Welcome to the Conservation Lecture Series

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Questions? Contact margaret.mantor@wildlife.ca.gov

Lecture Schedule

- **Amargosa Vole, Dr. Janet Foley & Dr. Robert Klinger**

  June 9, 1:00-3:00, Sacramento
- **White Abalone, Dr. Kristin Aquilino**

  July 22, 1:00-3:00, Sacramento

DESERT TORTOISE OUT STATE REPTILE

Presented by

Rebecca Jones

California Department

Of Fish & Wildlife

DT Protection

- 1939 state law prohibits purchase or sales
- 1961 laws prohibiting shooting or harming
- 1972-73 F&G code strengthened to prohibit collection of wild tortoises

- Desert Tortoise officially listed as threatened in August 1989 under the California Endangered Species Act CESA

Nomenclature

- *Gopherus agassizii* – Agaassiz's Land Tortoise

- *Gopherus morafkai* – Morafka's desert tortoise

Differences

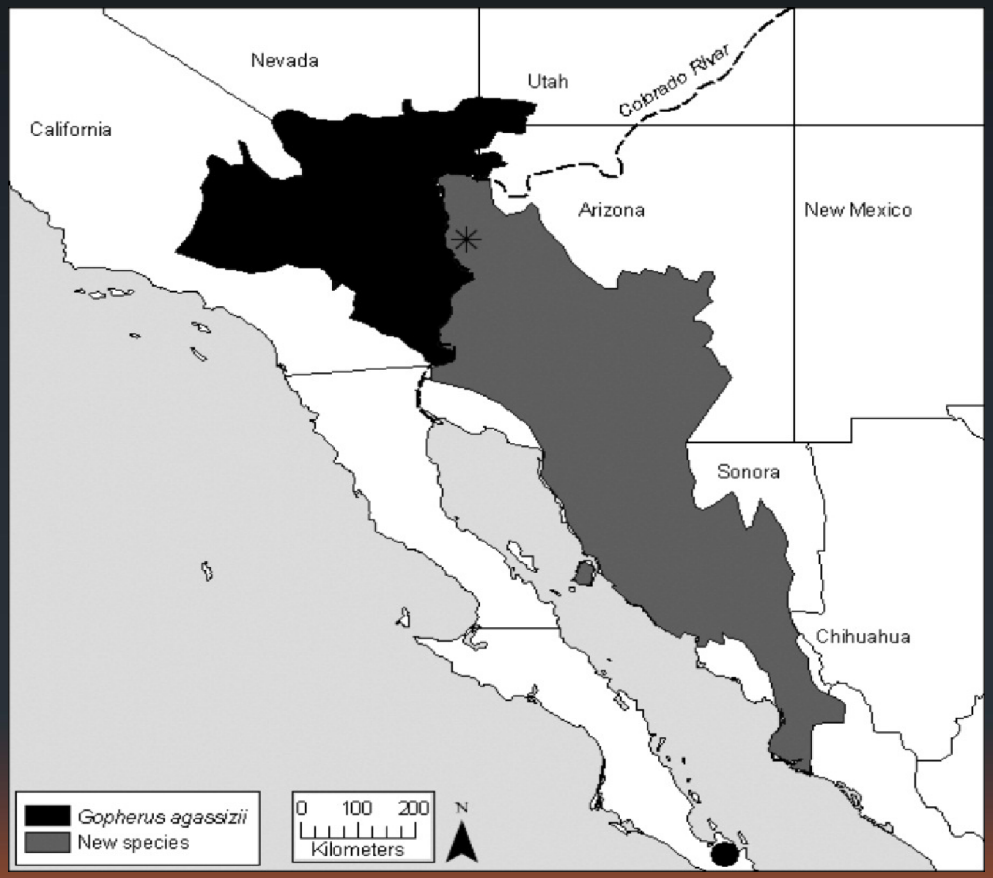
G. agassizii

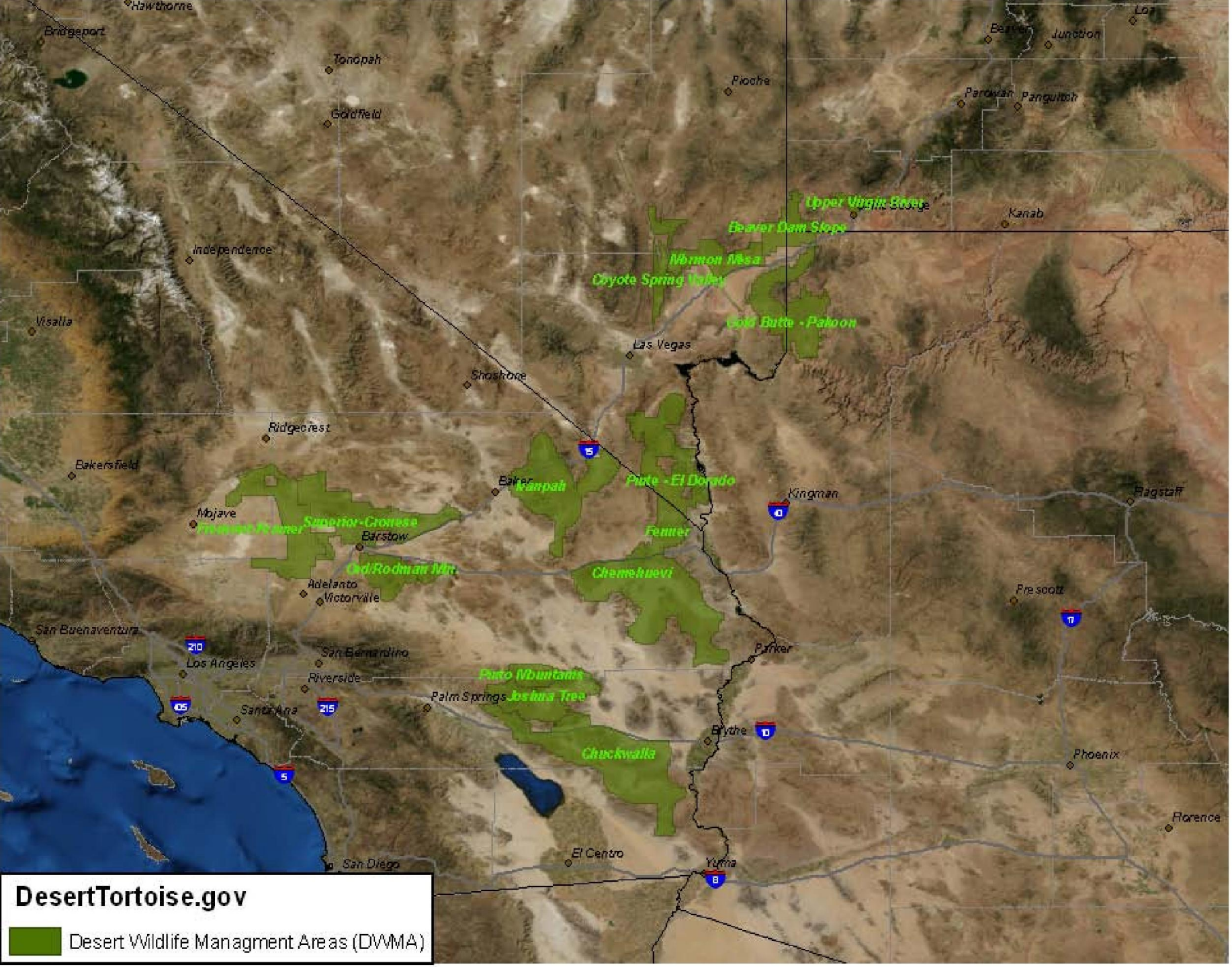
- Dome shaped
- North and west of the Colorado River
- Predominantly valleys and alluvial fans
- Number of clutches/yr 0-3

G. morafkia

- Flatter pear shaped
- South and east of the Colorado River
- Predominantly slopes and rocky hillsides
- Number of clutches/yr

Distribution

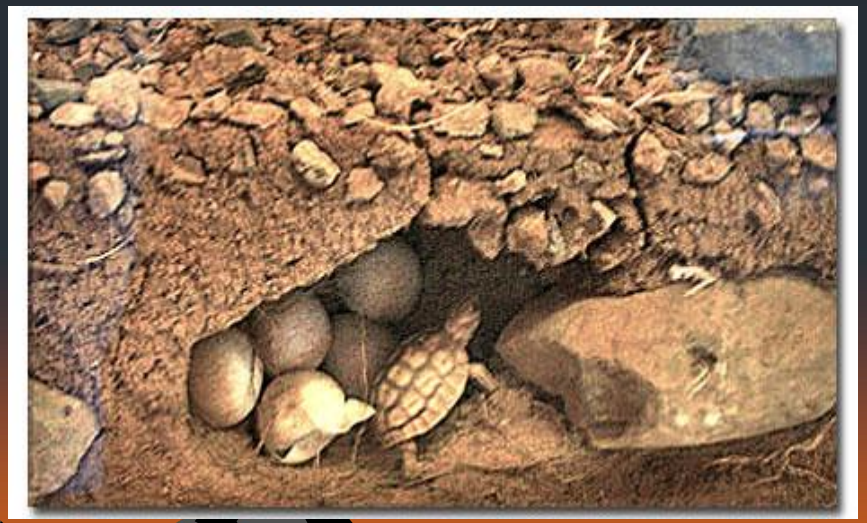



DesertTortoise.gov
Desert Wildlife Managment Areas (DWMA)
Hawthorne
Bridgeport
Tonopah
Goldfield
Pioche
Beaver
Junction
Parowan
Panguitch
Kanab
Upper Virgin River
Beaver Dam Slope
Mormon Mesa
Coyote Spring Valley
Gold Butte - Pakoon
Independence
Visalia
Las Vegas
Shoshone
Ridgecrest
Bakersfield
Baker
Ivanpah
Piute - El Dorado
Kingman
Flagstaff
Mojave
Superior-Cronese
Barstow
Fenner
Ord/Rodman Mtn
Chemehuevi
Adelanto
Victorville
Prescott
San Buenaventura
Los Angeles
San Bernardino
Riverside
Parker
Palm Springs
Joshua Tree
Santa Ana
Blythe
Chuckwalla
Phoenix
Florence
El Centro
San Diego
Yuma

Biology

- Mating occurs in late summer to early fall

- Eggs usual hatch the following year in late summer but hatch the spring after



Adult tortoise

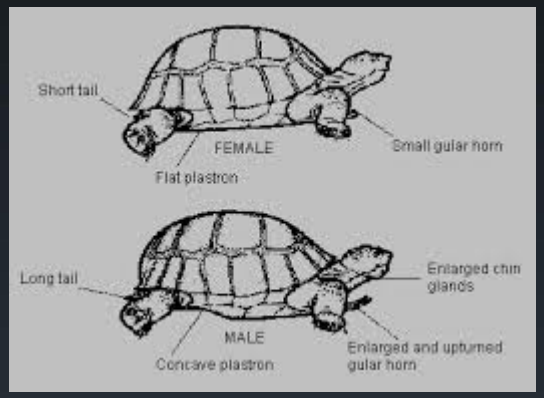
Sexual mature 15-20 yrs

Live to about 60 yrs in wild

Brumate in winter, but can be active any time of the year depending on temperature and rain

Females can store sperm

Lay 1-12 eggs may lay several clutches



- Color can range from blondish to all most black
- Bone is cover with scutes
- Home ranges - 2 to 40+ hectars

Hatchlings

- Size of silver dollar
- Soft shell
- Yoke sac
- Use rodent burrows

Diet

- Selective in choice of food depending on location and availability of plants
- Annual wildflower, hebaceous perrenials, native grasses and cacti.
- PEP (Potassium Excretion Potential) Plants *Lotus humistratus* and *Astragalus didymocarpus*

Threats

- Predators – Ravens, coyotes, golden eagles, badgers, desert kit fox, fire ants, ground squirrels, free-roaming dogs.

- Grazing

- OHVs

- Military Activities

- Alternative Energy

- Mining Past and Present

- Urban Developement

- Exotic Plant Species-
  - *Bromus rubens*,
  - *Schimus barbatus*,
  - *Erodium cicutarium*
- Roads and railroads
- Wild fires
- Global warming
- Collection
- Shooting
- Burros
- Agricultural development

Health and Disease

Mycoplasma

- Bacterial Disease
- Found in captive populations in the 1970's
- Found Desert Research Tortoise Natural Area (DTRNA)1988
- M. agassizii, and M. testudineum
- Known to case Upper Reparatory Tract Disease (URTD)

MYCOPLASMA

- Symptoms - discharge from the nares, puffy eyelids, eyes recessed into the orbits, dullness to the skin and scutes, weight loss and and lethargic or erratic behavior
- Translocate tortoise salvaged due to illness had a new *Mycoplasma* species on the penis

Cutaneous dyskeratosis

- Shell disease
- Unknown origin
- Initially identified on the Chuckwalla Bench
- Typified by shell lesions on the scutes
- Areas infected appear discolored, dry, rough and flakey, with peeling, pitting and chipping through multiple cornified layers

Cutaneous dyskeratosis

- Means of transmission are unknown
- Hypotheses include -
  - auto-immune disease
  - exposure to toxic chemicals
  - a deficiency disease

Herpesvirus

- Found captive population in 1982
- Seen in wild population 2003
- 2 new ones found
- URTD
- Plaques charateristic of Herpesvirus

EYE LESIONS, Blindness

DNA & ELISA were positive for *Mycoplasma testudineum*

Toxicants

- Arsenic
- Cadmium
- Lead
- Mercury
- Nickel
- Thorium

Typical Stressors for DTs

- Droughts: annual, seasonal
- Food quality & availability
  - biomass load of alien annuals
  - depletion of seed bank through grazing
- Toxicants, environmental contaminants
- Injuries from predators

Stressors have important roles

- Tortoise with 1 disease may show no clinical signs
- Tortoise with 1 disease & stressor more likely to show clinical signs, more likely to be ill & die
- Tortoise with 2 diseases more likely to die

No Simple Answers: Problem Areas

- *Clinical signs not evident or overlapping*
- *Diseases may be latent; once acquired, always present*
- *Multiple tests may be necessary for pathogens or parasites*
- *Some tests not readily available*

High Priorities for Research

- Effects of 2 pathogens operating together
- Herpesvirus: isolate and cultures of different types; transmission studies; location in tissues; recognize that tortoises may not mount an immune response
- *Mycoplasma: M. testudineum* transmission study, pathogenesis; study of new *Mycoplasma* from tortoise in Central Mojave Desert

Elevated toxicants

- Research is needed to:
  - establish baseline for adults at multiple sites, multiple seasons, dry and wet years
  - determine whether toxicants are transferred to eggs

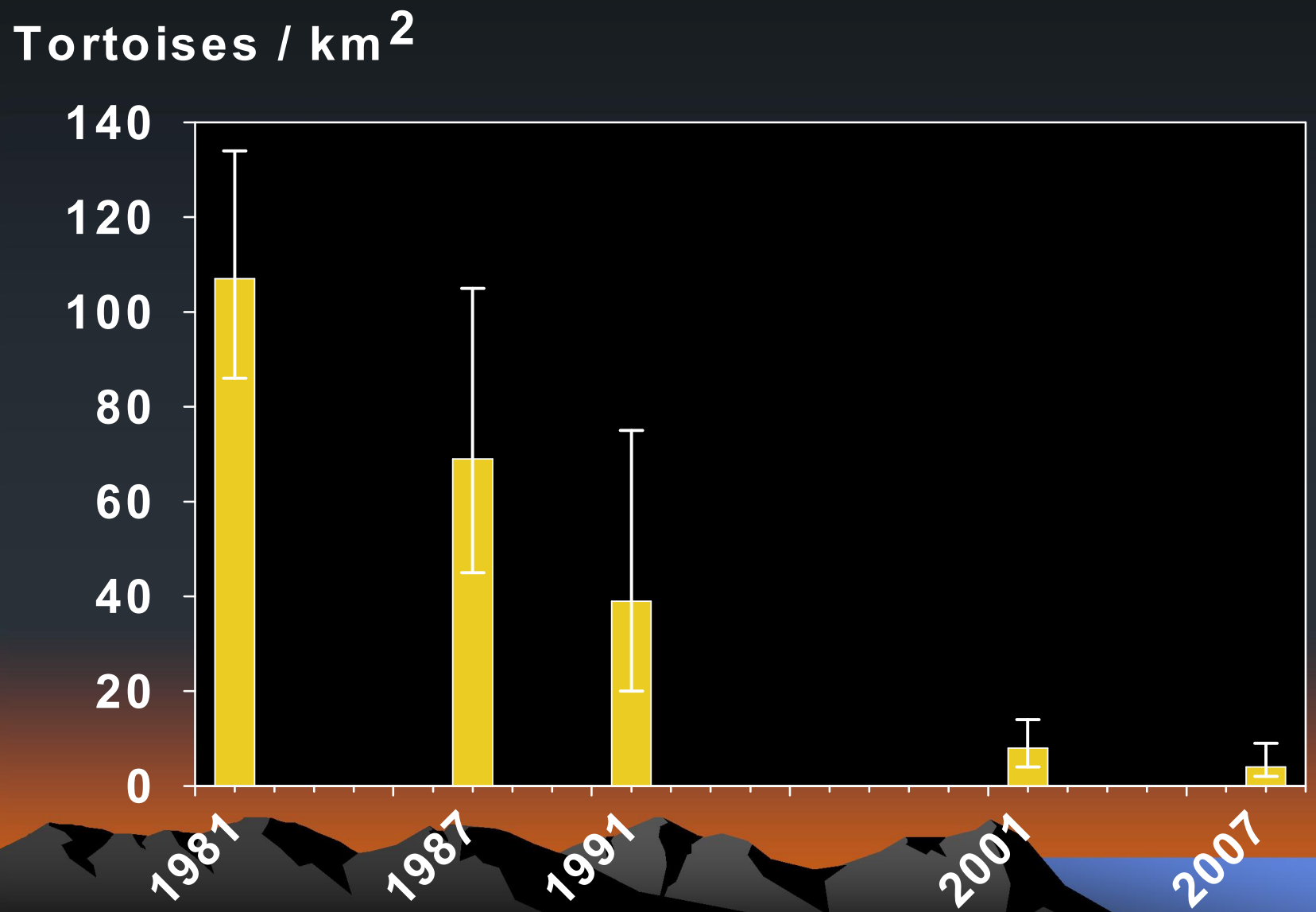
High Priorities for Research: Nutrition

- Are wild tortoises receiving adequate nutrition for
  - Growth
  - Egg production
  - Shell thickness & hardness
  - Resistance to disease

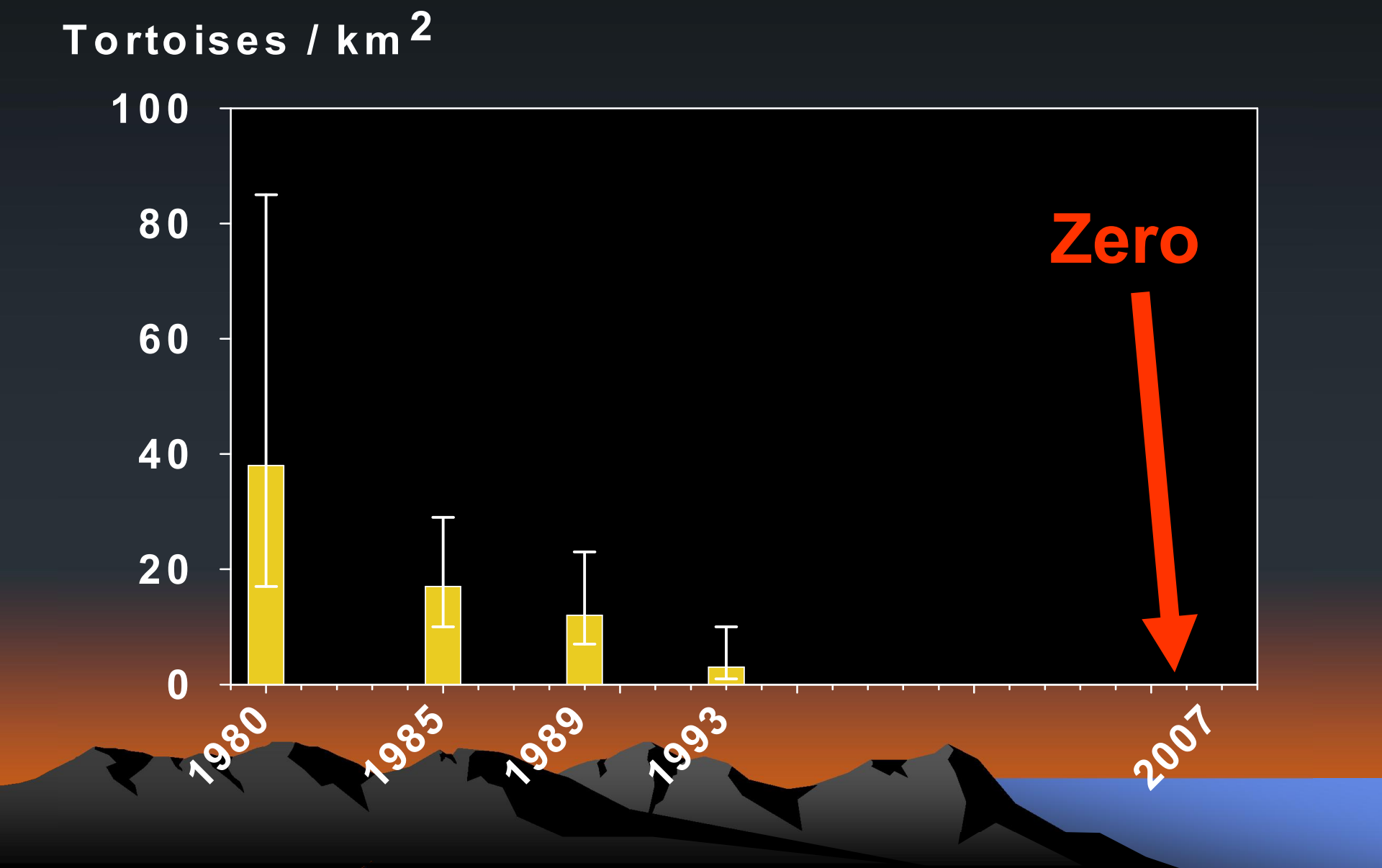
Population trends

- Study Plots
- Line Distance Sampling

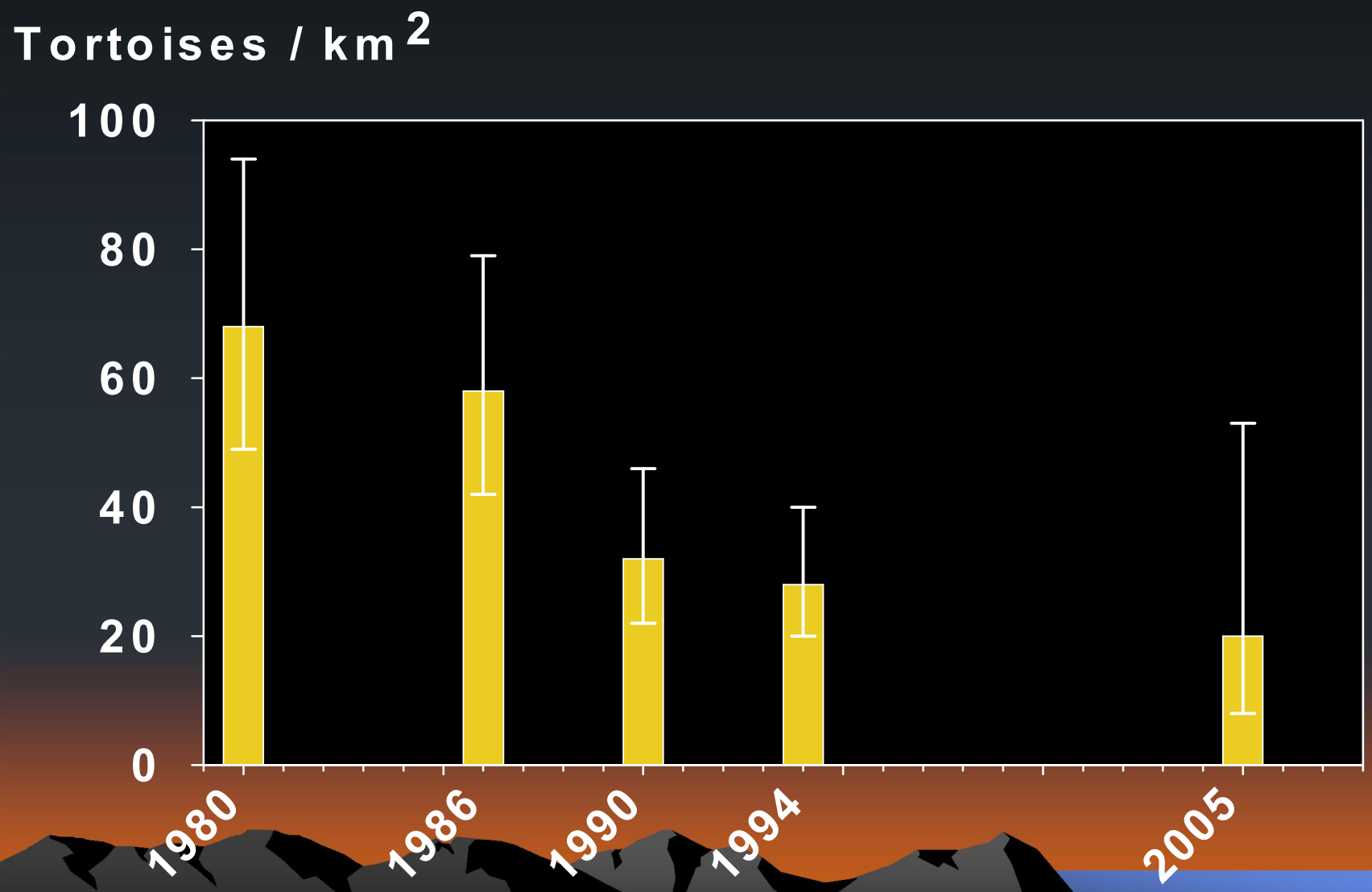
Fremont Valley— ALL sizes



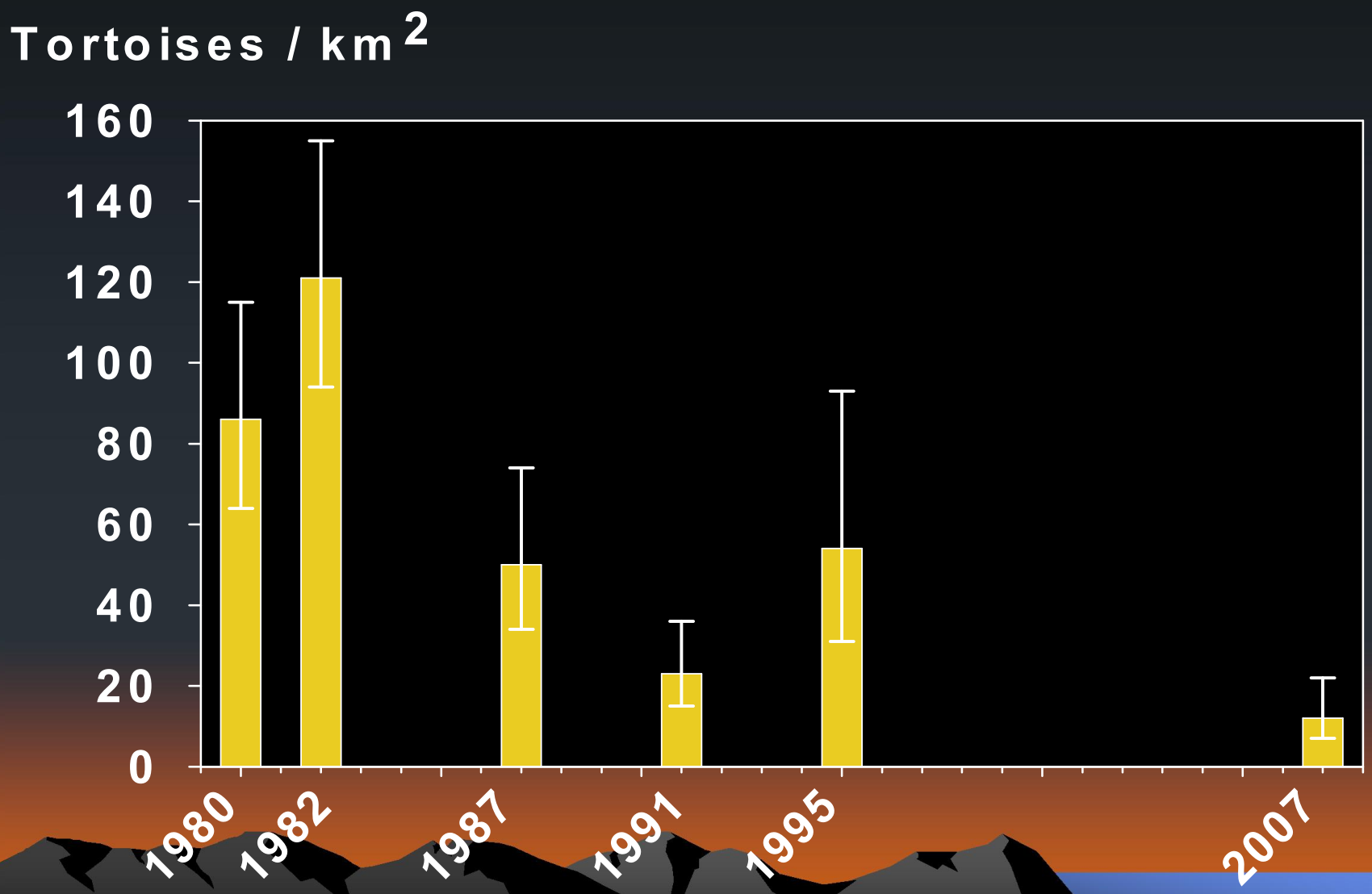
Fremont Peak —All sizes



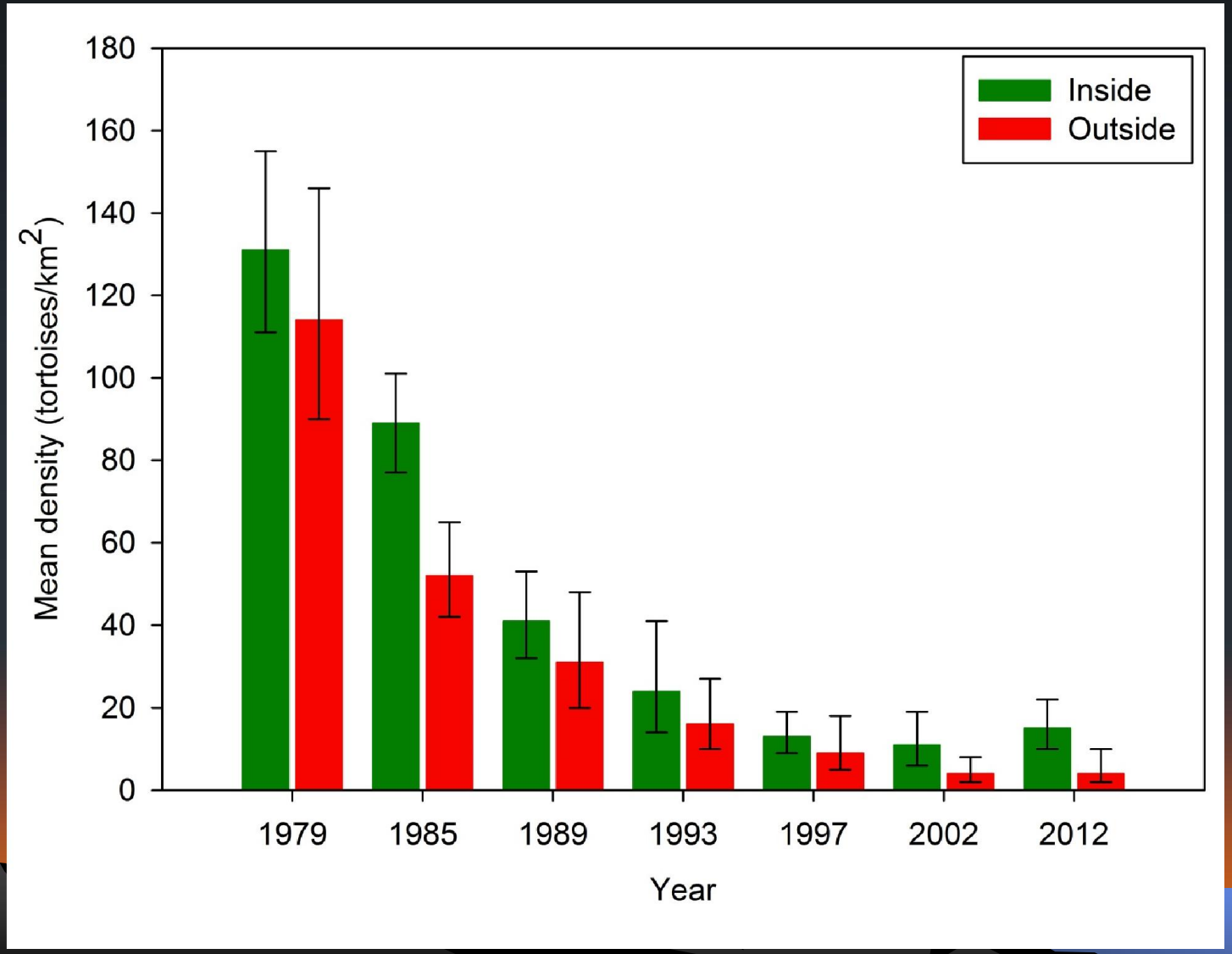
Lucerne Valley — All sizes



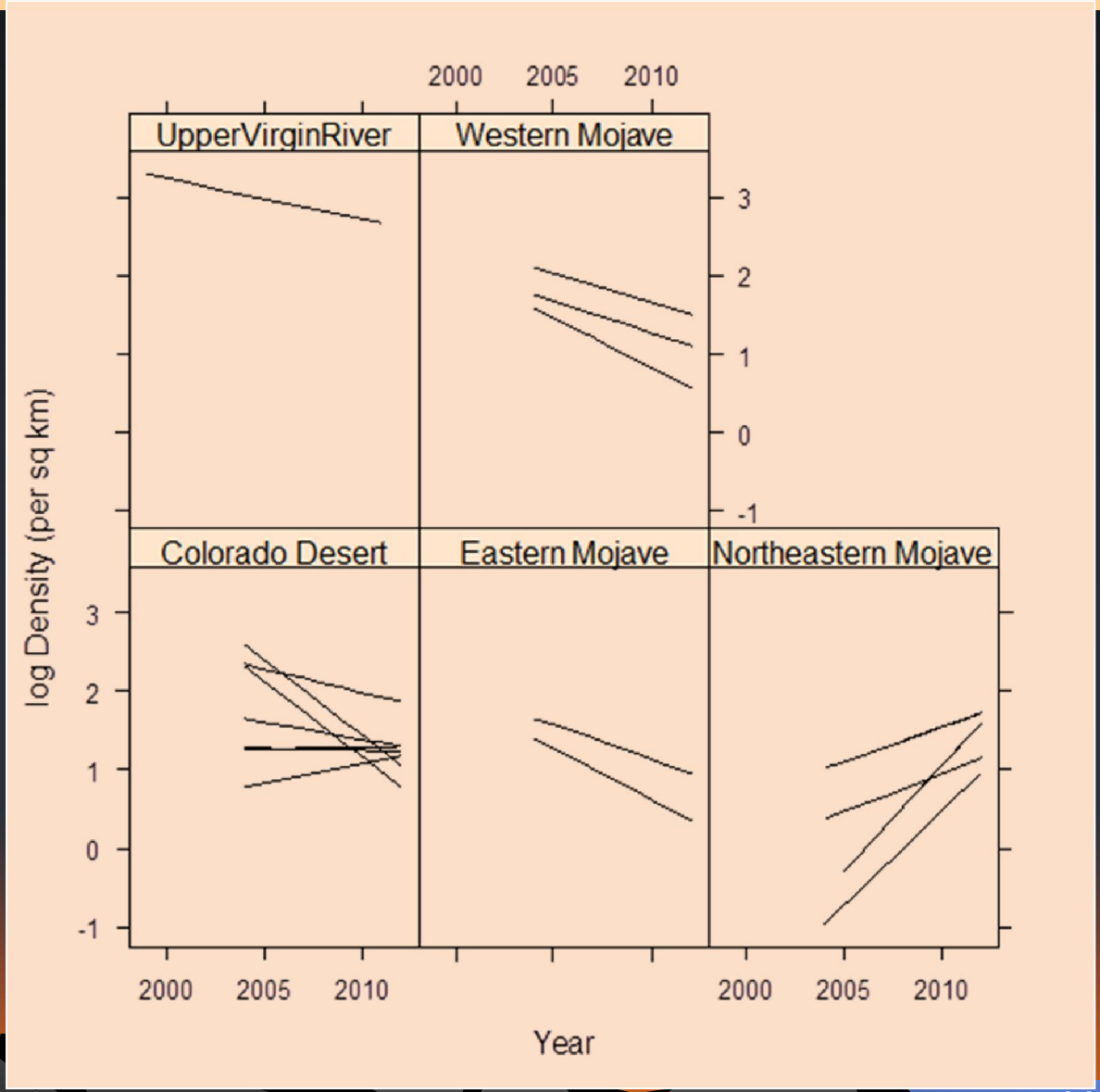
Kramer Hills — All sizes



Population declined 89% inside, 96% outside fence DTRNA



Trends in Abundance of Adult Tortoises



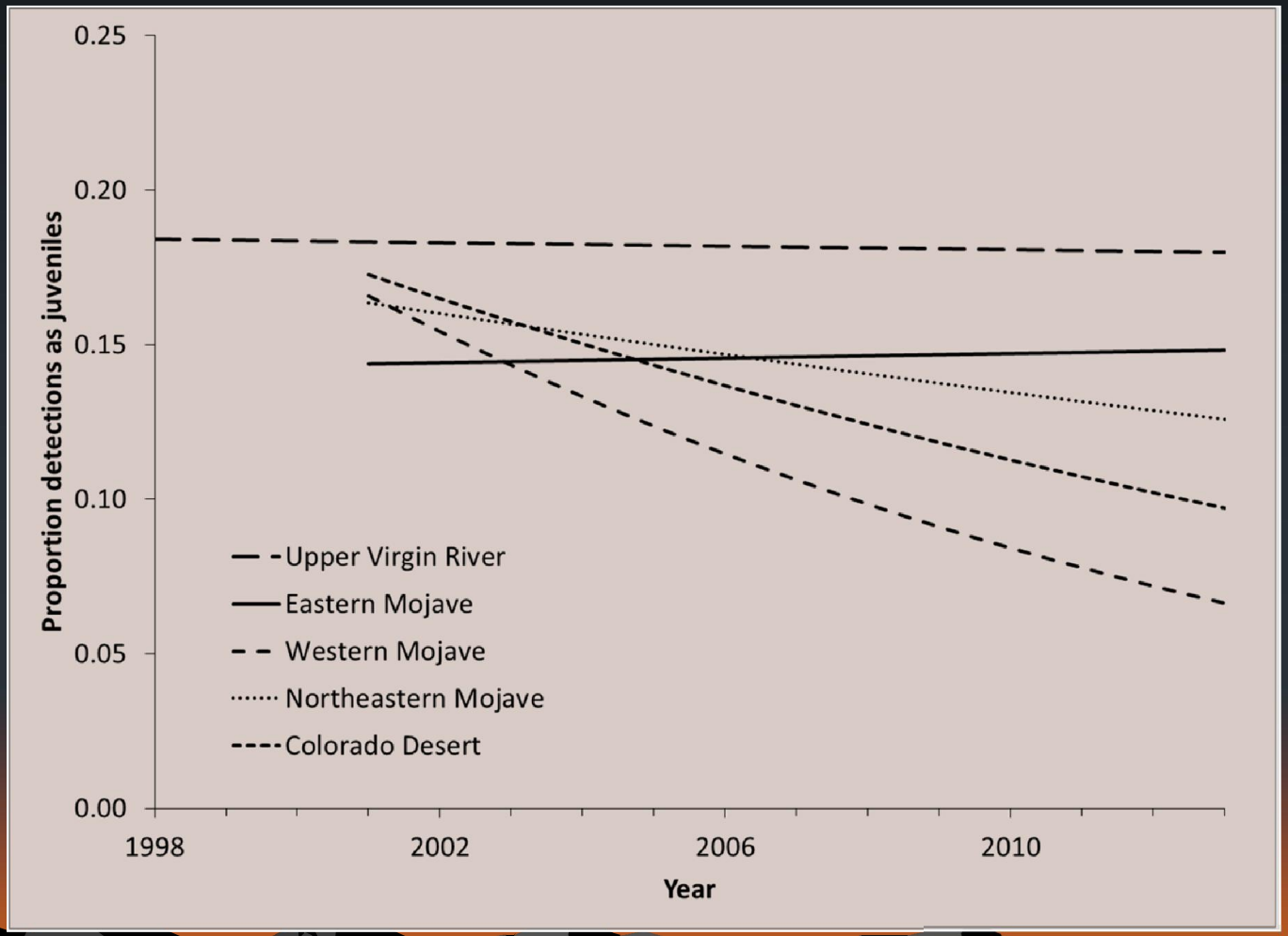
USFWS, in review

Change in abundance of adult Mojave Desert Tortoises in modeled habitat in each recovery unit

Recovery Unit	2004	2012	Change
Northeastern Mojave	13,709	40,838	+27,129
Upper Virgin River	12,678	8,399	-4,280
Eastern Mojave	68,138	42,055	-26,083
Colorado Desert	111,749	85,306	-26,443
Western Mojave	152,967	76,644	-76,323
Total	359,242	253,242	-106,000

USFWS, in review

Relative Abundance of Smaller Tortoises (< 180 mm)



U WS, in review

Management Histories & Strategies Affect Status of Agassiz's Desert Tortoise Populations

Kristin H. Berry[1], Lisa Lyren[1], Julie Yee[1], & Tracy Bailey[2]

[1]U.S. Geological Survey, CA, and [2]Ridgecrest, CA

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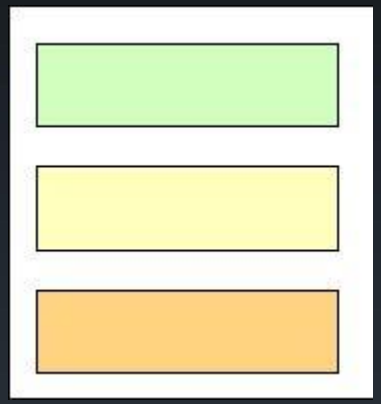
science for a changing world

OBJECTIVES

- Compare tortoise densitie
  & attributes
- Identify factors affecting
  recovery
- Provide recommendations for recovery &
  enhancing vehicle management

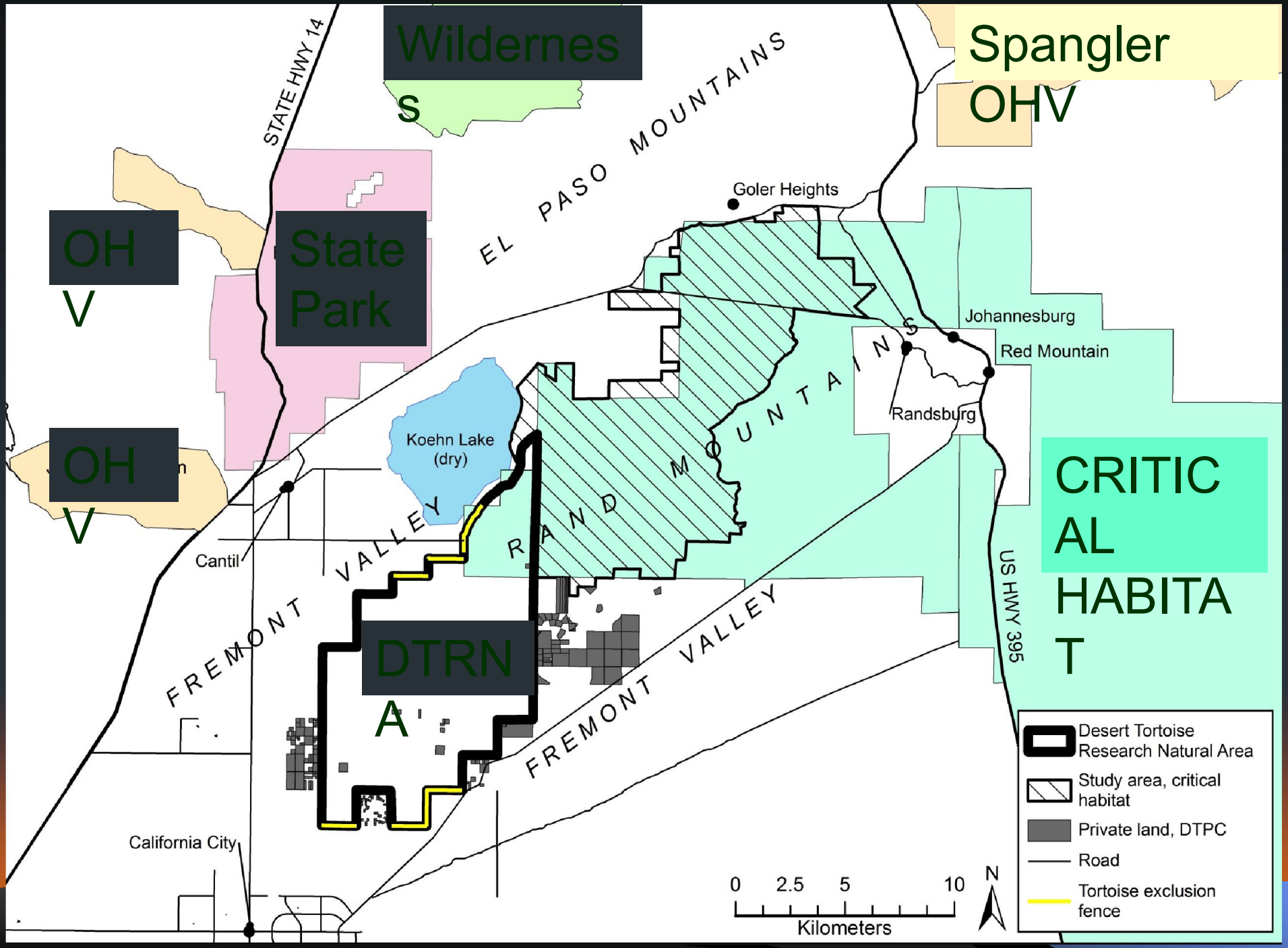
Three Management Areas/Strategies



DTRNA: DT Research Natural Area

Critical Habitat: Fremont-Kramer

Private lands: recently acquired, Desert Tortoise Preserve Committee, Inc.


Wildernes
s
Spangler
OHV
STATE HWY 14
EL PASO MOUNTAINS
Goler Heights
OH
V
State
Park
Johannesburg
Red Mountain
Randsburg
RAND MOUNTAINS
Koehn Lake
(dry)
OH
V
Cantil
FREMONT VALLEY
CRITIC
AL
HABITA
T
US HWY 395
DTRN
A
FREMONT VALLEY
California City
0 2.5 5 10
Kilometers
N
Desert Tortoise
Research Natural Area
Study area, critical
habitat
Private land, DTPC
Road
Tortoise exclusion
fence

DT Research Nat Area

- Protected >30 years
- Fenced, no grazing, no mining

Private lands (DTPC):

- No protection from grazing, vehicle use, dumping

Critical Habitat: Fremont-Kramer

- Sheep & intensive recreation vehicle use ‘til 1990
- Continuing recreational vehicle use

Population Densities-Adults

LOCATION	DENSITY/km^2	Confidence interval
DTRNA	10.2	9.9–10.4
DTPC private lands, unfenced	3.7	3.6–3.8
Critical habitat	2.4	2.3–2.6

USFWS 2011: 3.5/km^2

Death Rates lowest in Natural Area

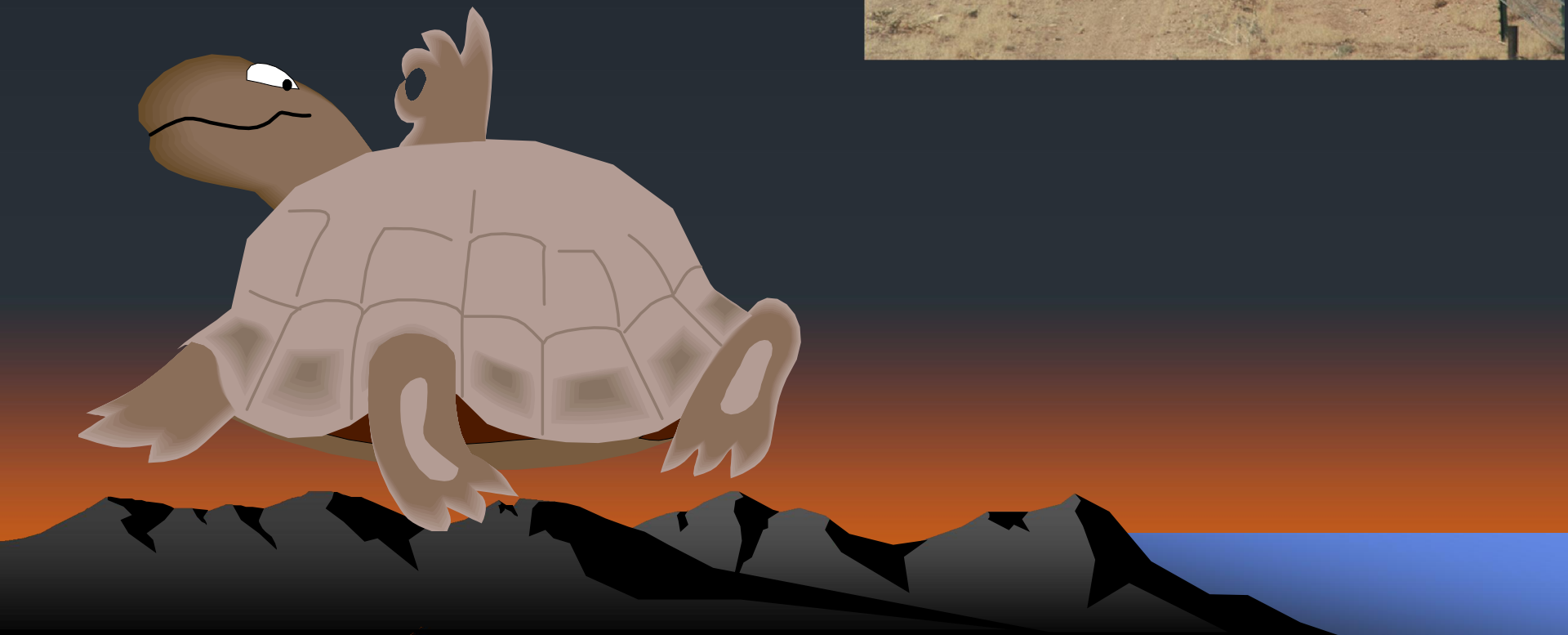
Management area	Crude annual death rate (%)
Desert Tortoise Research Natural Area	2.8
Critical habitat	20.4
Private lands	6.3

Causes of death for 47 on-plot tortoises

- Mammalian predators (coyote kit fox)
- Domestic dog
- Raven predation
- Vehicles
- Shooting
- Unknown

The DTRNA:

~ 40 years of protection from sheep, vehicles & other disturbances works!



Continued monitoring of a translocated population of Agassiz's Desert Tortoises (*Gopherus agassizii*): Questions that can aid conservation

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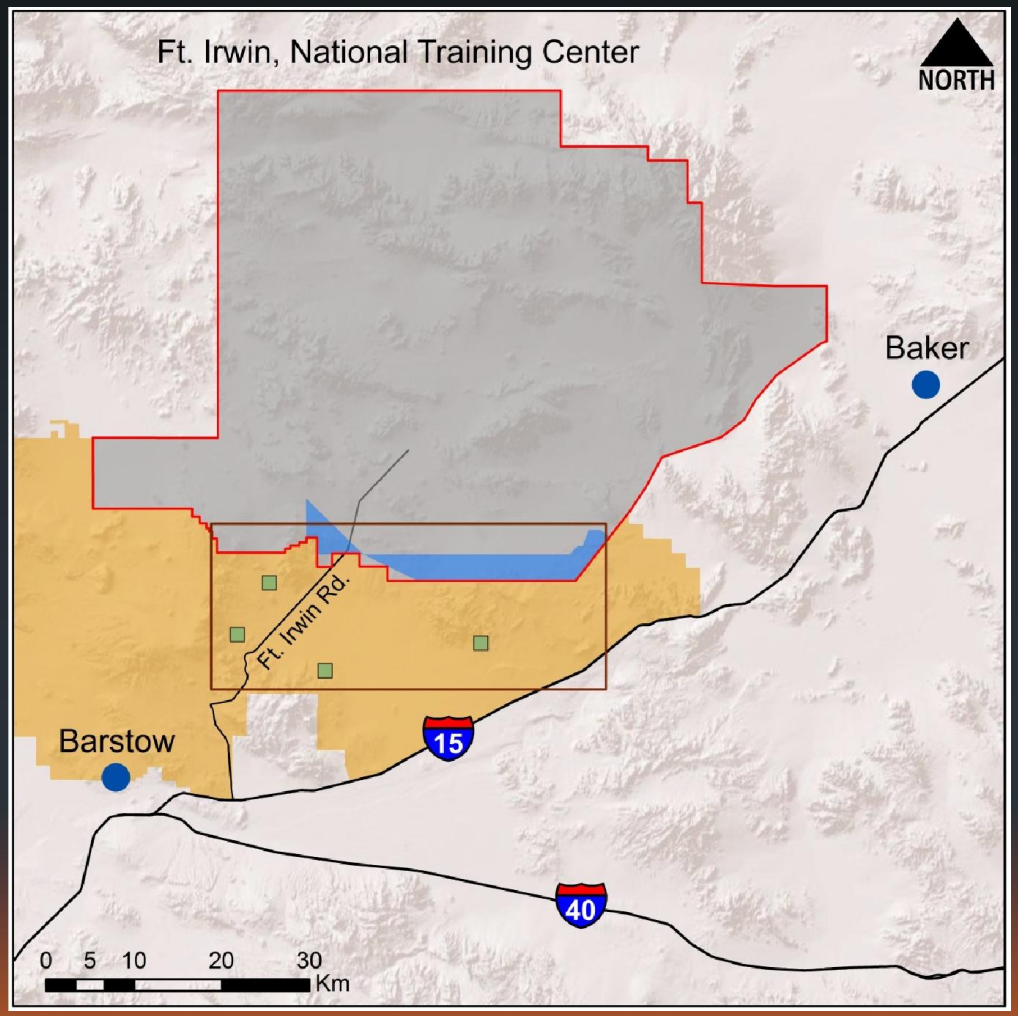
Translocation

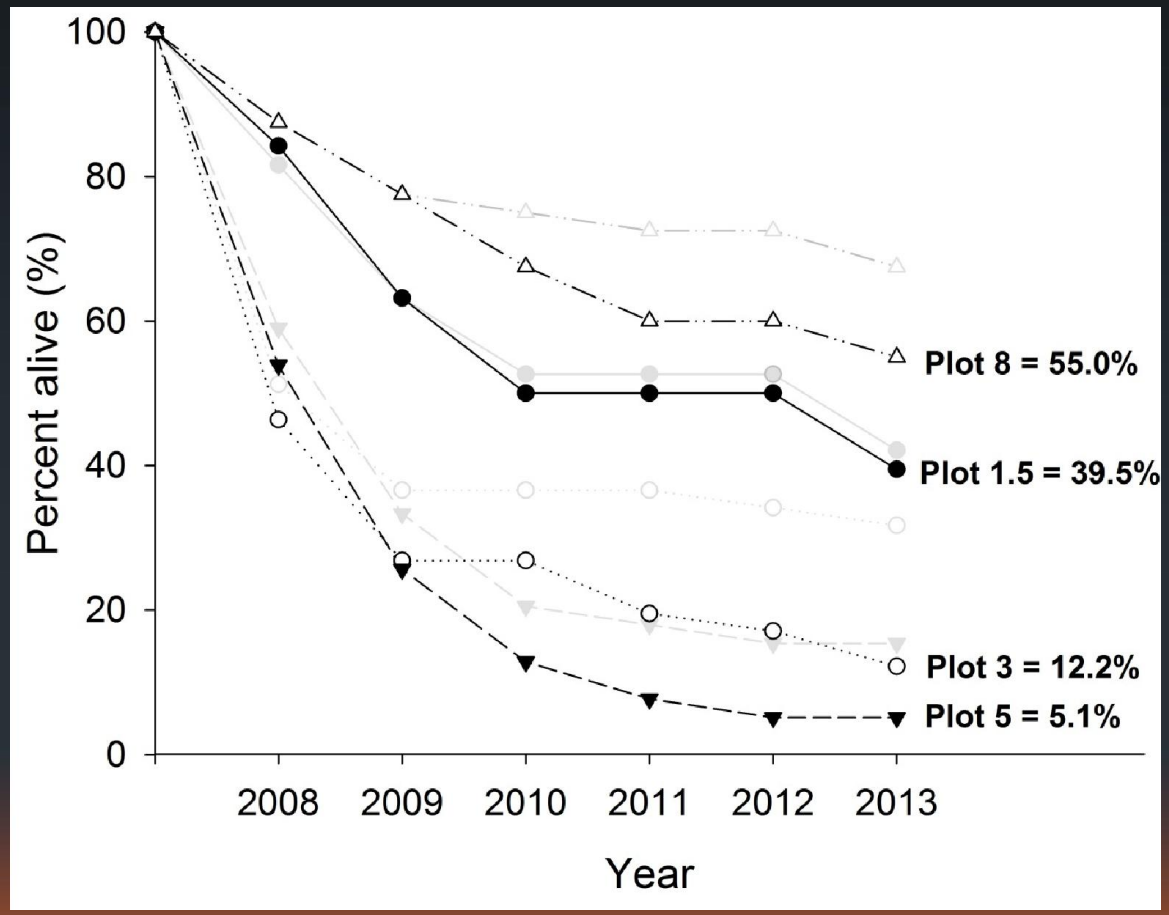
- Ft. Irwin, NTC
- Superior-Cronese Desert Wildlife Management Area (DWMA)
- Southern Expansion Area (545 km^2)
- Translocation sites (2.58 km^2)



Monitoring

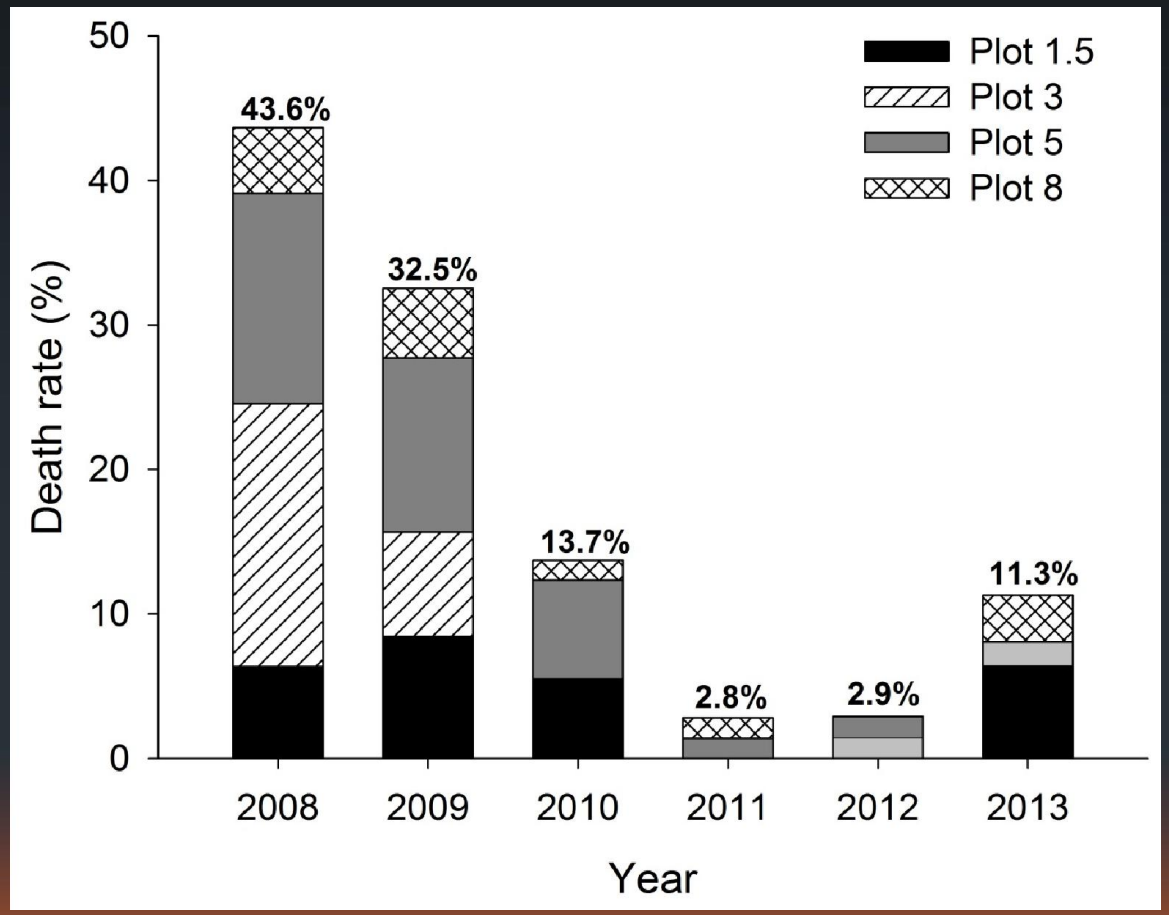
- Post-translocation
  - Released spring 2008
  - Monitored monthly for survival
  - Monitored seasonally for health

Percent alive per plot



Sources of Mortality

	Total	
	N	%
Predation - Canid	80	83.4
Predation - Raven	7	7.3
Temperature	3	3.1
Vehicles, crushing	3	3.1
Salvage – Disease	2	1.1
Snake bite	1	1.0
	96	


Plot 1.5
Plot 3
Plot 5
Plot 8
Death rate (%)
50
40
30
20
10
0
43.6%
32.5%
13.7%
2.8%
2.9%
11.3%
2008
2009
2010
2011
2012
2013
Year

Important questions to address

- Survival
  - What is the long-term survival of translocated tortoises?
  - How is the long-term survival influenced by release-related decisions: (1) location, (2) habitat, and (3) seasonal and annual droughts?
  - What information can we apply to future translocations to increase the survival rates?

- Mortality
  - Are translocated tortoises more susceptible to certain sources of mortality (canid, raven, exposure, etc.)?
  - Do patterns of mortality change by site and over time?

Importance of Good Surveys

- Number of tortoises found can determine how much effort will be needed for translocation plan.
- Do your job correctly if you want to keep working

Thank you

- Dr. Kristin Berry USGS Biological Resource Division

- Linda Allison – USFWS Desert Tortoise Recovery Office