

# Range-wide surveys for Mojave desert tortoises

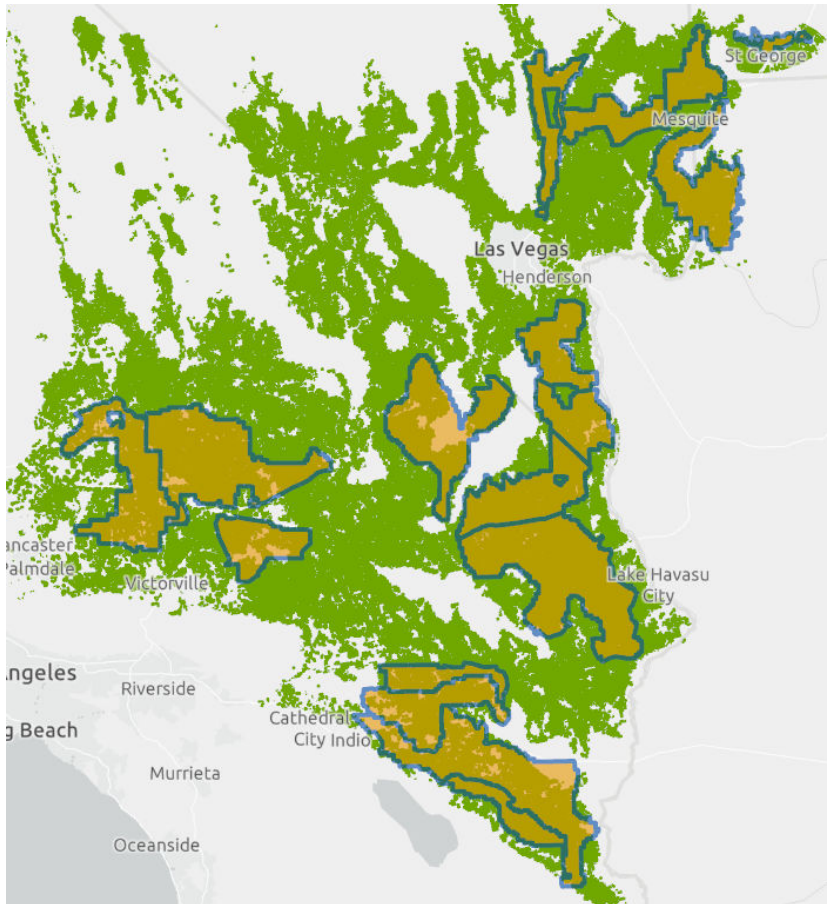
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[https://www.fws.gov/nevada/desert\\_tortoise/dtro/dtro\\_monitor.html](https://www.fws.gov/nevada/desert_tortoise/dtro/dtro_monitor.html)



# Surveys for annual densities of Mojave desert tortoises

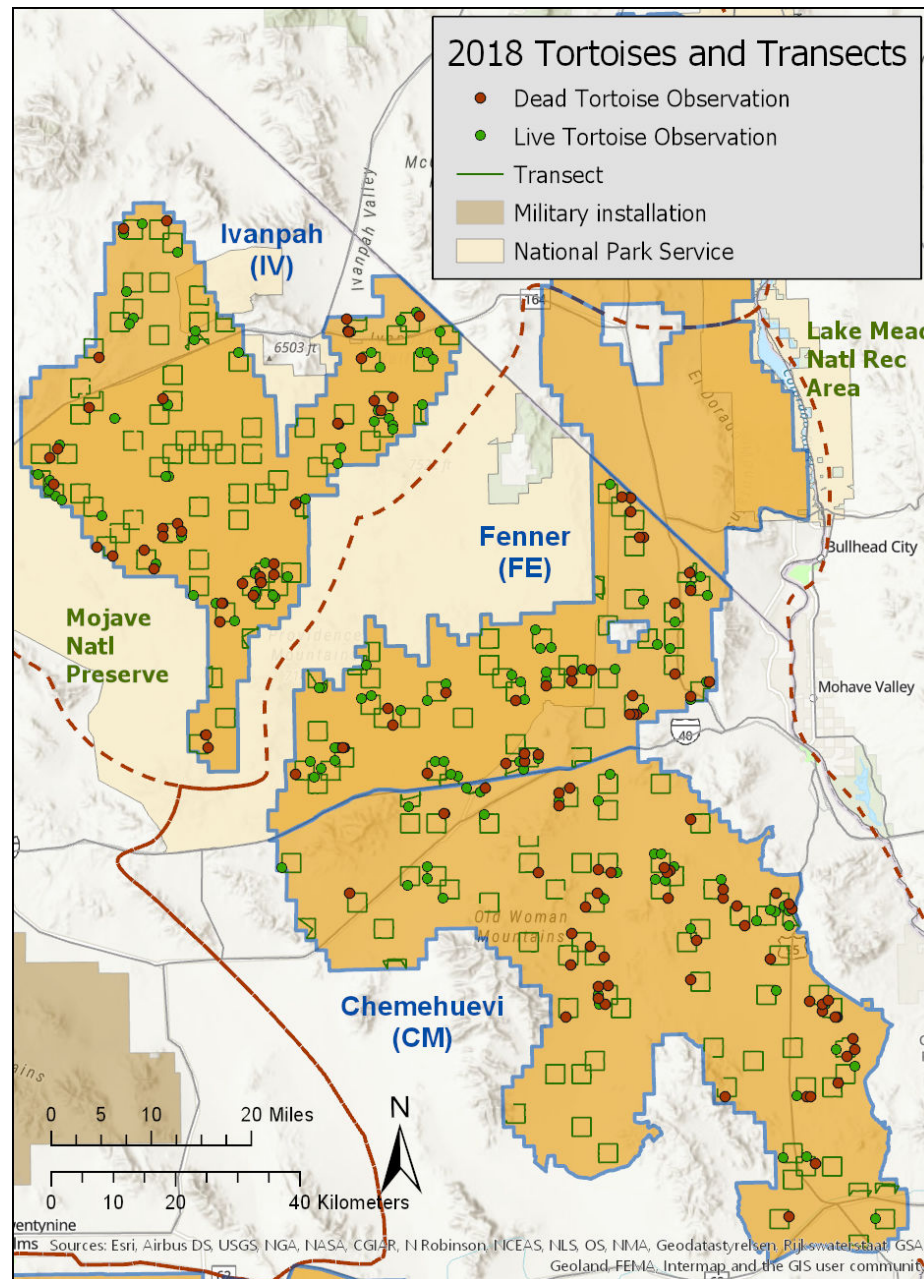


- This shows the Tortoise Conservation Areas (TCAs) and other potential habitat, without areas like cities that are impervious
- Each year, I use funding from cooperating agencies to coordinate surveys in a subset of these [orange] Tortoise Conservation Areas

Nussear et al. (2009), Fry et al. (2009)



# Surveys for annual densities of Mojave desert tortoises



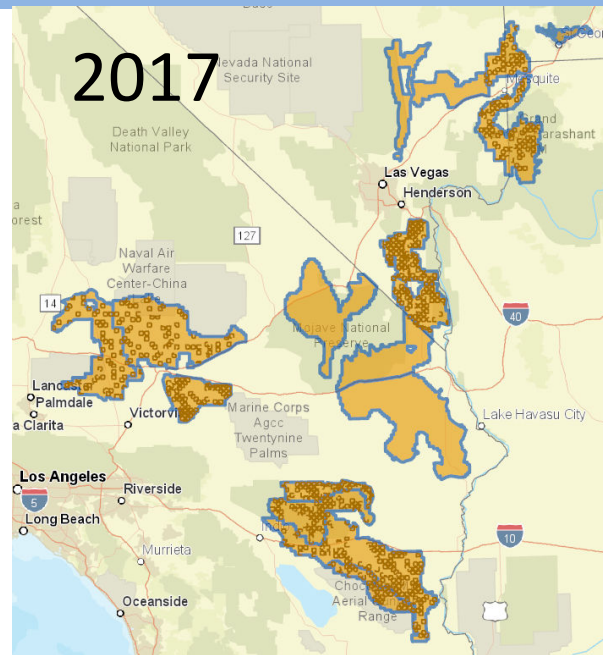
- Figure is from my annual report for 2018
- Each green square represents a day of work for 2 people + support
- The number of transects is set to find just enough tortoises for a credible density estimate
- This results in surveys that cover 0.5 – 2% of the area of each stratum





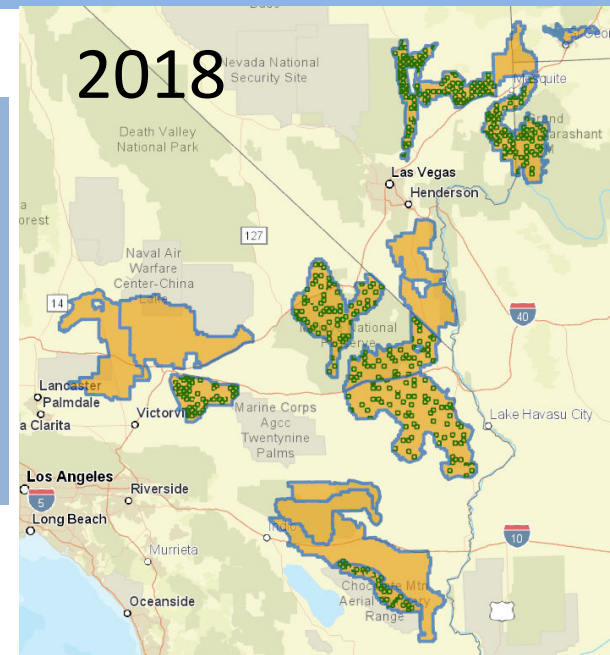
# Surveys for annual densities of Mojave desert tortoises

2017

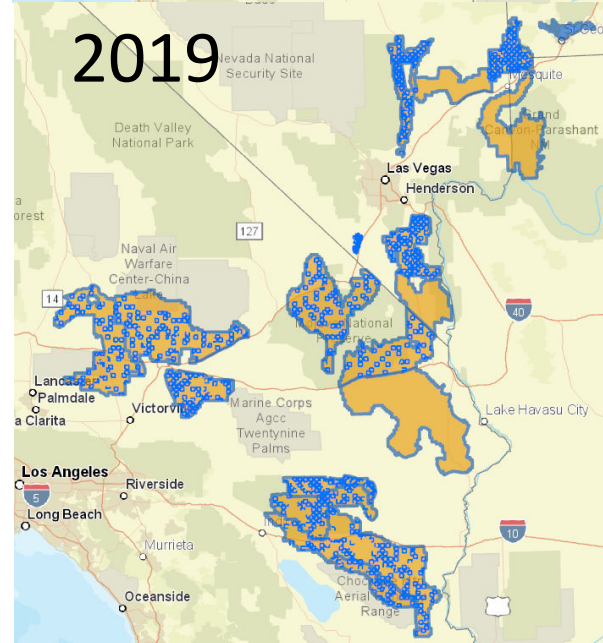


Costs are reduced by surveying each TCA approximately every other year (budget-dependent)

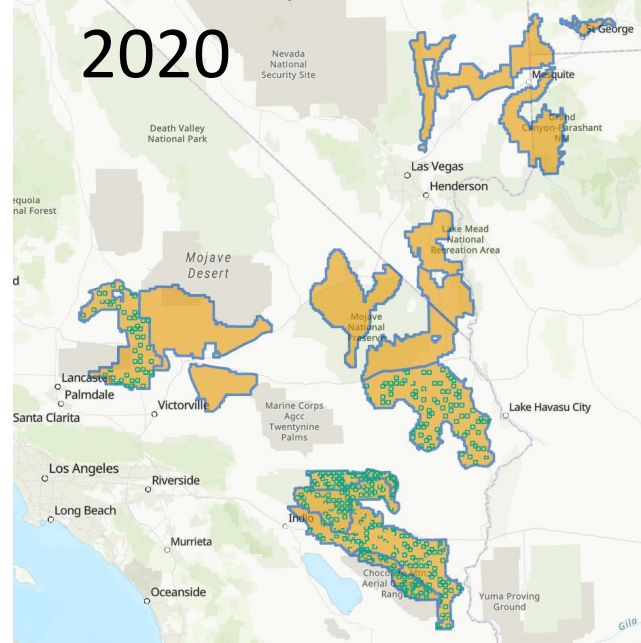
2018



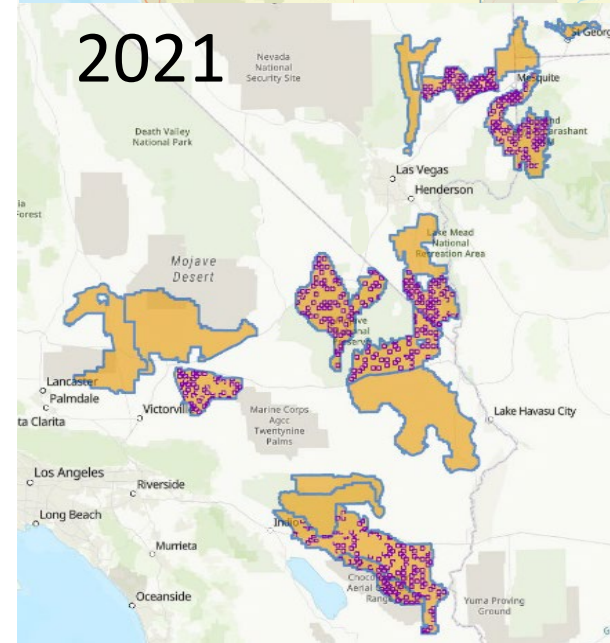
2019



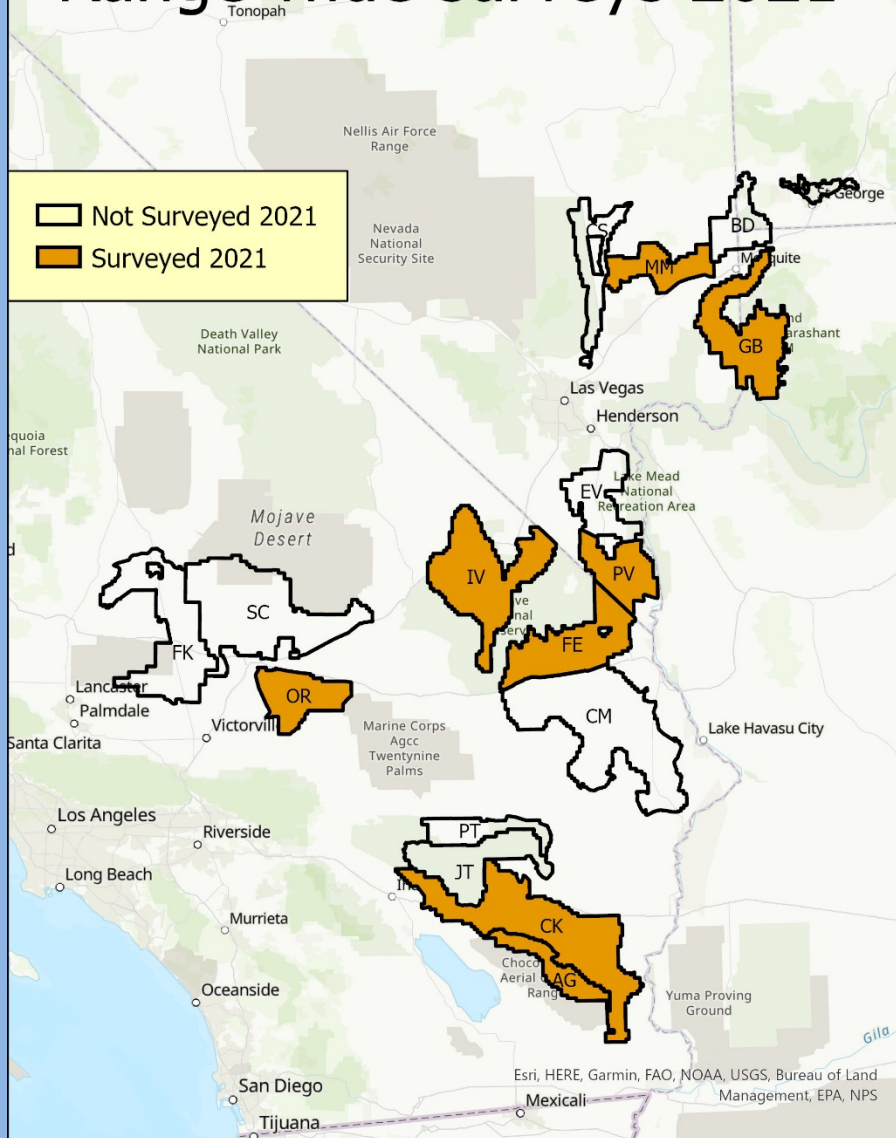
2020



2021



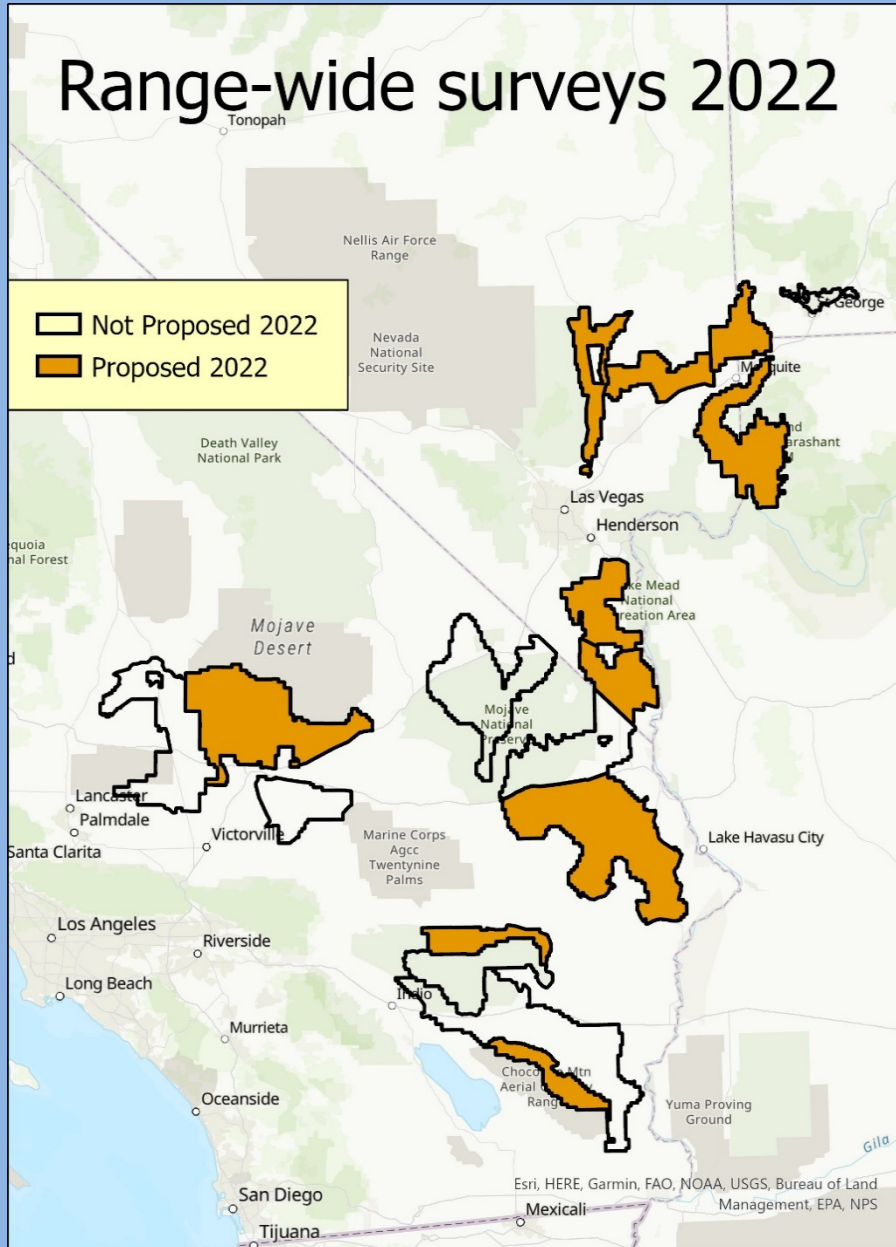
# Range-wide surveys 2021



- Upper Virgin River (Red Cliffs Reserve) was surveyed in odd years until 2021
- Eight other Tortoise Conservation Areas were surveyed



# Range-wide surveys 2022

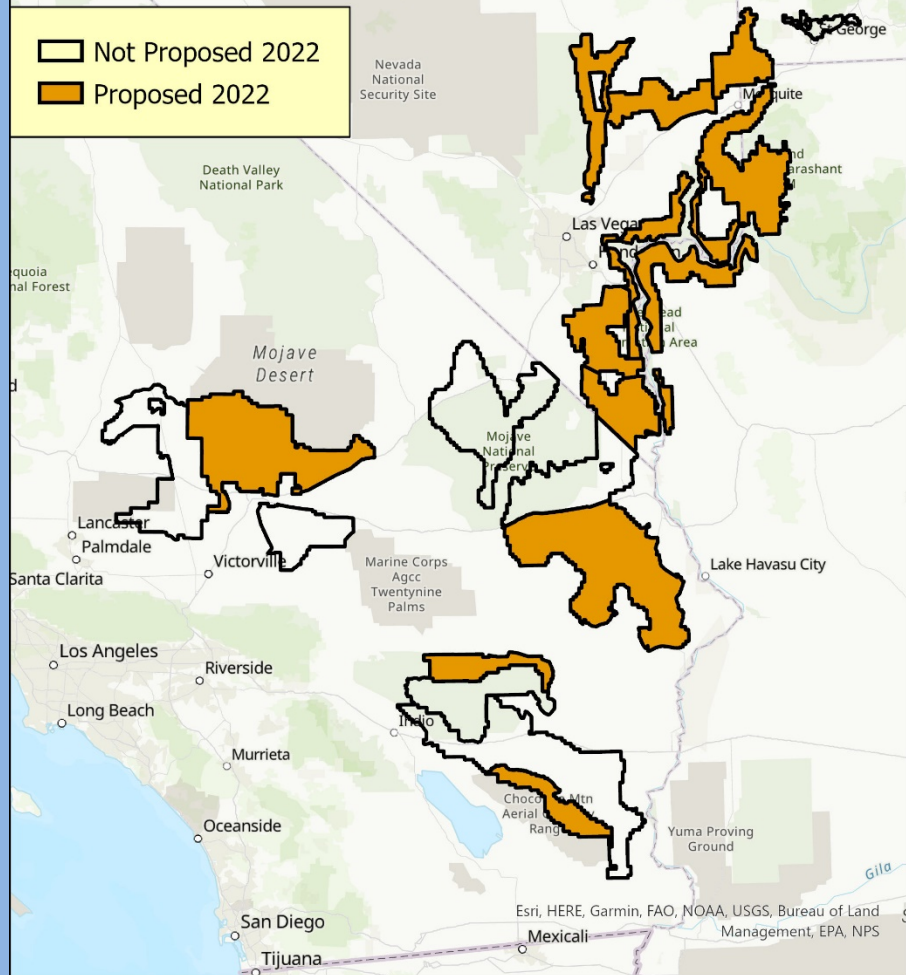


- Working with Clark County to complete full surveys in 6 of 7 TCAs in the northern half of the range
- Actual surveyed Tortoise Conservation Areas in California will depend on final funding amounts





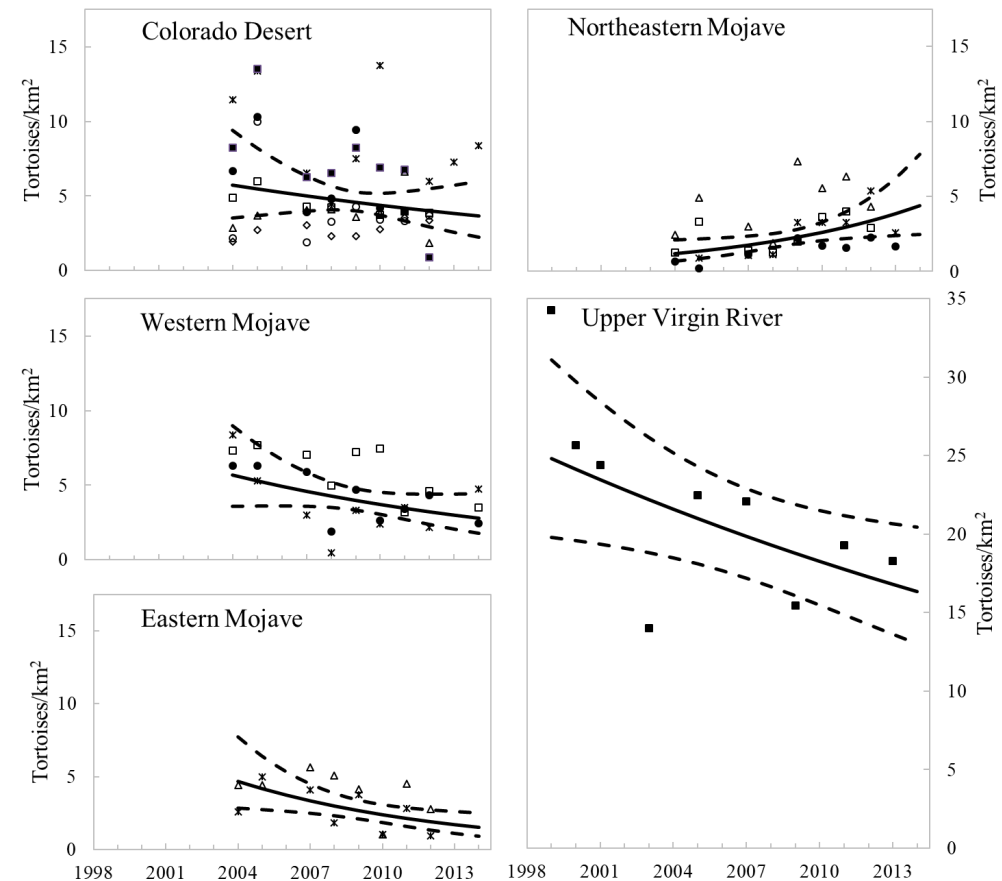
# Range-wide surveys 2022 including Lake Mead NRA



- Working with Clark County to complete full surveys in 6 of 7 TCAs in the northern half of the range
- Actual surveyed Tortoise Conservation Areas in California will depend on final funding amounts
- Adding surveys throughout Lake Mead National Recreation Area



# Trends in density of adult Mojave desert tortoises

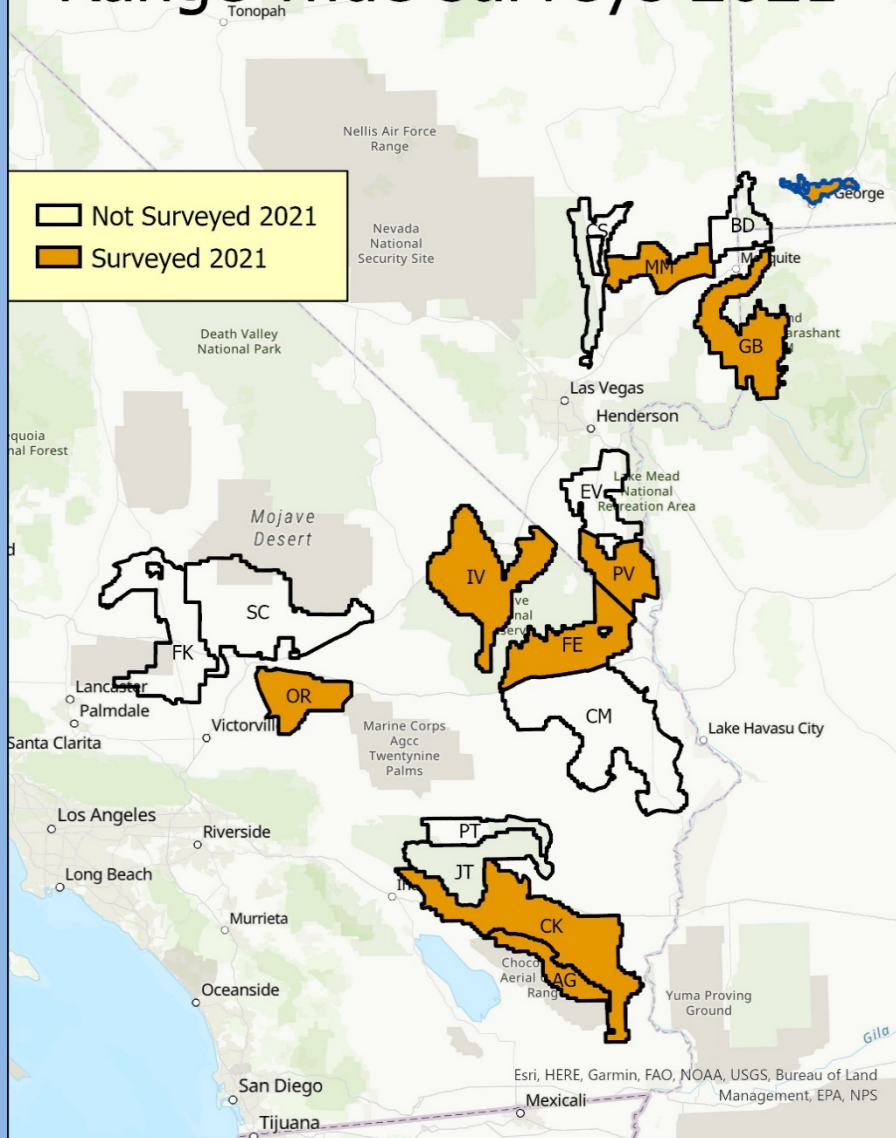


- Adult densities are declining or neutral in 4 of 5 recovery units
- Each recovery unit is represented by 1-7 separate Tortoise Conservation Areas (TCAs)
- Declines have been ongoing over 15 years, but Upper Virgin River still has higher adults densities than other recovery units.
- The recovery unit and individual TCAs with increasing trends had the lowest densities in 2004





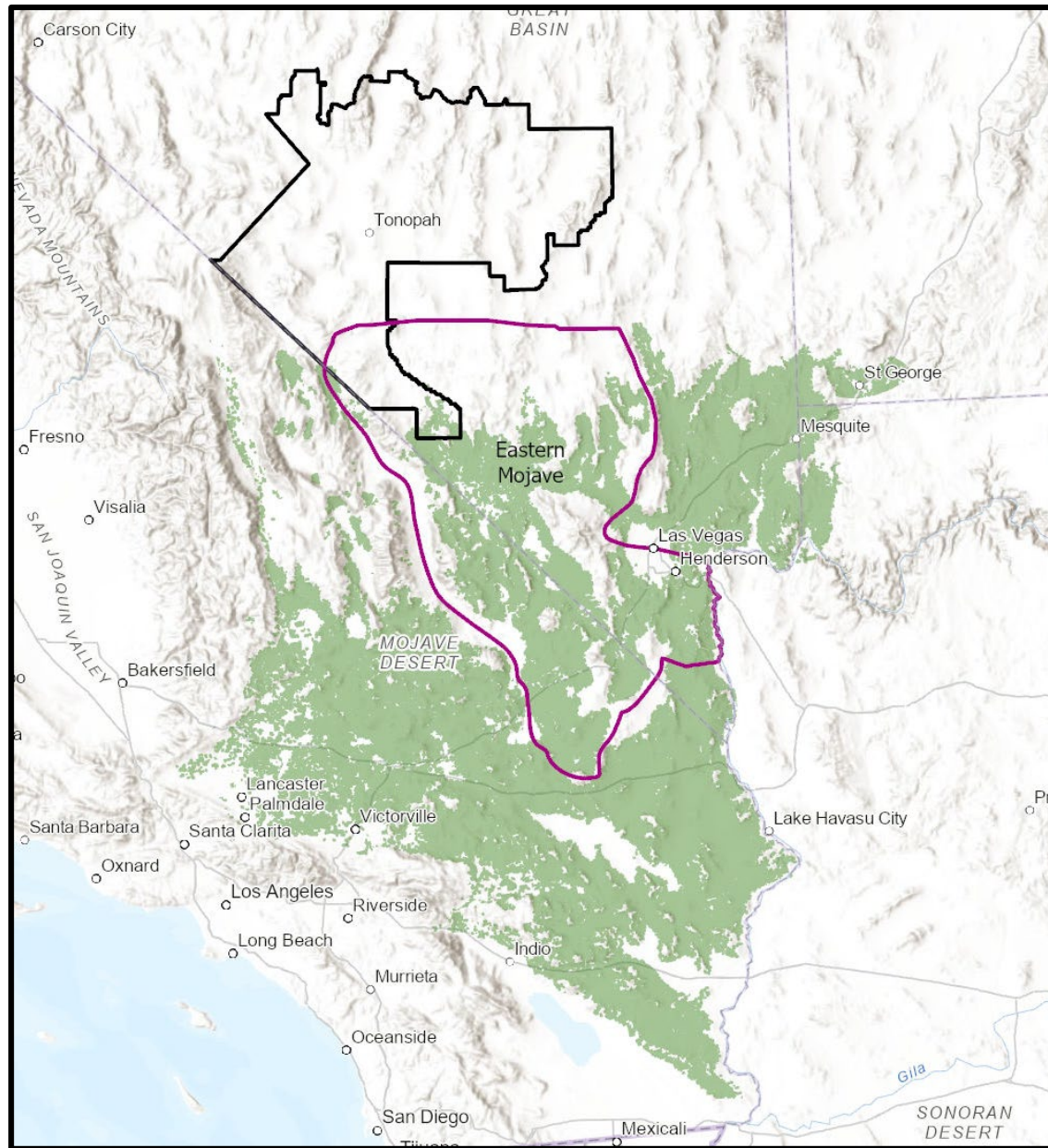
# Range-wide surveys 2021



- Since the 2021 surveys, all TCAs have been surveyed at least 3 times since 2014
- I am starting reanalysis to update the density trends

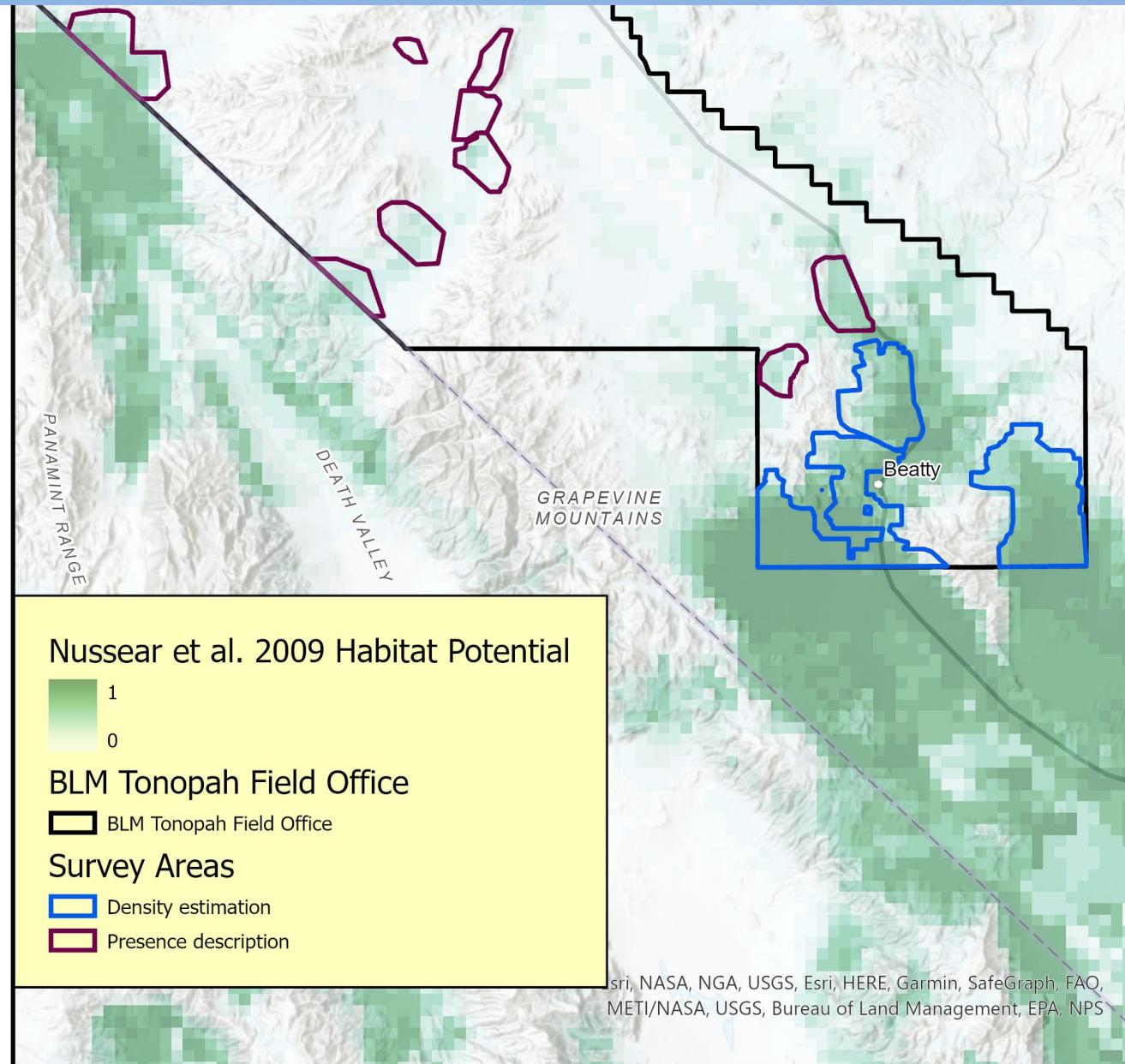


# Surveys in BLM Tonopah Field Office jurisdiction





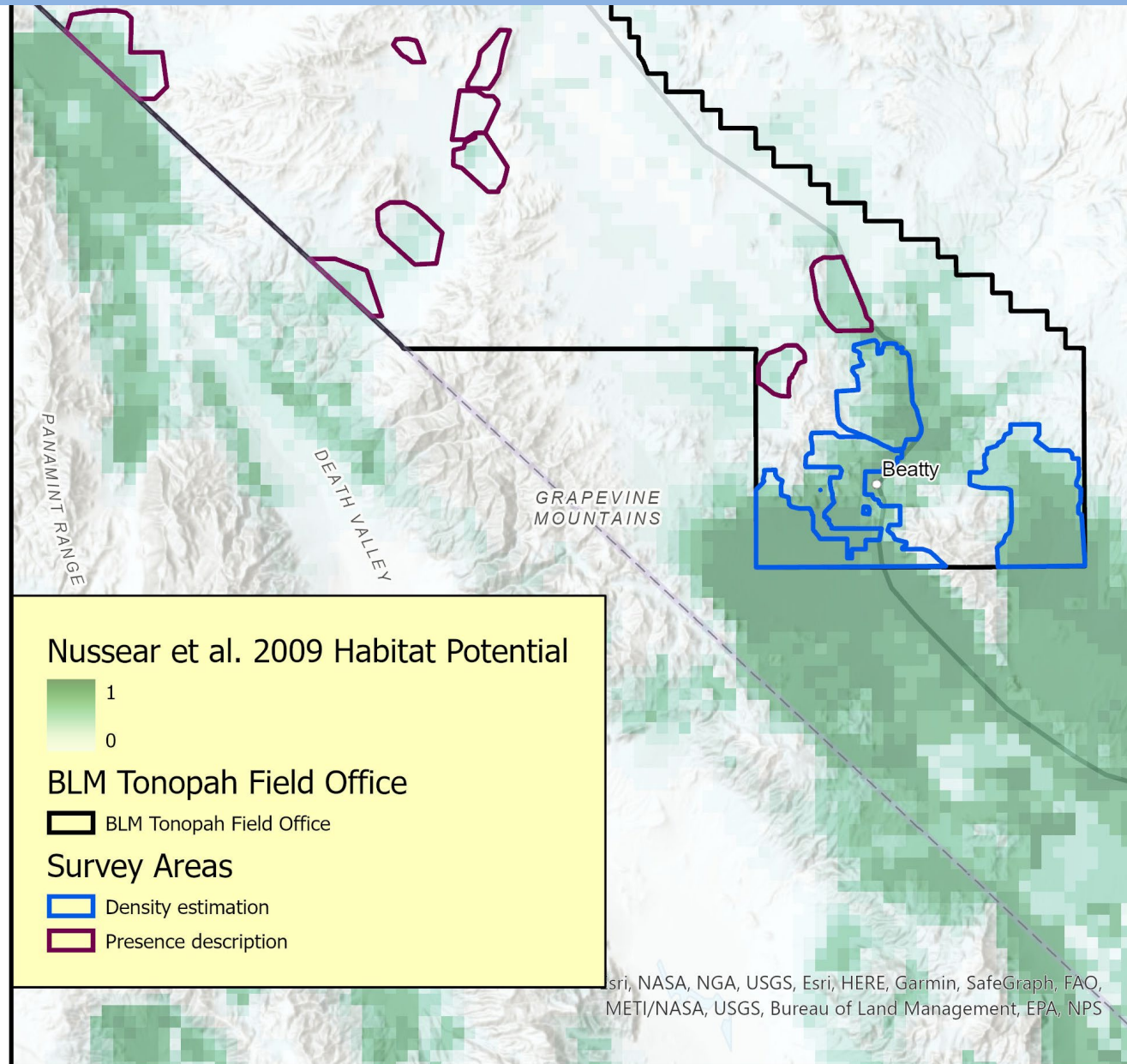
# Surveys in BLM Tonopah Field Office jurisdiction



- Areas around Beatty, Nevada, surveyed to estimate density
- Other potential habitat surveyed for signs of tortoises



# Surveys in BLM Tonopah Field Office jurisdiction



- Areas around Beatty had 1.3 adult tortoises/sqkm
  - Similar to TCAs in Eastern Mojave Recovery Unit where density is 1.5/sqkm
- In northern sites, we found no live or dead tortoises or occupied burrows
  - Not conclusive that there are no tortoises in these areas



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ENDANGERED SPECIES RESEARCH  
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## Quantifying development to inform management of Mojave and Sonoran desert tortoise habitat in the American southwest

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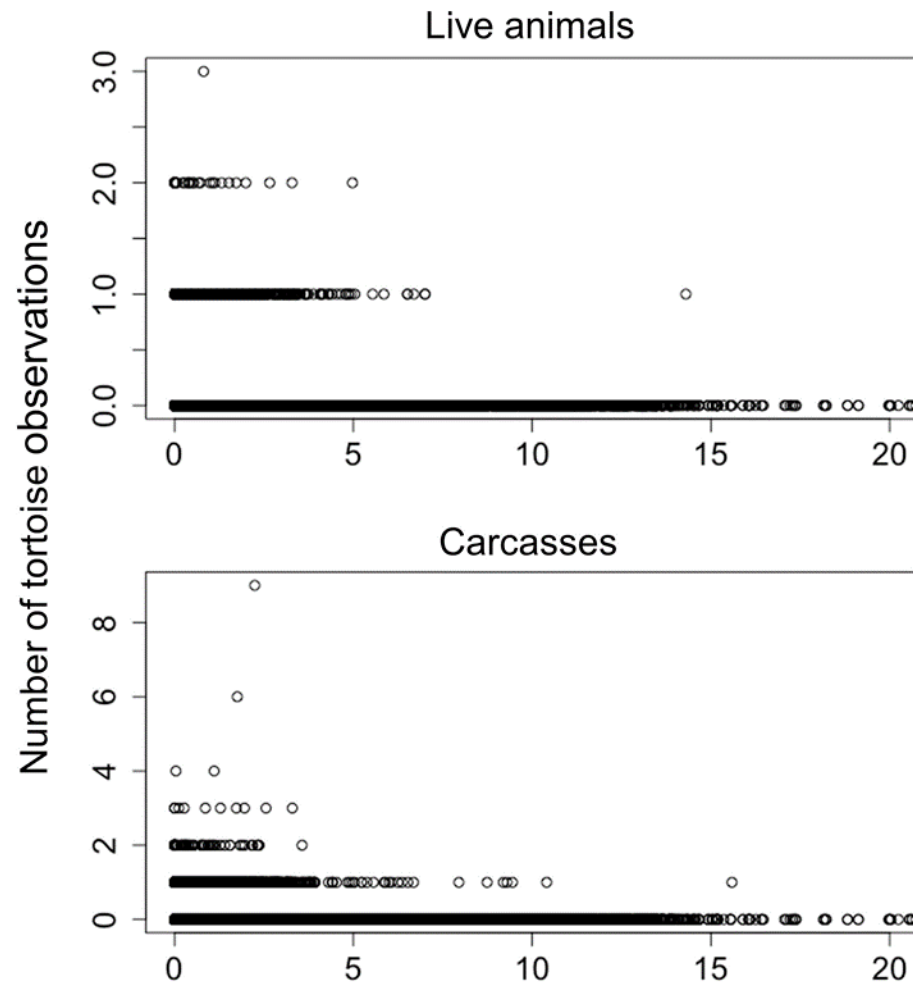
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# Live tortoises are not found with much more than 5% development within a 1-kilometer radius



Proportion of area developed within 1 km of the live or dead tortoise



