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SURVEYS FOR DESERT TORTOISE ON THE PROPOSED SITE OF A HIGH-LEVEL NUCLEAR WASTE REPOSITORY AT THE NEVADA TEST SITE*

by

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1. INTRODUCTION

The National Waste Terminal Storage Program is a national search for suitable sites to isolate commercial spent nuclear fuel or high-level radioactive waste. The Nevada Nuclear Waste Storage Investigation (NNWSI) managed by the U.S. Department of Energy (DOE), Nevada Operations Office, was initiated to study the suitability of a portion of Yucca Mountain on the DOE's Nevada Test Site (NTS) as a location for such a repository.

EG&G was contracted to provide information concerning the ecosystems encountered on the site. A comprehensive literature survey was conducted to evaluate the status and completeness of the existing biological information for the previously undisturbed area. Site specific studies were begun in 1981 when preliminary field surveys confirmed the presence of the desert tortoise (Gopherus agassizi) within the project area (Medica, O'Farrell, and Collins, 1981). FY82 studies were designed to determine the overall distribution and abundance of the tortoise within the area likely to be impacted be NNWSI activities.

The Yucca Mountain area of the Nevada Test Site is situated close to the northern range limit of the desert tortoise. Prior to the 1982 surveys, the desert tortoise was reported from only nine locations on NTS (Tanner and Jorgensen, 1963). A known population had been under study in Rock Valley about

*This work was performed under the auspices of the U.S. Department of Energy under Contract No. DE-AC08-83NV10282.

25 miles southeast of the project area. However, the distribution and population densities of tortoise in the southwest portion of NTS were virtually unknown. Results of our surveys indicate that desert tortoise can be expected, albeit in small numbers, in a wide range of Mojavean and Transitional habitats.

2. METHODS

The NNWSI project area covered a 27.5 square mile parcel located on Yucca Mountain in the southwestern portion of the Nevada Test Site (NTS), and adjacent portions of the Nellis Bombing and Gunnery Range and the Bureau of Land Management (BLM) lands in eastern Crater Flat, Nye County, Nevada (Figure 1).

Transect surveys were conducted to gather data on the presence and relative abundance of desert tortoise and associated wildlife. Straight line transects with an effective width of 10 yards were conducted over about 1/2 the area at 200 yard intervals for a density of eight per mile. Ridge surveys, which varied in effective width and route shape, were used to sample the rugged terrain which covered the other 1/2 of the project area. Transect length was determined by size of the area to be investigated, but was generally between 1 and 2.5 miles long.

Data gathered during surveys included: 1) date, time and weather during transects; 2) presence of tortoise and their sign; 3) the number of predator scat and pellets (coyote and raptor) examined for tortoise remains; and 4) the number of pack-rat middens examined for tortoise sign. All tortoise coversites encountered were prominently and flagged with surveyors tape.

For purposes of analysis, multiple sign found within a 1 square yard area were tallied as a single adjusted sign. Fragments of skeletal remains were counted as one sign if the pieces were in close proximity, i.e. 1-3 yards.

3. RESULTS AND DISCUSSION

Between 29 March and 28 May 1982, a total of 129 transects covering 195.7 linear miles in a 27 square mile area were surveyed for the presence of desert tortoise. Surveys were conducted at elevations ranging from 3200 to 4900 in each of the five major vegetation associations present (Figure 2). The dominant vegetation associations included, Larrea/Ambrosia, Larrea/Lycium/Grayia, Lycium/Grayia, Coleogyne, and Coleogyne/Larrea.

A total of 212 adjusted sign (Table 1) were observed during systematic surveys at an average of 1.1 sign per mile, or 1.6 sign per 1.5 miles. Sign recorded included a live, adult, female tortoise, seen basking on a burrow apron; burrows; scat which ranged in condition from old and decomposing to recent, and in size from small to large; skeletal remains of various ages of both adult and juvenile tortoises; and egg shell fragments.

When compared with results of surveys conducted by the BLM in other parts of Nevada, and in Arizona and California, our average figure of 1.6 sign per 1.5 miles indicates a very low population density (Karl 1981, Burge 1980, Berry and Nicholson 1979). Transects conducted by BLM in areas with known tortoise densities of over 200 per square mile, yielded at least 10 adjusted sign per 1.5 mile standard length BLM transect. If plugged into indices developed by BLM for

estimating absolute densities from sample transect data (Berry and Nicholson 1979), our figure of 1.6 sign per standard transect would fall into the lowest density category, and would indicate tortoise densities of less than 20 tortoise/sq mi.

At the onset of the study we did not intend to survey for desert tortoise at elevations above 4000 feet or on slopes of greater than 20 because desert tortoise had not been reported as occurring in such terrain. We found, however, that tortoise sign was found, and was in fact common, in such places, and survey effort was therefore expanded to include these areas.

Tortoise sign was recorded from throughout the range of topography and elevations present in the study area. Burrows and fresh scat were observed at 4900 ft on top of Yucca Mountain as well as on several other high, steep, rocky ridges in the area. Additionally, a burrow was discovered 5 miles north of the project area at an elevation of 5240 feet; several old scat found in the burrow confirmed its use by tortoise.

A significantly greater amount of sign was observed on slopes of hills than on the relatively level bajadas, although slopes varied widely in their potential as tortoise habitat. Over 3.5 times more tortoise sign was observed on sloping terrain than on level terrain even though a roughly equal number of transect miles were walked in each terrain type. Burrows, scats, and remains were observed on almost all slope gradients including very steep and rocky ones. On slopes, tortoise sign was most often found in the vicinity of rock outcroppings. Those outcrops in contact with soil rather than rock seemed to be preferred. In general, rock outcrops, contained the most sign and had the highest coversite potential of all the habitats investigated.

Survey results from Arizona indicated a similar preference for slope and rock outcrop habitats (Burge 1980). Surveys and reports from elsewhere in Nevada also indicate the presence of tortoise at higher than expected slope angles and elevations (Karl 1981).

Significantly lower than average numbers of sign (0.2 per mile vs 1.1 per mile) were observed where well developed desert pavements supporting nearly pure stands of Coleogyne vegetation prevailed over large areas. Coleogyne vegetation was observed to be unusually depauperate in winter annual vegetation, the primary food source of desert tortoise (Woodbury and Hardy 1948). This may account for the low tortoise densities observed.

Our survey results suggest that the densities of tortoise on Yucca Mountain vary between locations and that distribution is not random. Tortoise sign was clumped in areas of preferred habitat such as rock outcrops, and tortoise densities were almost certainly higher there than in habitats (such as low bajadas) where virtually no sign was observed. However, clumped sign may have actually been an artifact of the low numbers of tortoise present rather than an expression of habitat preference. A single tortoise can construct or use enough burrows, and deposit enough scat over the course of several years to give the appearance of the presence of more than one individual.

Habitat throughout the study area seemed to be suitable for this species. Soil surfaces were generally friable and did not preclude the construction of burrows as attested to by the presence of burrows dug by other species. Winter annuals, which comprise the major portion of tortoises' diet, were well represented in all vegetation types except Coleogyne. Many of the winter annuals present were known food sources for tortoise (Hohman et al. 1980). Low

tortoise densities in the study area are probably more attributable to the adverse regional climatic factors present at the northern edge of the species natural range than availability of food or shelter.

During the course of this project individual tortoise may be disturbed, displaced and even destroyed due to construction activities, and some potential habitat will be severely disturbed. However, because the majority of construction will occur in level terrain at low elevations, little impact is anticipated to the rock-outcrop habitat the tortoise seems to prefer at this site. EG&G has proposed certain measures that would serve to mitigate these impacts on individual tortoise. The primary instrument in this mitigation plan involves the use of preconstruction surveys for all proposed activities. A precedent for such surveys is already well established in NTS procedures. However, because of the very low densities of desert tortoise found in the project area, we can anticipate little or no impact on the viability of the species as a whole.

TABLE 1. NUMBERS OF ADJUSTED TORTOISE SIGN OBSERVED OVER 195.7 TRANSECT MILES ON YUCCA MOUNTAIN

SIGN TYPES	NUMBER OBSERVED
TORTOISE	1
BURROWS	69
SCAT	97
REMAINS	44
EGG SHELL FRAGMENTS	1
TOTAL	212

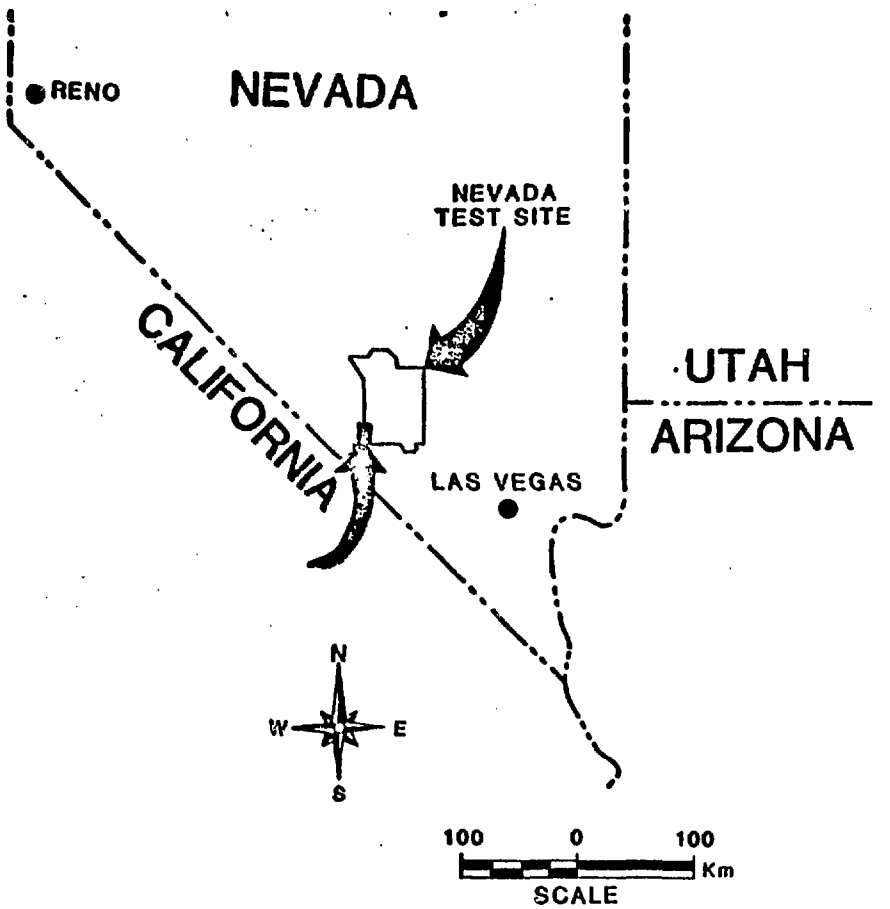

FIGURE 1. LOCATION OF THE NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS PROJECT AREA, NTS, NYE COUNTY, NEVADA

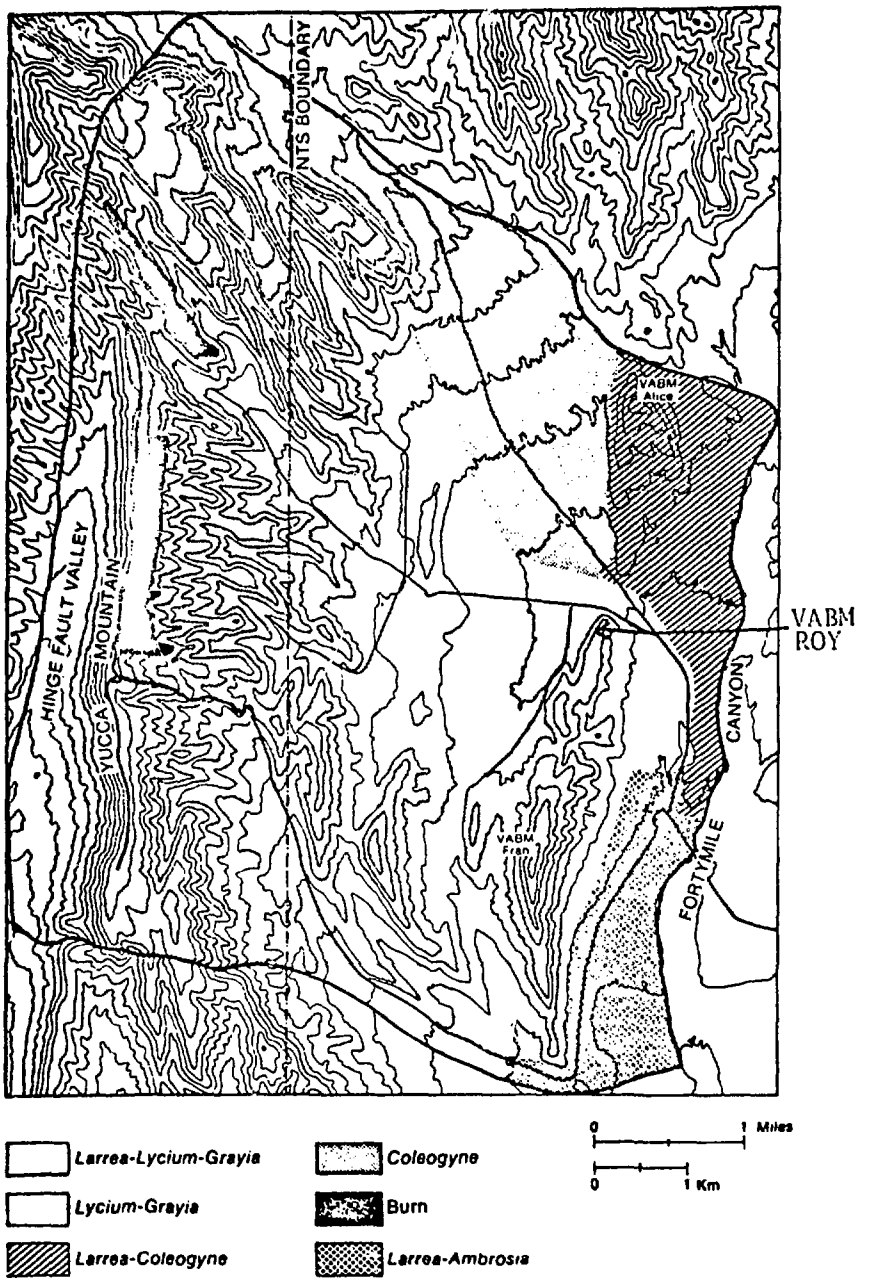

FIGURE 2. DISTRIBUTION OF THE SIX MAJOR VEGETATION ASSOCIATIONS OBSERVED ON YUCCA MOUNTAIN, NTS, NYE COUNTY, NEVADA

DISCLAIMER

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