desert conservation
PROGRAM
respect, protect and enjoy our desert!

Overview of the Desert Conservation Program's Occupancy and Covariate Sampling Projects

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Presentation Overview

- Background on Occupancy Sampling Project
- Background on the Covariate Sampling Project
- Summarize the outcomes of the two projects

Information for the Recovery of the Mojave Desert Tortoise

- Status and trends
- Habitat relationships
- Viable populations
- Connectivity within and between TCAs
- Translocation and augmentation
- Solar facilities
- Excessive predation
- Climate change

Two DCP Projects:

- Occupancy Sampling Project
  - Status and trends of populations
- Covariate Sampling Project
  - Habitat relationships

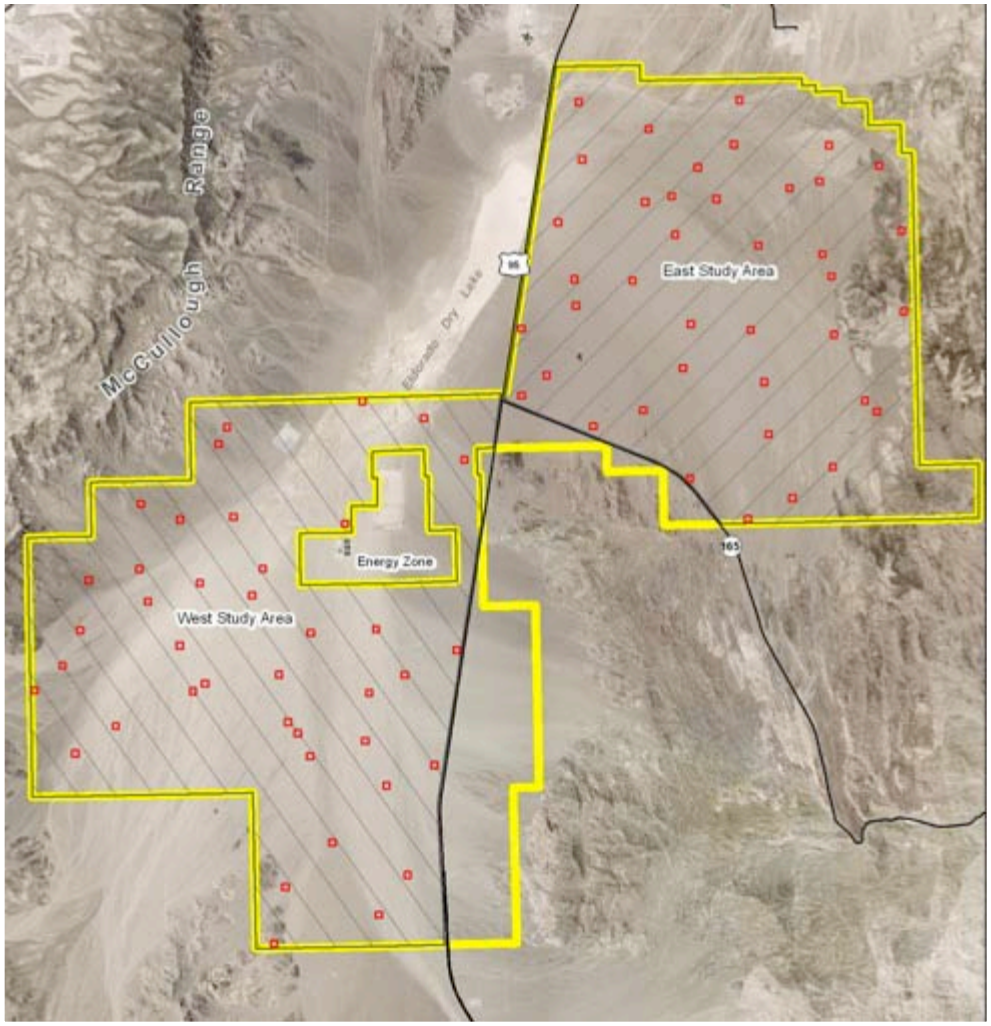
Occupancy Sampling Project

- Method for assessing status and trends
  - Alternative to line distance sampling
  - Potential of greater efficiency and statistical power at smaller scales over shorter timeframes
  - Identified in Revised Recovery Plan
  - 3 to 5 year pilot study
- Values for the BCCE
  - Assess status and trends of desert tortoise
  - Prioritize areas for habitat restoration/enhancement

Occupancy Sampling Project

- Estimates the proportion of habitat that is occupied
  - Presence of desert tortoise (live tortoises and active burrows)
  - Incorporates detectability (multiple visits to plots per season)
- Occurrence is not equivalent to abundance or density
- Probabilistic sampling design to select plots
- Plots allow correlation with other variables

Survey Plots for Occupancy Sampling



- 4 hectare plots
- Each study area has 40 survey plots (80 total)
- Plot placement: GRTS
- Sample size determined:
  - estimate of occupancy
  - detectability
  - number of surveys/year

Occupancy Sampling Project

- Data Collection
  - Plots surveyed 3 times during a season, 100% coverage
  - Sample season and time of day
  - Rotating time of day for each plot in each survey
  - Sign of an active plot
    - Live tortoises and active burrows
  - Other data collected
    - Carcasses, inactive burrows, predators, reptiles
- Analysis: Presence

Covariates Sampling Project

- Understand habitat relationships
- Values
  - Prioritize areas of BCCE for habitat restoration/enhancement
  - Predictive model of tortoise occupancy
    - From field data to remotely sensed data

Covariate Sampling Categories

- Vegetation
- Substrate
- Precipitation
- Disturbance and Habitat Alteration
- Management Action

Vegetation Covariates

- Cover of perennial shrub and succulent vegetation
  - Shade, food resources, burrow locations
- Shade cover of perennial shrub and succulent vegetation
  - Shade, burrow locations
- Ephemeral plant species cover and species richness
  - Food resources

Substrate Covariates

- Soil series and soil suitability for burrows
- Presence of petrocalcic horizon or duripan
  - Restrictive layers
- Total length of washes
  - All related to burrows

Other Covariates

- Precipitation
- Disturbance and Habitat Alteration
  - Distance to and density of linear disturbances
  - Distance to energy production and transmission facility sites
- Management Action
  - Distance to management actions

Covariate Sampling Project

- Data Collection
  - Different method for each covariate
- Analysis
  - Presence (AIC: Akaike's Information Criterion)
  - Random Forests

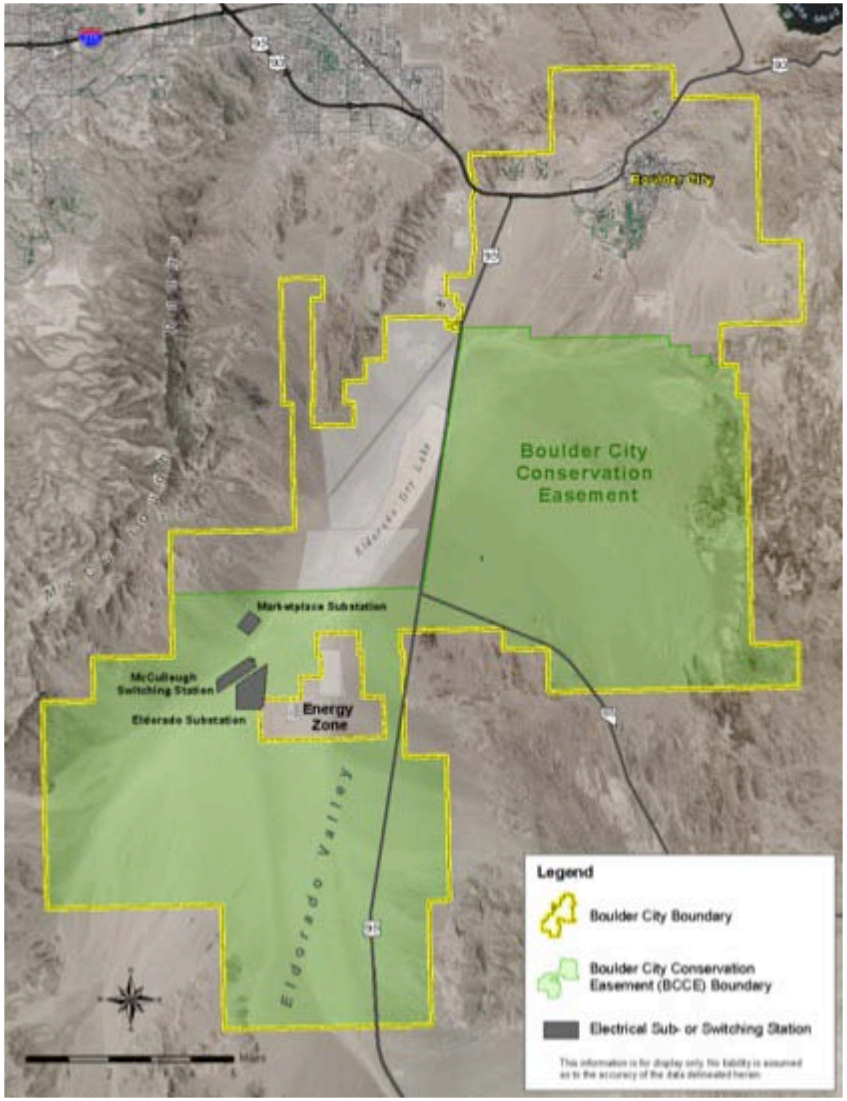
Status

- Occupancy Sampling
  - 2 years of data collection, initial analysis of data
- Covariate Sampling
  - Vegetation – first year of data collection
  - Soils – first assessment of soils
  - Precipitation – data sources
  - Remote Sensing – processing LiDAR and LANDSAT

- Outcomes of the two projects
  - Potential alternative for status and trends
  - Focus habitat restoration and enhancement
  - Greater understanding of habitat relationships
  - Predictive model of tortoise occupancy
    - Protection
    - Translocation

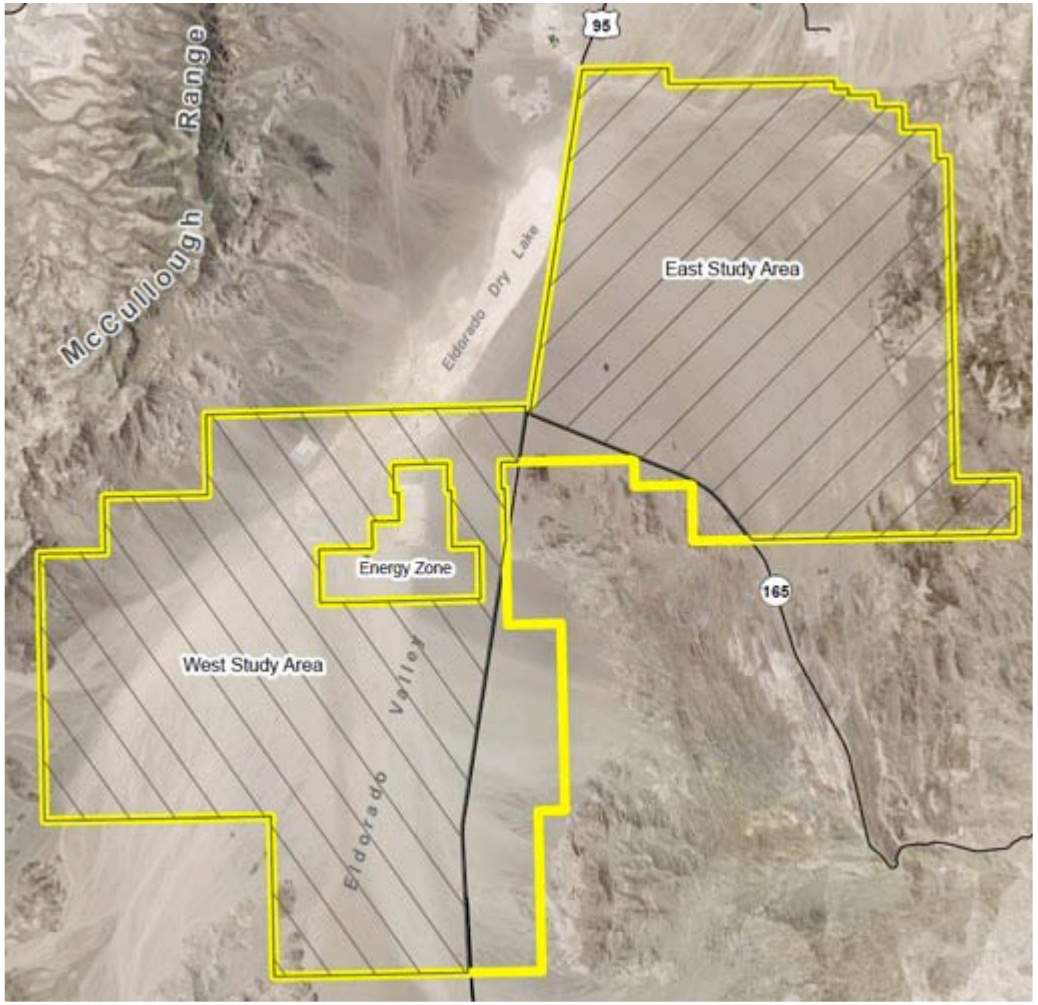
Questions

Project Location



- Boulder City Conservation Easement (BCCE)
  - 86,423 acres
  - Acquired for MSHCP to protect and manage desert tortoise

Study Area



- East Study Area
  - 37,593 acres
- West Study Area
  - 40,937 acres
- Excluded from study
  - Two areas isolated by roads
  - Energy facilities