

# Predator and Prey Dynamics in the Boulder City Conservation Easement

The Ecology and Population Dynamics of Coyotes (*Canis latrans*) and Black-tailed Jackrabbits (*Lepus californicus*) with Implications for the Desert Tortoise.

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# Background

This project was initiated due to concerns about coyote population levels and predation on desert tortoises in the BCCE.

- Esque et al. (2010) suggested that proximity to anthropogenic resources and abundance of prey influenced coyote predation of desert tortoises.
- Coyote density known to be correlated with abundance of black-tailed jackrabbits.
- Is coyote predation on desert tortoise inversely related to abundance of black-tailed jackrabbits?
- No estimates of abundance, density, or habitat use, available for coyotes or black-tailed jackrabbits in the Mojave Desert.



# Objectives

Major objective: To assess predator/prey interactions of coyotes and black-tailed jackrabbits and their impact on desert tortoise on the BCCE.

Ecological study of coyote and black-tailed jackrabbit predator/prey interactions

- Assess demographics: abundance, density, reproductive rates, mortality
- Determine habitat use patterns, food habits, home ranges, and movements and whether/how they are affected by anthropogenic subsidization.

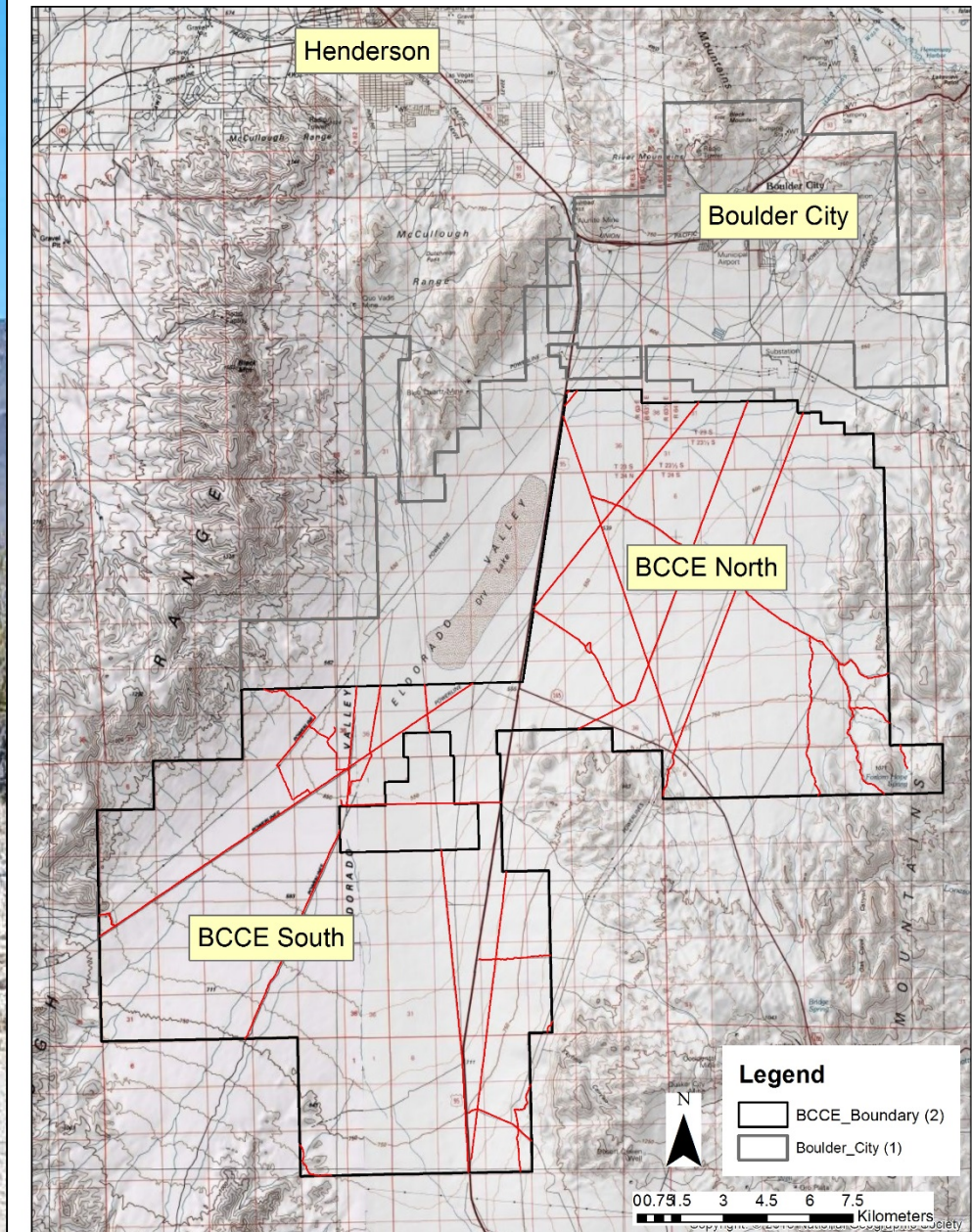
➤ A synthesis of simultaneously monitored coyote, black-tailed jackrabbit, and translocated desert tortoise population dynamics in the BCCE to inform management decisions regarding predators and interactions with translocated desert tortoise. (Collaborative)

Assess methods to obtain reliable estimates for continued, cost effective, monitoring of predator and prey populations in the BCCE and southern Nevada.

# Study Site

## The Boulder City Conservation Easement (BCCE)

- ~86,500 acres in the Eldorado Valley south of Boulder City, Nevada.
  - ~39,114 acres in the North BCCE.
  - ~47,424 acres in the South BCCE.
- Established in 1995 as partial mitigation for the take of desert tortoise and its habitat.
- Currently managed under the Multiple Species Habitat Conservation Plan (MSHCP)



# Methods: Combination of spotlight surveys, camera trap network & GPS/VHF collars

## Black-tailed jackrabbits:

- Spotlight transects,
- Thermal imaging surveys
- Camera traps

## Coyotes:

- Camera bait traps at sites with road-killed lagomorphs and deer as bait to investigate the carnivore and scavenger communities in the BCCE.
- Camera traps in travel corridors to detect movement of coyotes and observe prey abundance.
- Two grids of 20 cameras placed at random points to obtain estimates of seasonal changes in predator (coyote) and prey density.

# Methods: Coyote and black-tailed jackrabbit collars



This Fall we plan to deploy:

8 GPS collars on coyotes  
30 GPS collars on jackrabbits



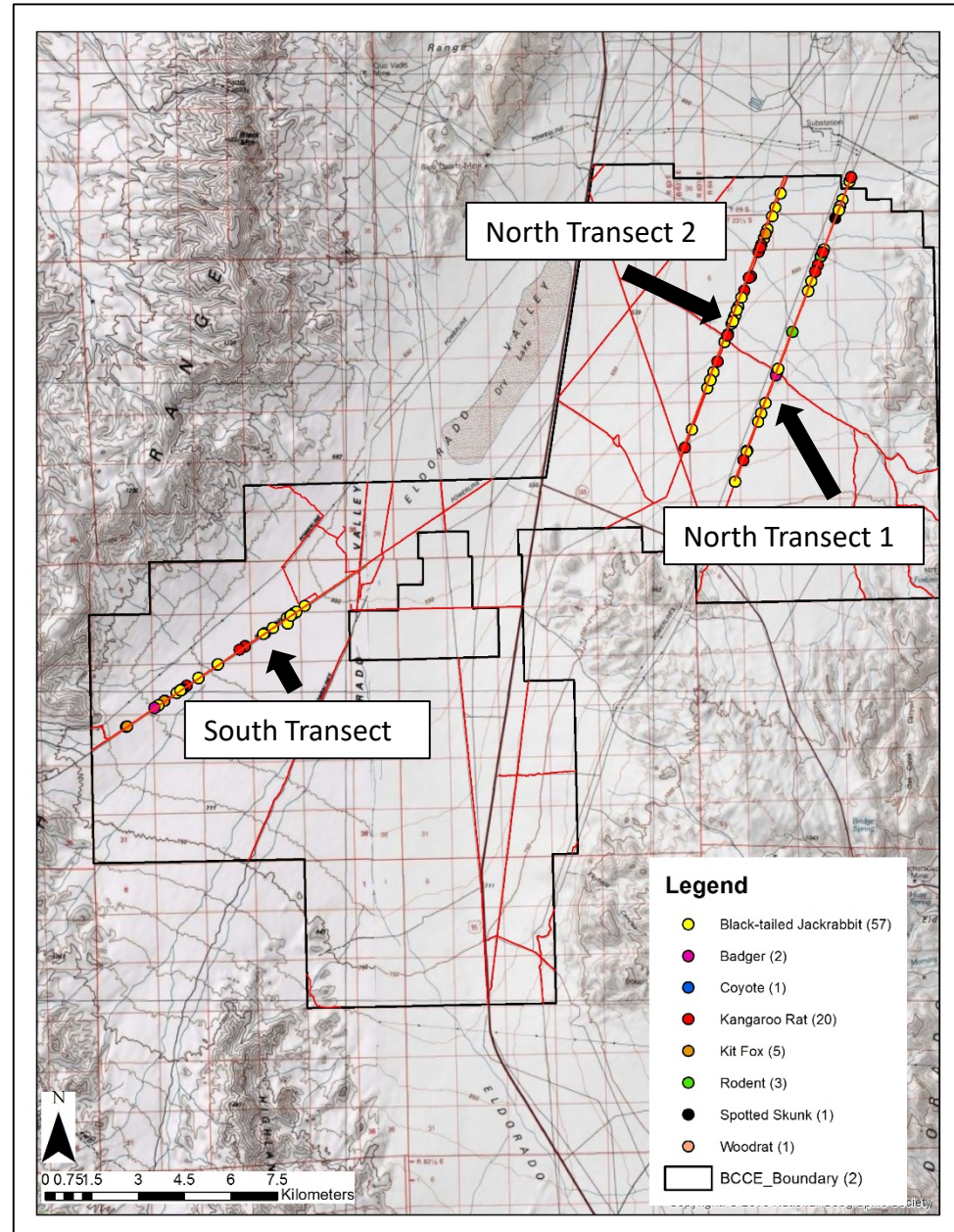
GPS collars will provide location data for:

- Habitat use
- Home ranges
- Movement patterns
- Social structure
- Survivorship
- Food habits

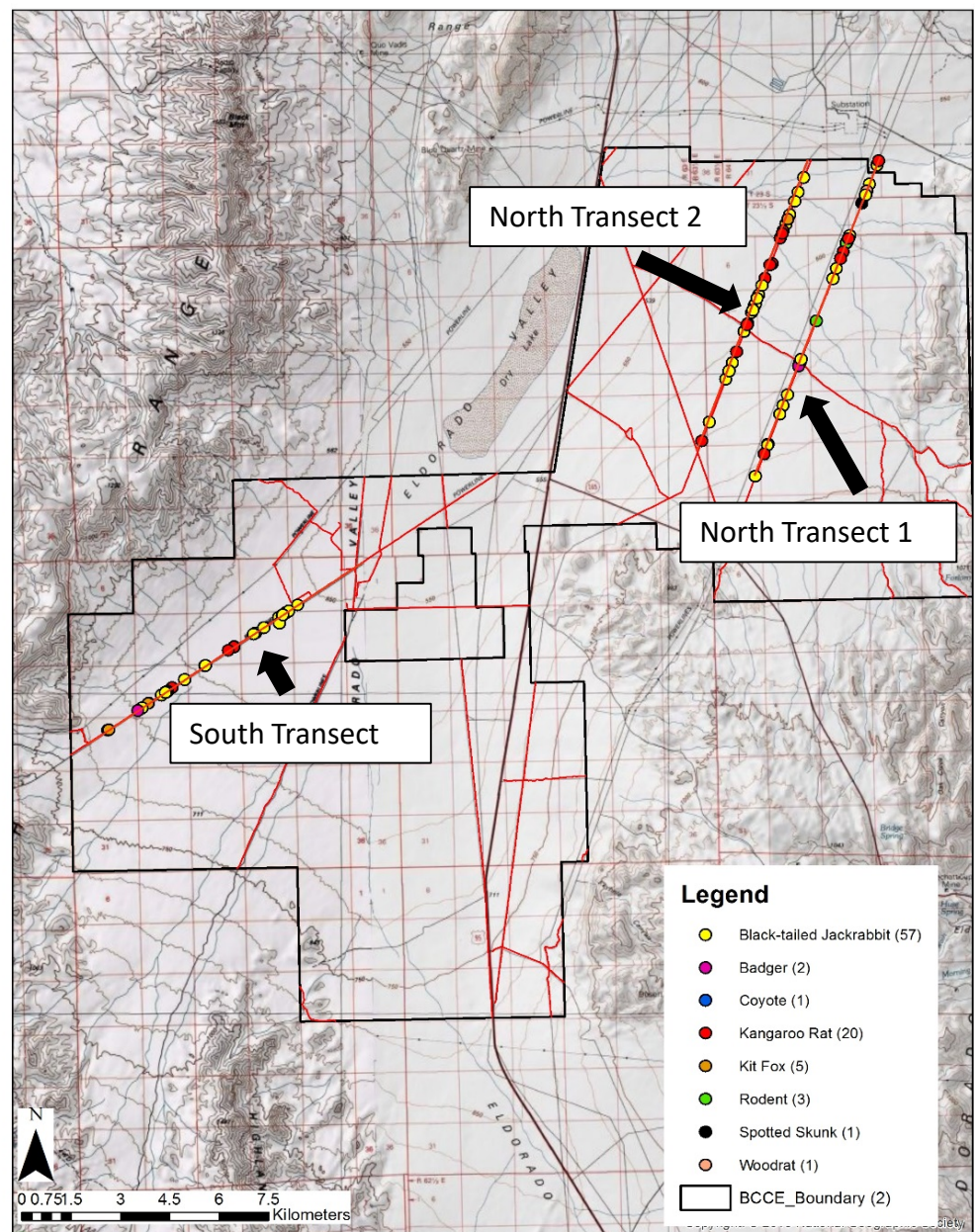


# Preliminary results: Spotlight transect surveys for jackrabbit abundance

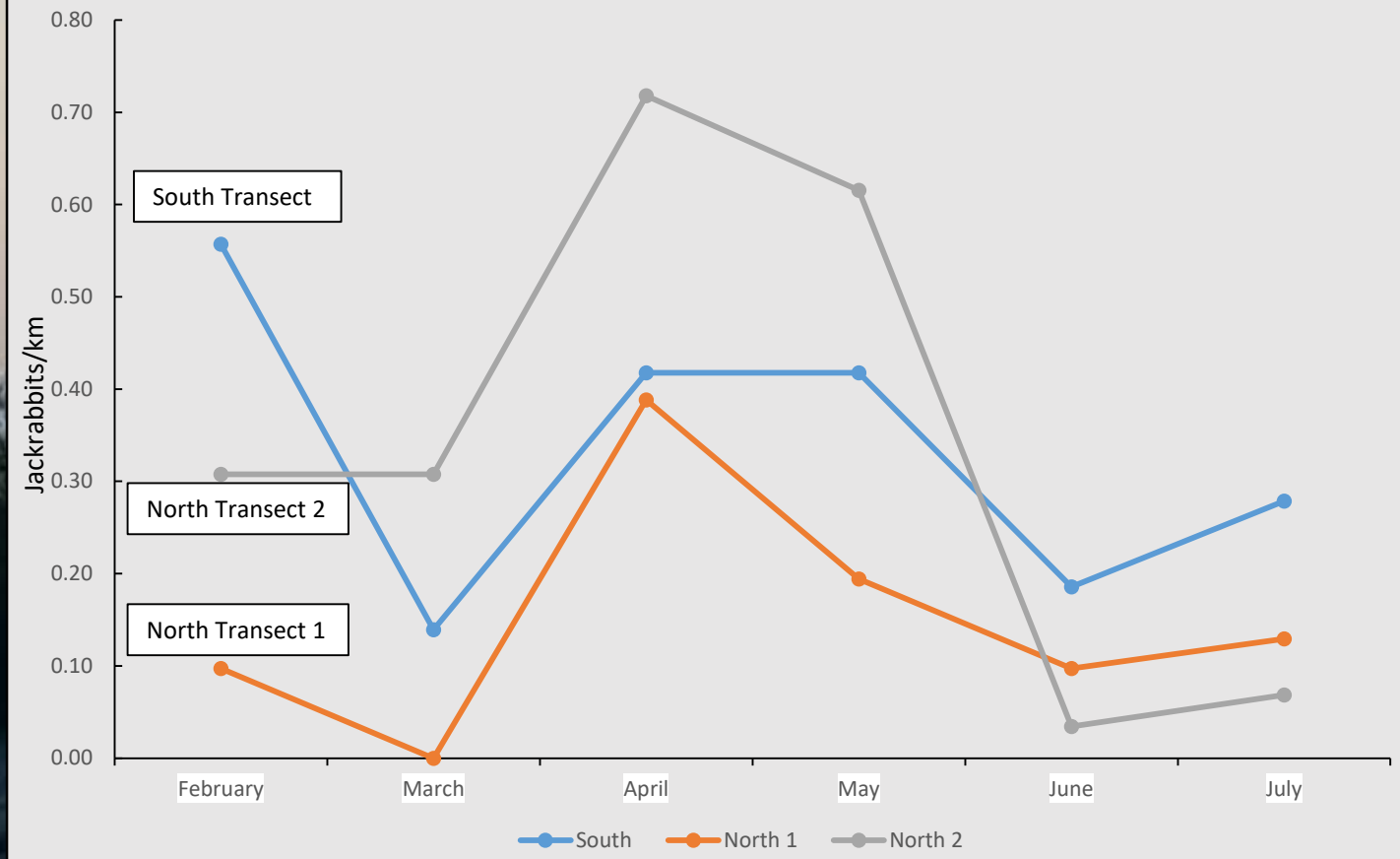
- Spotlight transects initiated in February 2018
- Transects
  - Occur 30 min after sunset
  - No greater than 5 to 7 km/hr.
  - Occur during full moon, calm conditions for consistency in surveys
  - GPS location & perpendicular distance of animals (measured using a laser rangefinder).
- Data to be analyzed using DISTANCE sampling.



# Spotlight transect surveys: some preliminary results



Indices of Jackrabbit Abundance (Jackrabbit/Km/Month)



- An index of monthly change in jackrabbit abundance jackrabbits sighted/km of transect.



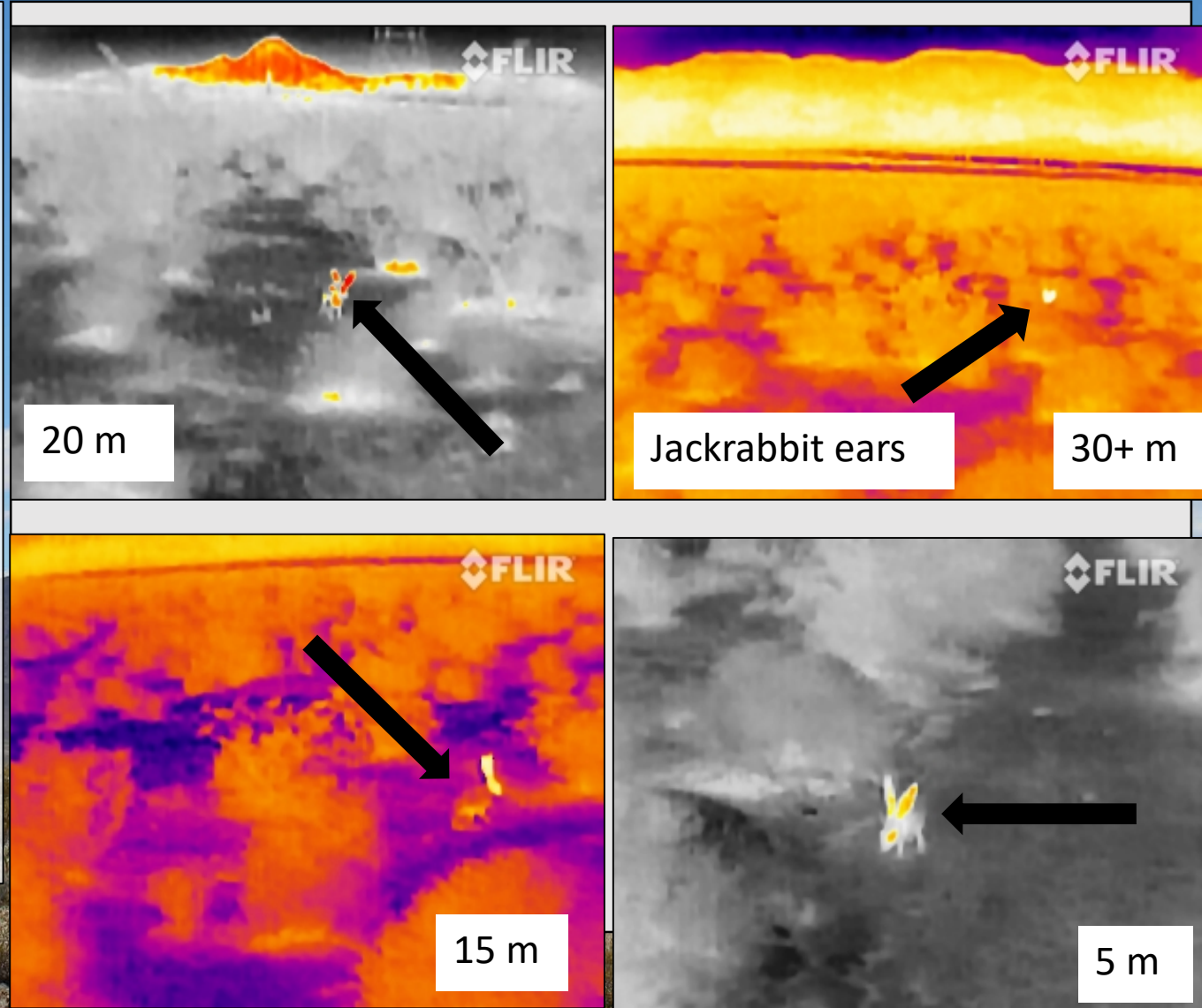
# Thermal imaging surveys

Thermal imaging surveys to survey young jackrabbits.

- Started in May 2018
- Summer heat has postponed surveys until Fall

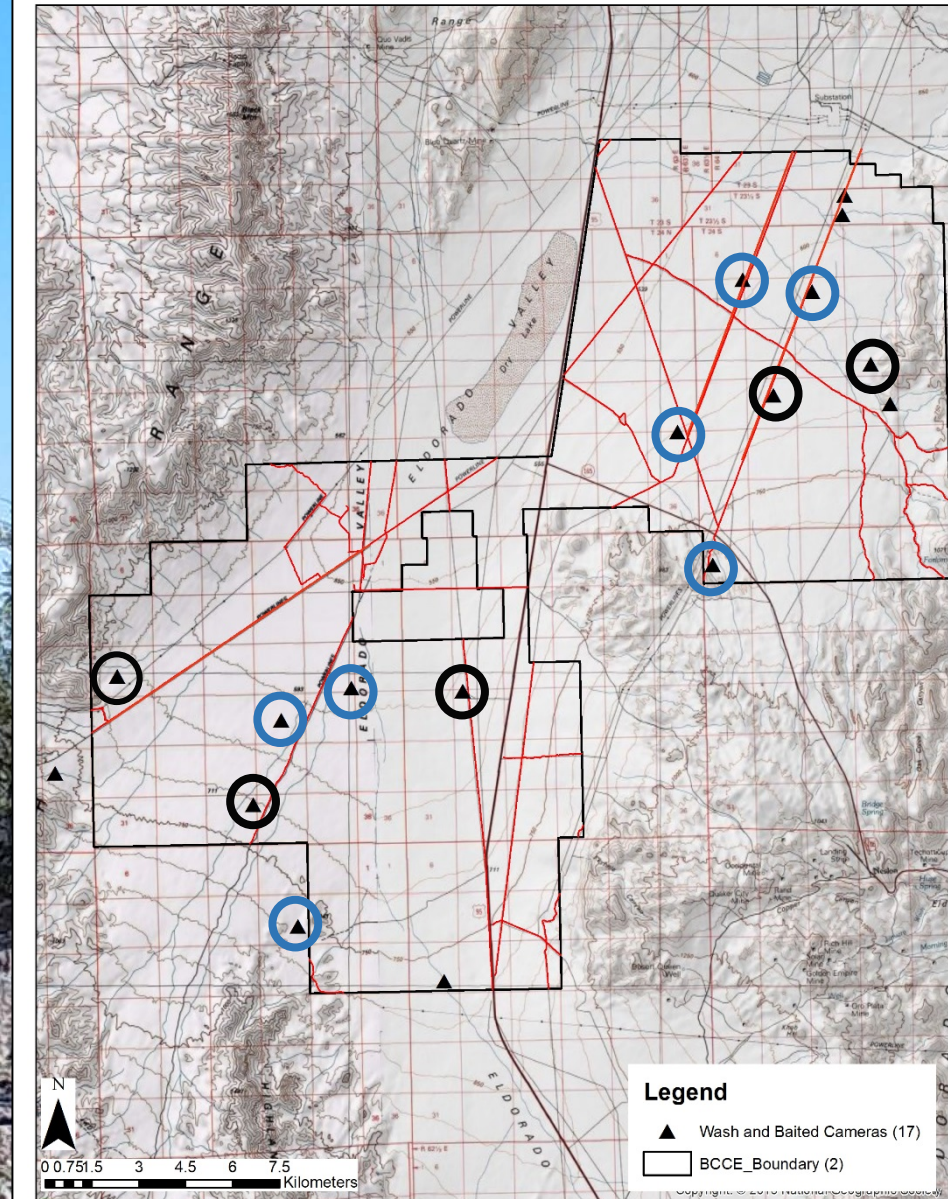
Also tested as a survey method for adult lagomorphs.

- In tests along roads, jackrabbits were clearly visible at distances of up to 20-30 m.

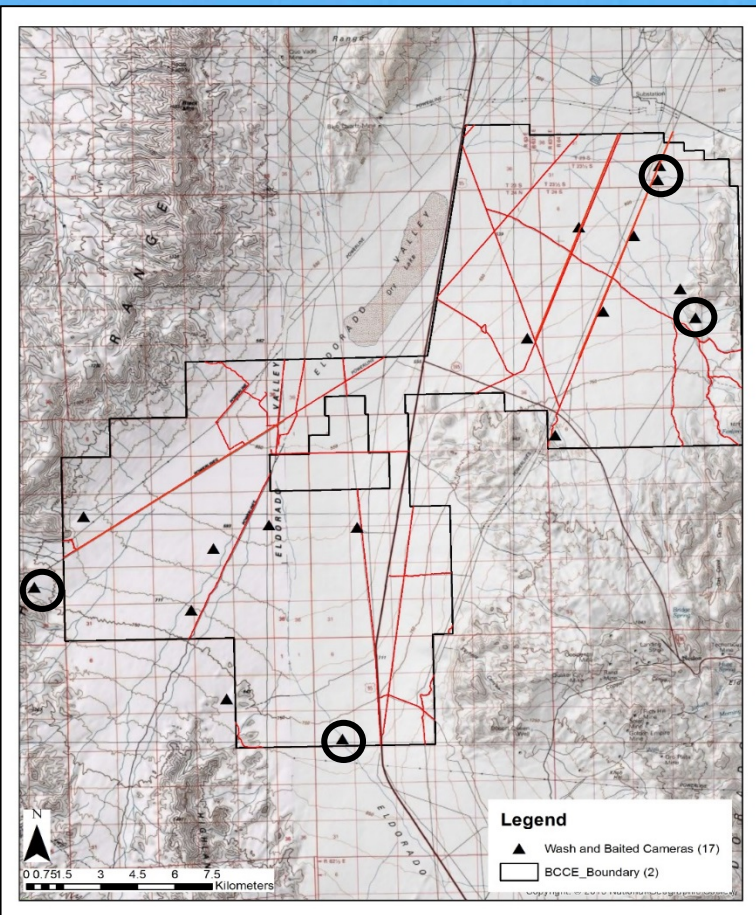


# Camera Bait Traps: Assessing the carnivore/scavenger community

- April to present we've monitored 11 carcasses: 5 deer (black circles) and 6 rabbits (blue circles).
- Turkey vultures were the first and most common visitors to carcasses throughout the BCCE.
- Coyotes (potentially 3-5 individuals) sporadically visited 4 of the 11 carcasses.
- Other predators observed: common raven, kit fox, badgers & antelope ground squirrels.



# Camera traps in washes

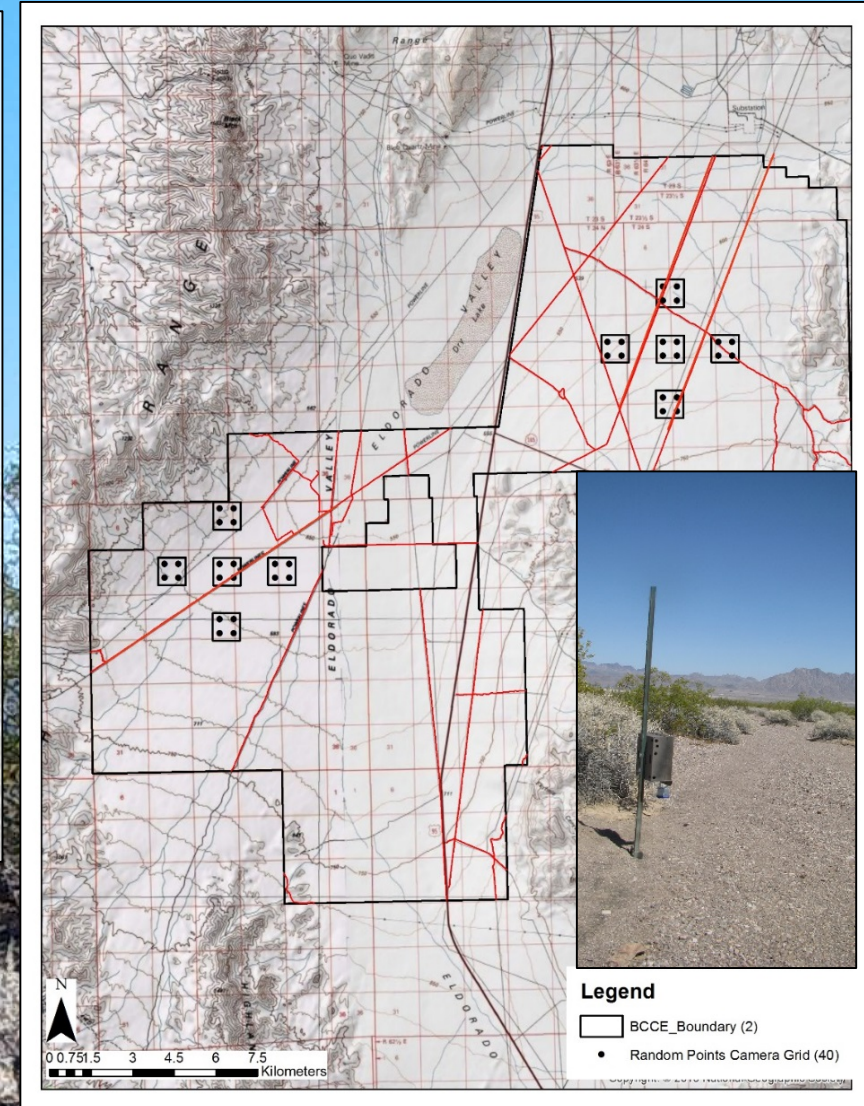


- Five cameras placed in washes to observe predator movement corridors (Circled in Map) in late June 2018.
  - Coyotes were detected 6 times, at 2 of the 5 locations.
  - Jackrabbits were detected 39 times, at 4 of 5 cameras
- Other species seen include badgers, kit foxes, and desert cottontail.
- Future plans call for adjusting current camera placements and adding more cameras.



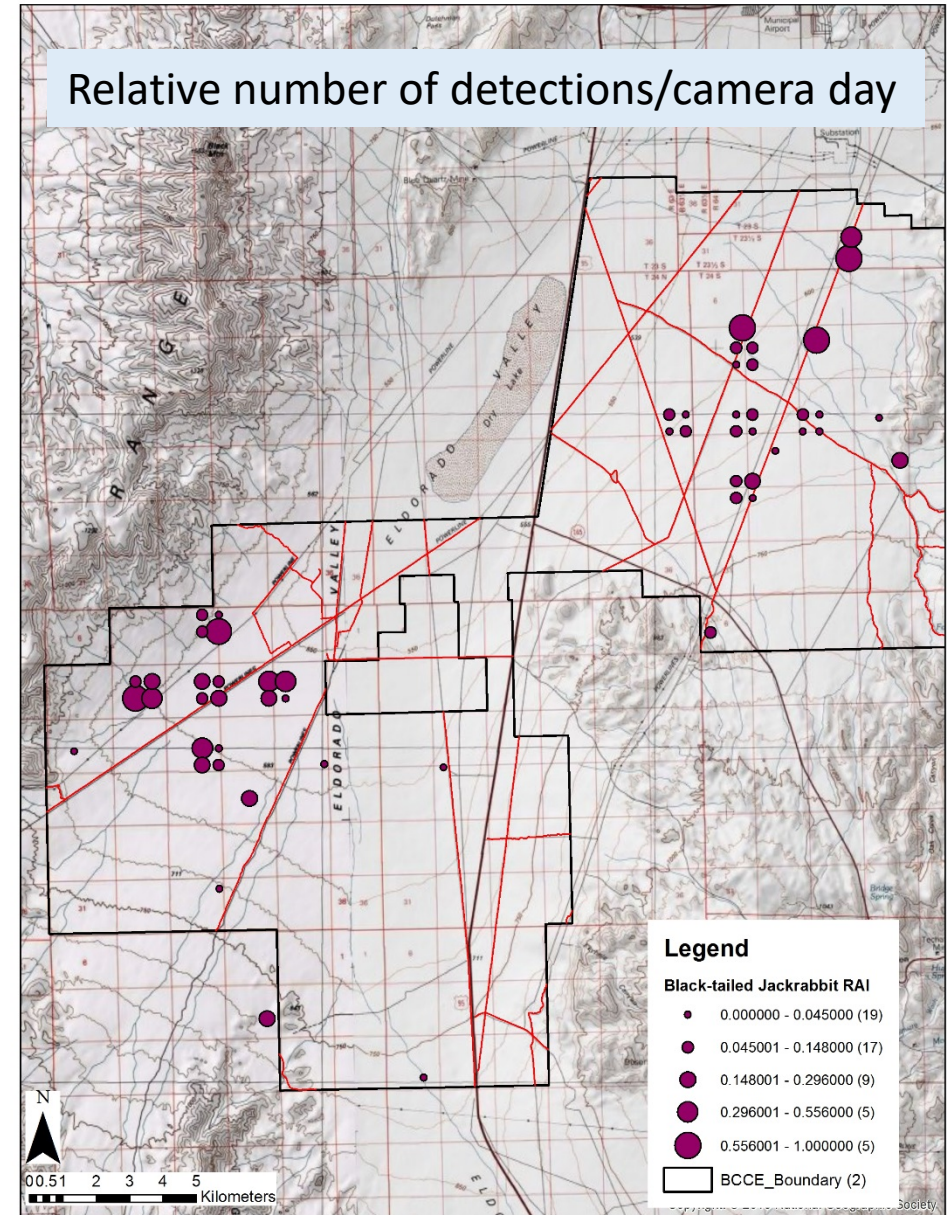
# Camera Trap Surveys: random grid observations

- Grid of 40 cameras in North and South BCCE at random points on landscape.
  - Cameras placed in late June.
- During July:
  - Jackrabbits observed 153 times.
  - Kit fox observed 24 times.
  - Coyotes observed 2 times, once in North BCCE, and once in South.
- 24 additional species also recorded
  - Badgers, kangaroo rats, ground squirrels, and many bird and lizard species.



# Camera Trap Surveys: Relative abundance of jackrabbits

- Using all camera data we can look at jackrabbit relative abundance across the BCCE for July.
- Relative abundance index (RAI): total # of animal detections/ total camera days.



# Camera Trap Surveys: Overview of species observed in the BCCE

- Total of 27 species observed at cameras in washes, at carcasses, and in the random grid.
  - 9 at cameras in washes
  - 12 at cameras at carcasses
  - 24 at cameras in random grids
- Only four of 27 species were observed at all three types of camera settings i.e. cameras in washes, at carcasses, and in random grids.



# Only the first stage of this study

- Camera work will continue throughout the next year:
  - Bait traps to evaluate the community of scavengers & predators present in the BCCE.
  - Random grids to provide estimates of seasonal changes predator & prey abundance. (Add more grids)
  - Expanding the number of cameras in washes to observe coyote populations.
- Thermal imaging surveys are planned following the arrival of cooler temperatures.
- This Fall, we will capture and collar coyotes and jackrabbits.



# Acknowledgments & Questions

- Thanks to Scott Cambrin, Kimberley Jenkins, and all the folks at the Clark County DCP.
- USGS technicians who helped with Spotlight Transects this spring: Jordan Swart, Amanda McDonald, Greg Olsen.
- Ben Nolan, our technician on the project for the USGS.

Any Questions?

## Literature Cited:

Esque, T. C., K. E. Nussear, K. K. Drake, A. D. Walde, K. H. Berry, R. C. Averill-Murray, A. P. Woodman, W. I. Boarman, P. A. Medica, J. Mack, and J. S. Heaton. 2010. Effects of subsidized predators, resources variability, and human population density on desert tortoise populations in the Mojave Desert, USA. *Endangered Species Research* 12: 167-177.