

Desert Tortoise Occupancy and Habitat Covariate Sampling Pilot Study

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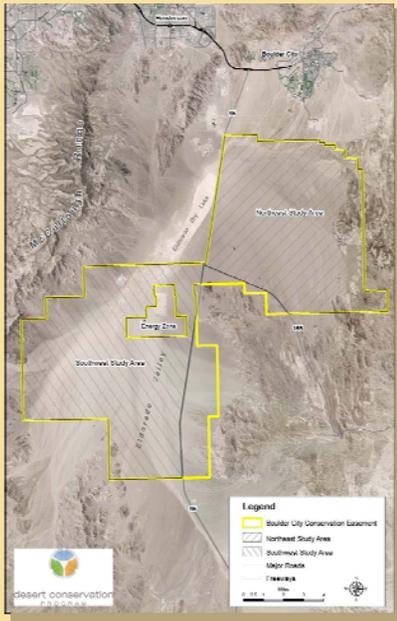
Introduction

The U.S. Fish and Wildlife Service has developed a scientifically sound sampling methodology to estimate Mojave desert tortoise population numbers in large recovery units, but land managers need to make restoration and conservation decisions at smaller spatial and temporal scales (5-10 years). Land managers also need to explore correlations between tortoises and habitat and threat factors to adaptively manage the resources. The pilot study presented here explores the use of occupancy sampling to meet land managers' needs.

Objectives

There are two objectives for the monitoring protocol:

- Analyze status and trend in desert tortoise occupancy/use within the study area using indicators of live tortoises and active burrows; and
- Correlate pattern and change in occupancy/use with habitat (e.g., cover of vegetation, herbaceous vegetation), habitat alteration (e.g., roads, off-road vehicle disturbance), and management practices (e.g., closing roads, vegetation restoration).



Location of Study Area within the Boulder City Conservation Easement, Nevada

Occupancy Sampling

- Determines the proportion of habitat within an area that contains indicators of a targeted species.
- Assesses the proportion of habitat occupied by a species and does NOT estimate abundance or density.
- Assumes that status and trends in the population can be assessed by changes in the proportion of the sample units that are occupied or used by the species.
- May be able to provide land managers data that detect trends over shorter timeframes than other sampling methods.

Assumptions

- Tortoises will respond to changes in habitat, habitat alteration, or management practices by altering their occupancy or use of an area.
- Tortoises will not occupy unsuitable habitat unless all suitable habitat is beyond capacity to support additional tortoises.
- Tortoises will vacate non-preferred suitable habitat before vacating preferred suitable habitat.
- Management actions can improve non-preferred or non-suitable habitat to increase its preference or suitability and can also prevent declines in preference or suitability.

Sampling Design

- Each sample unit is 4 hectares square (≈10 acres).
- There are a total of 80 sample units with 40 units in each of two study areas.
- Sample units were randomly placed using the Generalized Random Tessellation Stratified (GRTS) sampling approach.
- We will achieve 100% coverage by having 2 surveyors walk 10-meter belt transects.
- Each unit to be sampled 3 times/year between March 15-May 15.



Sample Units Placed Using GRTS Sampling Approach

Study Area

The pilot study will take place in the Boulder City Conservation Easement (BCCE). The BCCE is part of the Piute Eldorado Desert Wildlife Management Area in the Eldorado Valley southwest of the populated area of Boulder City. The BCCE is an 86,423 acre easement held by Clark County and managed by Clark County on lands owned by Boulder City.

For further information: Please contact SWainsco@ClarkCountyNV.gov or visit <http://www.ClarkCountyNV.gov/depts/dcp/pages/default.aspx>. Study design funded by Southern Nevada Public Lands Management Act (SNPLMA) Round 6 and MSHCP Section 10 fees. Pilot study monitoring will be funded by SNPLMA Round 8.

Tortoise Occupancy Indicators

To measure occupancy the below data will be collected. U.S. Fish and Wildlife Service handling protocols will be followed.

Tortoises

- Location
- Midline Carapace Length
- Sex
- Tag Number

Tortoise burrows

- Location
- Photo
- Active or Non-active
- Height and width
- Soil type



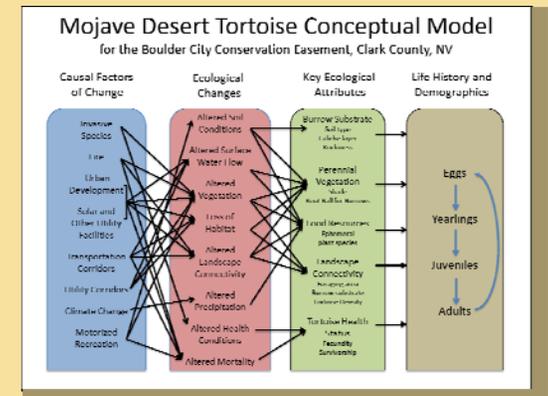
Occupancy Indicators – Live Tortoise and Active Burrow

Habitat Covariate Indicators

To identify potential habitat covariates to measure in conjunction with the occupancy sampling of desert tortoise, a conceptual model was developed. Conceptual models have been widely acknowledged as having exceptional value for the conservation and management of natural resources. These models show the complex causal relationships between a species' life history and its habitat, and how they relate to threats and management actions. The model allows the identification of predicted pathways between management actions and the response of a species or ecological system.

The values of developing this type of model are:

- Facilitates a comprehensive look at all the factors that influence the status and trend of a species or ecological system;
- Illustrates the complex linkages between and among key ecological attributes, changes to key ecological attributes and the causal factors of change;
- Assists in the identification of priority factors or factor linkages for management and monitoring; and
- Identifies parts of the system that are well understood and those that limit the application of available knowledge to management.



Conceptual Model of Habitat Covariates

The model developed for desert tortoise within the study area consists of four primary components, from left to right: causal factors of change; ecological changes; key ecological attributes; and life history and demographics. Arrows are used to represent the relationships among these subcomponents and flow from left to right to indicate hypothesized cause and effect, respectively.

The model illustrates our understanding of desert tortoise, the abiotic and biotic variables of its habitat within the study area, and the causal factors that may change those variables. The model includes only those factors that we feel are key to the dynamics of the species and the implementation of management. Key ecological attributes to measure will be selected from the model.

Data Analysis

- Tortoise occupancy data will be analyzed using a model (Program PRESENCE 3.1).
 - The model relates occupancy to characteristics of the sample unit and incorporates detection probability.
- The number of live tortoises in sample units by date and time of day, and average number of tortoises per sample unit will be calculated.
- Burrow data will be summarized spatially, number of burrows occupied by one or more tortoises or defined as active will be tallied.
- Temperature data will be tested for correlation with tortoise activity and time of day.
- Habitat covariate indicator data will be tested for correlation with occupancy data to identify patterns.