Range-wide surveys for Mojave desert tortoises

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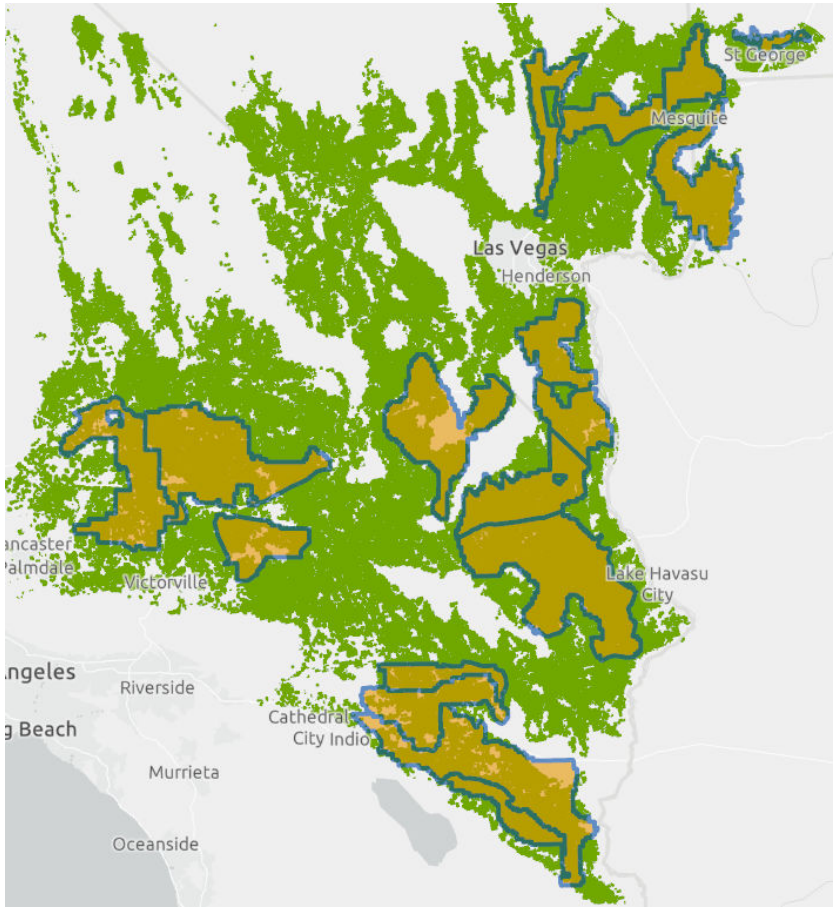
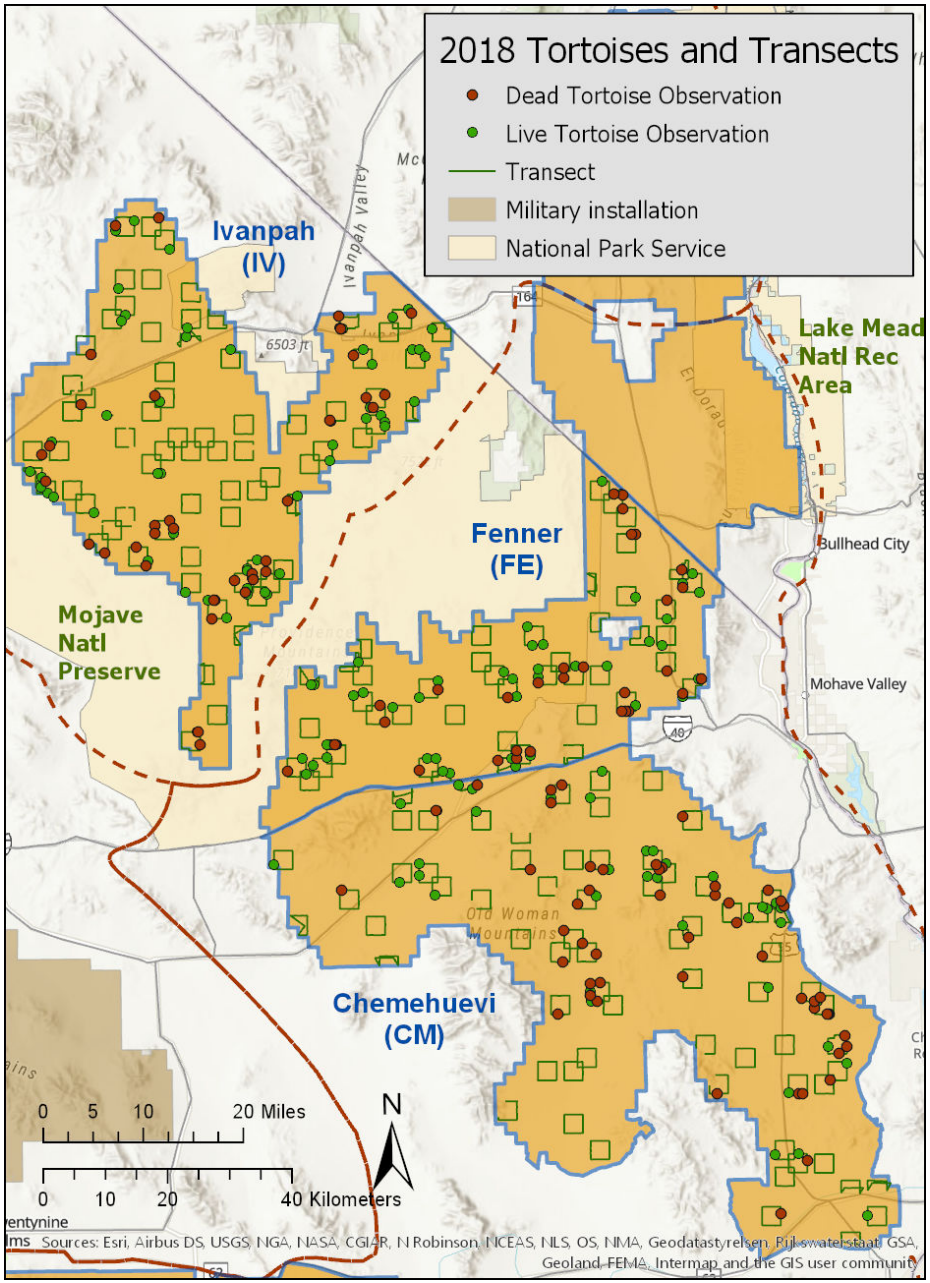
https://www.fws.gov/nevada/desert_tortoise/dtro/dtro_monitor.html

Surveys for annual density of Mojave desert tortoises



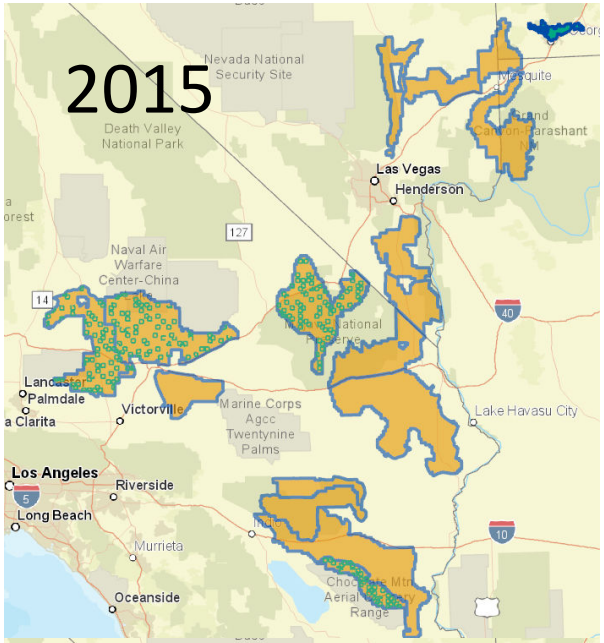
- This shows the TCAs and other potential habitat described by Nussear et al. (2009), without areas that are known to be impervious (Fry et al. 2009)
- Each year, I use funding from cooperating agencies to coordinate surveys in a subset of these [orange] Tortoise Conservation Areas

Where do these density estimates come from?

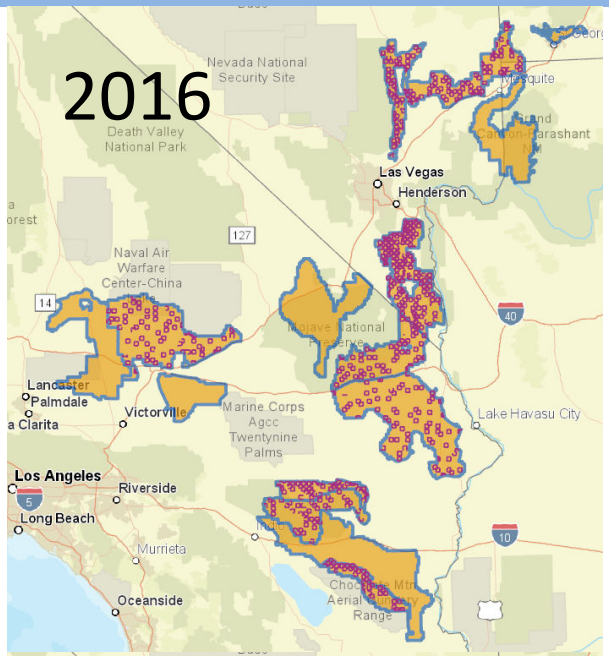


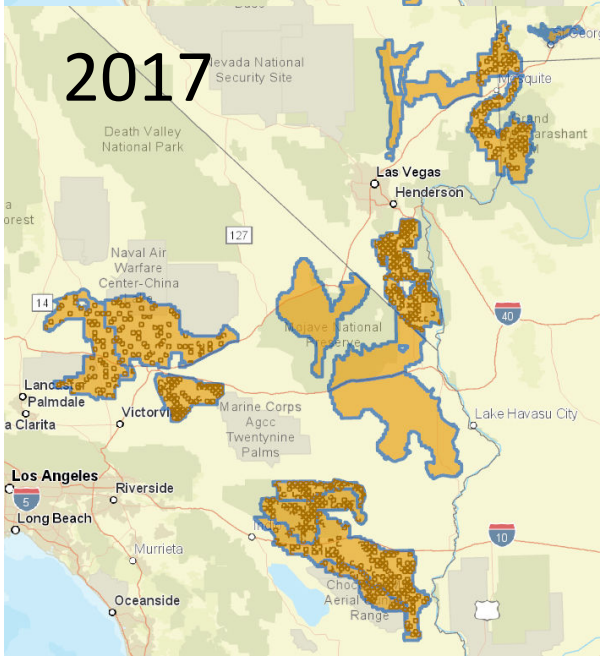
- Figure is from my annual report for 2018
- Each green square represents a day of work for 2 people + support
- The number of transects is set to find just enough tortoises for a credible density estimate
- This results in surveys that cover 0.5 – 2% of the area of each stratum

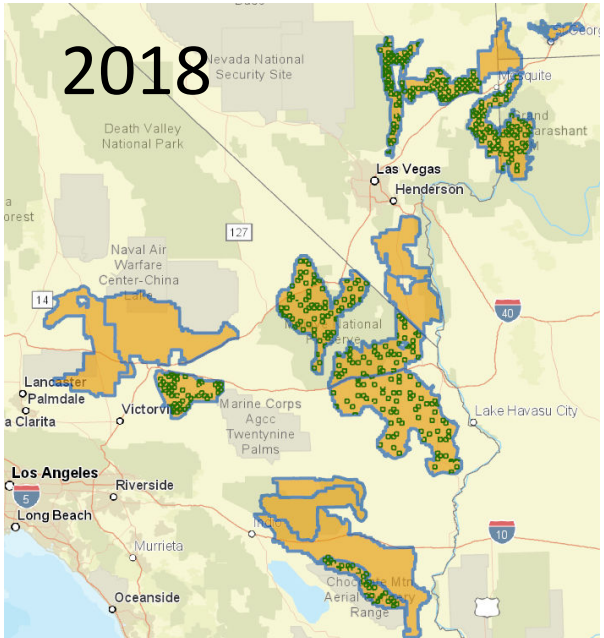
Where do these density estimates come from?

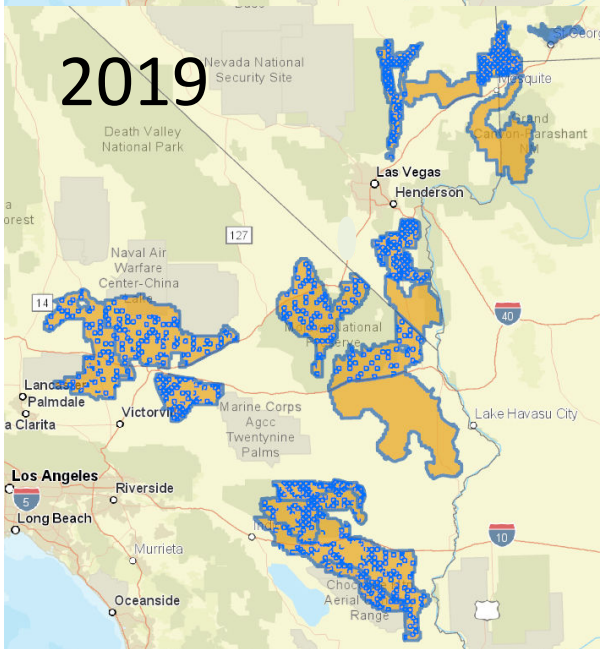


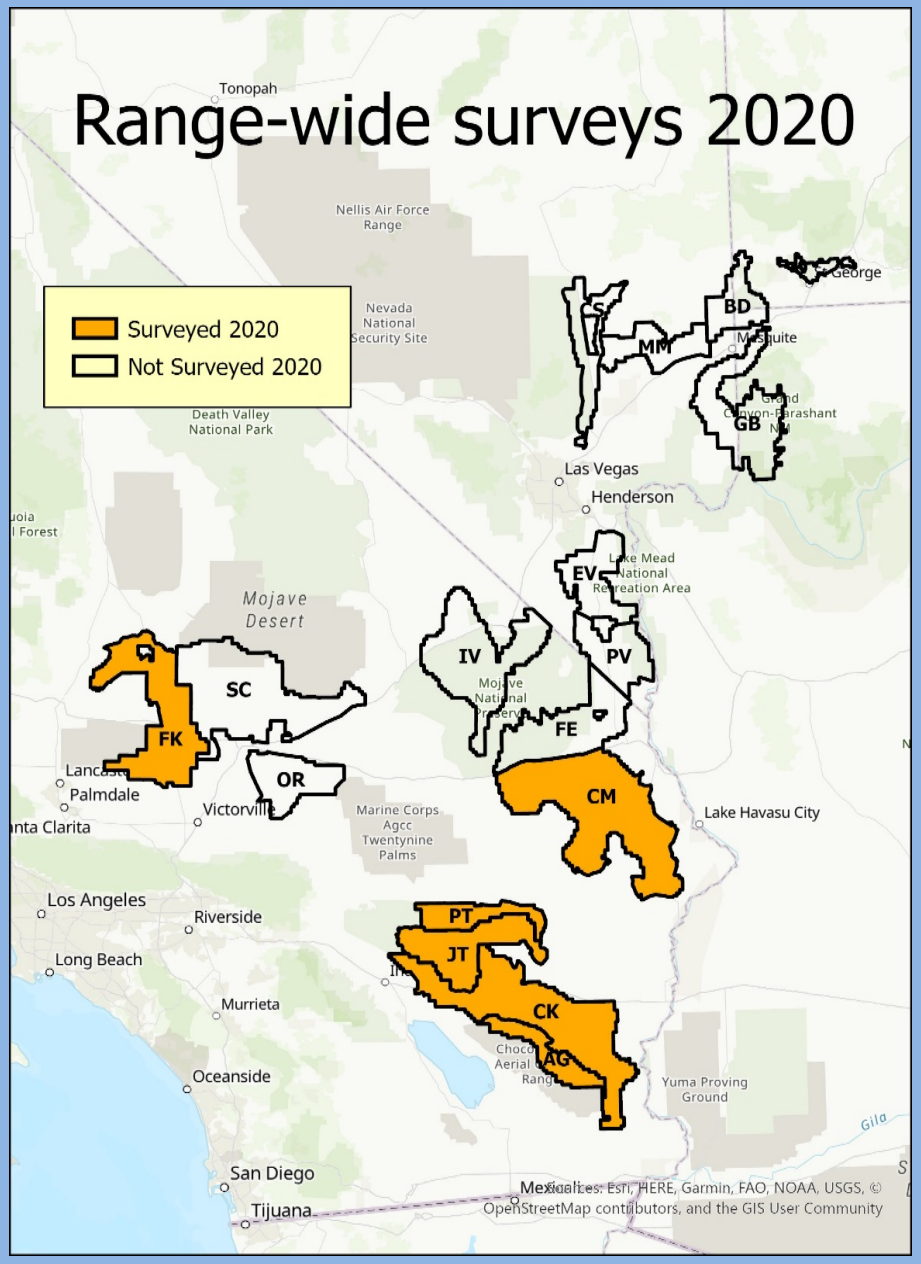
Costs are reduced by surveying each TCA approximately every other year (budget-dependent)



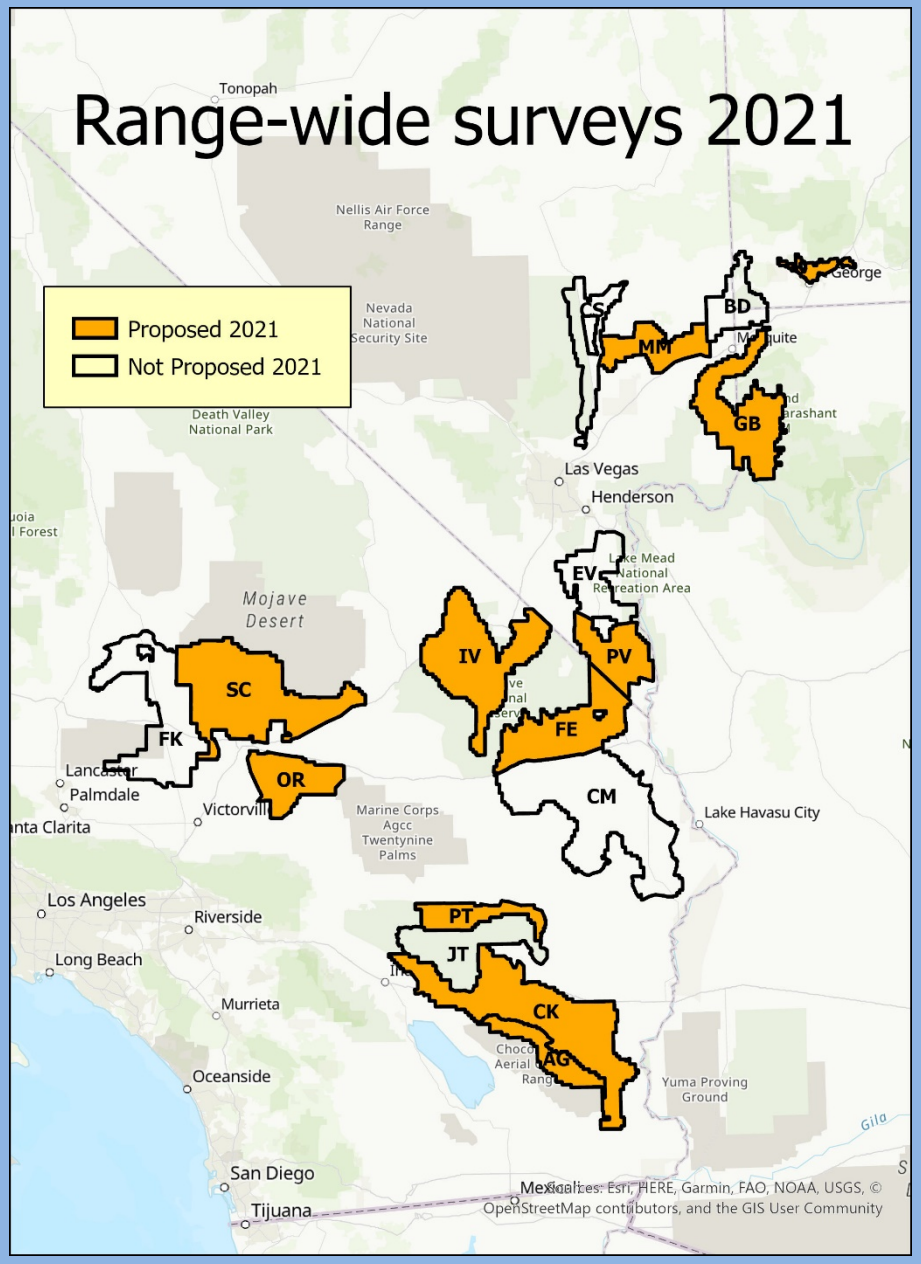






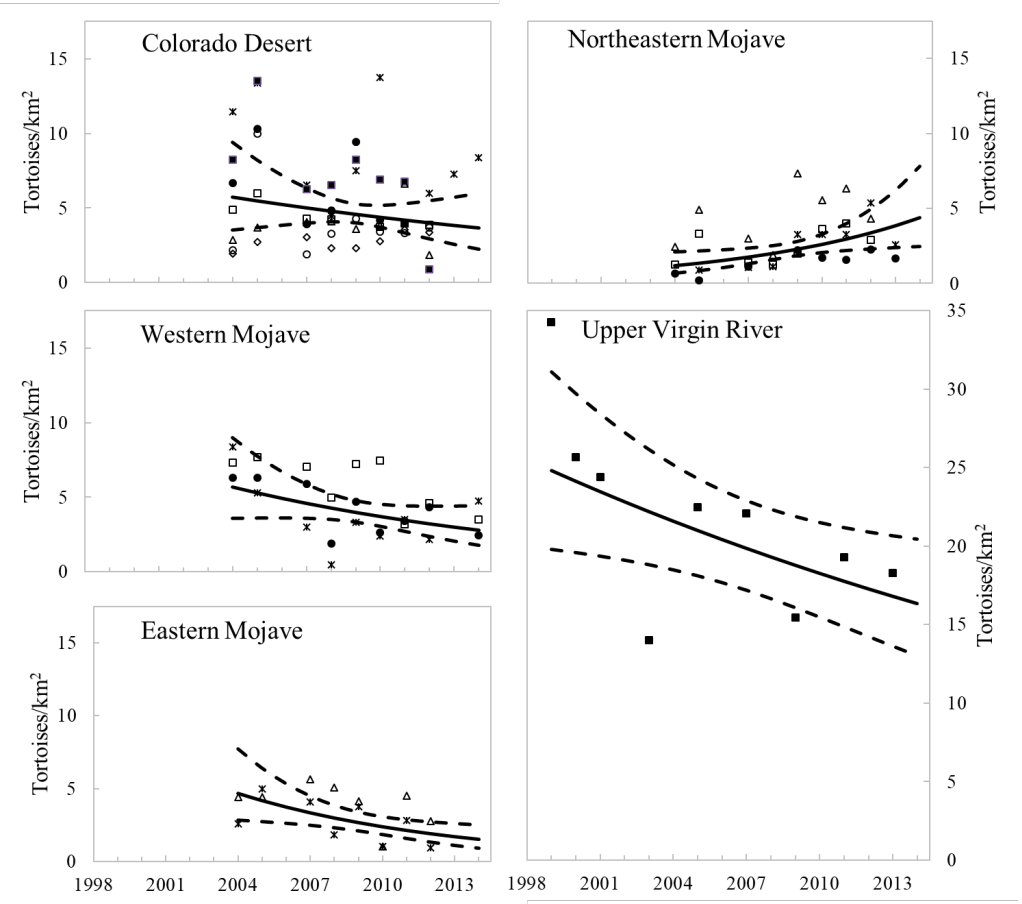


- Upper Virgin River (Red Cliffs Reserve) is surveyed in odd years
- Surveys in Nevada and Arizona were planned but precluded by coronavirus emergency measures
- Surveys crews in California were able to complete surveys after state coronavirus measures were put in place



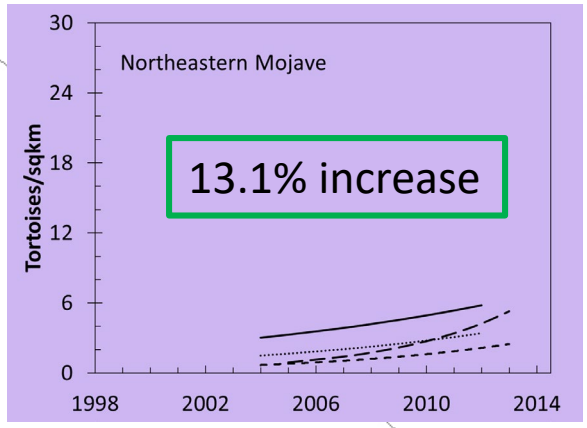
- Upper Virgin River (Red Cliffs Reserve) is surveyed in odd years
- Surveys in Nevada and Arizona planned for 2020 will instead be conducted 2021
- Actual surveyed Tortoise Conservation Areas in California will depend on final funding amounts

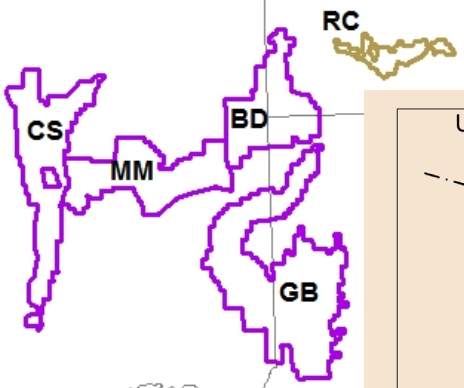
Trends in density of Mojave desert tortoises

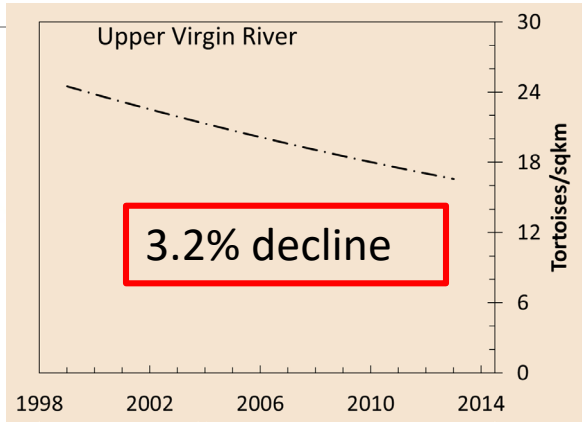


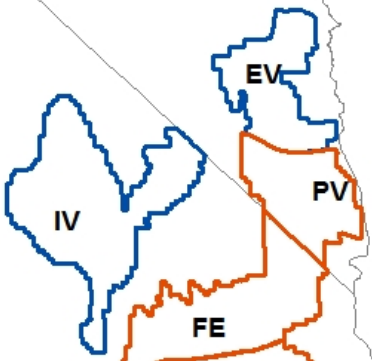
- Trends in adult densities are declining or neutral in 4 of 5 recovery units
- Each recovery unit is represented by 1-7 separate Tortoise Conservation Areas (TCAs)
- Although declines have been ongoing over 15 years, Upper Virgin River still has higher adults densities than other recovery units.
- The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

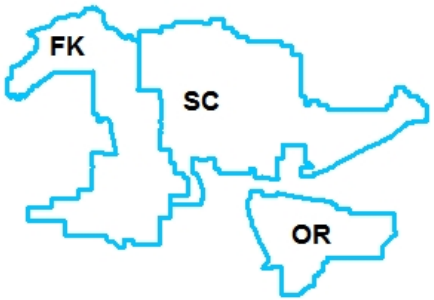
Allison and McLuckie 2018

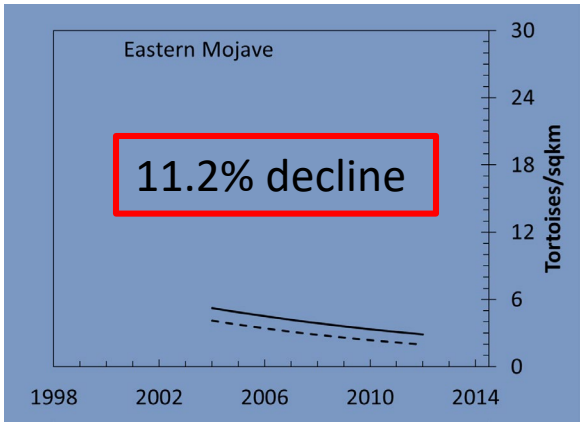

Northeastern Mojave
13.1% increase
Tortoises/sqkm
30
24
18
12
6
0
1998
2002
2006
2010
2014

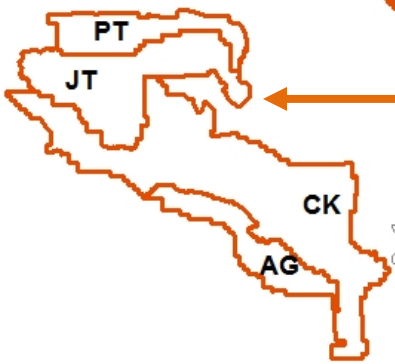

RC
CS
MM
BD
GB

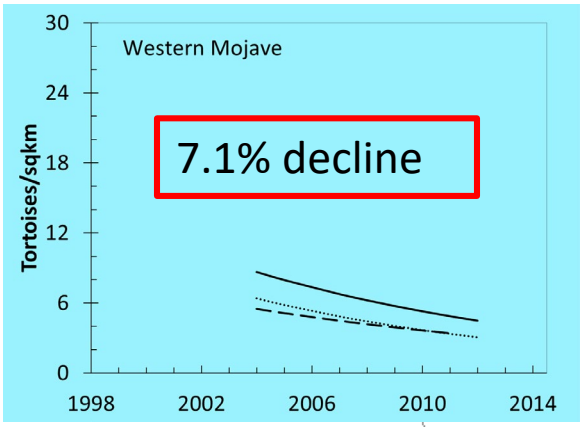

Upper Virgin River
3.2% decline
Tortoises/sqkm
30
24
18
12
6
0
1998
2002
2006
2010
2014

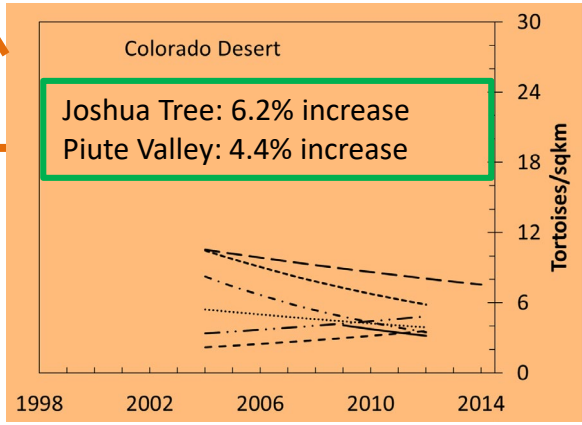

EV
IV
PV
FE
CM


FK
SC
OR

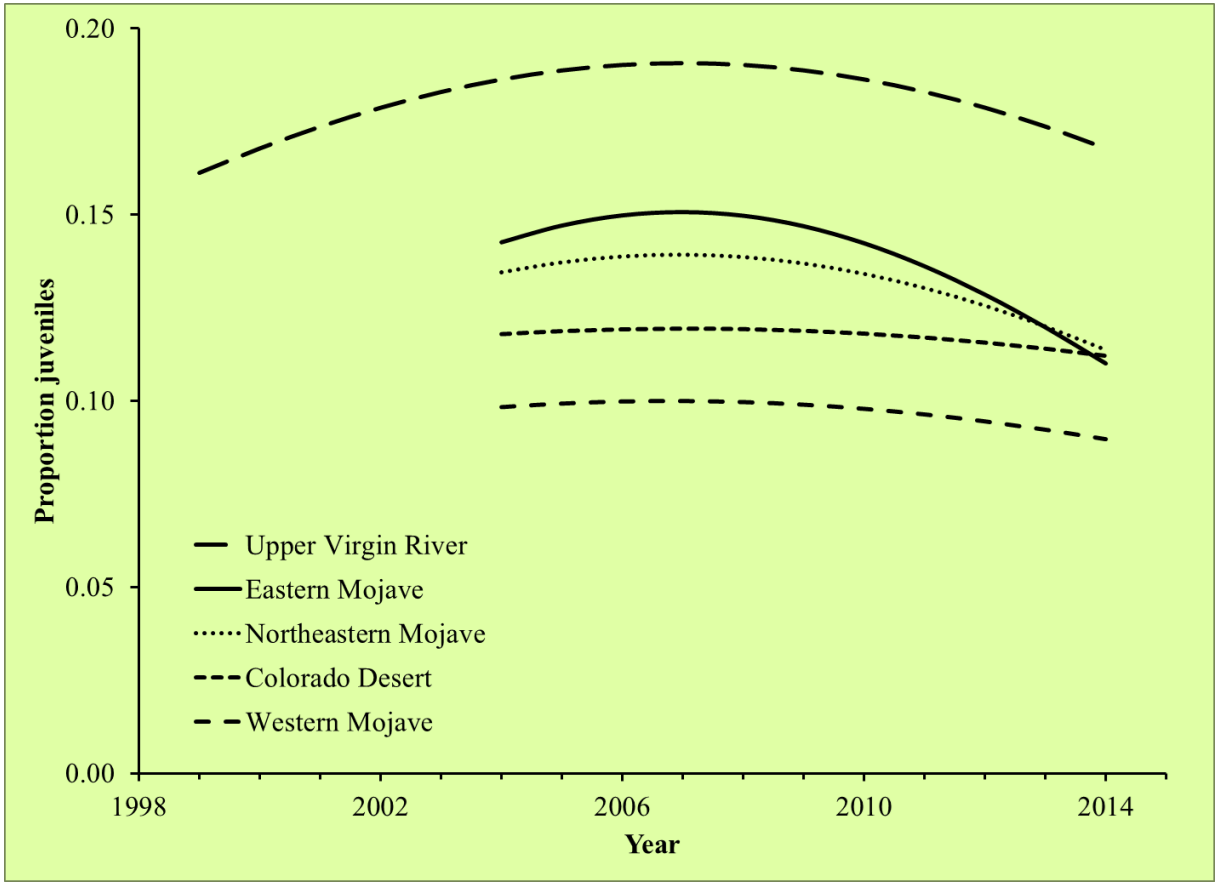

Eastern Mojave
11.2% decline
Tortoises/sqkm
30
24
18
12
6
0
1998
2002
2006
2010
2014


PT
JT
CK
AG


Western Mojave
7.1% decline
Tortoises/sqkm
30
24
18
12
6
0
1998
2002
2006
2010
2014

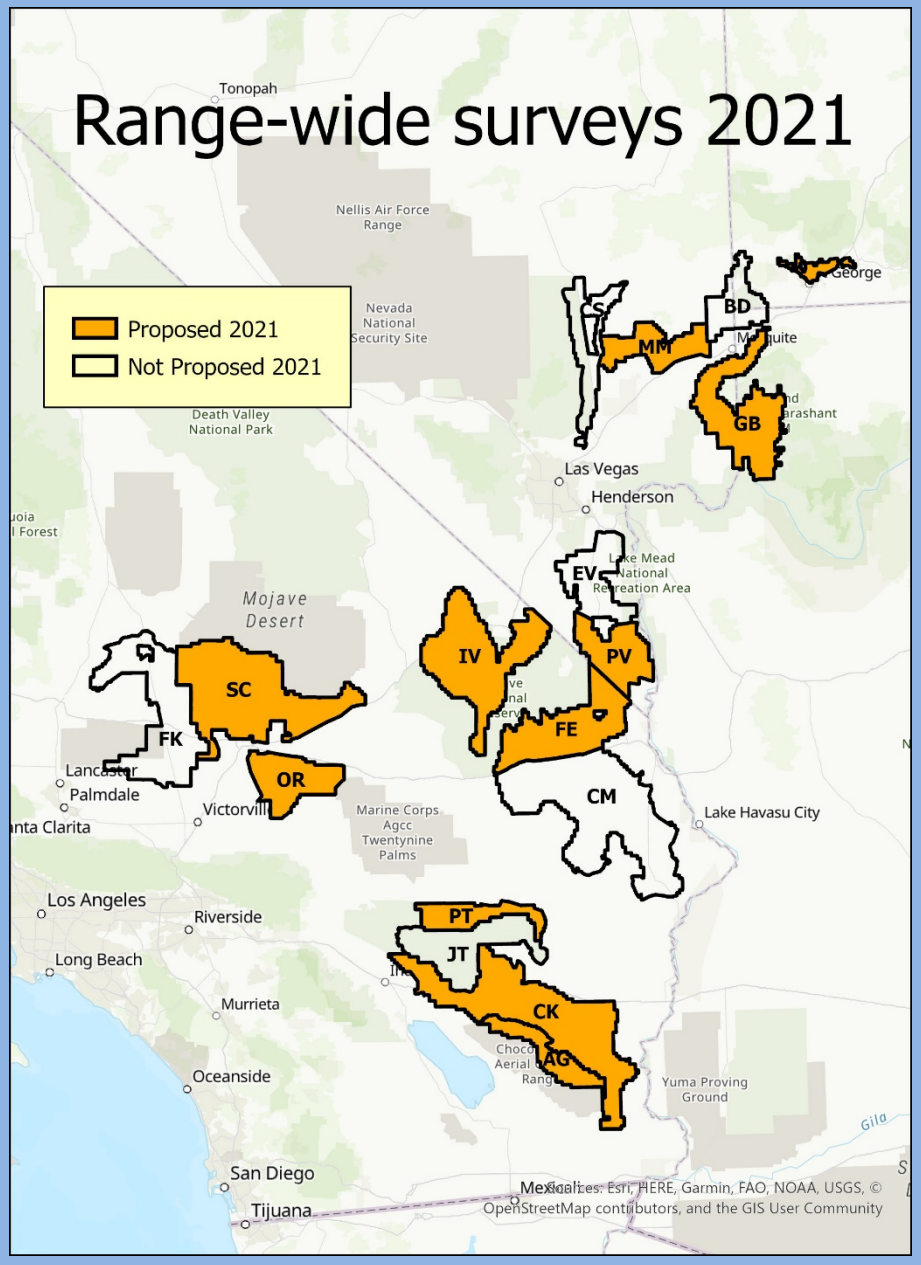

Colorado Desert
Joshua Tree: 6.2% increase
Piute Valley: 4.4% increase
Tortoises/sqkm
30
24
18
12
6
0
1998
2002
2006
2010
2014

Relative Abundance of Smaller Tortoises (< 180 mm)



Allison and McLuckie 2018

- The proportion of juveniles has been declining in all recovery units since 2007.
- Juveniles will not bolster adult numbers in the near term



- After 2021, all TCAs will have at least 3 more surveys since 2014 and I will reanalyze the density trends