

A photograph of a desert tortoise resting on sandy, sparsely vegetated ground. A semi-transparent map overlay is visible in the background, showing a location with coordinates 11 N 614591 3893029, a date 04/12/24, and a bearing of 019° N19E 0338mils. A compass rose at the bottom right indicates North and a distance of 030.

Recovery Implementation Teams: Progress and Issues Addressed

Kerry L. Holcomb
U.S. Fish & Wildlife Service
Desert Tortoise Recovery Office
Kerry_Holcomb@fws.gov



Outline

- ❖ The toll vehicles have on tortoise populations
- ❖ Route density threshold relative to 2004 to 2014 trend estimates (Averill-Murry & Allison 2022)
- ❖ Route density threshold relative to 2001 to 2020 trend estimates (Zylstra 2023)
- ❖ Development of a rangewide route density surface (100 km² resolution)
- ❖ Defensible polygon prioritization
- ❖ Conclusions



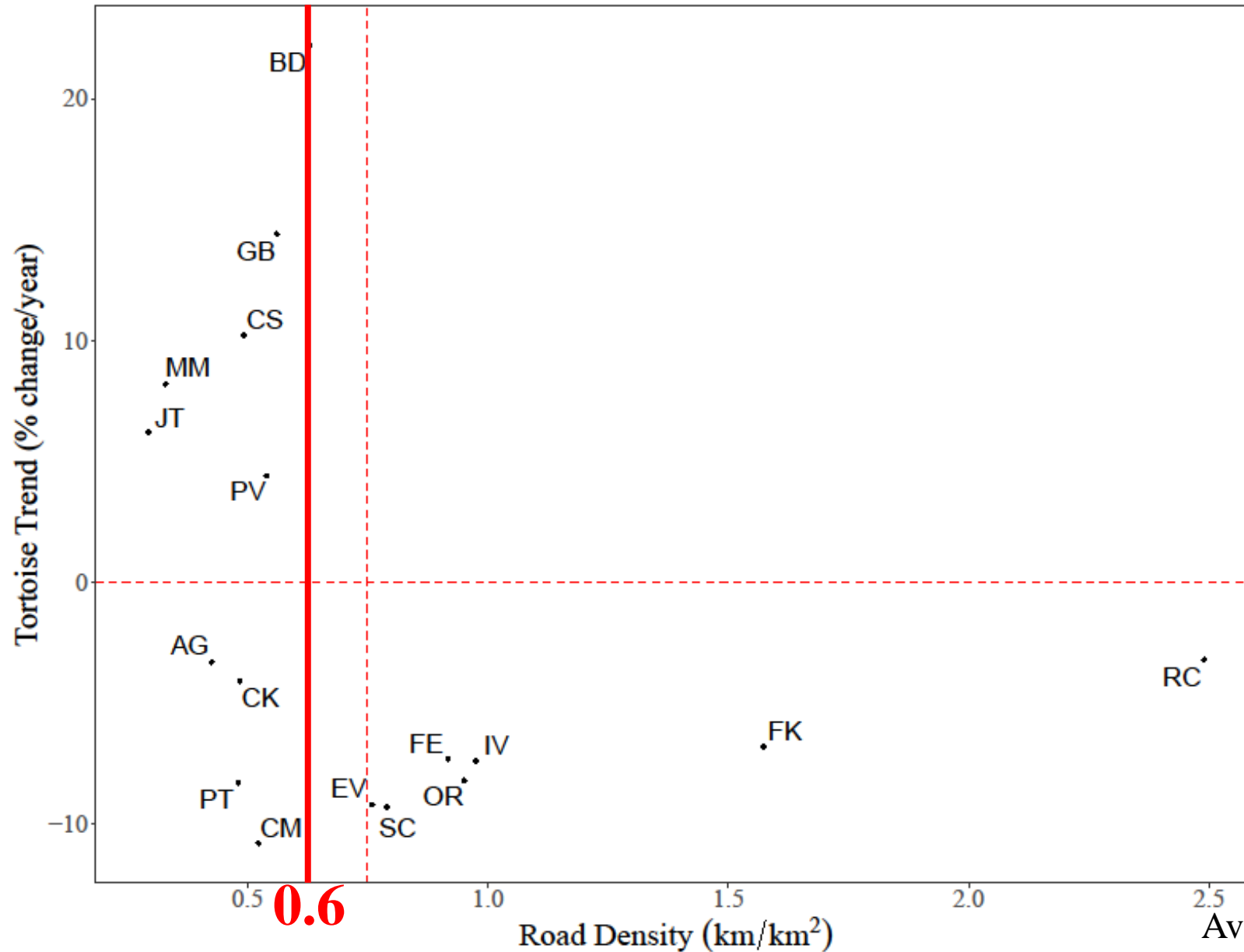


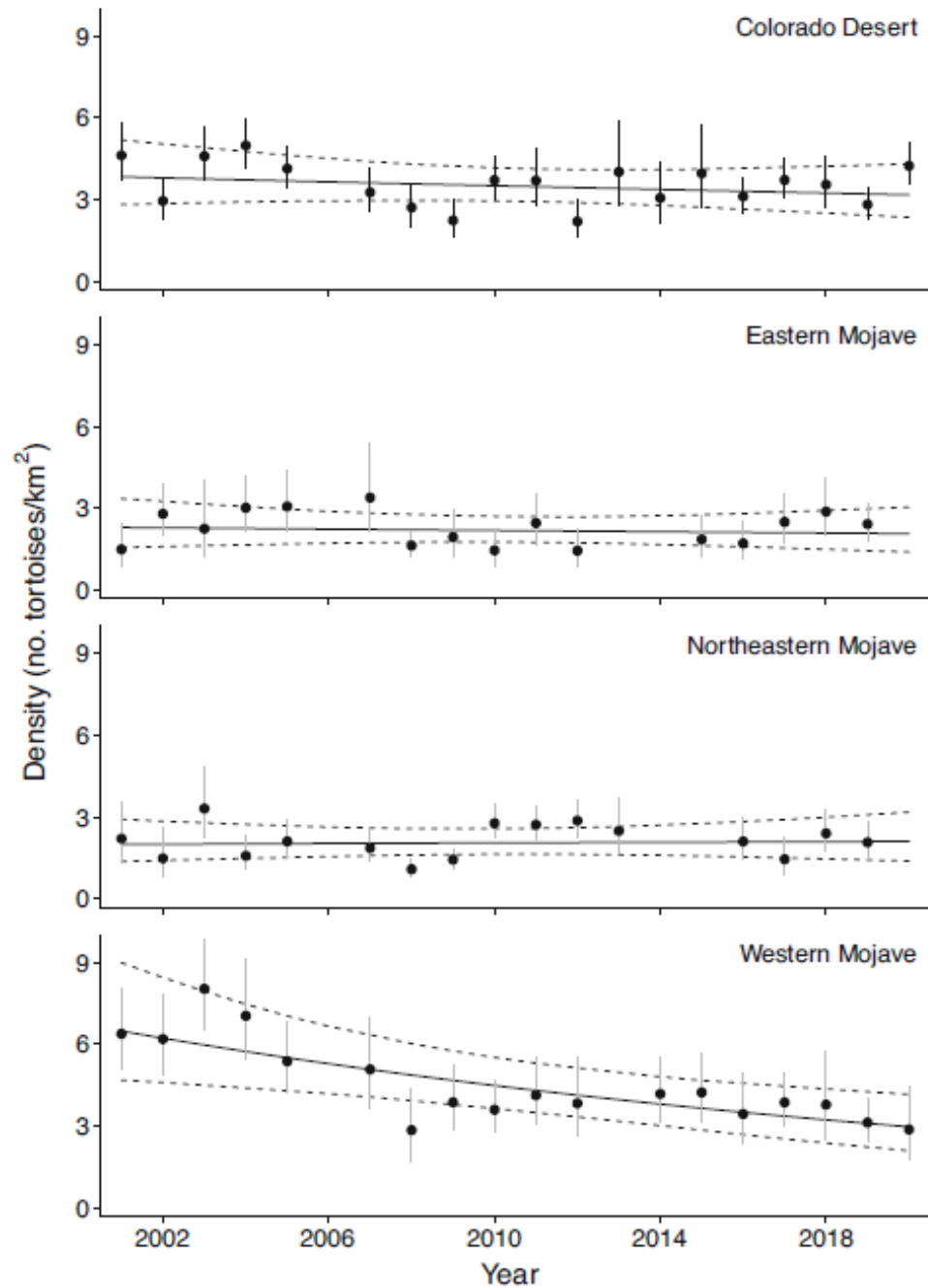
The Toll That Vehicles Have on Tortoise Populations

- Deplete populations
- Bias sex ratios
- Shift demographics
- Limit population size
- Alter behaviors
- Degrade habitats
- Fragment habitats
- Fosters invasive plant introductions
- Subsidize and attract predators
- Increase the likelihood of collection and contact with previously captive tortoises



Annualized Adult Mojave Desert Tortoise Trends in each Tortoise Conservation Area Between 2004 & 2014 *Versus* 2014 “Road” Density





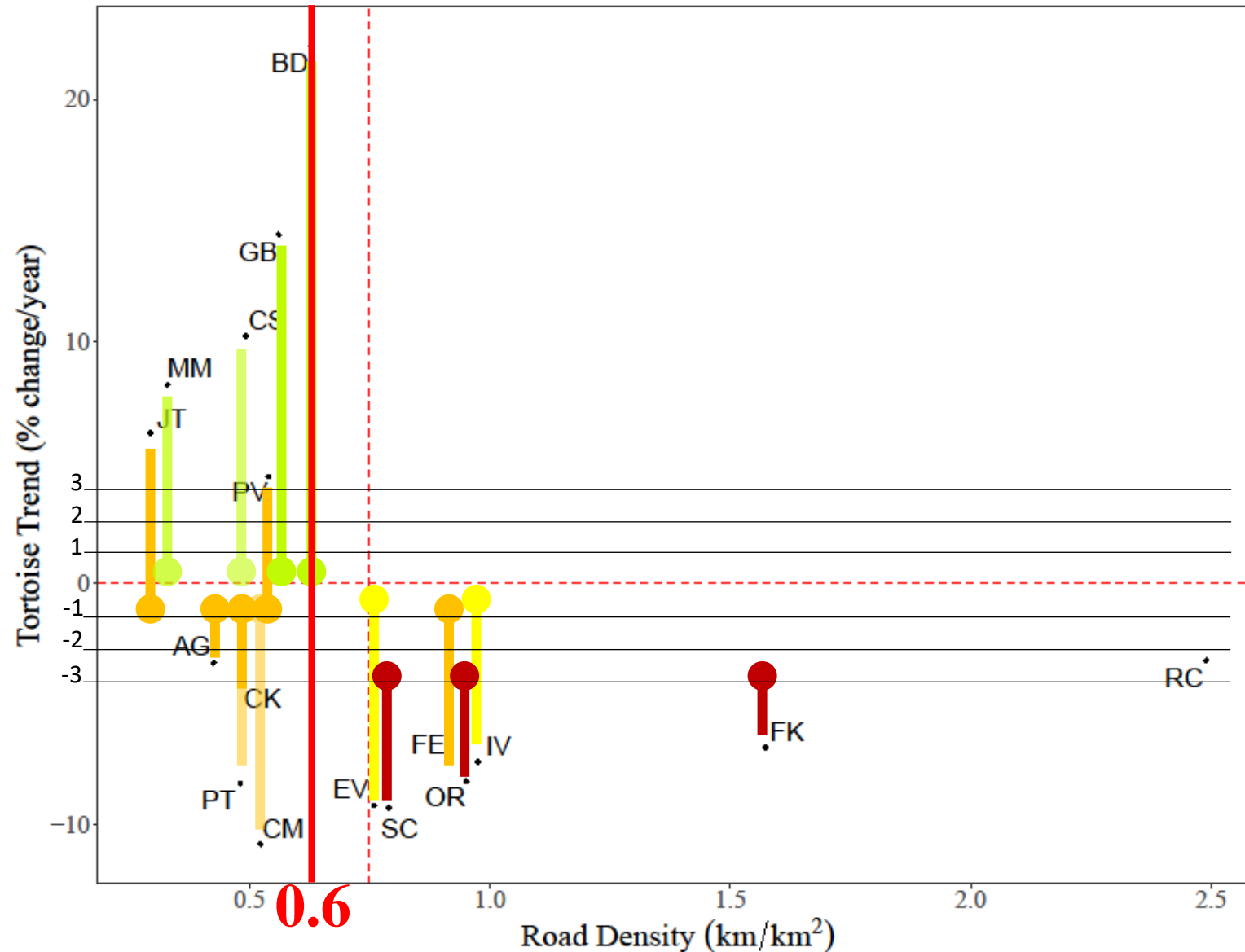
Updated Density Estimates between 2001 and 2020

Recovery unit	Difference in abundance
Colorado Desert	-12,782 (17,774)
Eastern Mojave	-5081 (16,925)
Northeastern Mojave	1124 (8508)
Western Mojave	-112,020 (42,490)
Total	-129,380 (50,692)

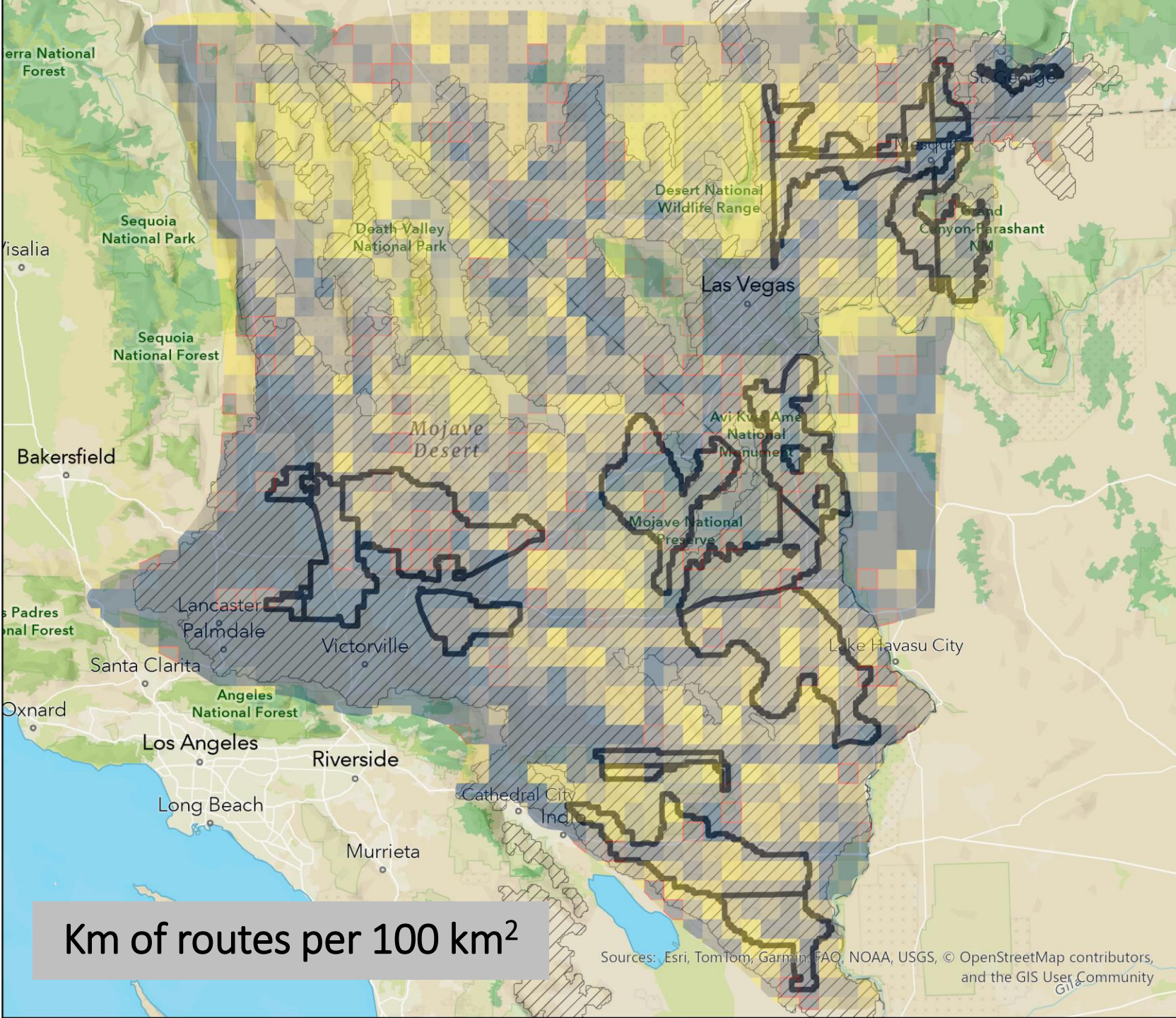
Adult Mojave Desert Tortoise Density Change Estimates – 2001 to 2020

RIT	TCA	2001 (tortoise / sqkm)	2020 (tortoise/ sqkm)	Difference (Tortoise/ sqkm)	Precent Change	Precent Annual Change
Eastern & Northeastern Mojave	CS	1.83	1.93	0.10	5%	0.27
Eastern & Northeastern Mojave	MM	1.88	1.97	0.09	5%	0.24
Eastern & Northeastern Mojave	GB	1.50	1.57	0.07	5%	0.23
Eastern & Northeastern Mojave	BD	1.72	1.80	0.08	5%	0.23
Eastern & Northeastern Mojave	EV	1.67	1.52	-0.15	-9%	-0.45
Eastern & Northeastern Mojave	IV	1.75	1.59	-0.16	-9%	-0.46
Western Mojave & Colorado	CK	2.84	2.37	-0.47	-17%	-0.83
Western Mojave & Colorado	PT	3.59	2.99	-0.60	-17%	-0.84
Western Mojave & Colorado	PV	2.90	2.41	-0.49	-17%	-0.84
Western Mojave & Colorado	JT	3.07	2.55	-0.52	-17%	-0.85
Western Mojave & Colorado	CM	2.70	2.24	-0.46	-17%	-0.85
Western Mojave & Colorado	AG	3.74	3.10	-0.64	-17%	-0.86
Western Mojave & Colorado	FE	3.56	2.95	-0.61	-17%	-0.86
Western Mojave & Colorado	SC	5.45	2.50	-2.95	-54%	-2.71
Western Mojave & Colorado	OR	3.80	1.74	-2.06	-54%	-2.71
Western Mojave & Colorado	FK	7.29	3.33	-3.96	-54%	-2.72

Annualized Adult Mojave Desert Tortoise Trends in each Tortoise Conservation Area Between 2001 & 2020 *Versus* 2014 “Road” Density



Averill-Murry &
Allison 2022
Combined with
Zylstra et al.
2023



2020 TIGER Roads

SUM_km

0 - 7

8 - 16

17 - 25

26 - 34

35 - 44

45 - 60

61 - 73

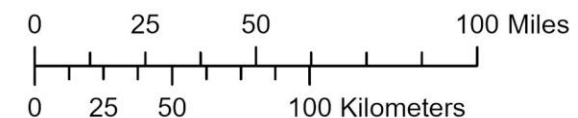
74 - 104

105 - 189

190 - 1666

Draft FWS MDT
OneRange

Critical Habitat

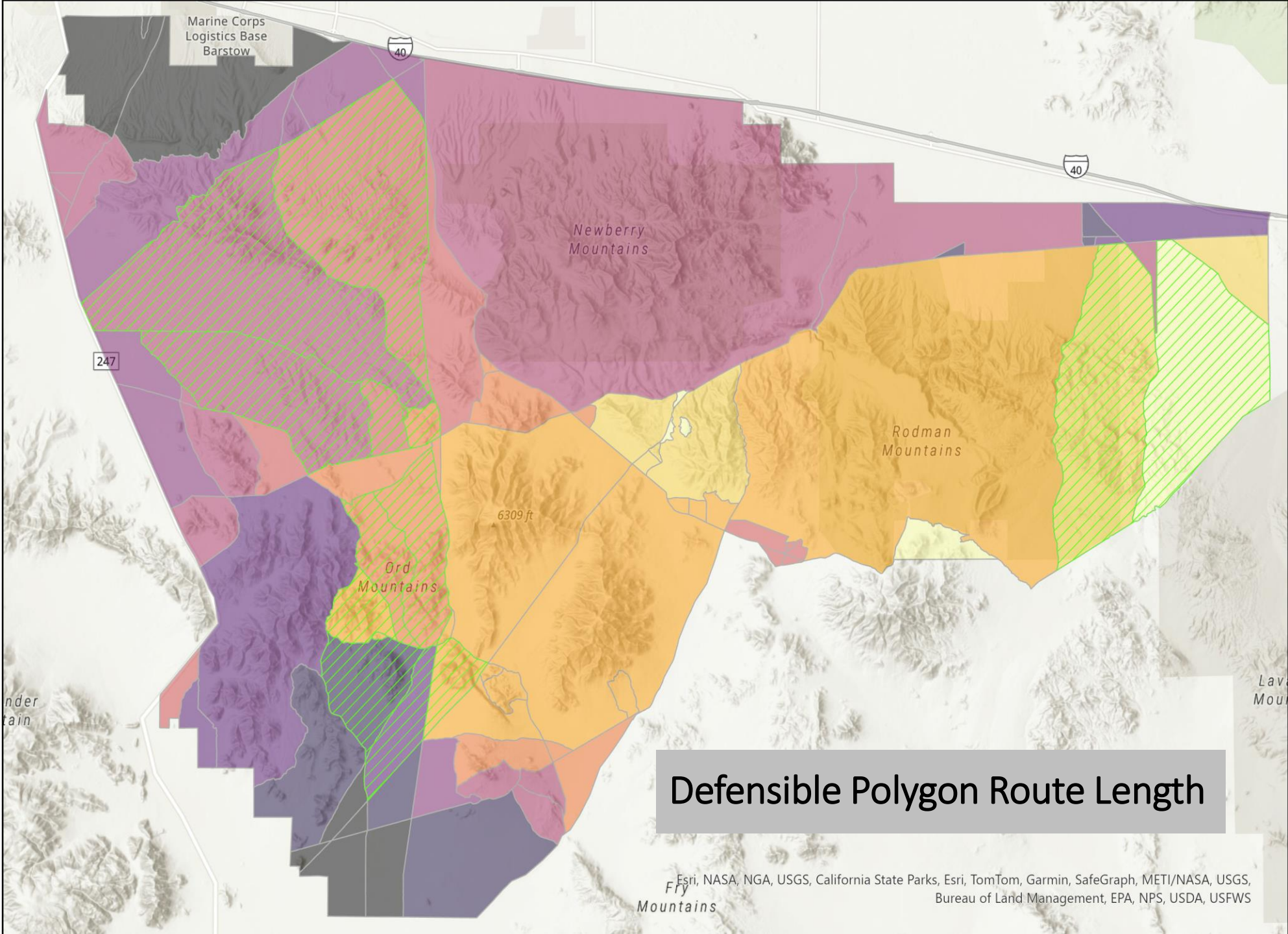
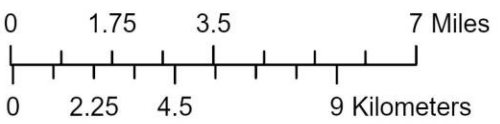


Treated Defensible Polygons

Average Route Density By Defensible Polygon

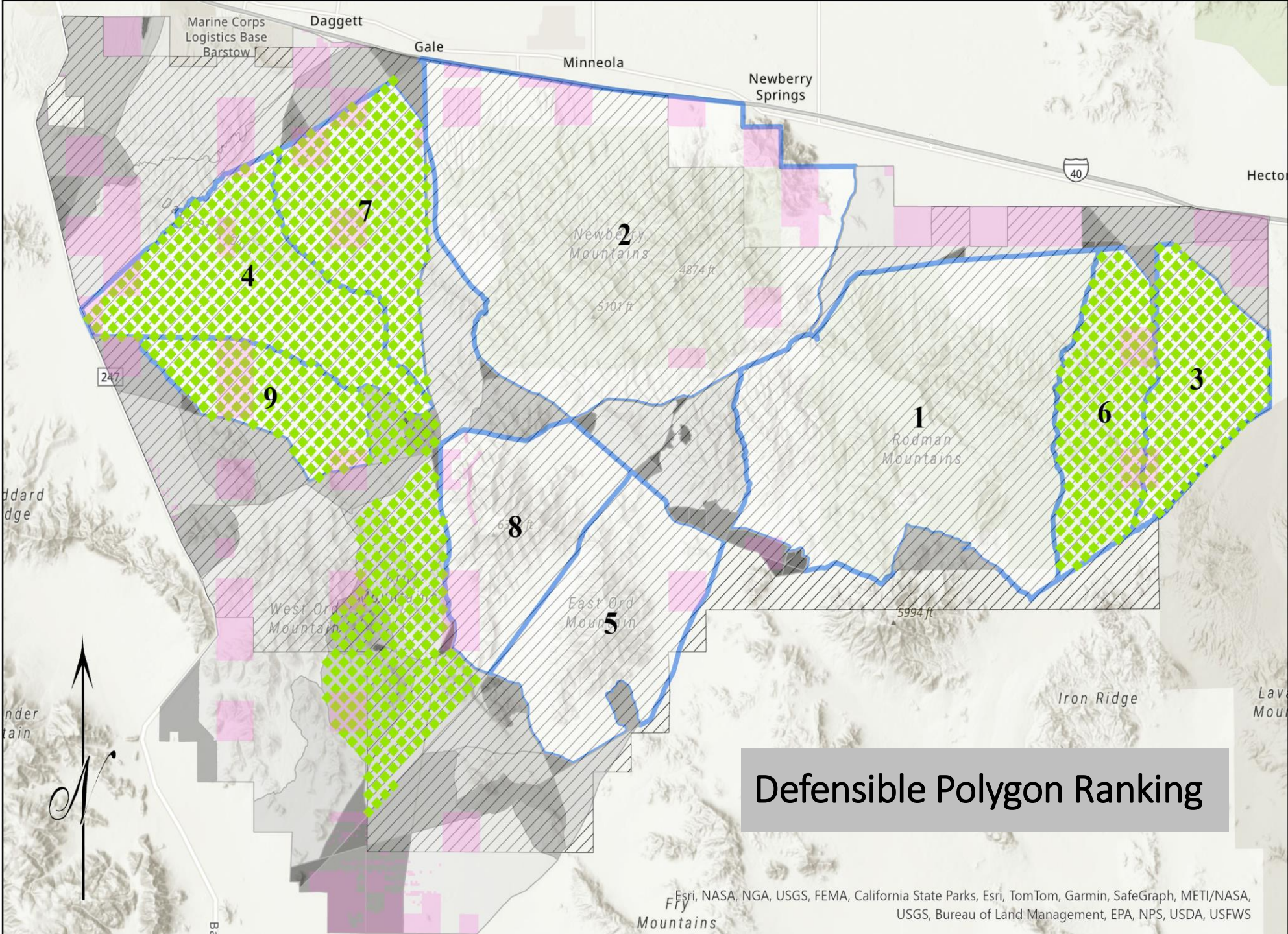
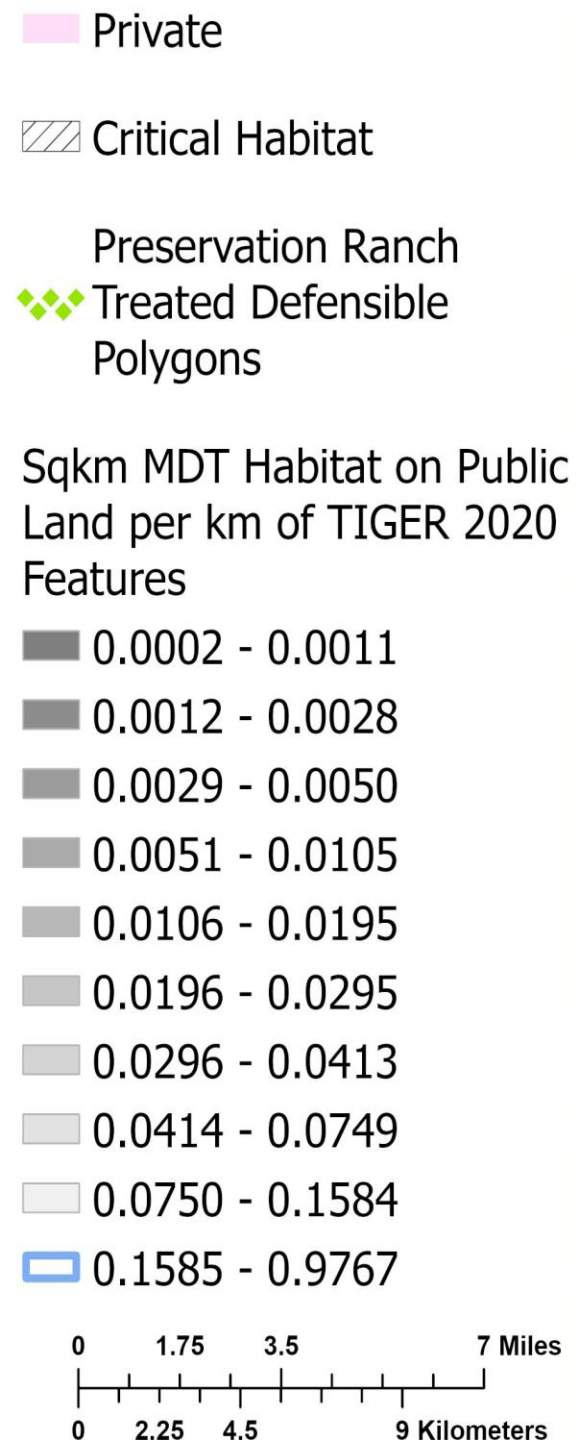
MEAN_SUM_km

- 57 - 58
- 59 - 75
- 76 - 85
- 86 - 94
- 95 - 108
- 109 - 117
- 118 - 133
- 134 - 158
- 159 - 186
- 187 - 294



Defensible Polygon Route Length

Esri, NASA, NGA, USGS, California State Parks, Esri, TomTom, Garmin, SafeGraph, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA, USFWS



Defensible Polygon Ranking



Conclusions

- ❖ Linear Landscape Feature density is a positive covariate with...
 1. Mojave desert tortoise road mortality
 2. Subsidized predator density
 3. Present invasive species cover
 4. Fire ignition risk, and more...
- ❖ The route density threshold for positive population trends is ~ 0.6 routes km/ km²
- ❖ Approximately 11,014 of 26,116 km² (~42%) of critical habitat are currently **above the route density threshold** and need to be restored
- ❖ Dividing the area of MDT Habitat on Public Land by the length of TIGER 2020 features creates a useful index for prioritizing the restoration of defensible polygons