dragged off of the study area, or located below ground where surveyors can not locate them.

Conclusions and Recommendations

The main management objectives for this project were to search for and monitor the health and survivorship of 9 desert tortoises that retained nonfunctioning transmitters from a tracking study completed in 1999, and to collect data on other tortoises associated with that project. Given the amount of time since Nussear's study was completed,

locating 4 of the 9 missing tortoises should be considered a success (Table 1). Additionally, this project resulted in the evaluation of 18 tortoise marked during the previous tortoise study and the discovery and evaluation of 4 additional tortoises. The data collected have been sent to Kenneth Nussear and will allow for a follow-up of his earlier translocation study. The NPS recommends continued periodic monitoring of this population on Mormon Mesa in order to evaluate long-term effects of translocating desert tortoises to an area that contained a naturally occurring population.

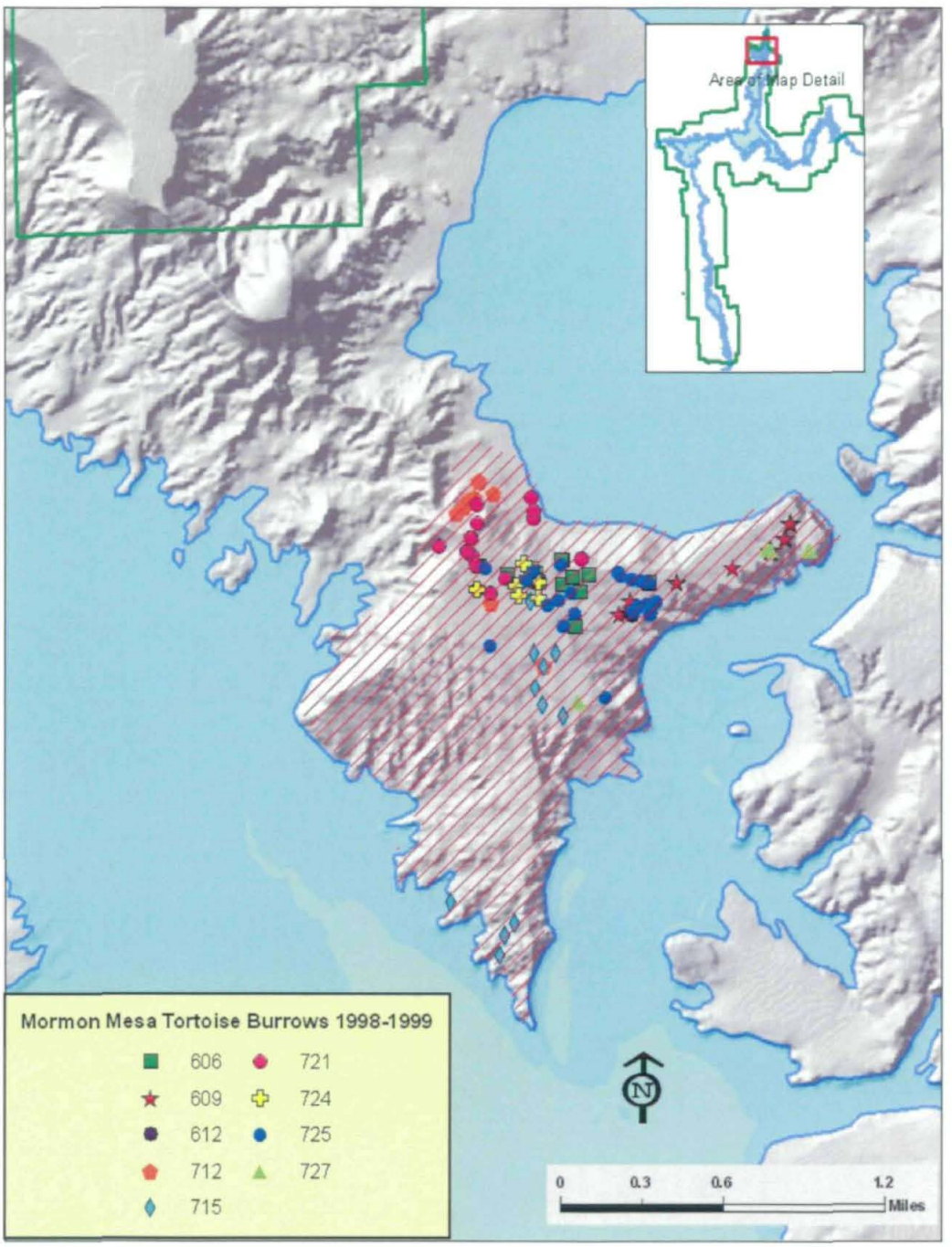

Figure 1. Lower Mormon Mesa tortoise study area, Lake Mead National Recreation Area. The symbols represent active desert tortoise burrows during the study period of 1998-1999. The number associated with each symbol is the identifying number assigned to each of the tortoises still carrying a transmitter at the end of the study period (Nussear 2004). The red hash marks indicate the extent of the study area searched by the National Park Service in 2004-2005.

Table 1. Desert tortoises found during National Park Service searches in 2004 and 2005 on Lower Mormon Mesa, Lake Mead National Recreation Area. Notch Number is the identifying number given the tortoise in the 1998-1999 by notching the carapace (Nussear 2004). The Floy Tag number is an external tag cross-referenced with the Notch Number attached to tortoises; some of these tags were replaced or added during this study. Hash marks indicate the tortoise was not included in the previous study. One of the two tortoises identified with notch number 710 was misread during capture.

Notched Number	Floy Tag Number	Date Found	Sex	Overall Condition	Transmitter Present
712	2709	4/1-4/29/2004	female	healthy	Dislodged
--		4/1/2004	male	unhealthy #	no
913		4/1/2004	male	unknown	no
733	733	4/1/2004	male	unknown	no
603	603	4/1/2004	female	unknown	no
607		4/13-4/272004	male	healthy	no
--		4/13/2004	female	healthy	no
630	?30	4/13/2004-10/25/05	male	healthy	no
--		4/13/2004	male	healthy	no
710*	044	9/29/2004	male	healthy	no
710*	2444	4/28/2005	female	healthy	no
723		9/29/2004	female	healthy	no
--	047	9/29/2004	male	healthy	no
612	092	9/29/2004	female	healthy	yes, removed
720	990	9/30/2004	female	healthy	no
609		9/30/2004	unknown	dead	yes, collected
701	1609	4/27/2005	unknown	healthy	no
620		4/27/2005	male	dead	no
608		4/27/2005	unknown	healthy	no
610		4/27/2005	unknown	healthy	no
--	095	4/27/2005	female	healthy	no
627	059	4/28-4/29/2005	male	healthy	no
701		4/28/2005	male	healthy	no
724	2471	4/29/2005	female	healthy	yes, removed
730	?30	6/20/2005	male	healthy	no
601	690	10/26/2005	male	unhealthy #	no

* Tortoise located on a second date.

Tortoise exhibited indicators of an upper respiratory tract disease.

LITERATURE CITED

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ACKNOWLEDGMENTS

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