Improving Juvenile Desert Tortoise Survival

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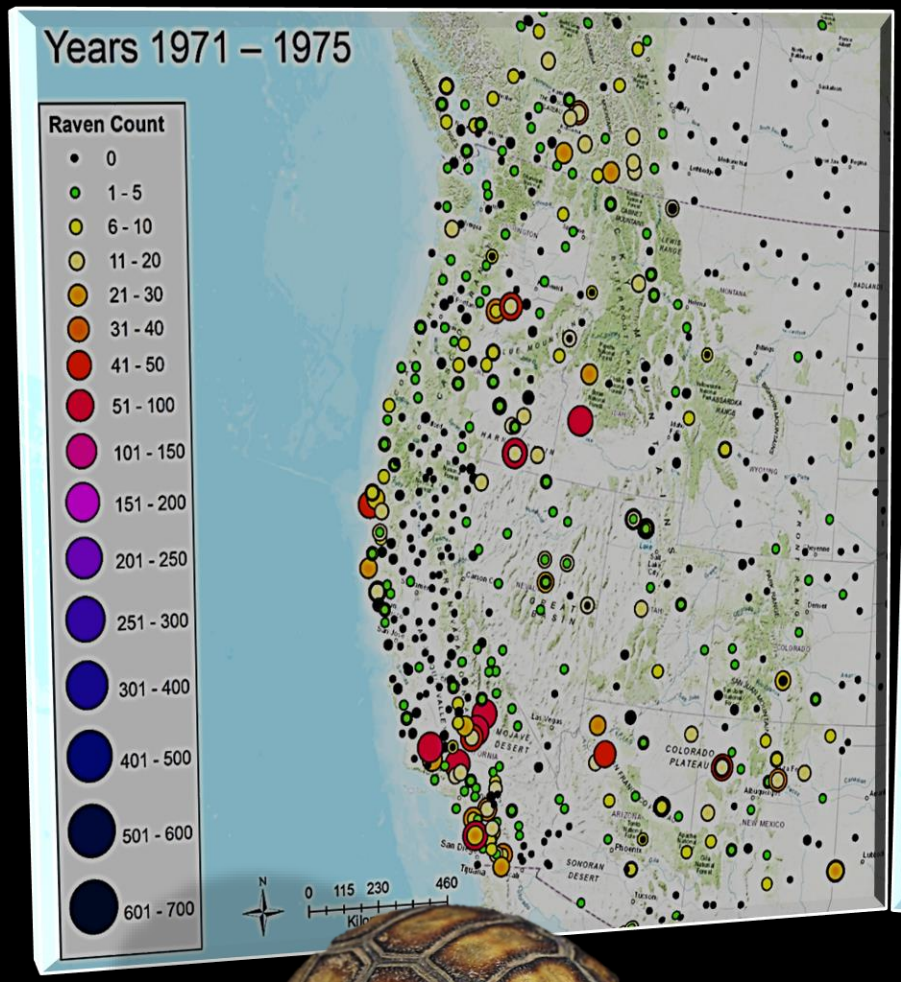
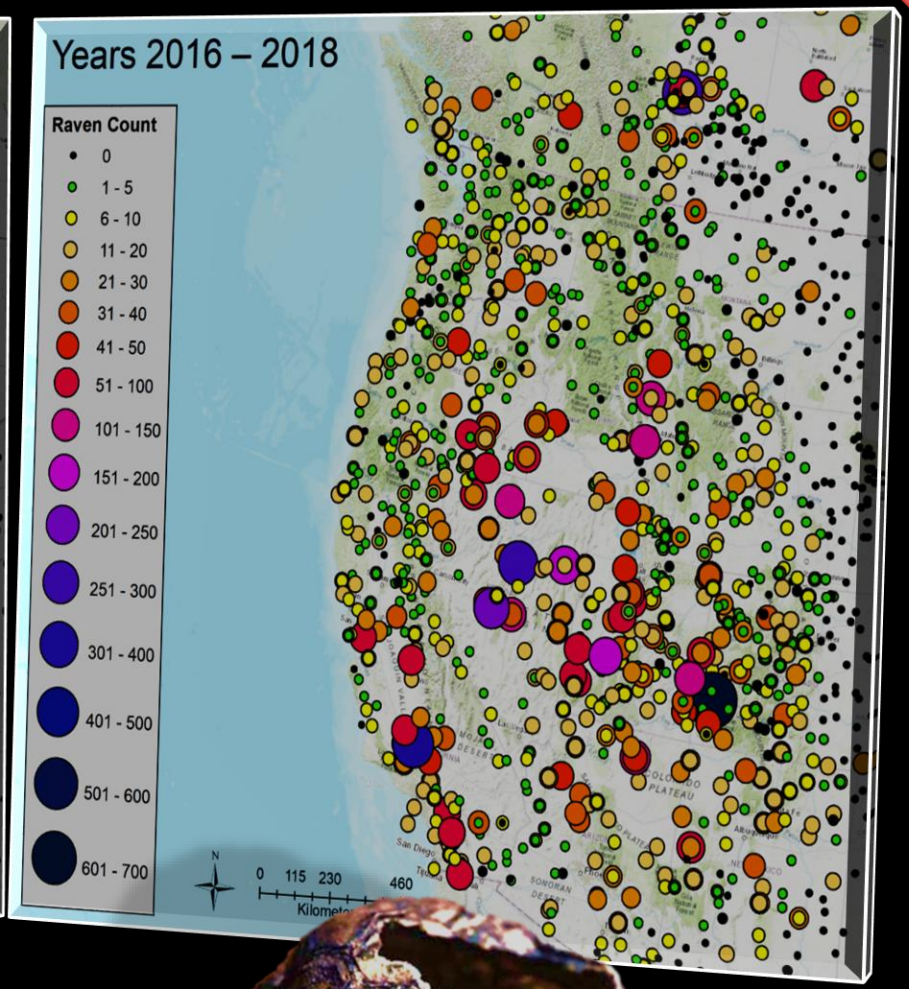
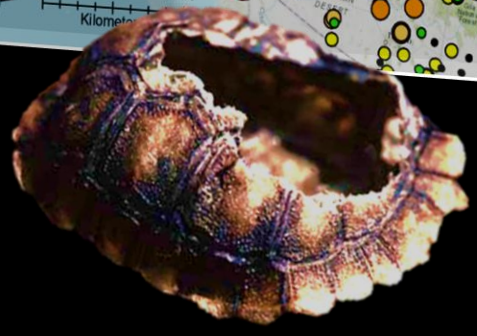
Breeding Bird Survey: Common Raven

(Sauer and Link)







Juvenile Mojave Desert Tortoise Vitality Rates

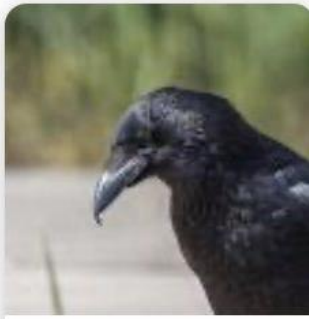
Discussion

Study (yr.)	Annual Mortality	Annual Mortality due to Ravens	Annual Mortality due to Other
McGovern et al. 2020 (18-19)	0.217	0.065	0.152
Daly et al. 2019 (15-16)	0.620	0.296	0.324
Tuberville et al. 2019 (12-13)	0.674	0.283	0.391
Nagy et al. 2015 (04)	0.938	0.438	0.500
Nagy et al. 2015 (07)	0.906	0.656	0.250
Mean	0.671	0.347	0.323

$$S_{annual} = \exp(-CH_{annual}) - O_{mortality}$$

Common raven

Rook



Carrion crow

Western jackdaw

Hooded crow

Australian raven

Pied crow

American crow

Large-billed crow

American Crow

+ straight beak
+ generally smaller

Common Raven

+ slight point on beak
+ "nasal" feathers extend

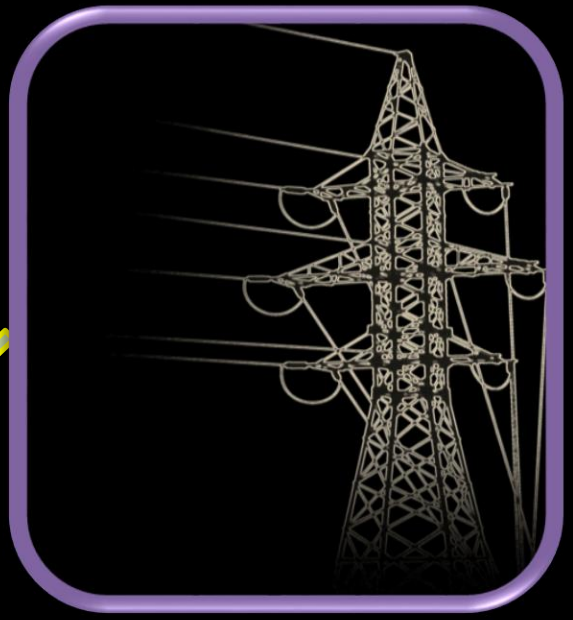
+ short rhythmic "caw"s
+ smooth neck feathers

+ deeper raspy "croak"
+ long shaggy neck feathers

+ consistant flapping
+ fan-shaped tails
+ shorter primaries

+ soaring/ aerobatics
+ wedge-shaped tails
+ longer primaries

Common Raven Population Explosion

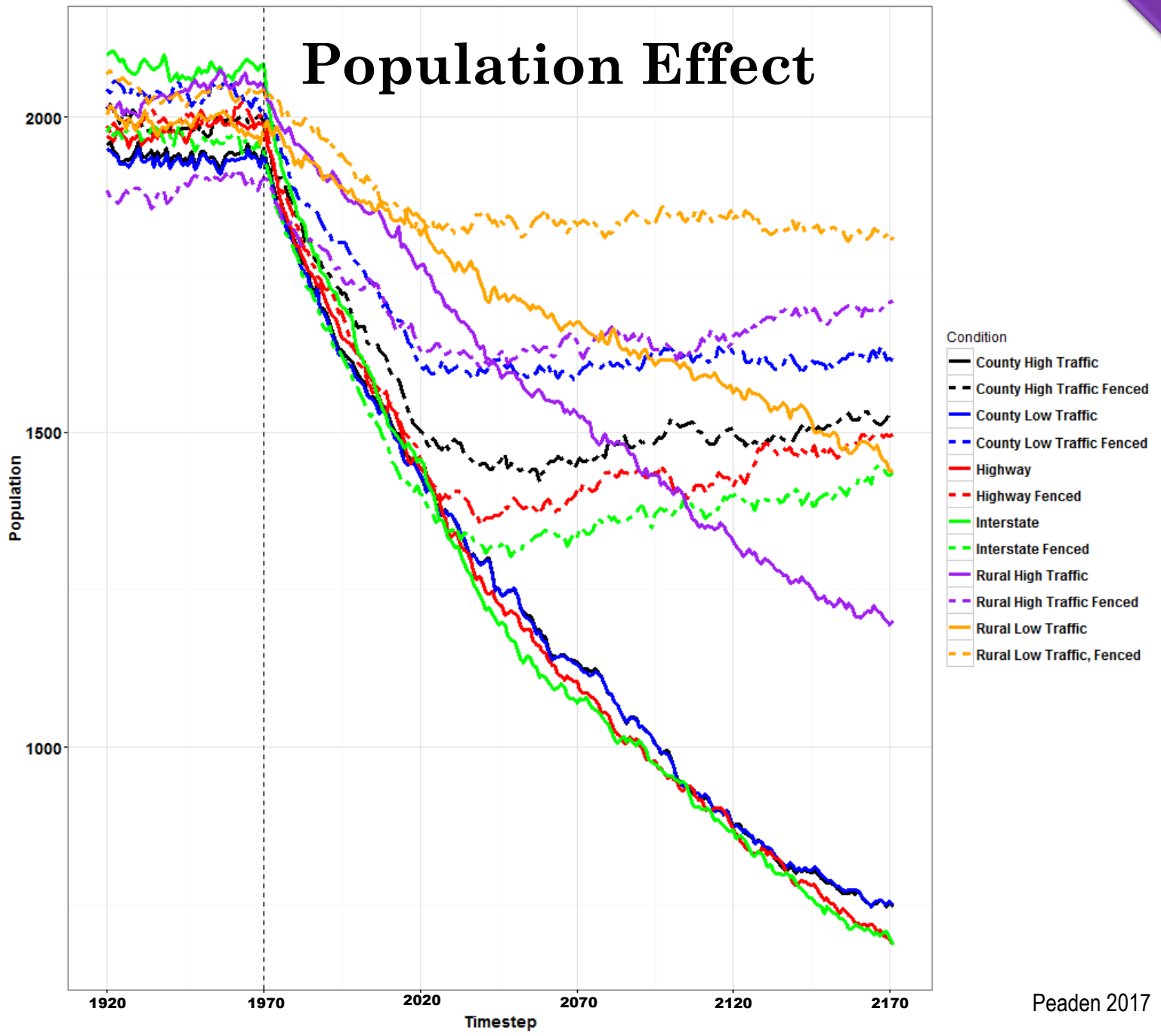


REDUCED

REDUCED

Demographic Squeeze

Population Effect



Peaden 2017

Viable Conflict Threshold Development & Implementation

Methods

- Common raven density monitoring: Each April, and when possible, September, using randomly placed common raven and raptor point counts

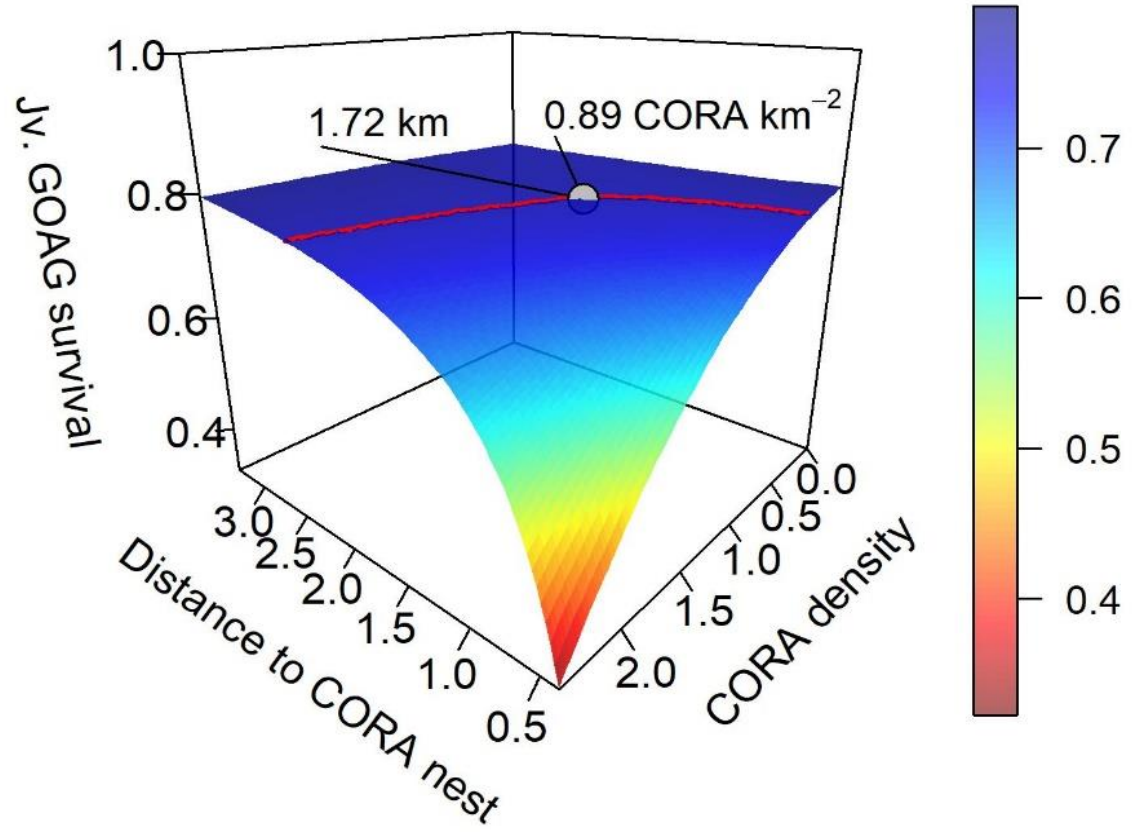
- Distance to nearest nest: The initial geodatabase contained >750 previously active common raven nests, observed as active between March 2013 & July 2021

- Decoy survival (a proxy of 0- to 10-year-old tortoise survival) in each monitoring area was estimated in 2020 & 2021 and will continue to be estimated in some areas each April, and when possible, September.

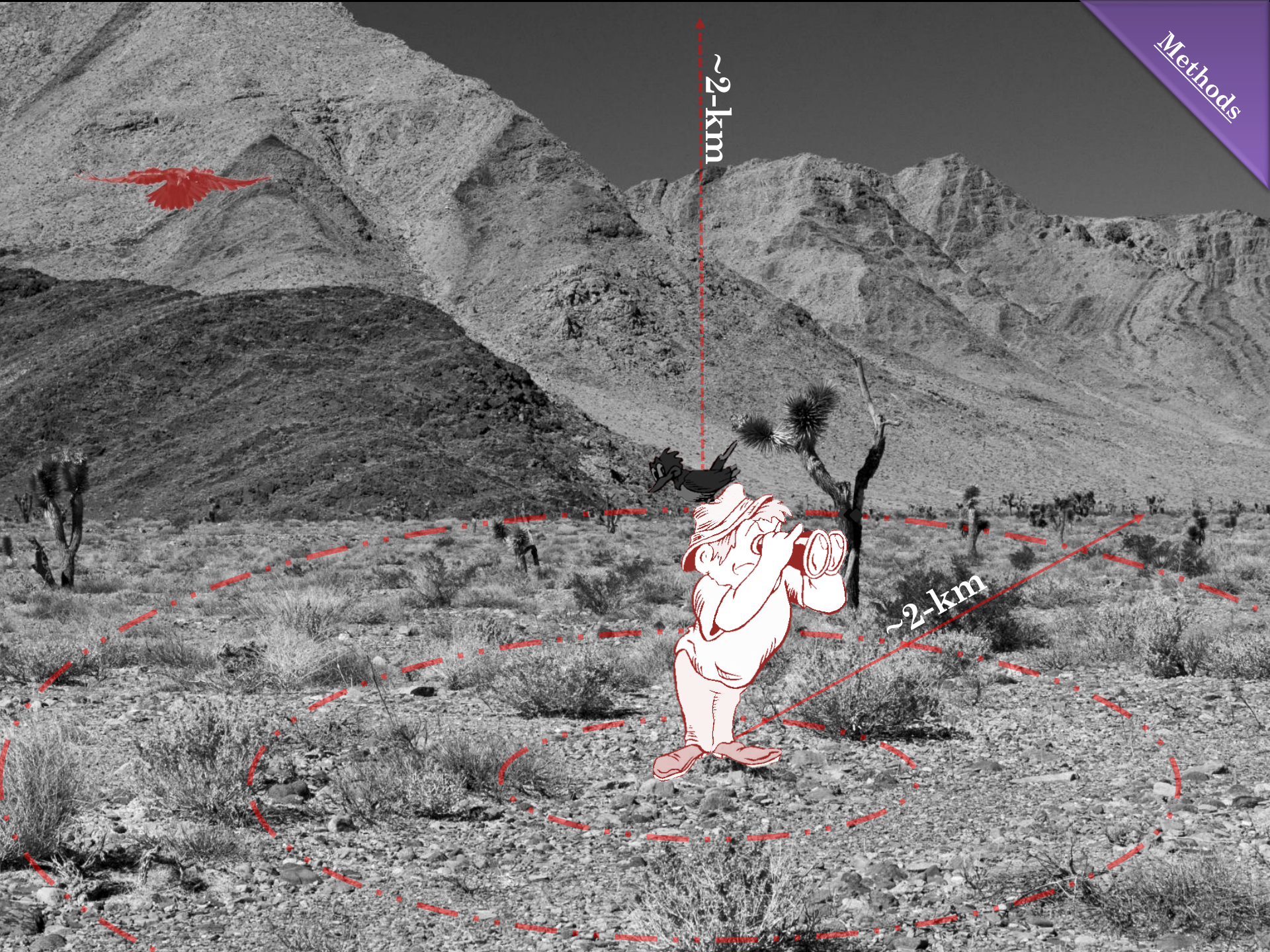
- The effects of common raven density and distance to nearest previously active common raven nest on decoy survival were then described by carrying out a Bayesian share frailty model.

Mojave desert tortoise – Common Raven Viable Conflict Threshold

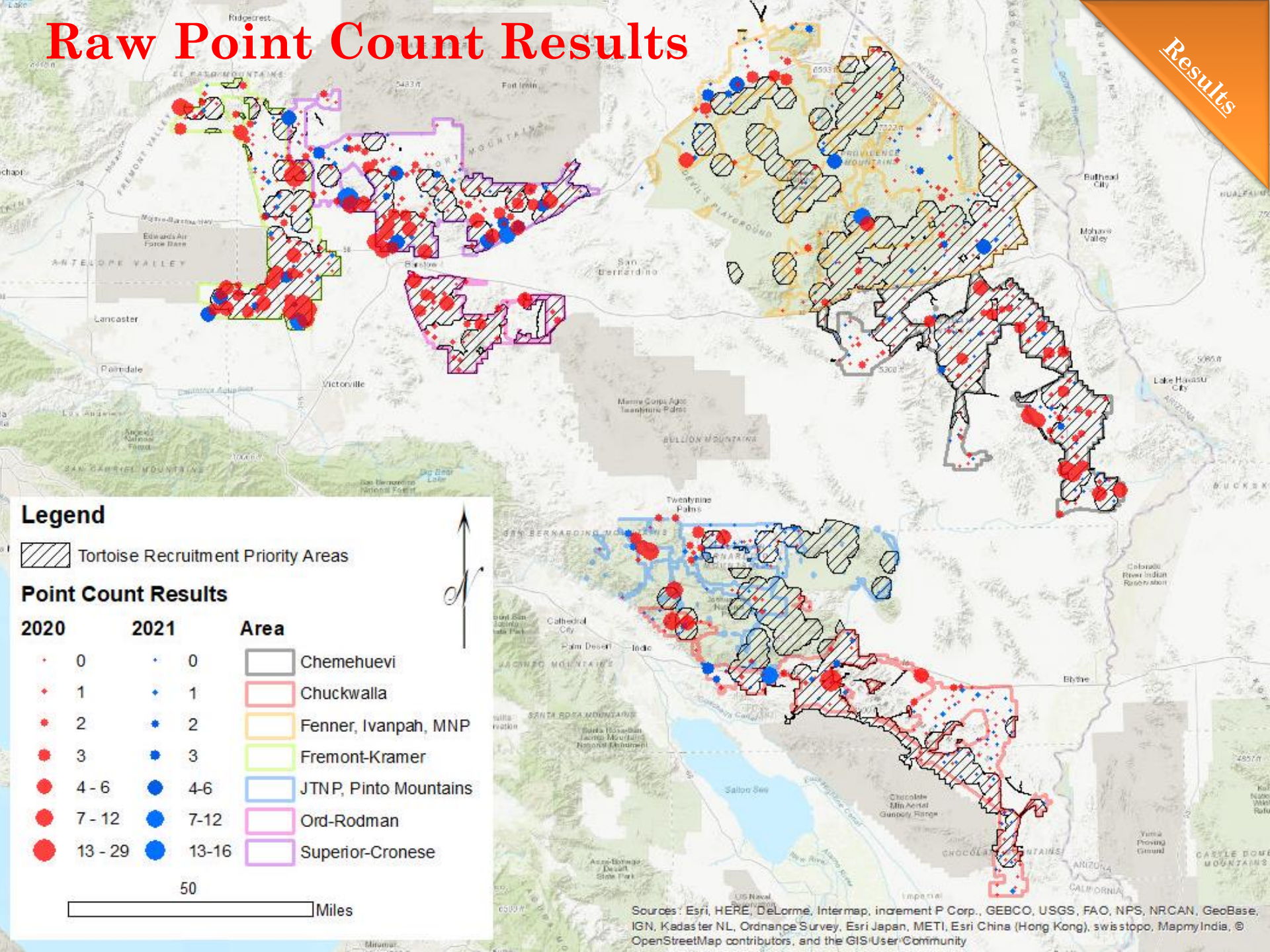
Results



Holcomb et al. *accepted December 2021*

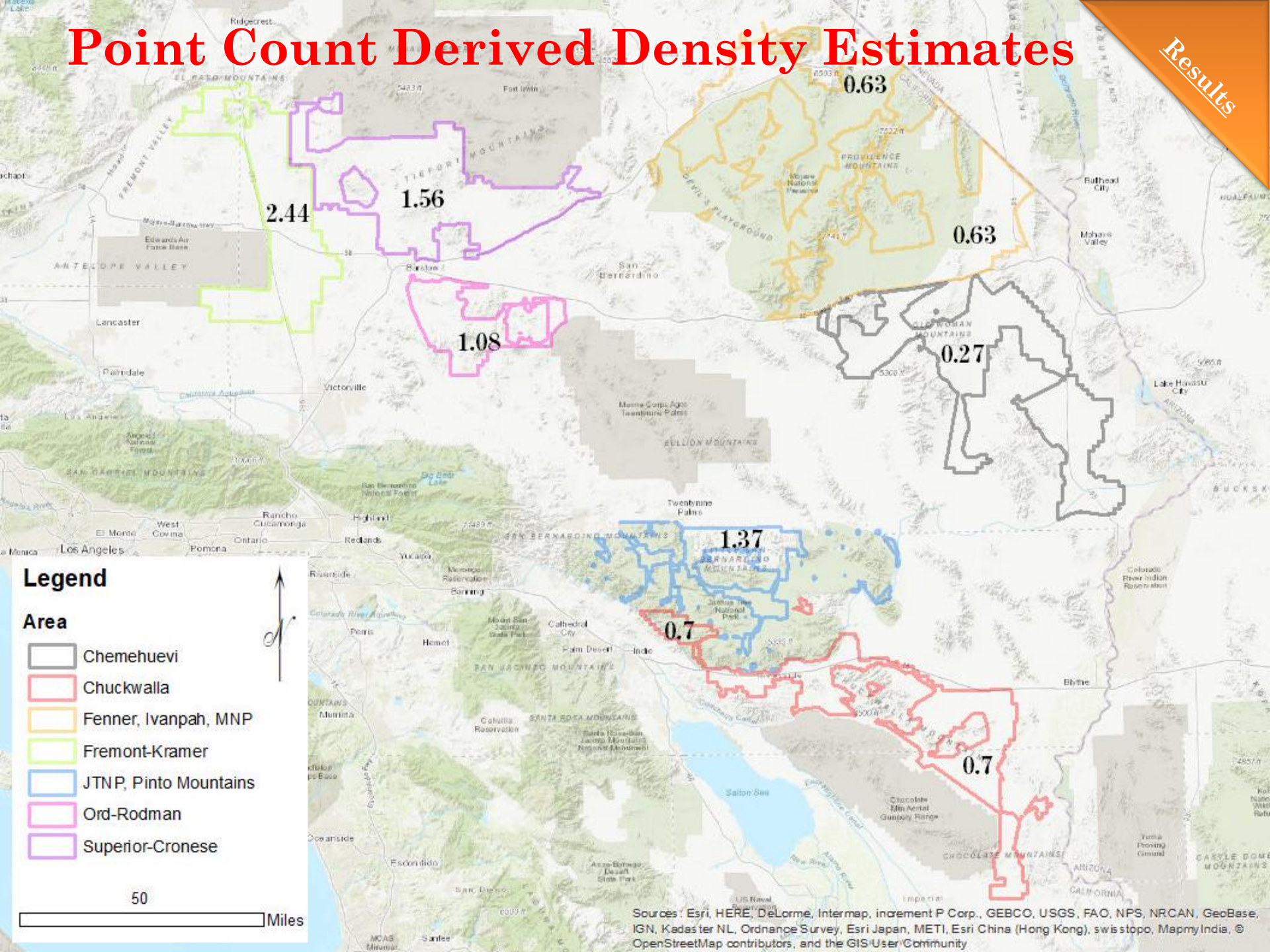

Methods
~2-km
~2-km

Raw Point Count Results



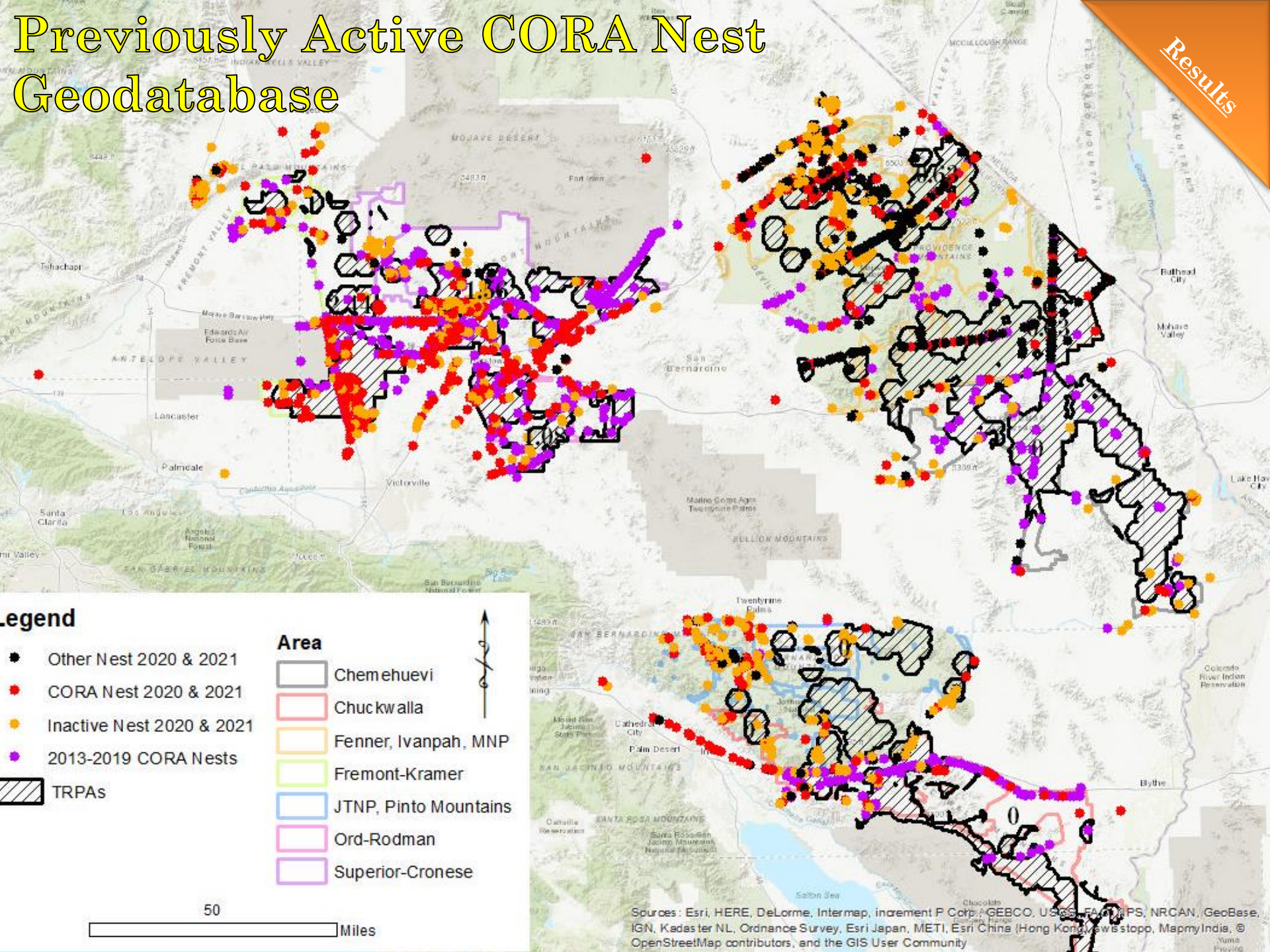
Point Count Derived Density Estimates

Results



Previously Active CORA Nest Geodatabase

Results



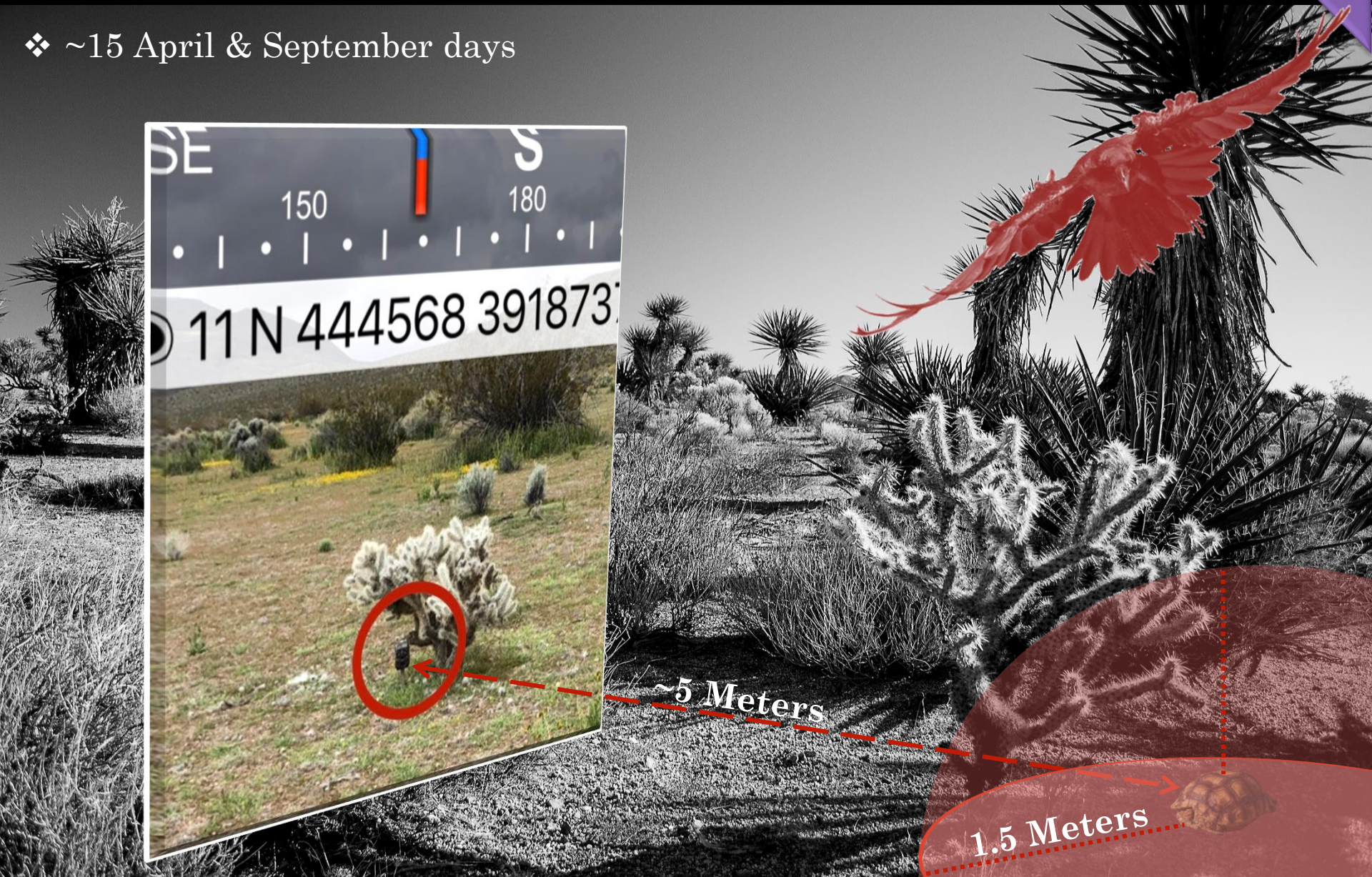
Desert Tortoise Decoy "Survival" Trials

- Decoy "survival" probability
- $CH_{annual} = UH_{1day} * T_{days} * P_{day}$
- 168 days active annually (Agha et al. 2015)
- 19% exposure during days active (Daly et al. 2019)
- Decoys were placed in open or at the edge of a dripline, if shrub cover was ≤2-m from an assigned random point

Methods

Sample Space & Schedule

- ~15 April & September days

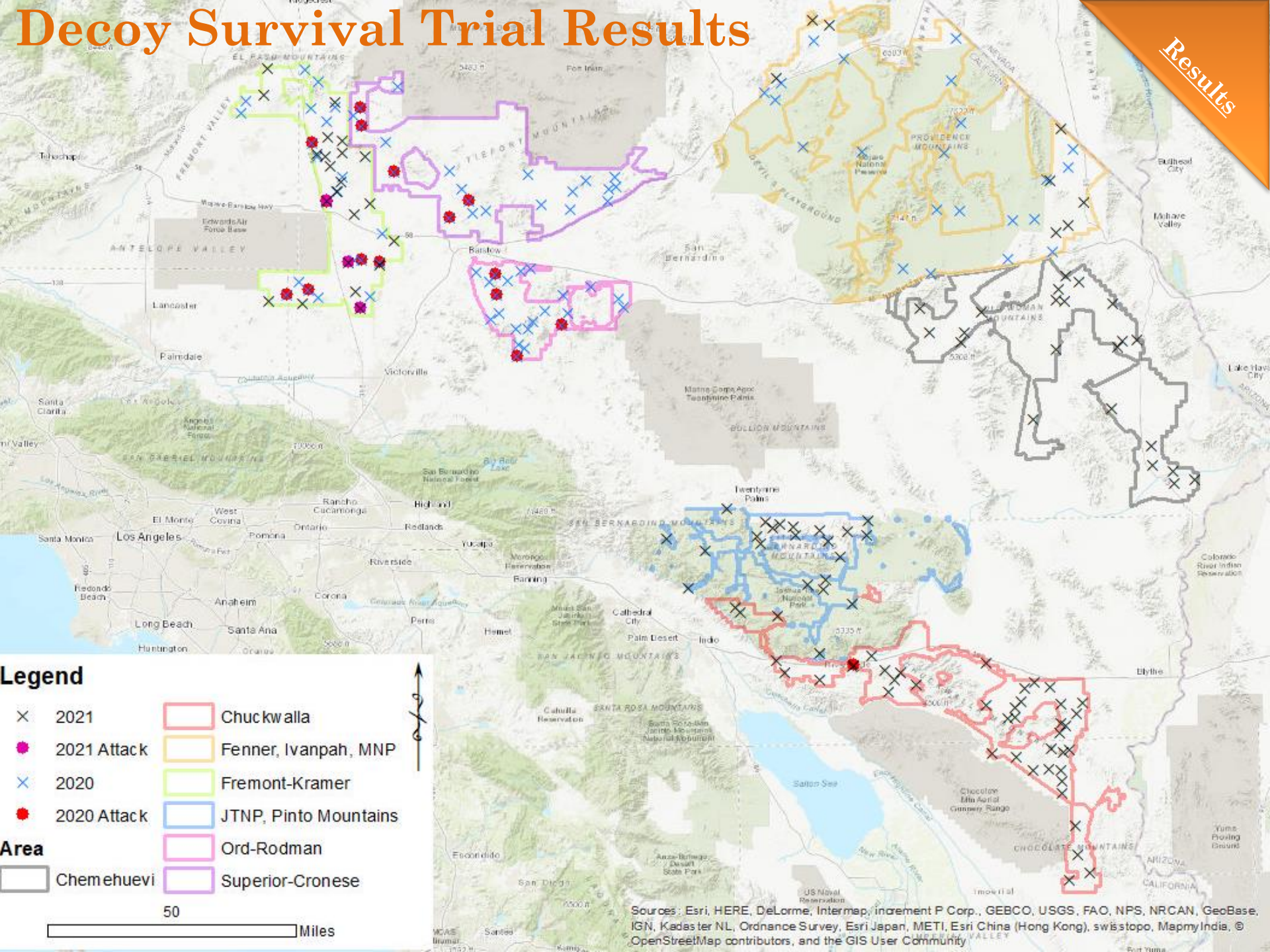


Cuddeback Digital

4/14/2019 3:17 PM ID:419

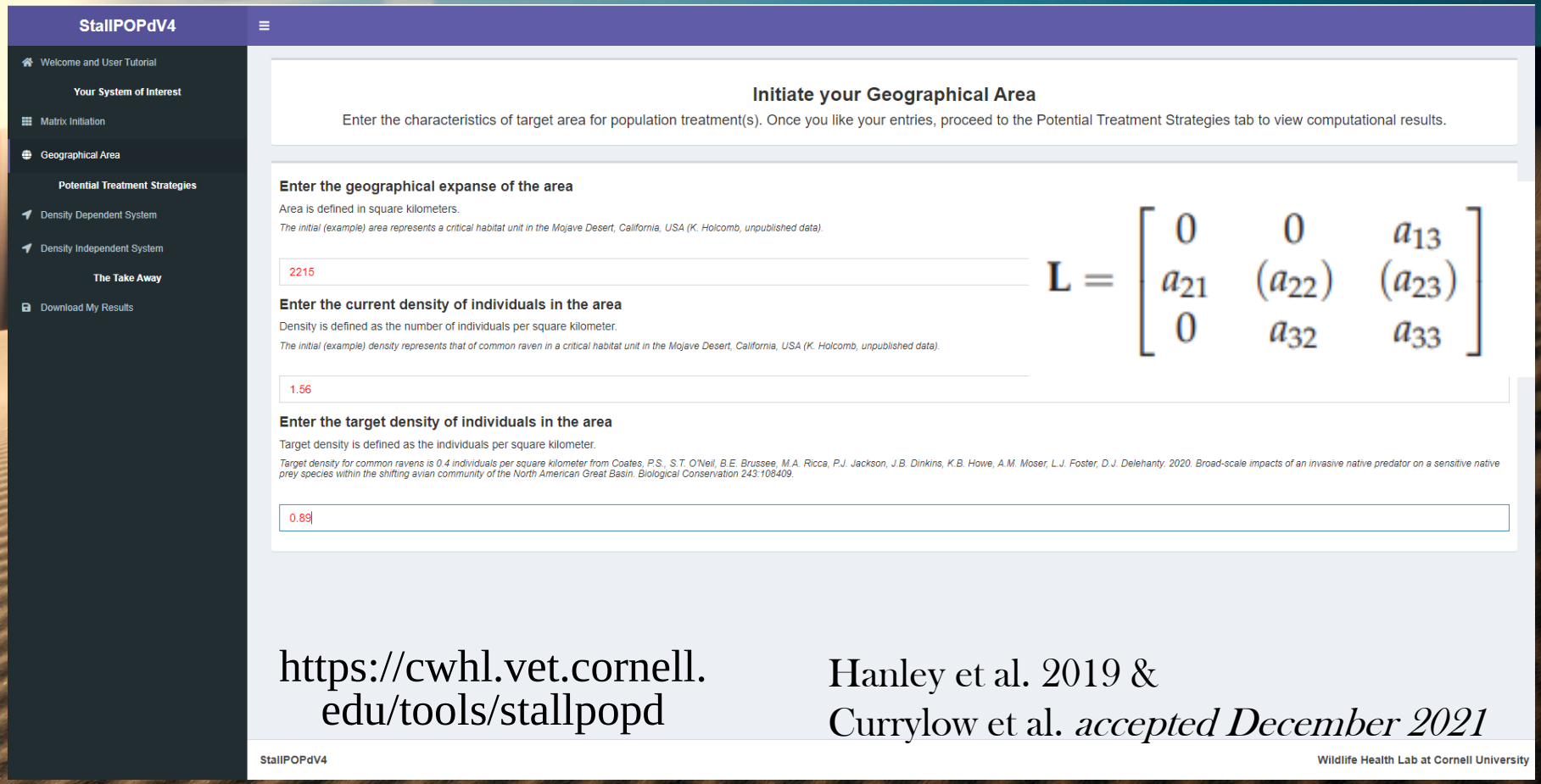
Decoy Survival Trial Results

Results



StallPOPd V3 Web Interface

Discussion

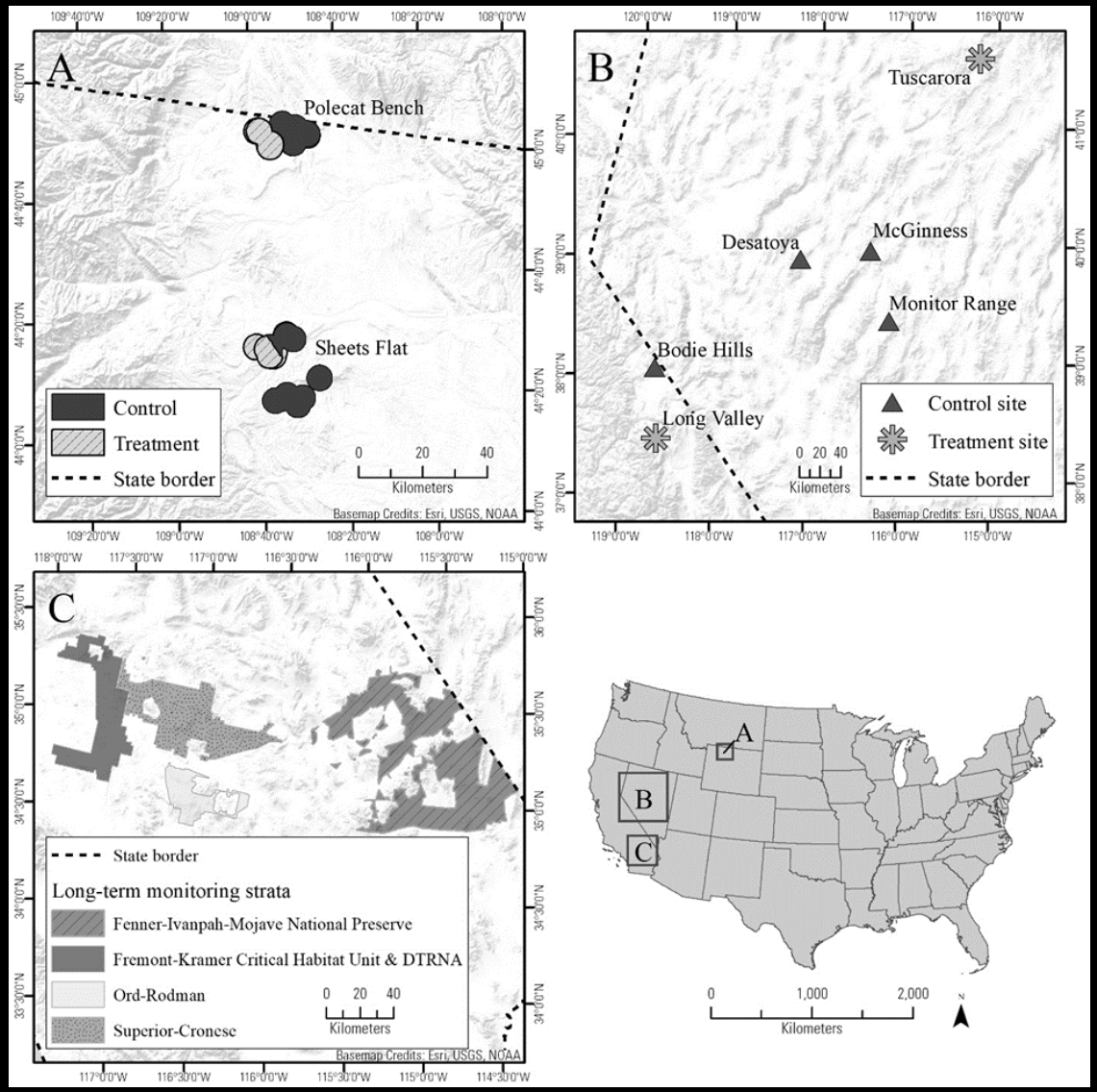


https://cwhl.vet.cornell.edu/tools/stallpopd

Hanley et al. 2019 &
Currylow et al. *accepted December 2021*

Raven Reproduction Manipulation Case Studies

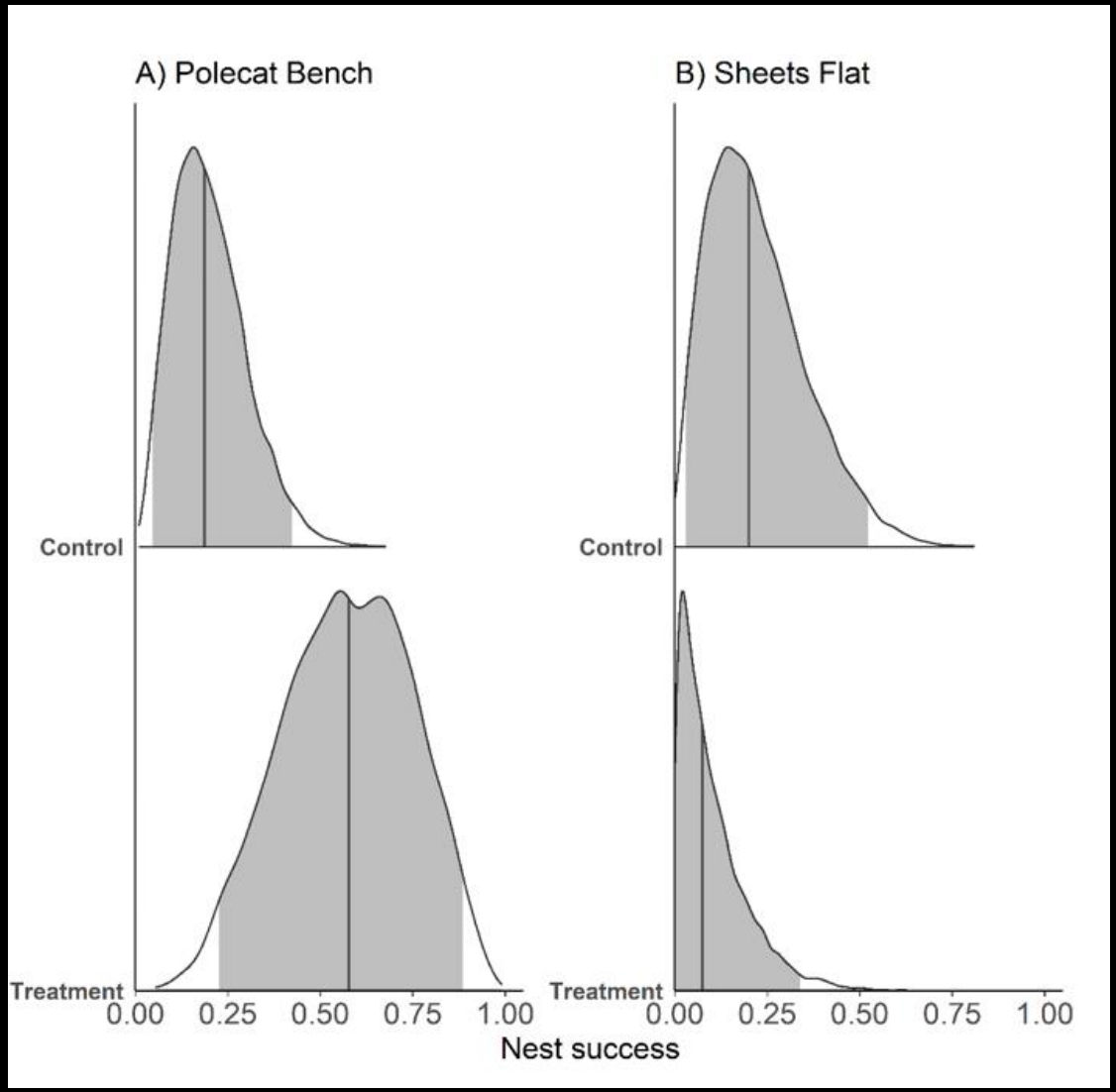
Results



Sanchez *accepted December 2021*

Effect of Raven Nest Removal on Great Sage-grouse Nest Success (Site A, Great Basin)

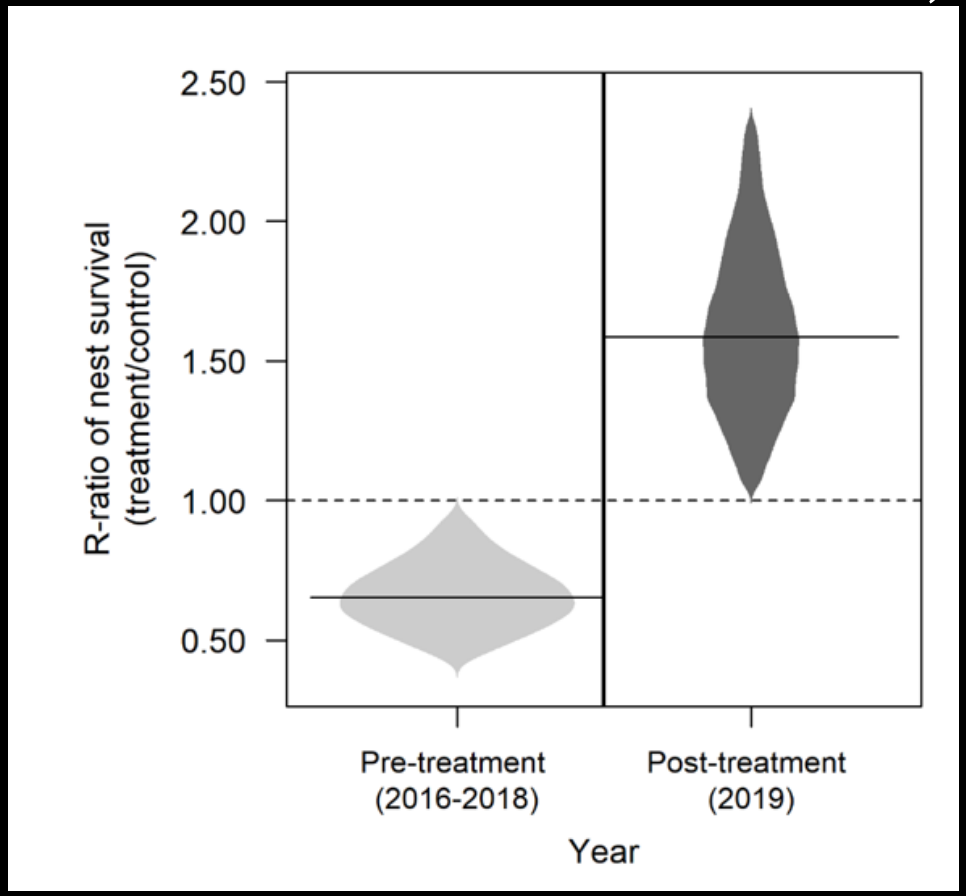
Results

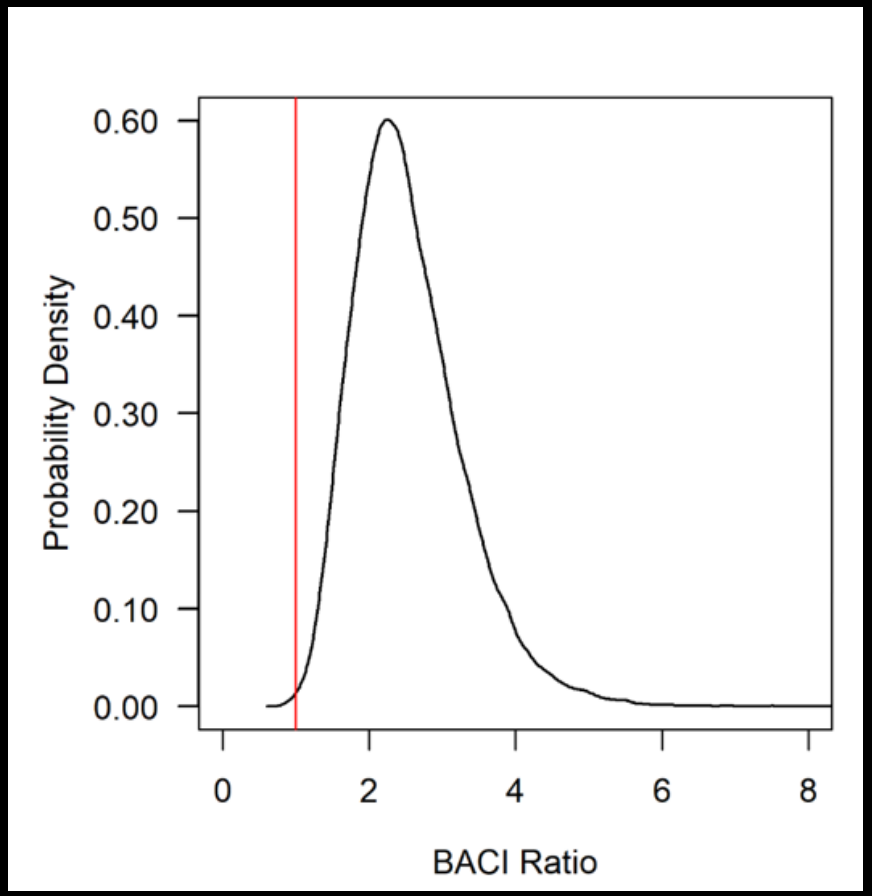


Sanchez et al. *accepted December 2021*

Effect of Raven Egg Addling on Great Sage-grouse Nest Success (Site B, Great Basin)

Results

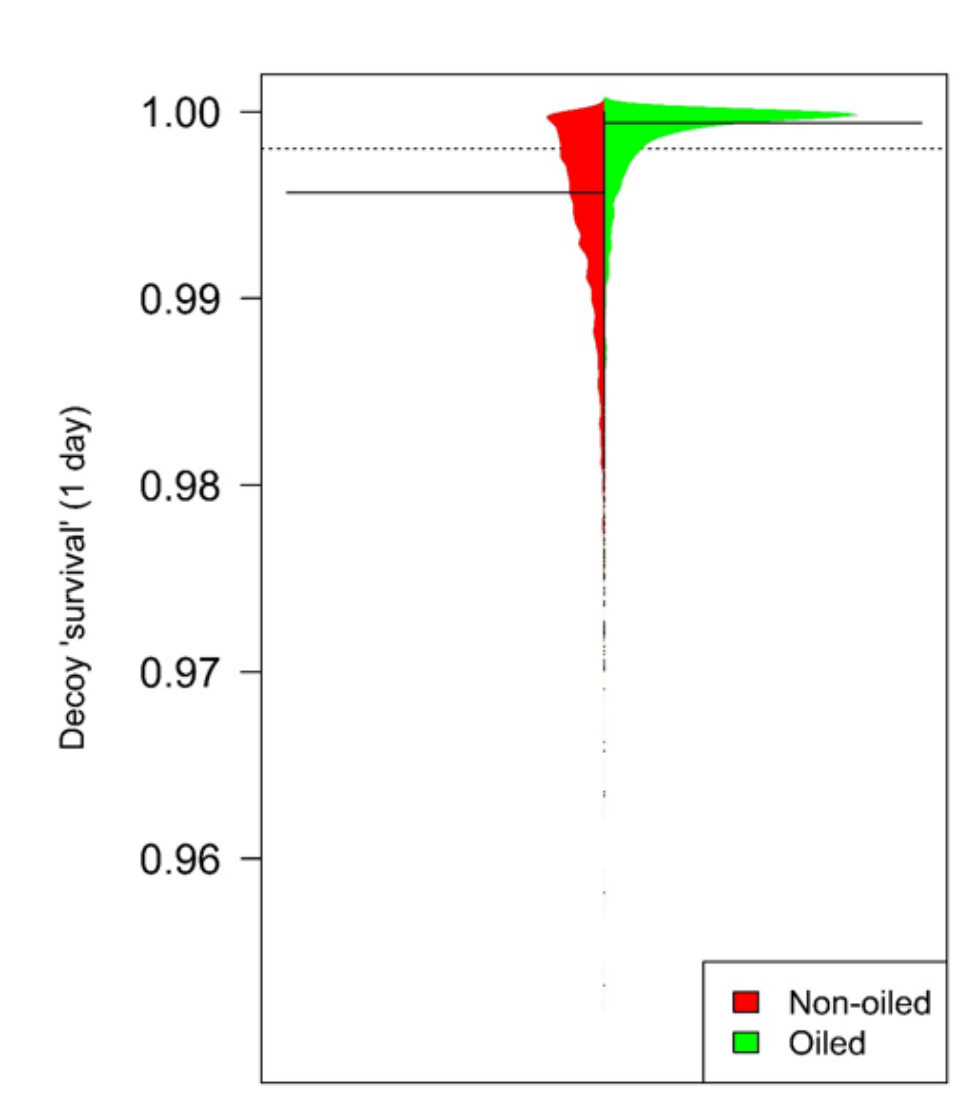




Sanchez et al. *accepted December 2021*

Effect of Raven Egg Addling on Tortoise Decoy "Survival" (Site C, Mojave)

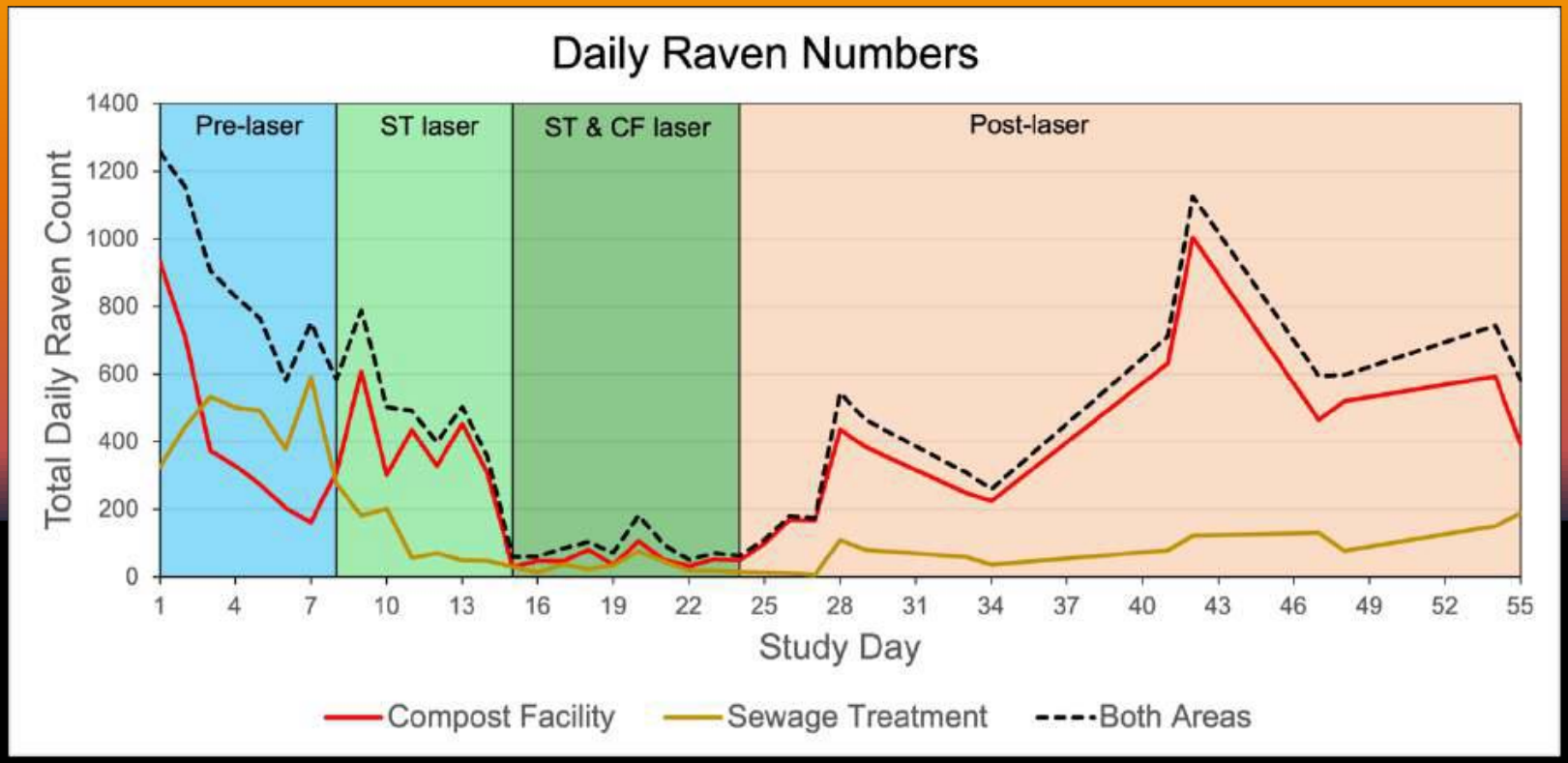
Results



Sanchez et al. *accepted December 2021*

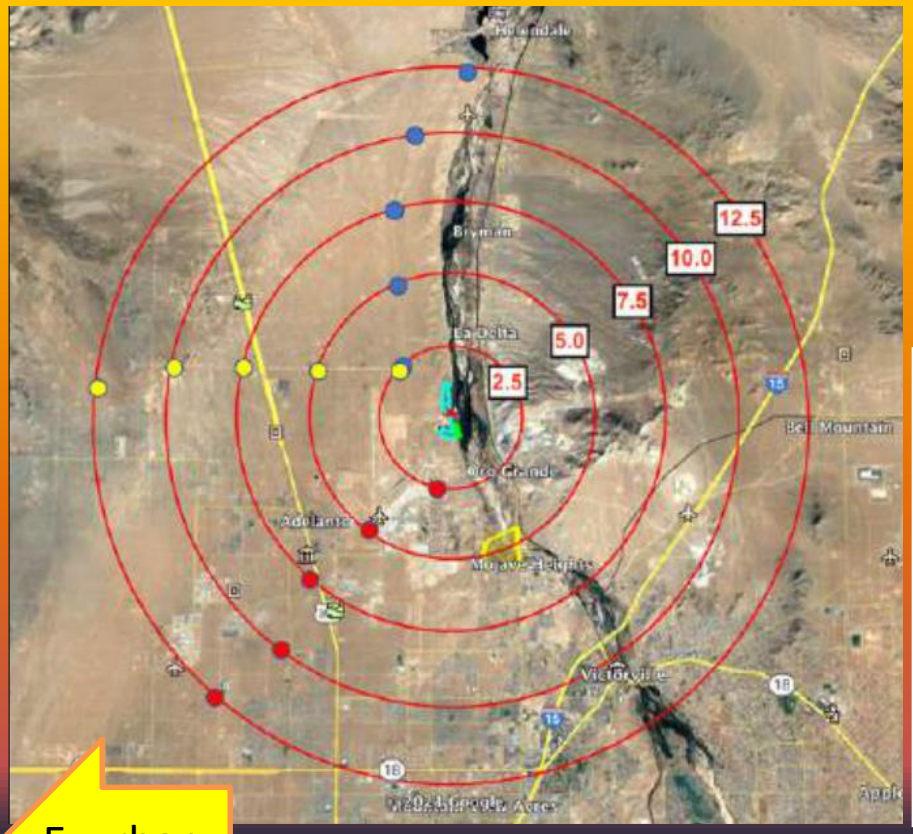
Reduce Wildlife Access to Subsidies

Action

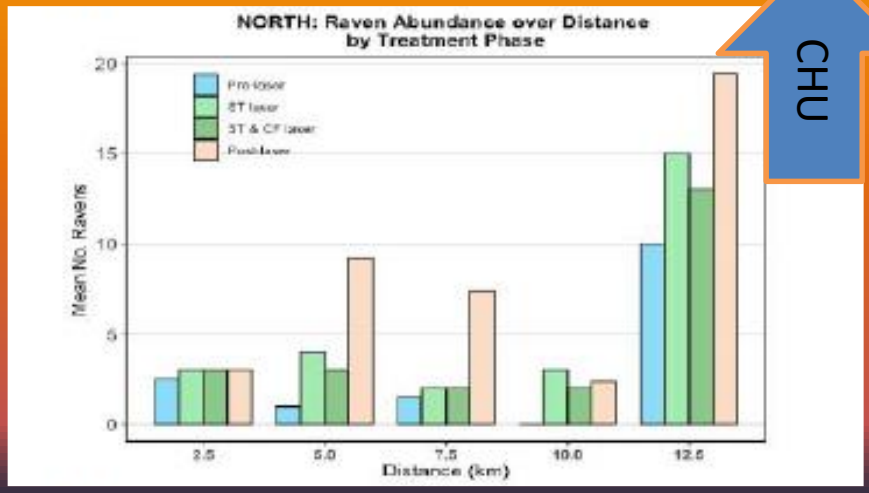


Raven Dispersal in Response to Subsidy Denial

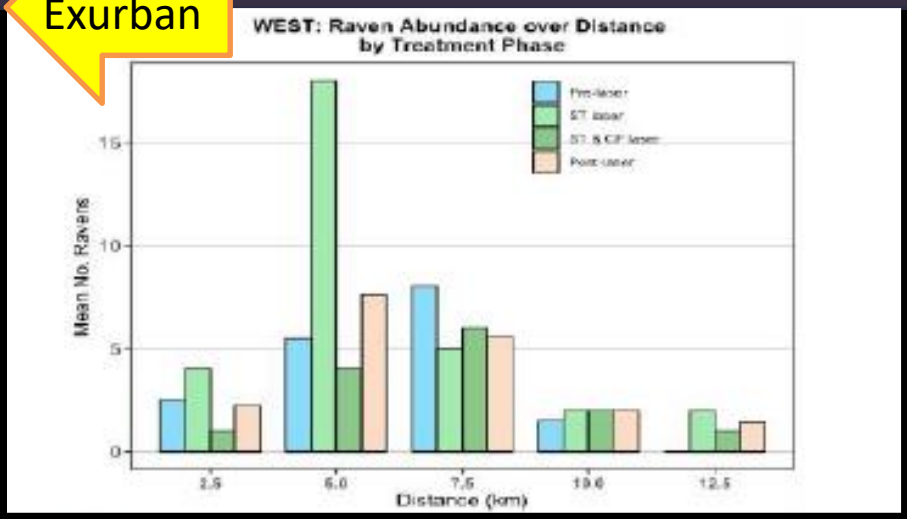
Action

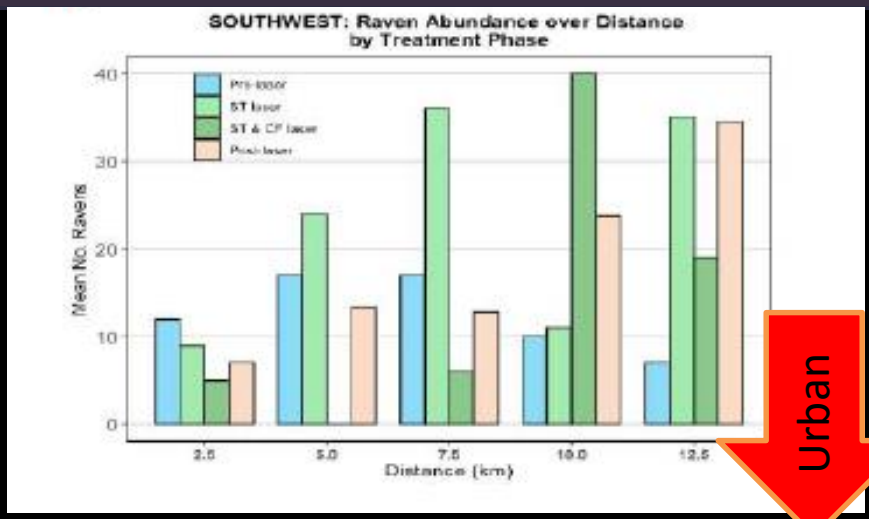


Exurban



CHU





Urban

Reduce Wildlife Access to Subsidies

Action

COALITION FOR A BALANCED ENVIRONMENT

Action

How to Help

Find Raven Nests

to Save Tortoises

Apply observation skills to advance desert conservation

Hardshell Labs, Inc.
Tule Springs Fossil Beds National Monument

Why?

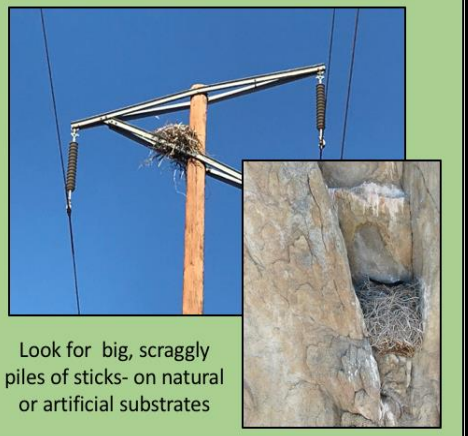
Predation skyrocketing

Kramer Hills, CA, 1988: Remains of 136 juvenile tortoise remains collected from beneath a single raven nest

Exploding raven populations have made raven predation a major threat to desert tortoises and other wildlife

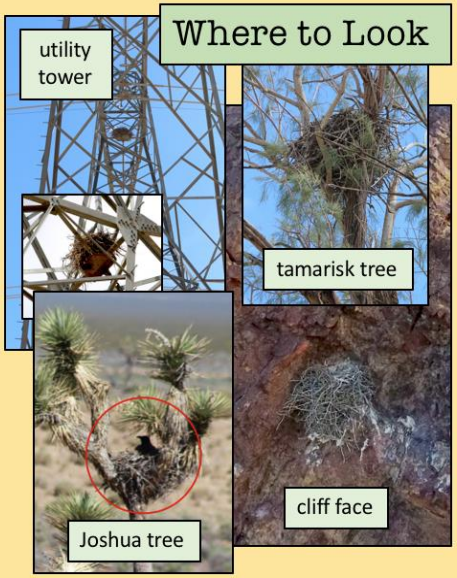
How?

Record nest info on the Raven Tracker App

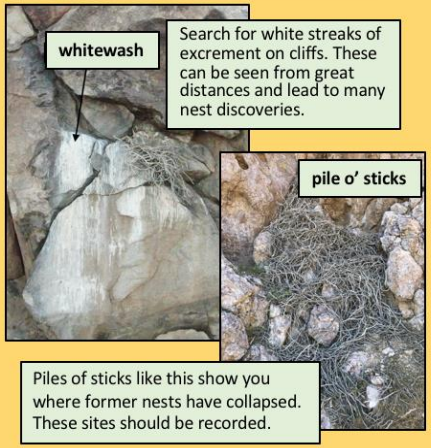


Look for big, scraggly piles of sticks- on natural or artificial substrates

Where to Look



Structural Clues



How to Help

Action

Behavioral Cues: nest sequence

- **Courtship-** pairs flying or perching together

- **House hunting-** 1 or 2 ravens visiting nests

- **Home repairs-** sticks or fluff carried to nest

- **Incubation-** eggs laid, then long bouts of sitting

- **Nestlings-**young ravens cared for by adults

- **Fledging-** adults lead flying young away from nest

Timing: pairs vary across Spring

February

March

April

May

June

- earliest courtship
- courtship and nest prep in full swing
- early egg laying
- egg laying peaks / early hatching
- most eggs hatched / care of nestlings
- nestlings grow rapidly / first fledging
- fledging concludes / nests abandoned

Info you will record

Where: map coordinates, other location clues

Substrate: What structure supports the nest? Cliff, tree, transmission towers, other artificial structure

Nest condition: structural integrity, signs of occupation

Bird activity: courtship, nest building, incubating, rearing nestlings, fledging of young

Prey remains: take photos & describe

What we can do with it

Map: Create a comprehensive map of raven nests in the wild, in agricultural areas, and in cities

Monitor: observe the mapped nests to learn more about raven nesting behavior

Manage (short-term): The map guides the use of non-lethal management actions to curb raven damage to tortoises and other wildlife

Manage (long term): Track raven nest distribution, habits and success to determine the effect of management actions

How to Help

We want you! The more eyes we have in the field the more complete the picture we will have of the problem.

Learn more- To see more pictures and read more about raven nesting, visit www.ravenobserver.com

Get out there- Take binoculars, phone and a sense of discovery out in the field

Make careful observations- Find new raven nests and gather as much information about them as you can

Record and report- Enter your data on the form at www.ravenobserver.com

Follow along- To see your contributions and those of others to the database go to www.ravenobserver. com

Spread the word- The more the merrier! Tell your friends and ask them to help out, too.

Let's do it for them!

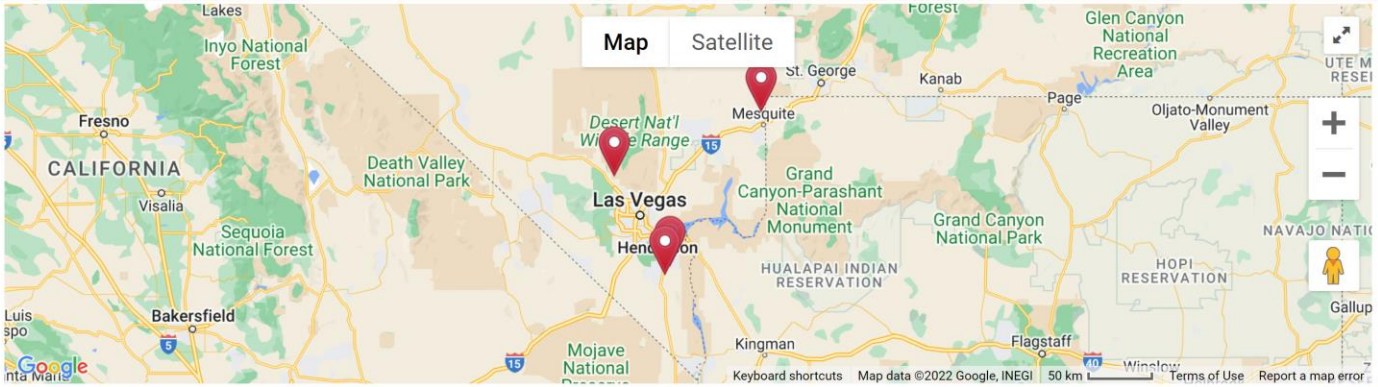
How to Help

Action

ravenobserver.com/results/

www.ravenobserver.com

Raven Nest Observation Portal | Submit Your Observation | Results | Gallery



Observation: – X7OZLIFL – 20220419

Rob McLennan

04/18/2022 6:30 pm

Land fill

Not related to nest sightings... The city of Mesquite landfill attracts literally hundreds of ravens. This landfill is approximately 5 miles from the Scenic, AZ. area. In the

Observation: – 1VAKVRGD – 20220418

Rob McLennan

Observation: – 15BSP9WT – 20220316

Tim Shields

03/12/2022 3:00 pm

tree: cottonwood

Largest cottonwood near Desert Wildlife National Refuge visitor center. Tree in middle of Coyote Loop trail. Thick leaf litter beneath nest may have concealed some

Observation: – YKISXLJM – 20220316

John Mark Simmons

03/15/2022 3:30 pm

tree: Joshua tree

This may be an old inactive nest, difficult to tell. No adults seen in the immediate vicinity. Will check

Waiting for events.jotform.co...

Acknowledgments