

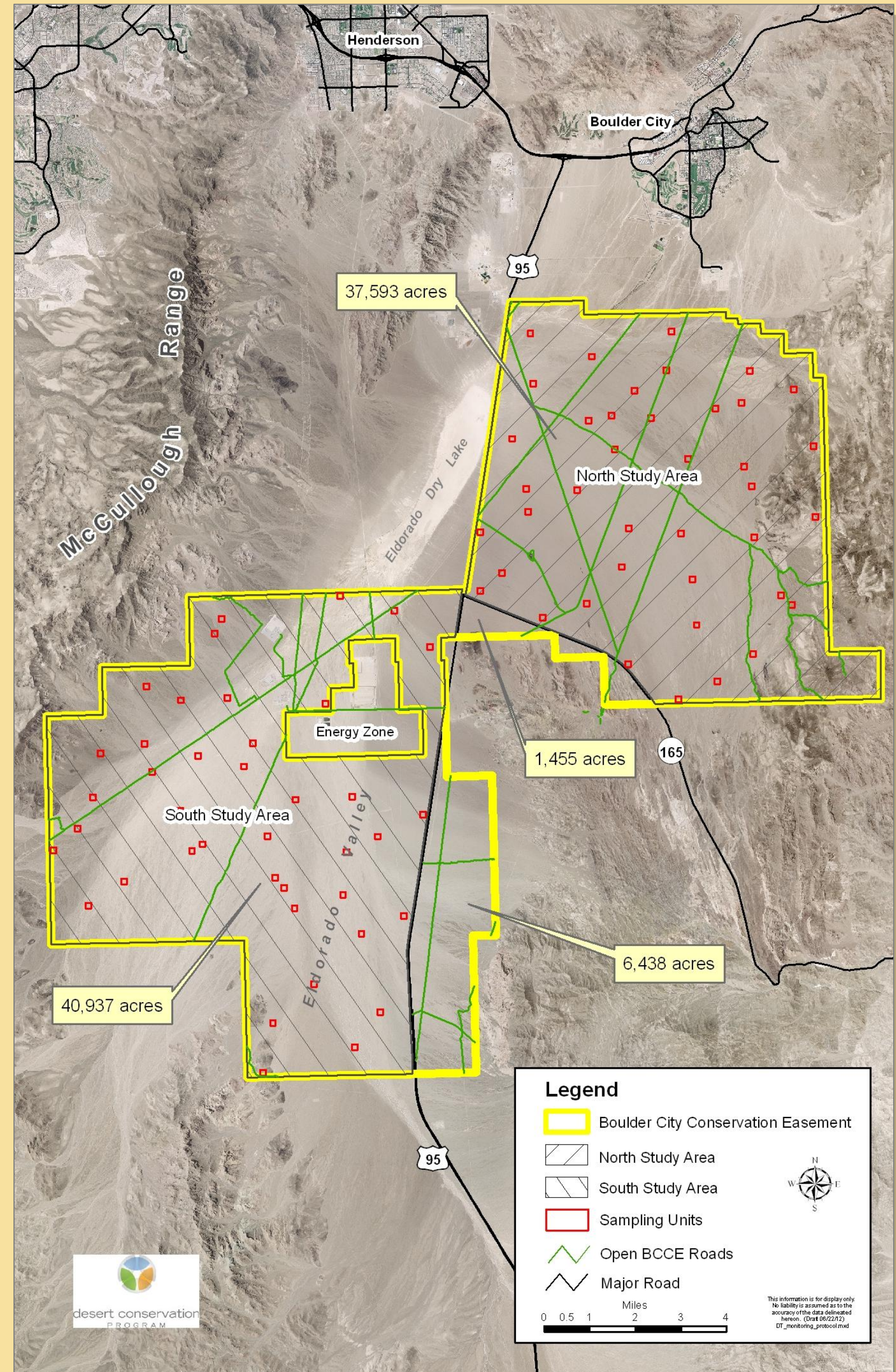
Desert Tortoise Occupancy and Habitat Covariates Sampling Pilot Study

Introduction

Clark County has developed a pilot study to test occupancy sampling in the Boulder City Conservation Easement (BCCE). We predict the sampling method will allow us to make decisions at useful spatial and temporal scales (5-10 years) and to explore correlations among tortoise occupancy, habitat, habitat alterations, and management practices in order to adaptively manage BCCE resources.

Objectives

- Analyze status and trend in desert tortoise occupancy/use within the study area using indicators of live adult tortoises and active tortoise burrows;
- Correlate pattern and change in occupancy/use with habitat, habitat alteration, and management practices



Location of Study Area, South of Boulder City

Study Area

The BCCE is 86,423 acres and 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 easement owned and managed by Clark County on Boulder City lands.

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 alterations, or management practices by altering their occupancy 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 unsuitable habitat to increase preference or suitability and can also prevent declines in preference or suitability.

Sampling Design

- 80, four hectare (≈10 acres) sampling units, randomly placed
- 100% coverage, two surveyors walk 10-meter belt transects
- Each unit sampled three times/year between mid March – mid May

Tortoise Occupancy Indicators

To determine the occupancy status of a sampling unit, the following data will be collected.

Live Adult Tortoises

- Location
- Midline Carapace Length
- Sex
- Tag Number & Color

Active Tortoise Burrows

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



Occupancy Indicators – Live Tortoises and Active Tortoise Burrows

Habitat Covariate Indicators*

The following measurements will be made to characterize habitat (burrow substrate and food, water, and shelter resources), habitat alteration, and management practices within or surrounding each sampling unit. A combination of field measurements, remote sensing, and GIS analyses will be used. Frequency of measurements will vary based upon weather, likelihood of change, and rate of change.

Burrow substrate

- Soil diggability classification
- Location on alluvial fan
- Caliche in washes

Food, shelter, and water resources

- Ephemeral plant cover and diversity
- Perennial plant diversity, canopy cover, and shade cover
- Natural and modified water sources

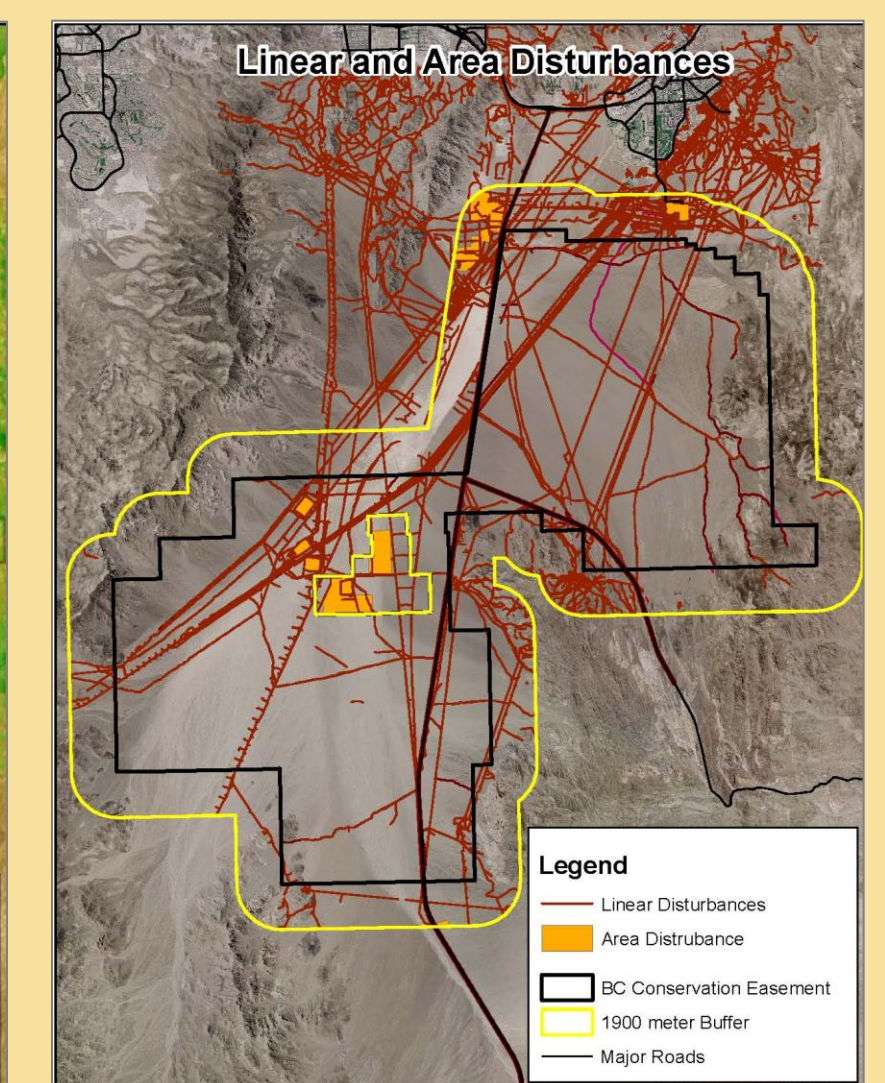
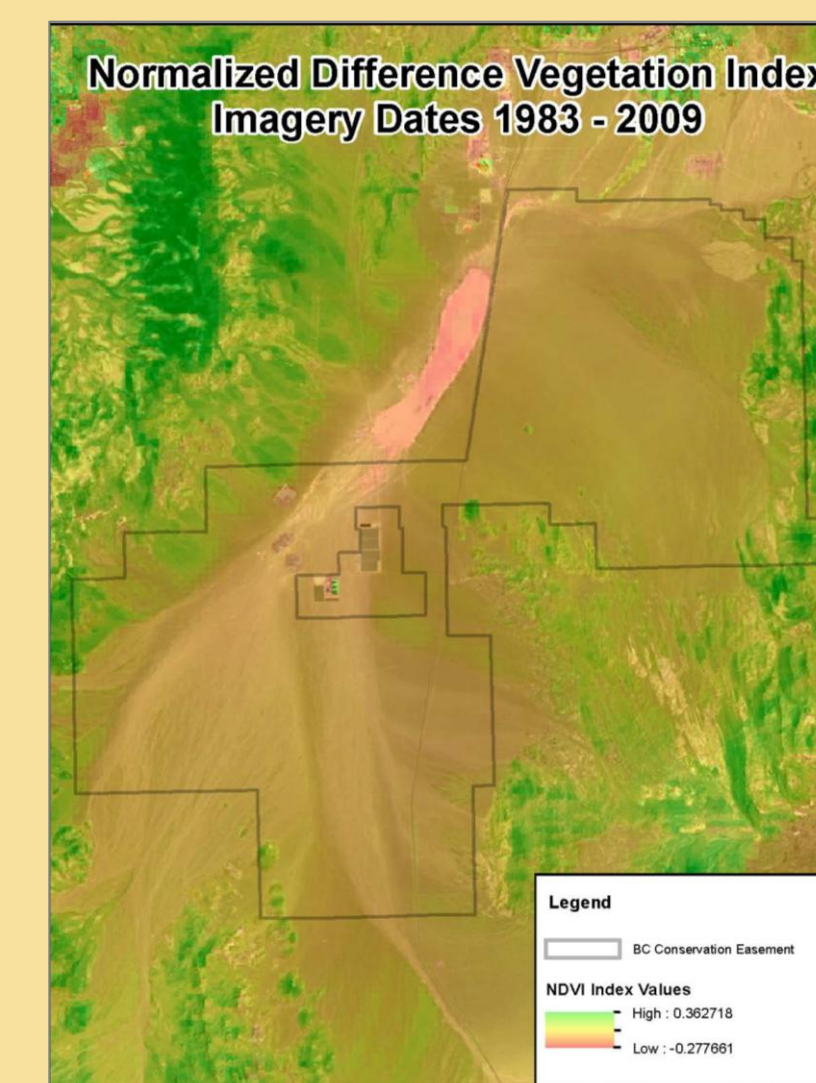
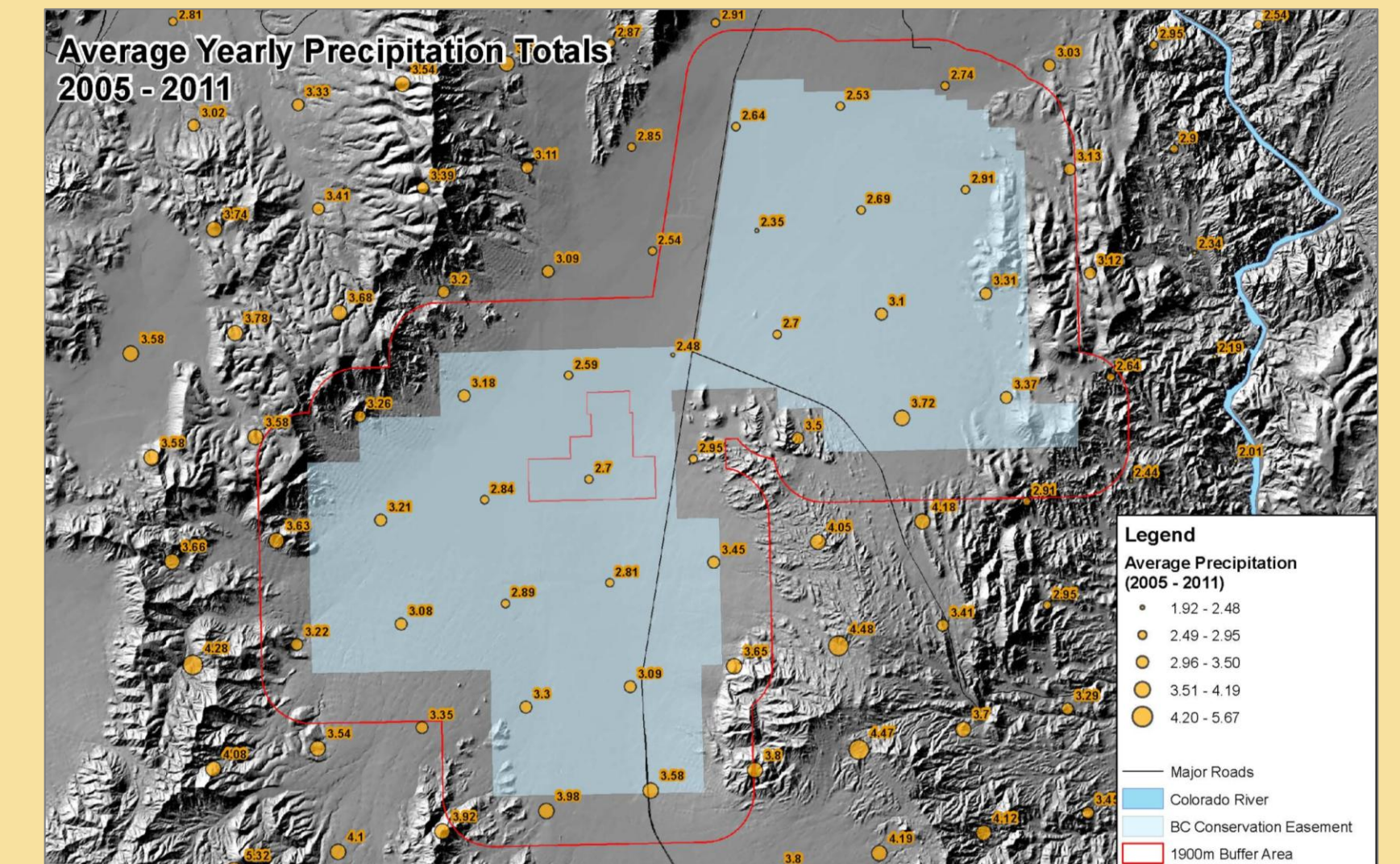
Habitat alterations

- Disturbances (linear and polygons)
- Energy transmission and generation facilities

Management practices

- Open and private roads
- Closed and restored linear disturbances
- Other restored or enhanced areas
- Tortoise relocations
- Law enforcement activities

*Habitat Covariate Indicators are in draft status



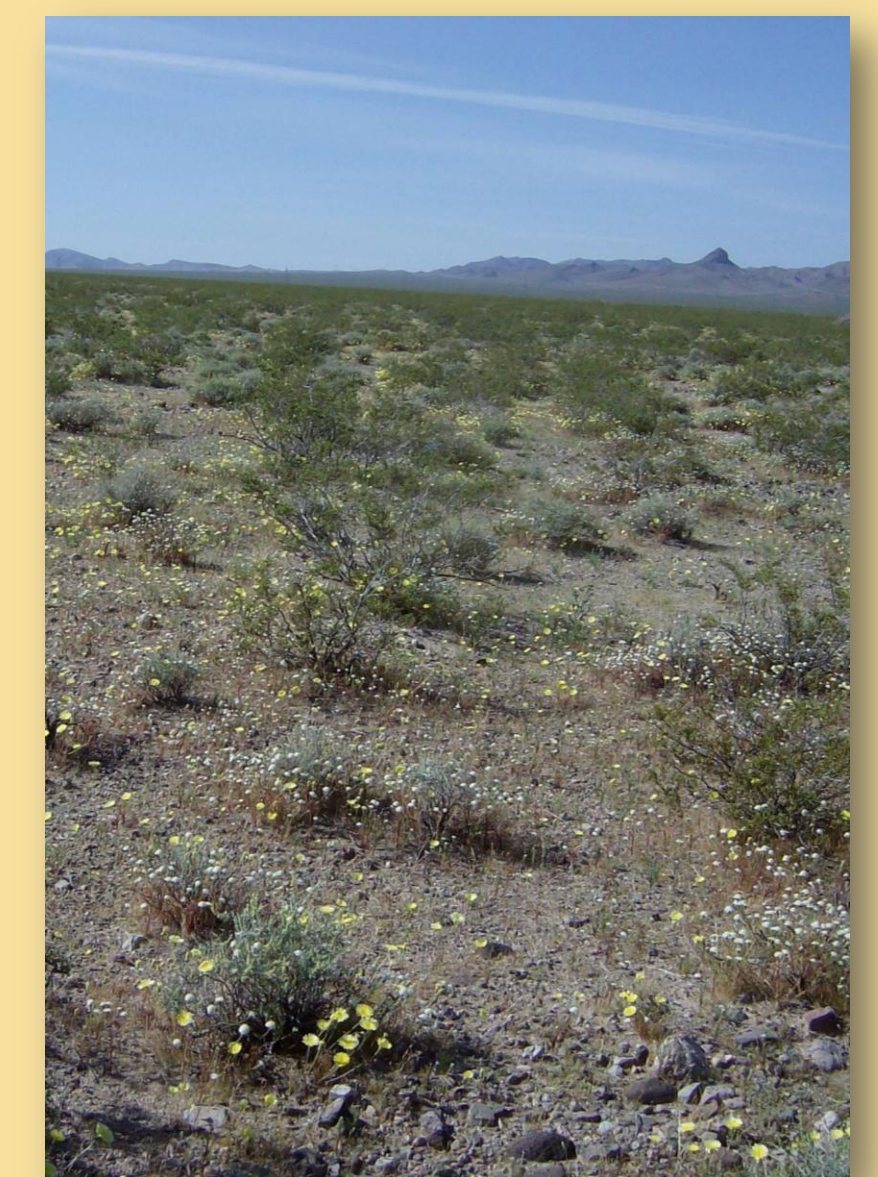
Data Analysis

- Tortoise occupancy data will be analyzed using a model (Program PRESENCE 3.1) that relates occupancy to characteristics (habitat indicators) of the sample unit and incorporates tortoise detection probability.
- The number of live tortoises in sample units by date, time of day, and average number of tortoises per sample unit will be calculated.
- Burrow data will be summarized spatially. The 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 to refine the next season's sampling schedule.
- Habitat covariate indicator data will be tested for correlation with occupancy data to identify patterns.

Adaptive Management of the BCCE

Results of the data analysis and observations made during monitoring will be used to adaptively manage the BCCE. The information may be used to improve law enforcement patrols, prioritize restoration and cleanup areas, and identify areas for avoidance of new discretionary disturbances. Data and the analysis results will be shared with US Fish and Wildlife Service on an annual basis.

For further information: Please contact SWainsco@ClarkCountyNV.gov or visit <http://www.ClarkCountyNV.gov/depts/dcp/pages/default.aspx>.



BCCE spring vegetation