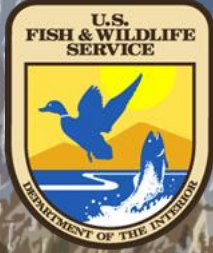


Desert Tortoise Range-wide Monitoring Update

Corey Mitchell

U.S. Fish and Wildlife Service - Desert Tortoise Recovery Office



Management Oversight Group
October 3, 2024

Presentation Outline



Monitoring program background



Tortoise population trends



Recent line-distance surveys



Demographic plots

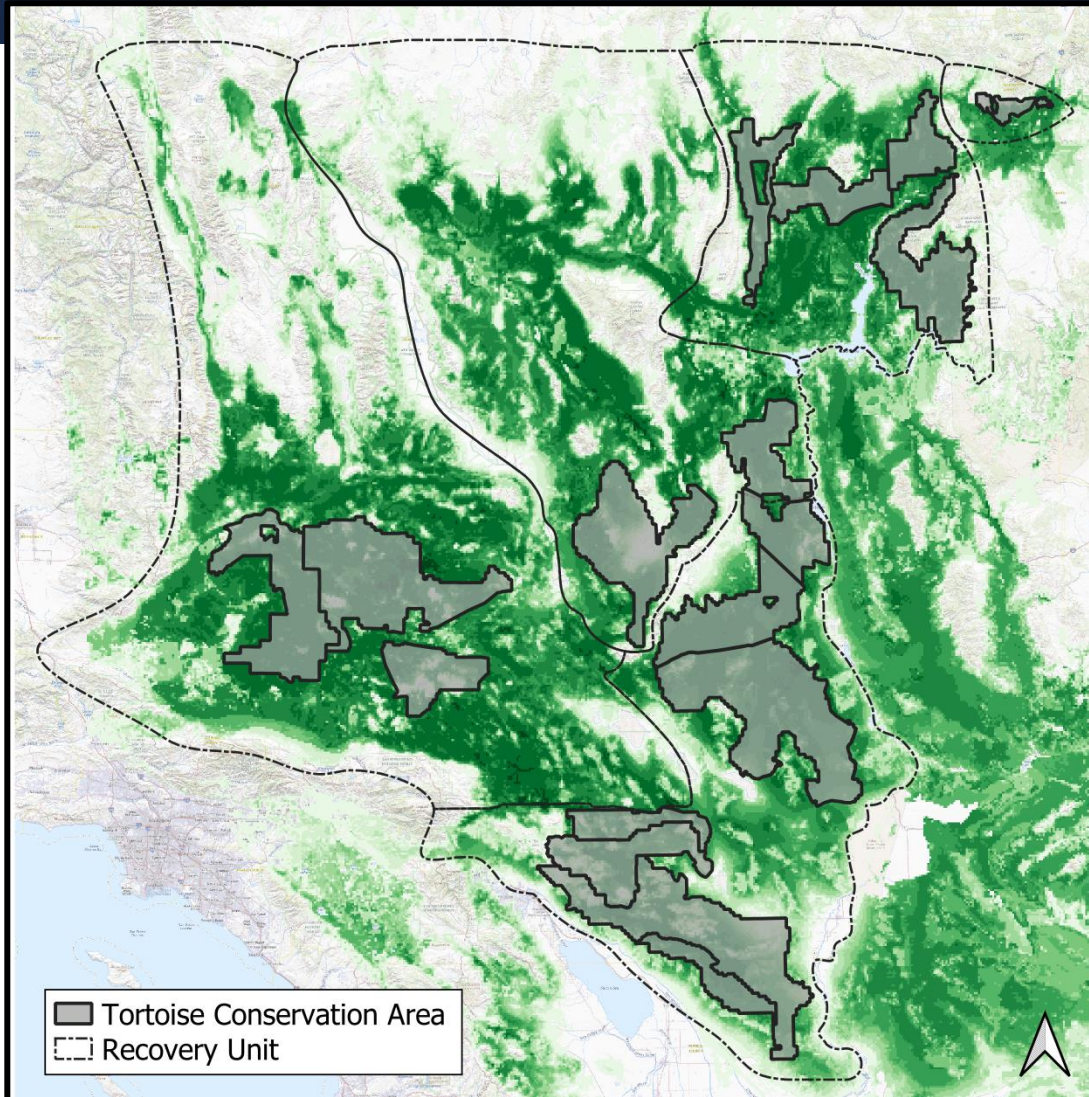


Conclusions





Range-wide Monitoring Program



- Challenged with trying to understand **tortoise density & vital rates** across the range
- **17 Tortoise Conservation Areas** of over **7.1 million acres** across 4 states
- Cryptic fossorial animals with spatial aggregations which makes monitoring complex

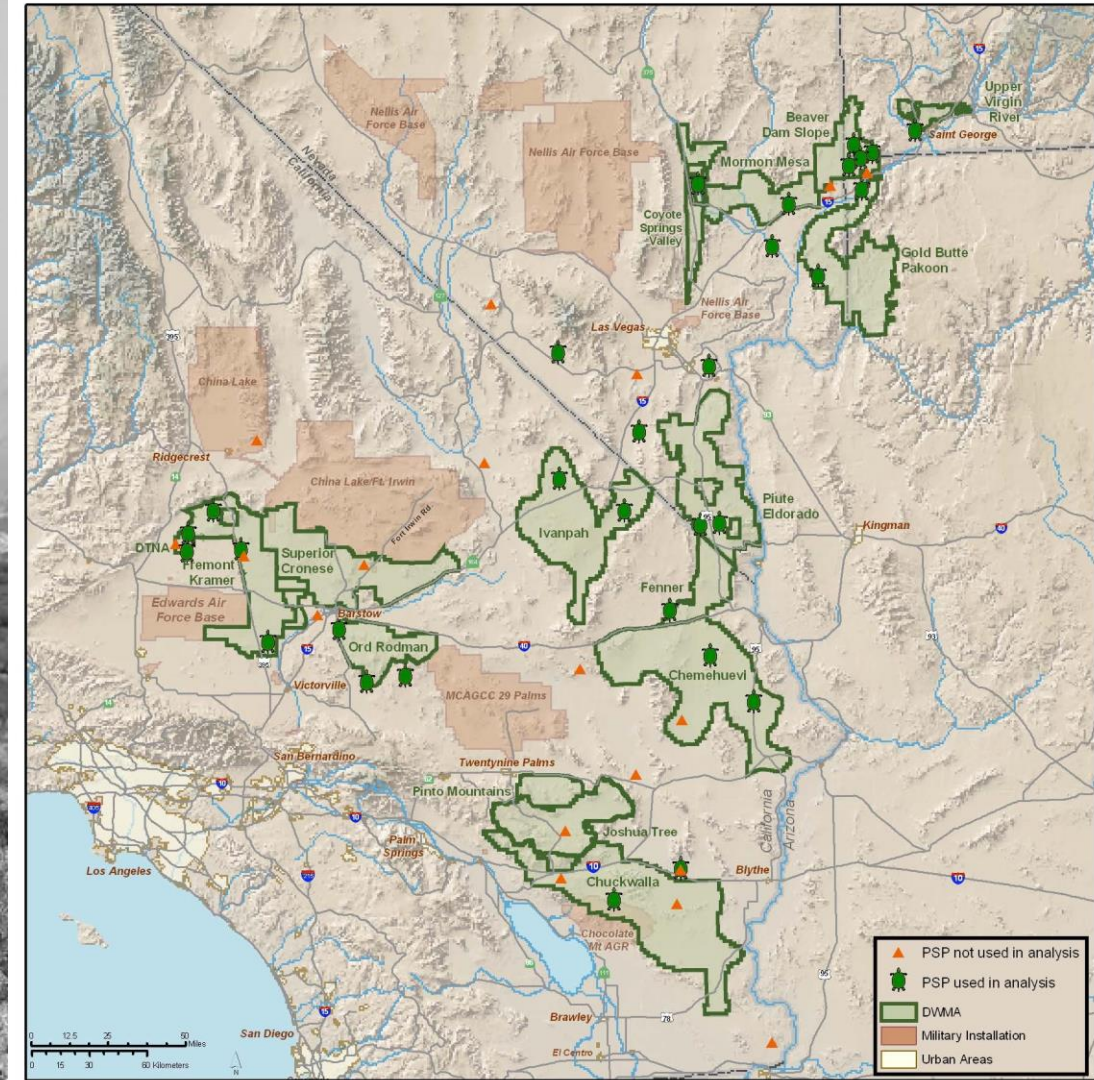


History of Tortoise Monitoring



Tortoise populations monitored with:

- Long-term study plots throughout the range
- Line distance sampling in Tortoise Conservation Areas beginning in early 2000's
- Both are necessary to meet recovery goals





Tortoise Monitoring Methods



Line Distance Surveys:

- Focused on detecting adults
- Juveniles not reliably detected
- Vital rate data lacking
- Broad, landscape scale estimates

Plot Based Demographic Surveys:

- All age classes detected and recaptured
- Vital rates
- Fine-scale estimates

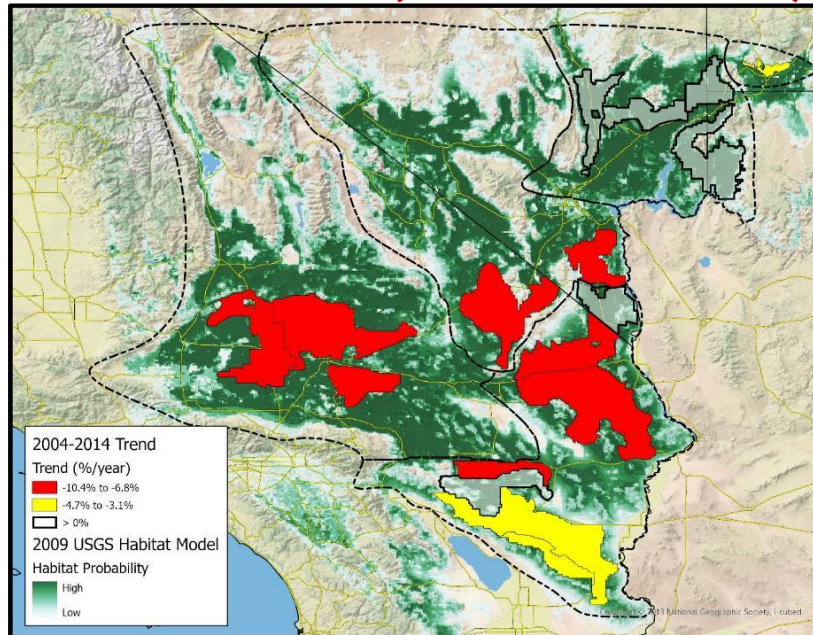




Tortoise Population Trends

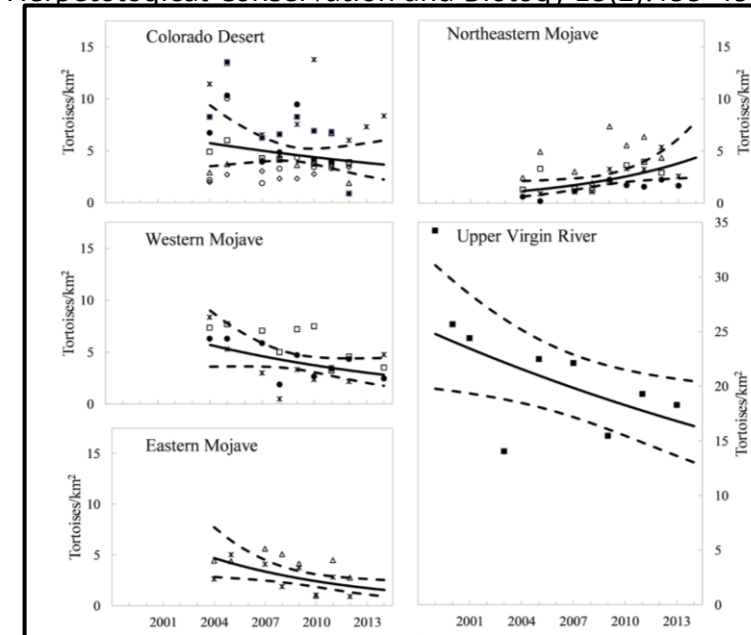


2004 – 2014 Trend (net decline of 37%)



Allison and McLuckie 2018

Herpetological Conservation and Biology 13(2):433-452.



**Negative population trends in most TCAs (11/17)
for Mojave Desert Tortoises**



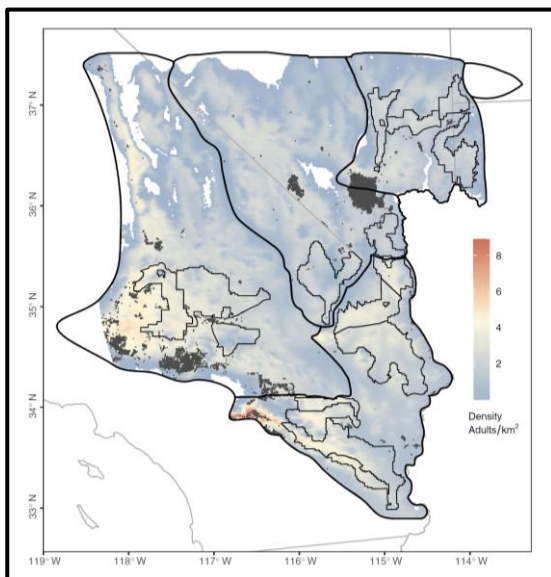
Spatial Variation in Tortoise Density



2001 – 2020 Trend

Zylstra et al. 2023

Ecosphere 14:e4448



- Density varied geographically
- Adult density declined ~1.8% per year with **steepest declines in West Mojave**, losing an estimated **129,000 adults (36%)** across range between 2001 and 2020.

TABLE 5 Predicted abundance (with associated standard error in parentheses) of adult Mojave desert tortoises in 2001 and 2020, and the difference between the two years, in modeled areas of four recovery units.

Recovery unit	2001		2020		Difference in abundance
	Area (km ²)	Abundance	Area (km ²)	Abundance	
Colorado Desert	30,815	75,918 (12,458)	30,723	62,820 (9862)	−12,782 (17,774)
Eastern Mojave	39,778	53,564 (10,784)	39,567	48,692 (9886)	−5081 (16,925)
Northeastern Mojave	19,537	24,322 (4991)	19,437	25,255 (5593)	1124 (8508)
Western Mojave	50,623	206,540 (35,443)	50,444	94,433 (16,737)	−112,020 (42,490)
Total	140,753	362,290 (41,513)	140,171	234,197 (25,106)	−129,380 (50,692)

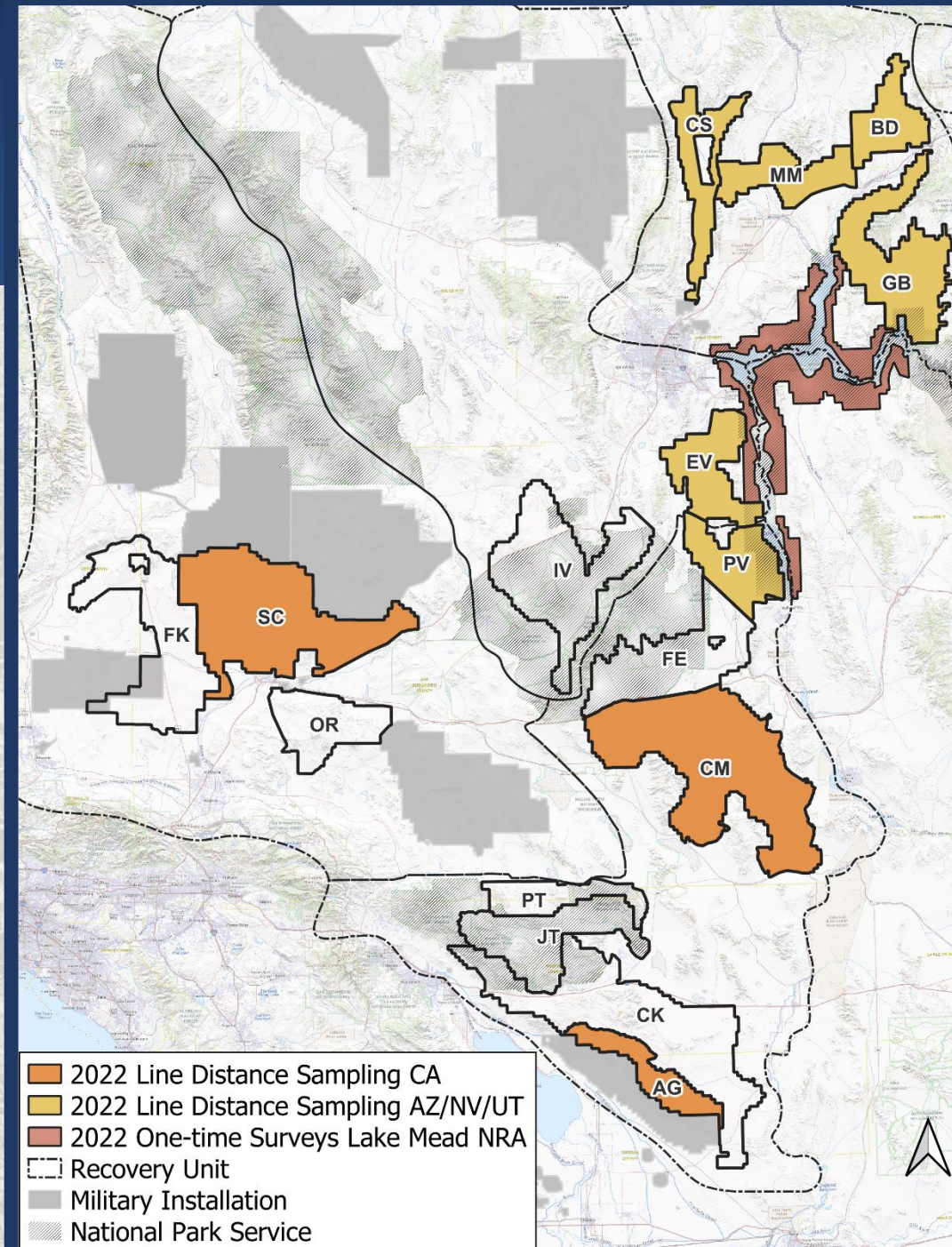


Recent Density Estimates

2022 Density Estimates

Adult Tortoise Density (/km²)

Recovery Unit/ Stratum		Density	Lower 95%	Upper 95%	CV(D)
Western Mojave					
Superior-Cronese	SC	2.2	1.4	3.4	22.97
Colorado Desert					
Chocolate Mtn north	AGN	7.4	4.0	13.6	31.79
Chocolate Mtn south	AGS	2.1	0.8	5.4	50.14
Chocolate Mtn	AG	4.2	2.4	7.3	28.84
Chemehuevi	CM	4.5	2.9	7.0	22.97
Piute Valley	PV	3.1	1.4	7.1	43.94
Northeastern Mojave					
Beaver Dam Slope	BD	2.8	1.3	6.4	43.29
Coyote Springs	CS	4.5	2.1	9.5	39.27
Gold Butte-Pakoon	GB	2.6	1.3	5.5	38.88
Mormon Mesa	MM	2.6	1.1	6.0	45.61
Eastern Mojave					
Eldorado Valley	EV	2.9	1.5	5.8	36.44





Recent Density Estimates

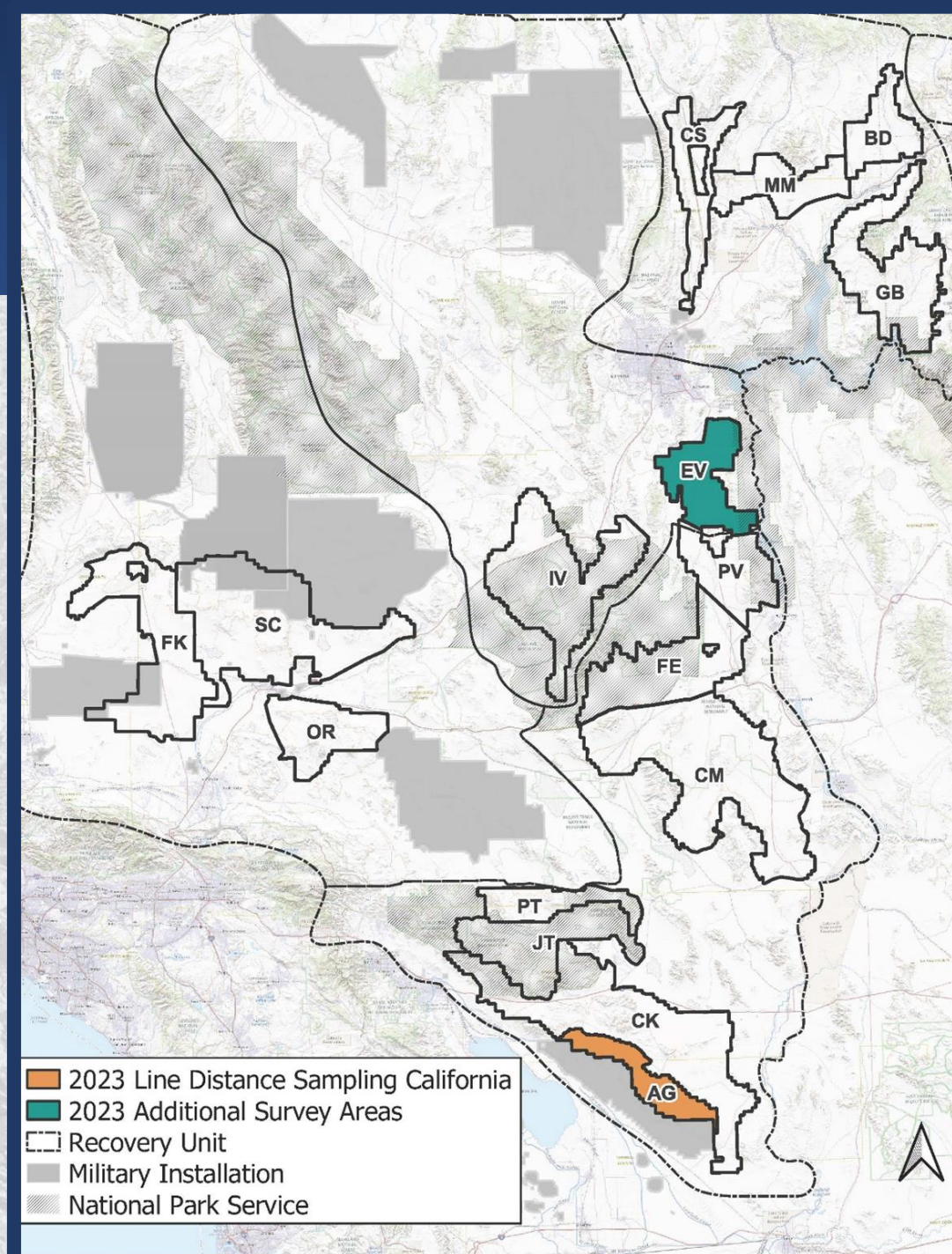
2023 Density Estimates

Line Distance Sampling

- Chocolate Mountain AGR, CA

Additional Surveys

- Eldorado Valley, NV





Recent Density Estimates

2024 Density Estimates

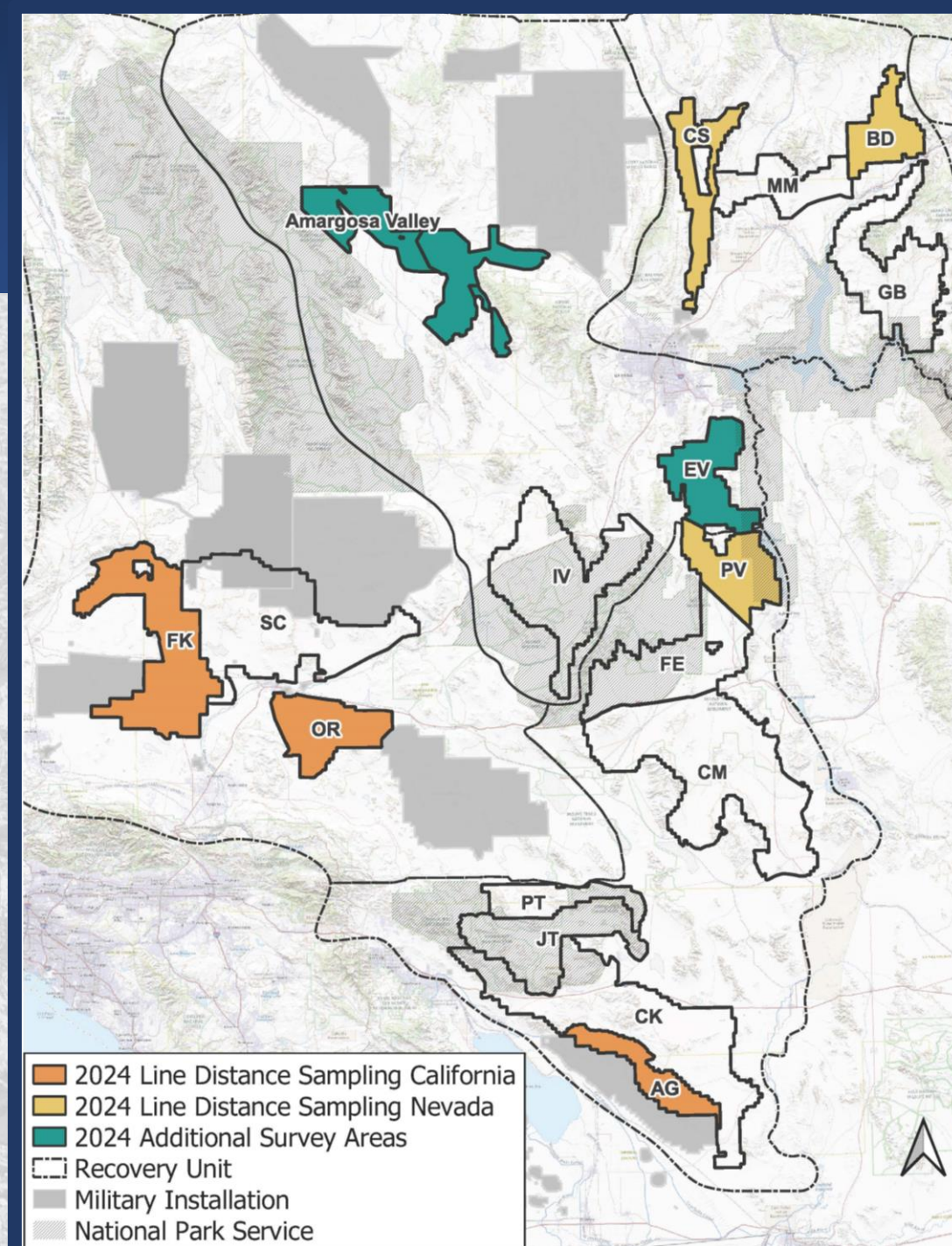
Line Distance Sampling

- Chocolate Mountain AGR, CA
- Fremont-Kramer, CA
- Ord-Rodman, CA
- Beaver-Dam Slope, AZ/NV/UT
- Coyote Springs, NV
- Piute Valley, NV

Additional Surveys

- Eldorado Valley, NV
- Amargosa Valley, NV

Results expected Jan 2025





Recent Density Estimates

2025 Density Estimates

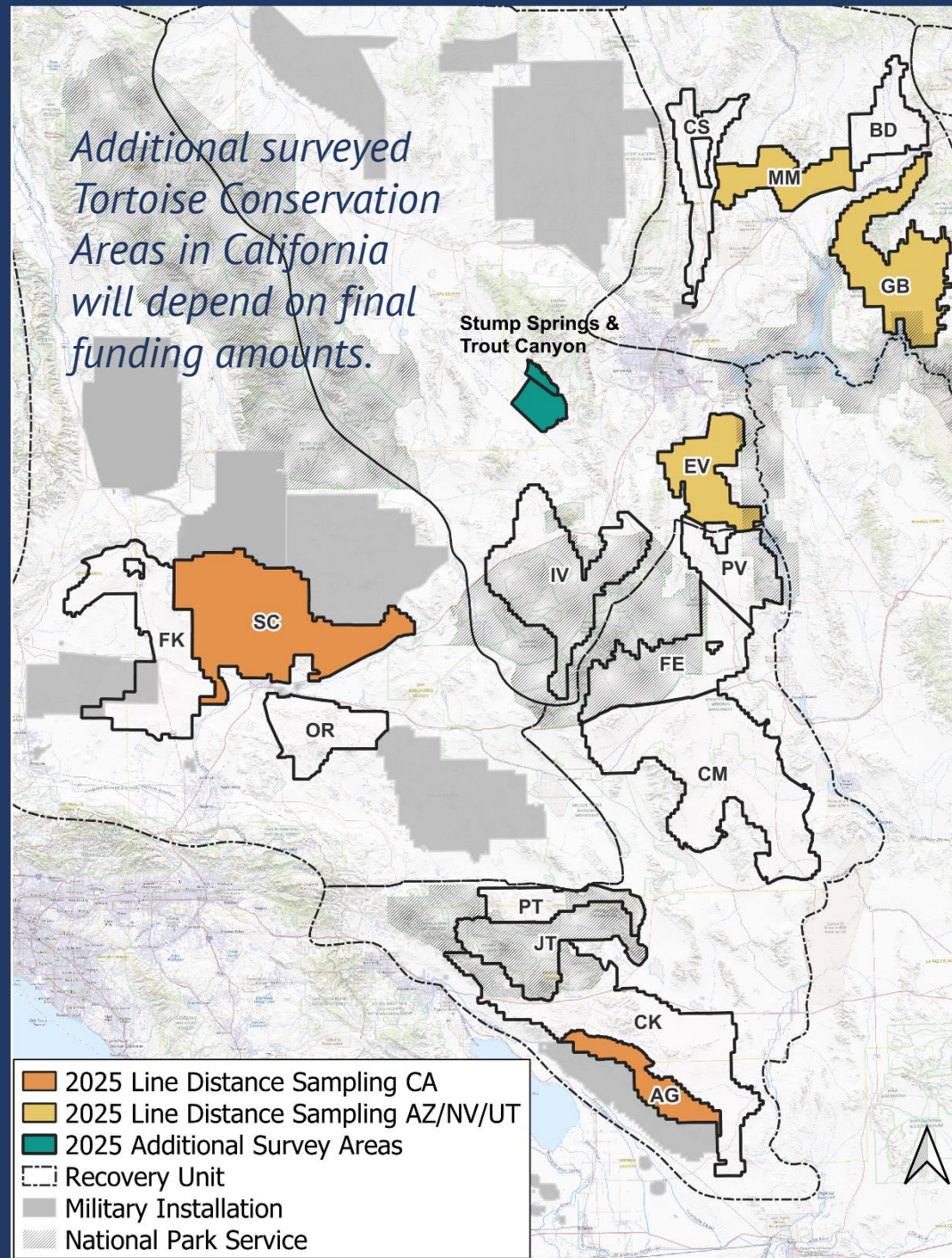
Planned Line Distance Sampling

- Chocolate Mountain AGR, CA
- Superior-Cronese, CA
- Eldorado Valley, NV
- Mormon Mesa, NV
- Gold Butte-Pakoon, AZ/NV

Select areas in California have not been surveyed in approximately 3-4 years due to funding shortages.

Additional Surveys

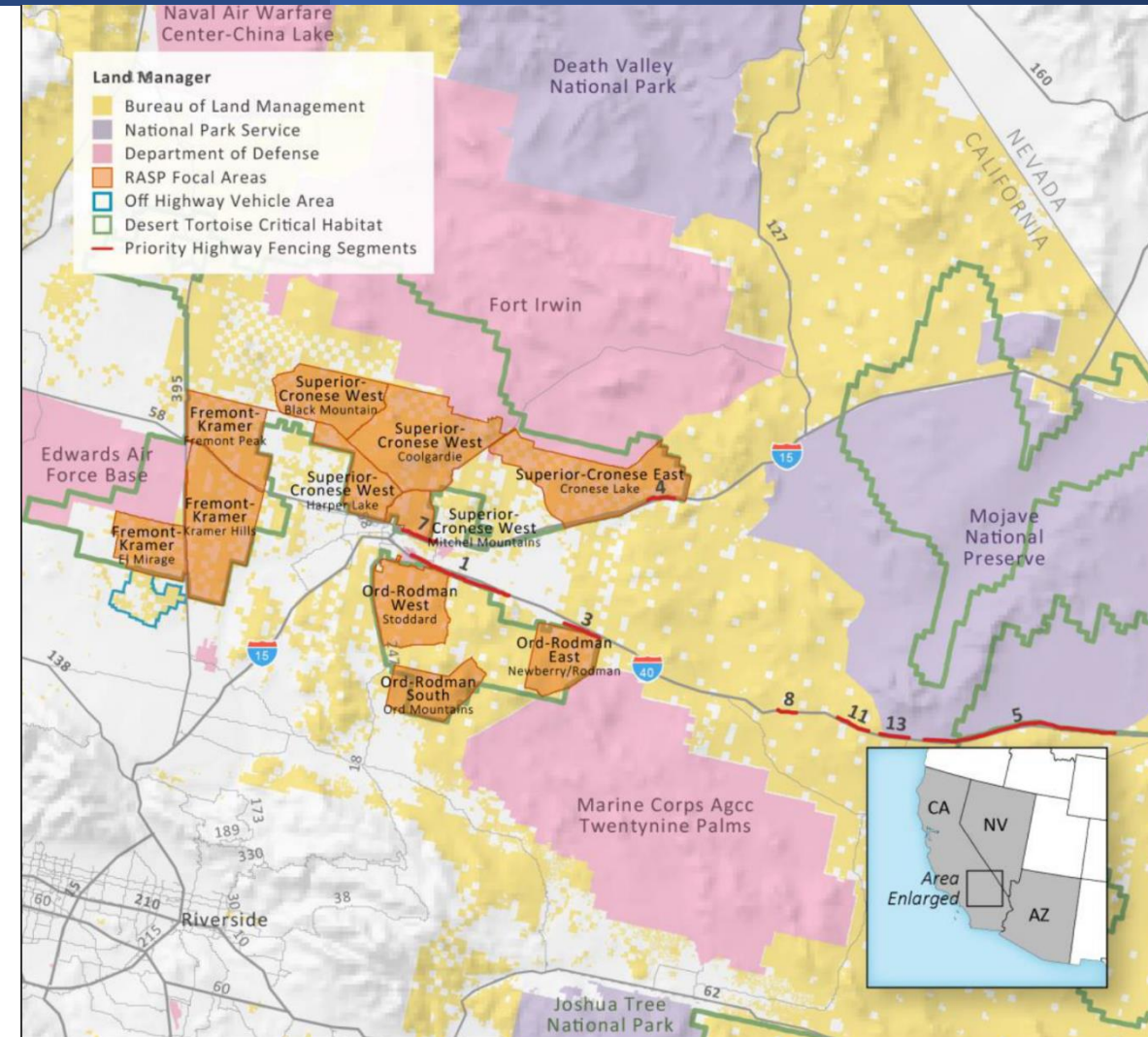
- Stump Springs & Trout Canyon, NV





Six demographic plots established in RASP focal areas in the Western Mojave Recovery Unit

- Superior-Cronese West & Ord-Rodman West (2023)
- Superior-Cronese East & Fremont-Kramer Fremont Peak (2024)
- Ord-Rodman East & Fremont-Kramer Kramer Hills (2025)



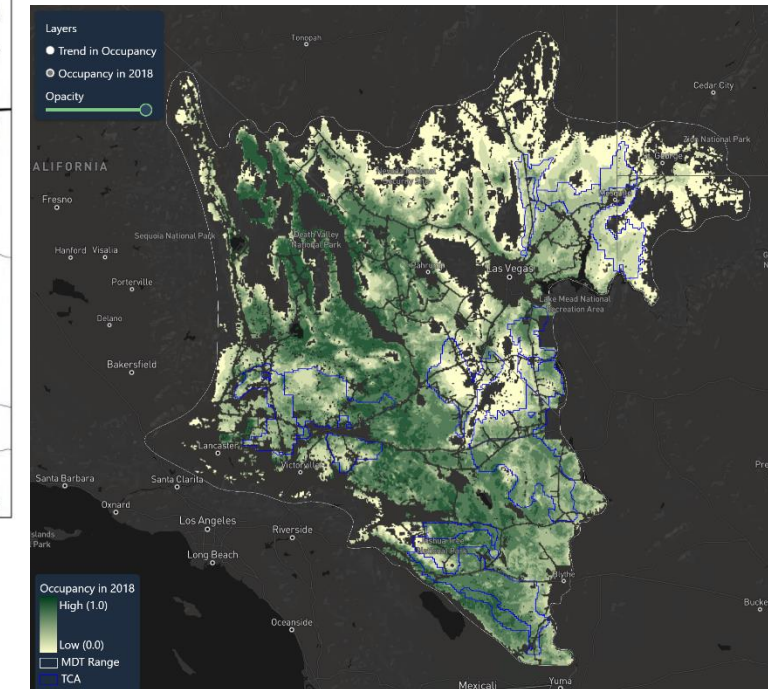
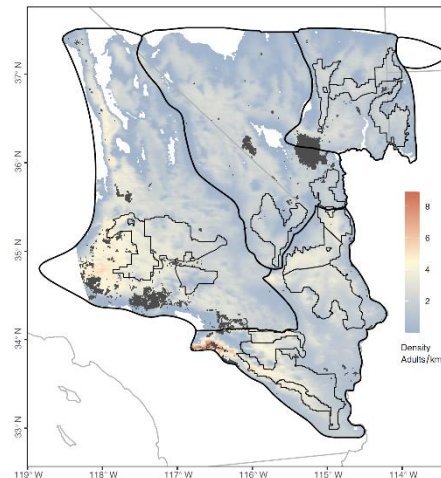
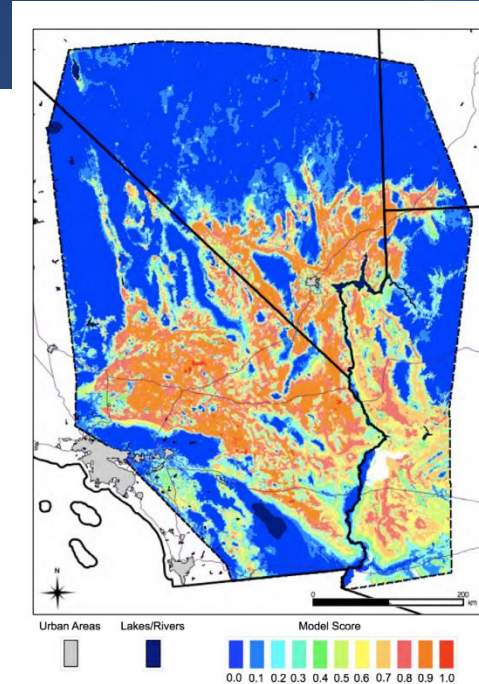


Plot Selection

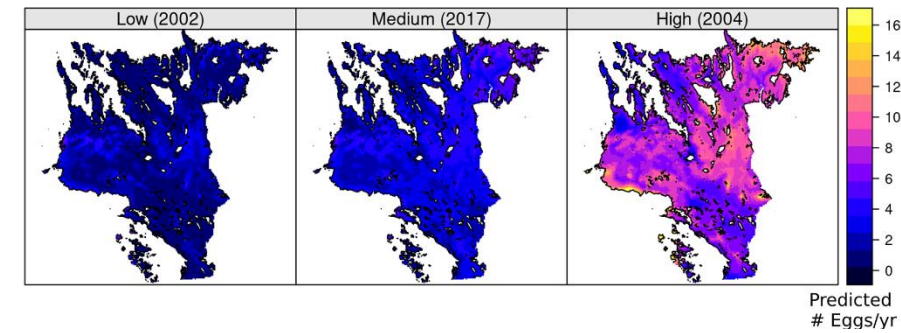


Plot locations selected based on:

- Habitat suitability - Nussear et al. 2009
- Density - Zylstra et al. 2023
- Occupancy – Kissel et al. 2023
- Egg potential – Mitchell et al. 2021
- Land ownership
- Distance to roads



Egg Potential Range





W. Mojave Plot Selection



1 sq km plots -

stratified random sampling

2023

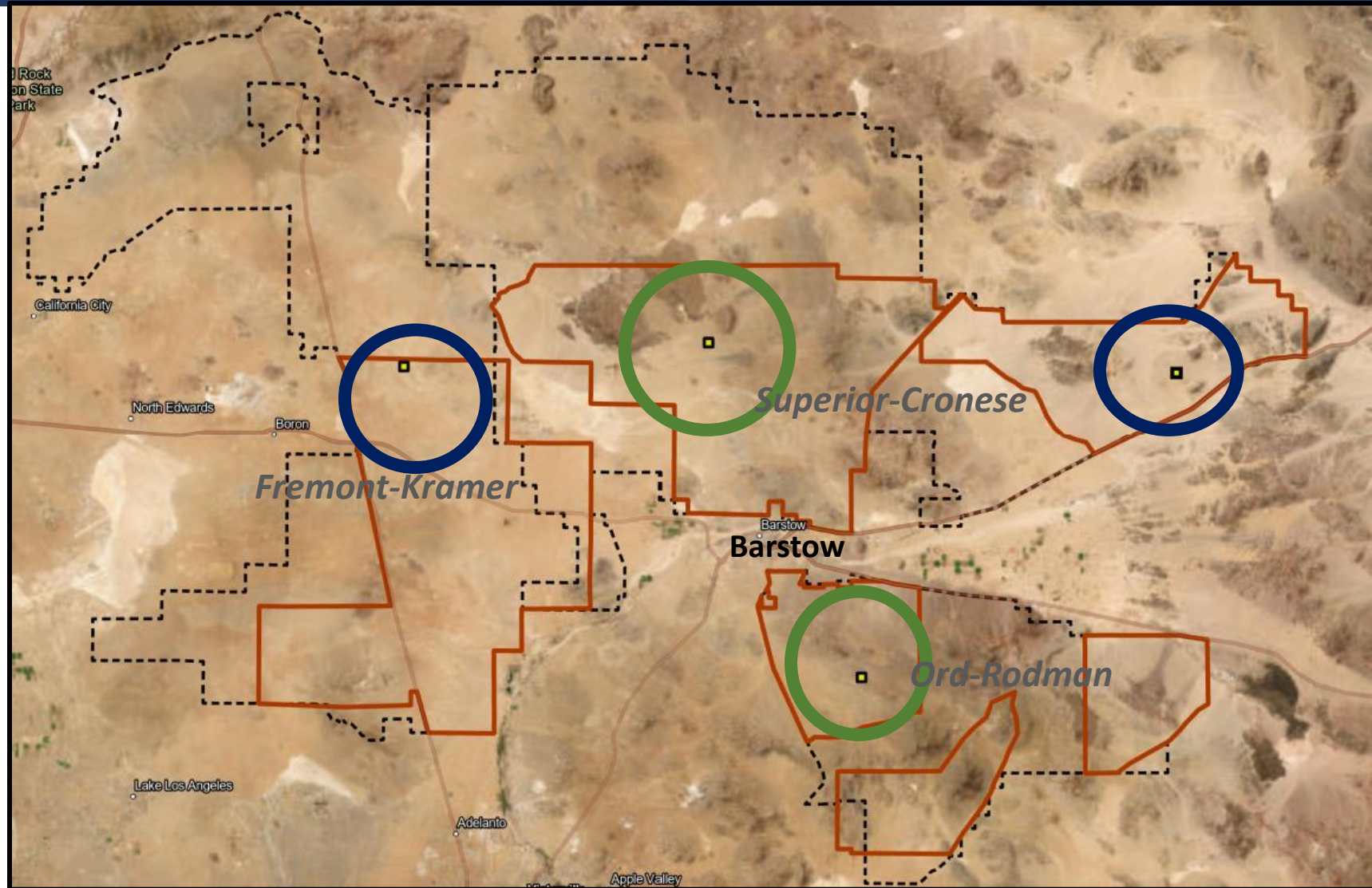
Superior-Cronese West

Ord-Rodman West

2024

Superior-Cronese East

Fremont-Kramer Fremont Peak

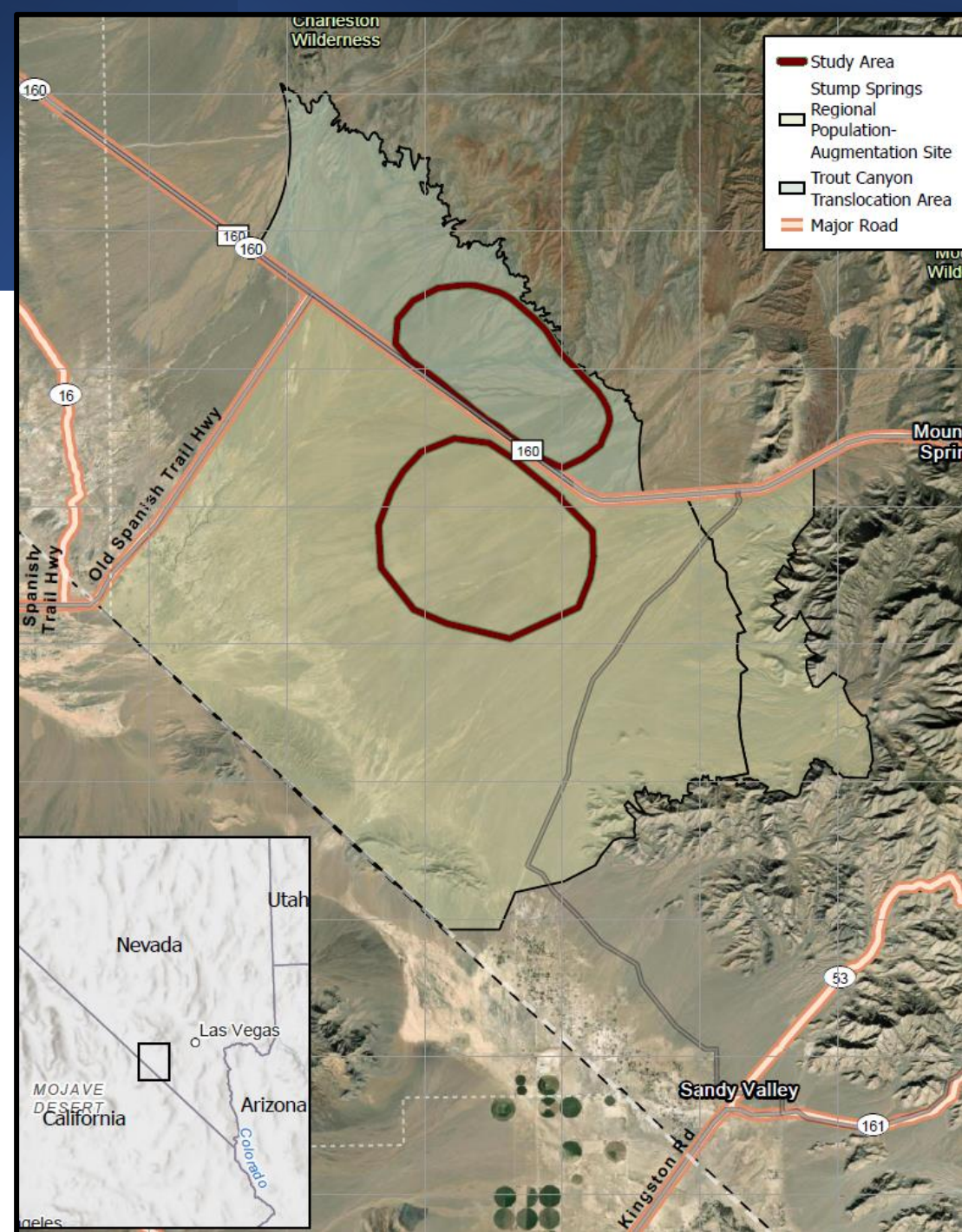




E. Mojave Plot Selection

Additional plots established in the Eastern Mojave Recovery Unit:

- **Stump Springs** Regional Population-Augmentation Site
- Greater **Trout Canyon** Translocation Area
- Post translocation monitoring outlined in the 2022 Translocation Plan for the Stump Springs Regional Augmentation Site





2023 Mark-Recapture Results



Preliminary Results:

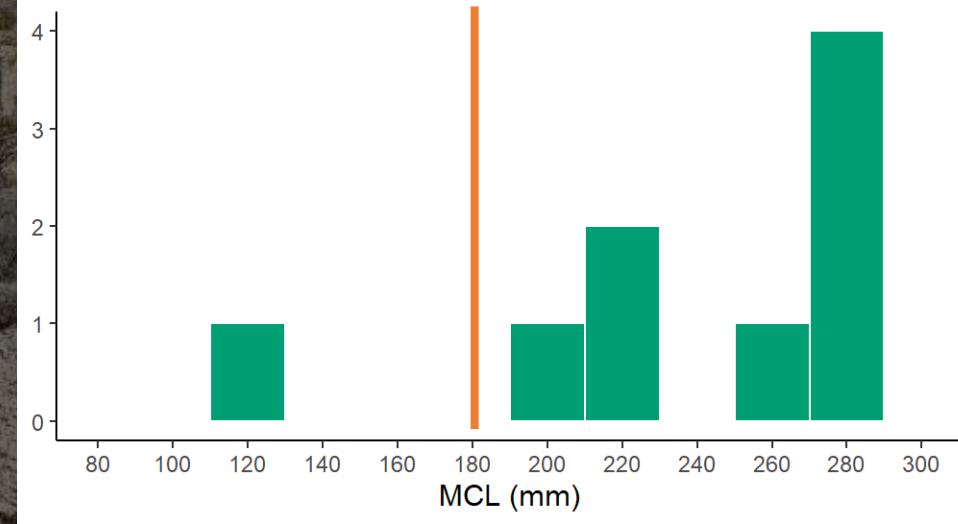
Superior-Cronese West

- 9 tortoises (8 Adults: 1 Juvenile)
- 122-289 mm MCL

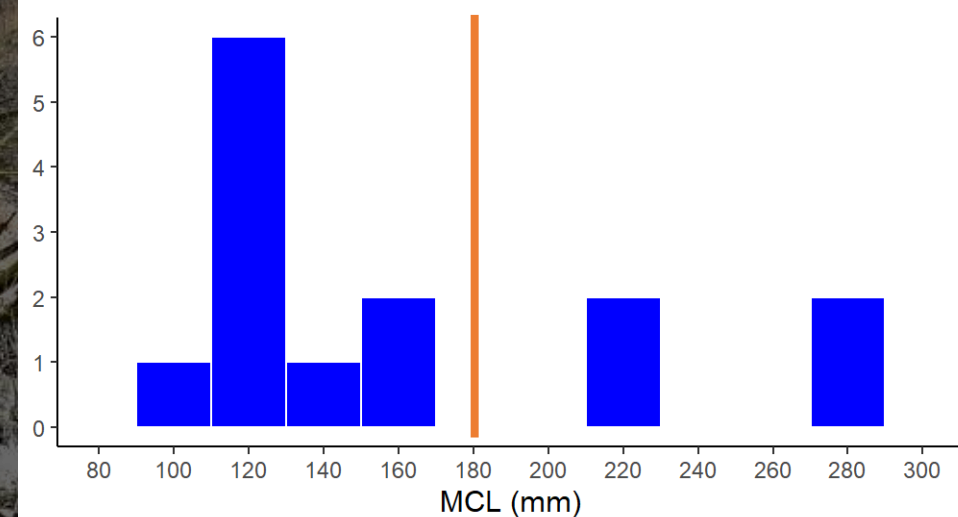
Ord-Rodman West

- 14 tortoises (4 Adults: 10 Juveniles)
- 95-290 mm MCL

Superior-Cronese West Plot



Ord-Rodman West Plot

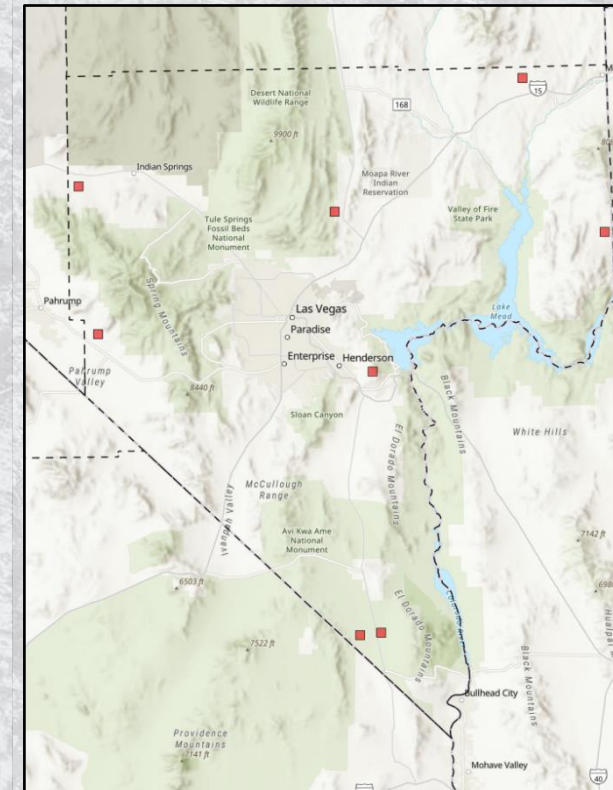
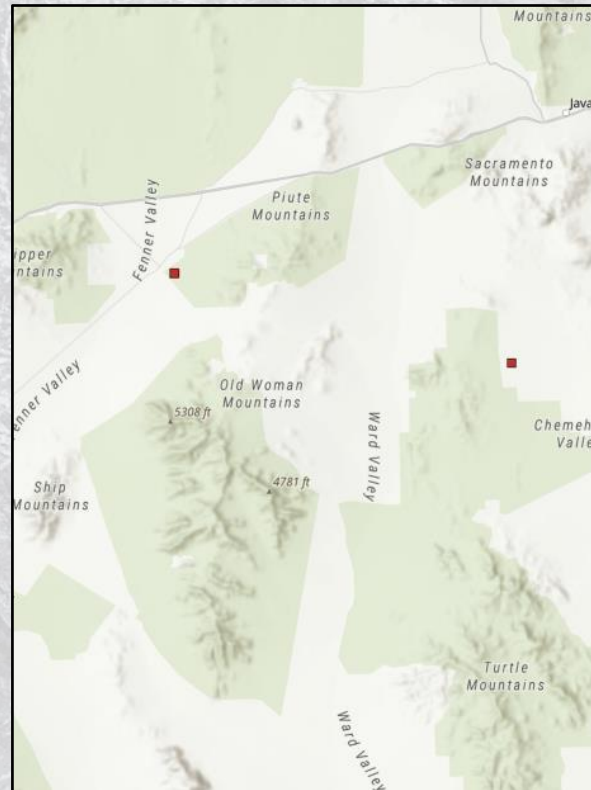
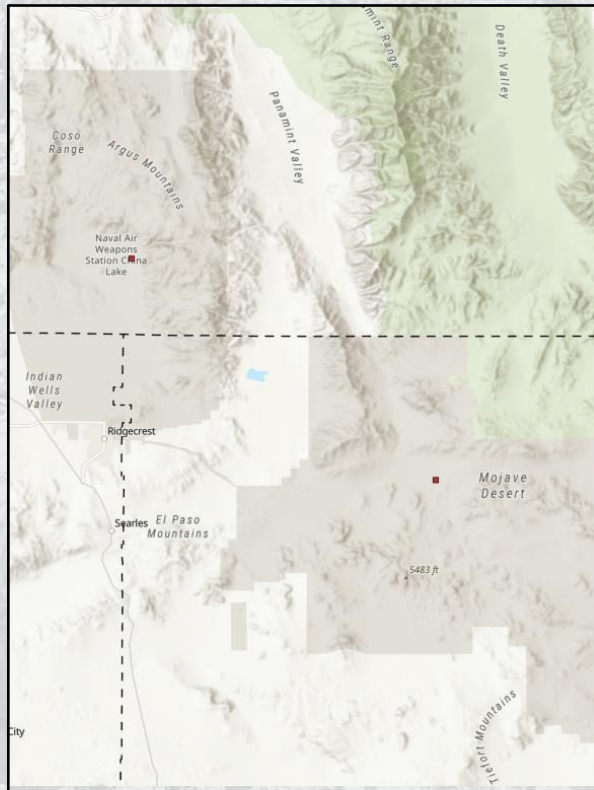
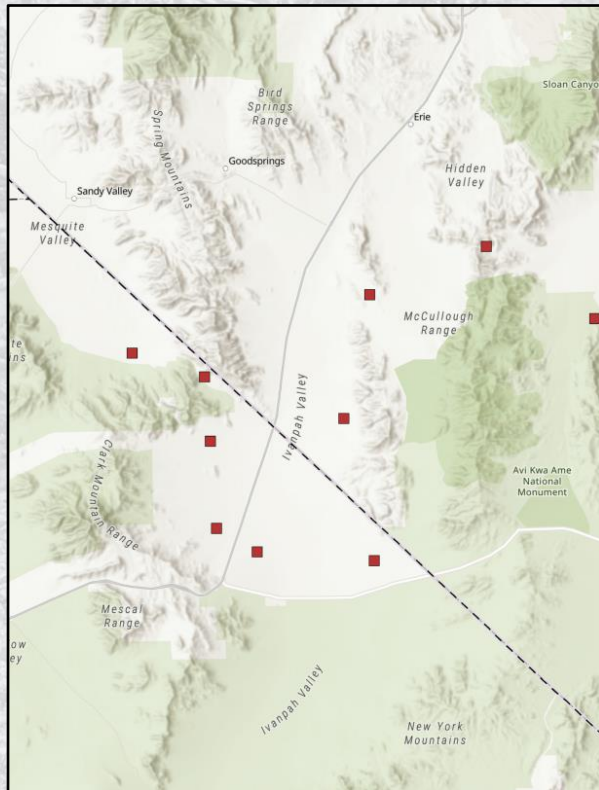




Repeated Survey Methods Across the Range



USGS, UNR, CA-BLM, Clark County, and others



Prioritizing demographic studies across the range (Recovery Criterion 1b, USFWS 2011)



Conclusions



Range-wide tortoise monitoring is **complex** and **sometimes counterintuitive**



Adult populations are in **decline** across the range, limited knowledge of status of other age classes



Sufficient funding to achieve monitoring goals continues to be an issue across the range



Working to increase understanding of **vital rates** by **implementing demographic plots** across the range



Recent work highlights need for both **density** and **demography** focused surveys





Desert Tortoise Recovery Office

- Kristina_Drake@fws.gov
- Kimberleigh_Field@fws.gov
- Kerry_Holcomb@fws.gov
- Corey_Mitchell@fws.gov

Thank you to all our many partners!

The monitoring program isn't possible
without your continued involvement

Continued thanks to the long-term
support from Linda Allison

