

2022 Progress Report



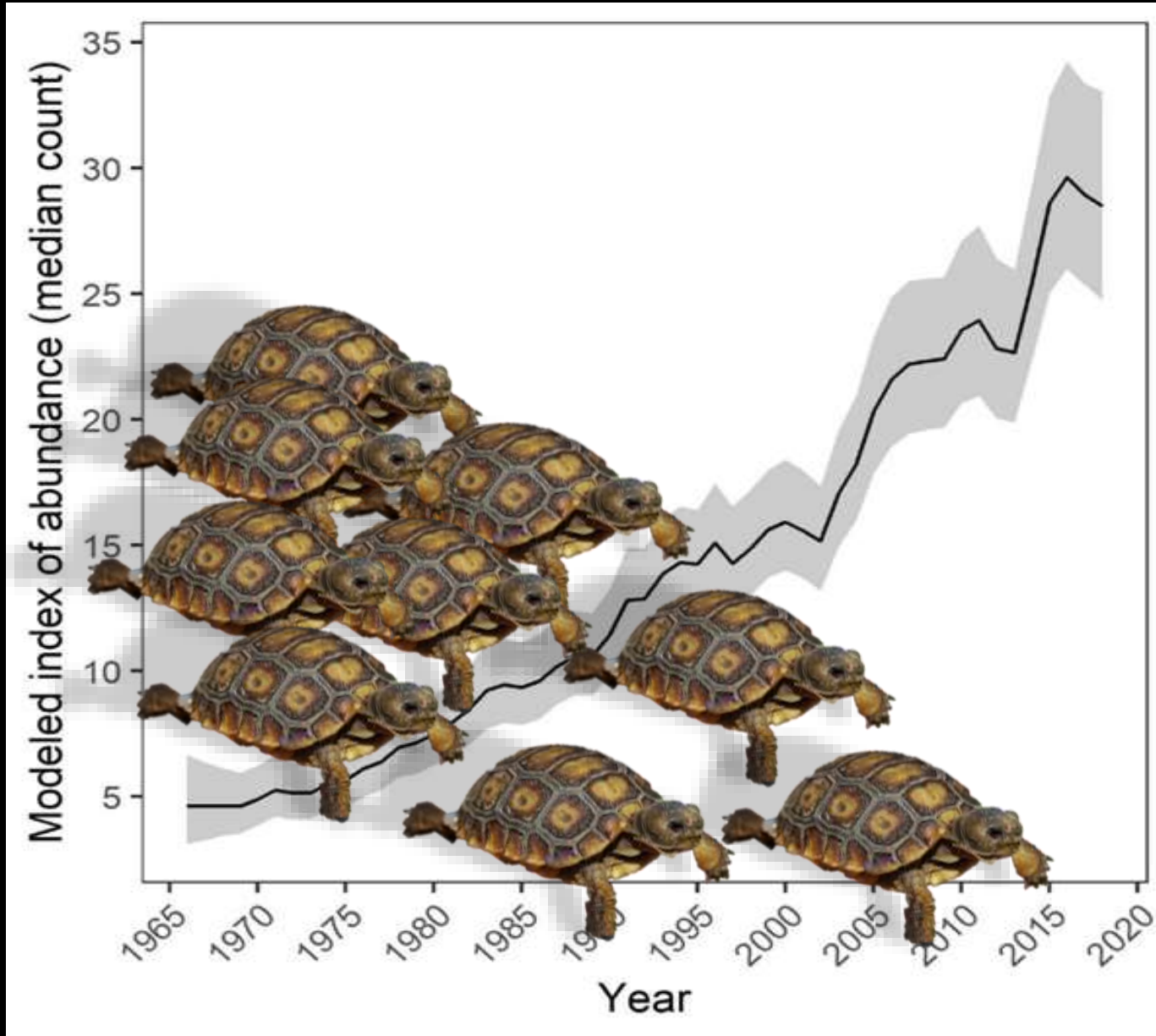
Kristina Drake

Kerry L. Holcomb
Palm Springs Fish and Wildlife Office
Kerry_Holcomb@fws.gov

North American Desert Ecoregion

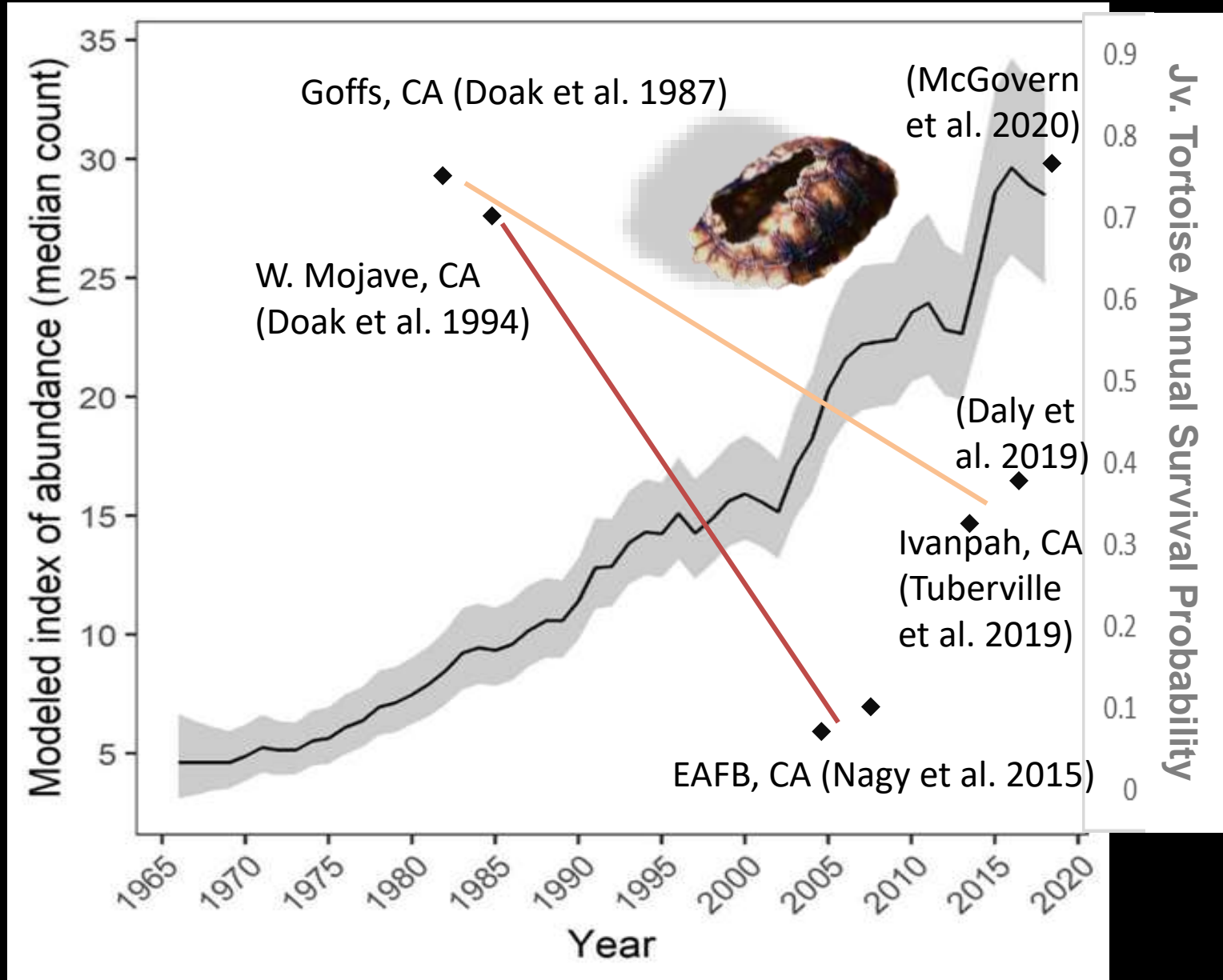
(Harju et al. *in press*)

Introduction

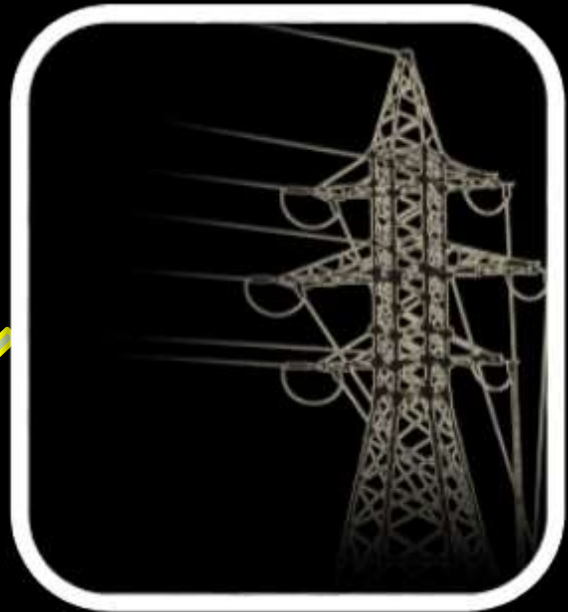


North American Desert Ecoregion

(Harju et al. *in press*)



Drivers of Common Raven Expansion



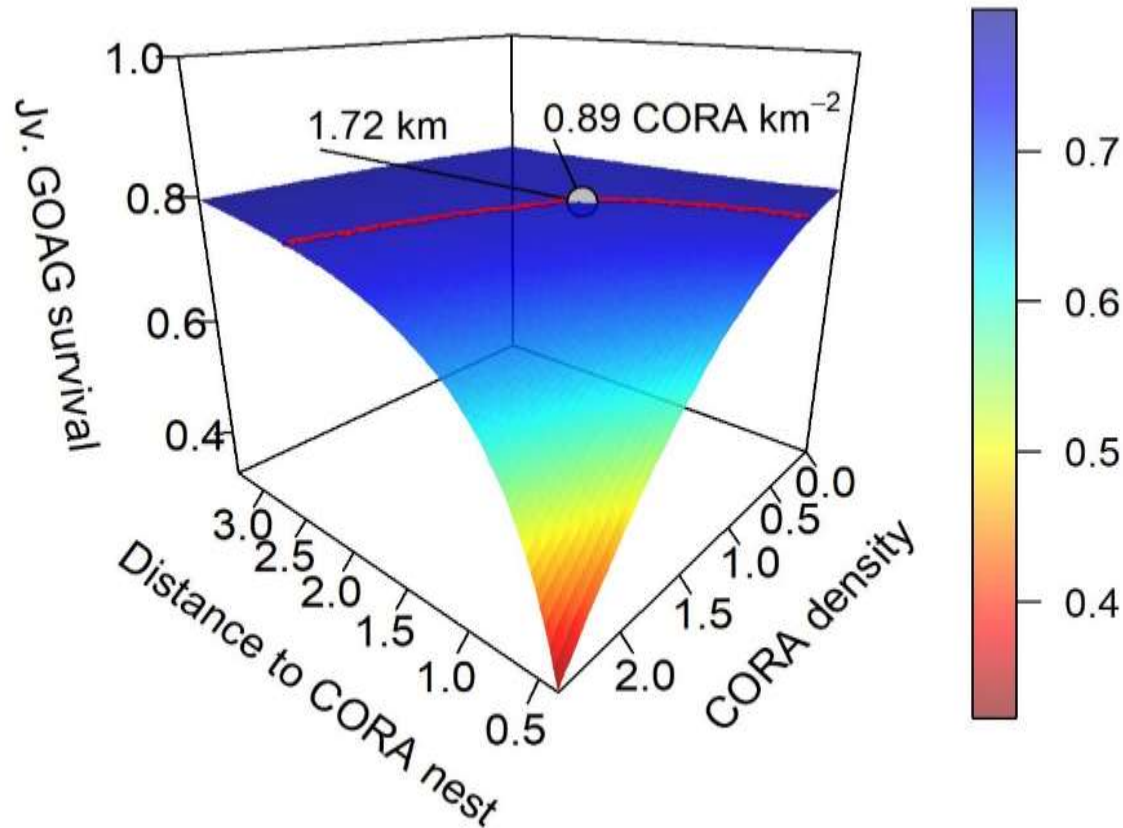
Credit: Kevin Powell

REDUCED

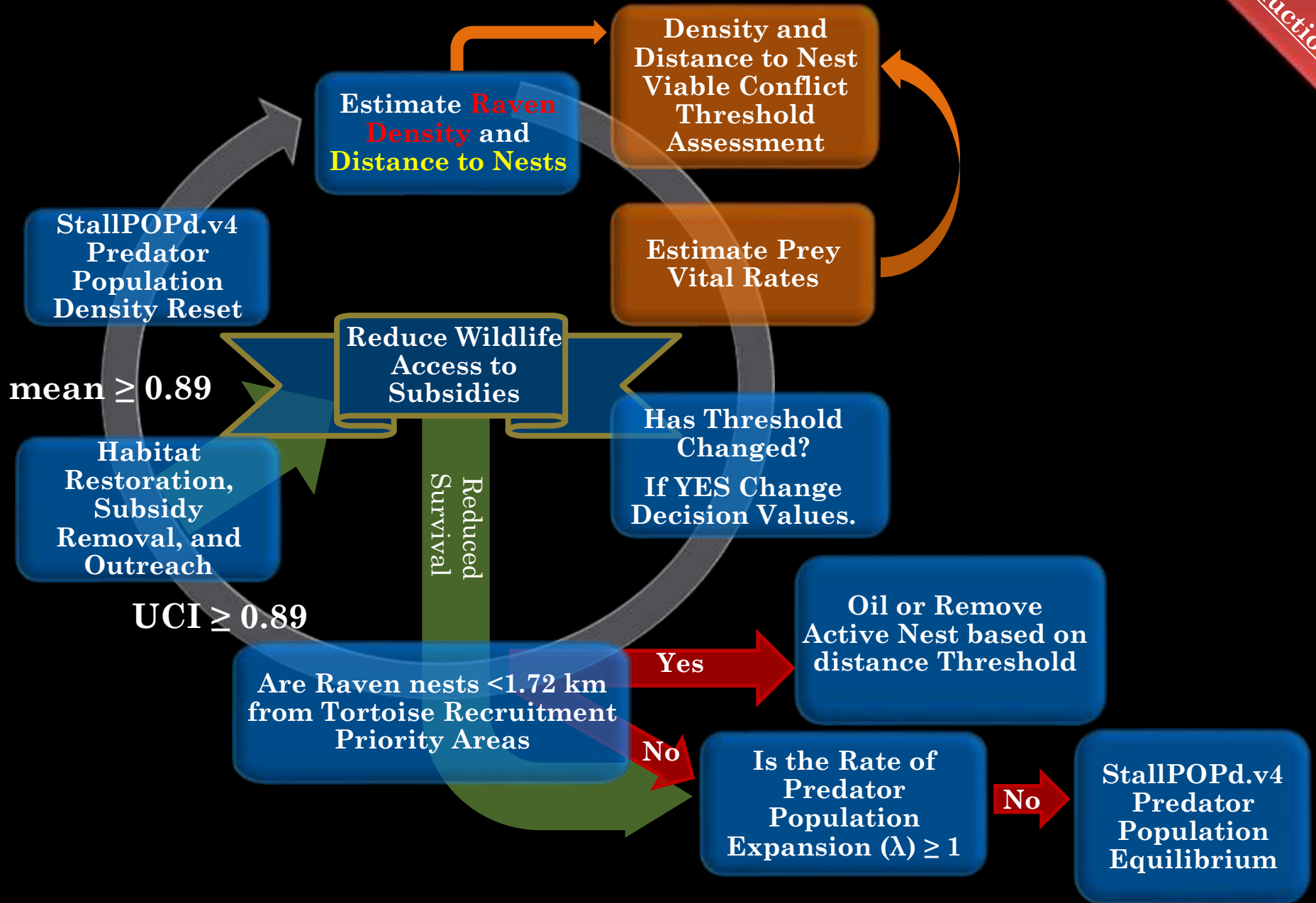
REDUCED



Mojave desert tortoise – Common Raven Viable Conflict Threshold

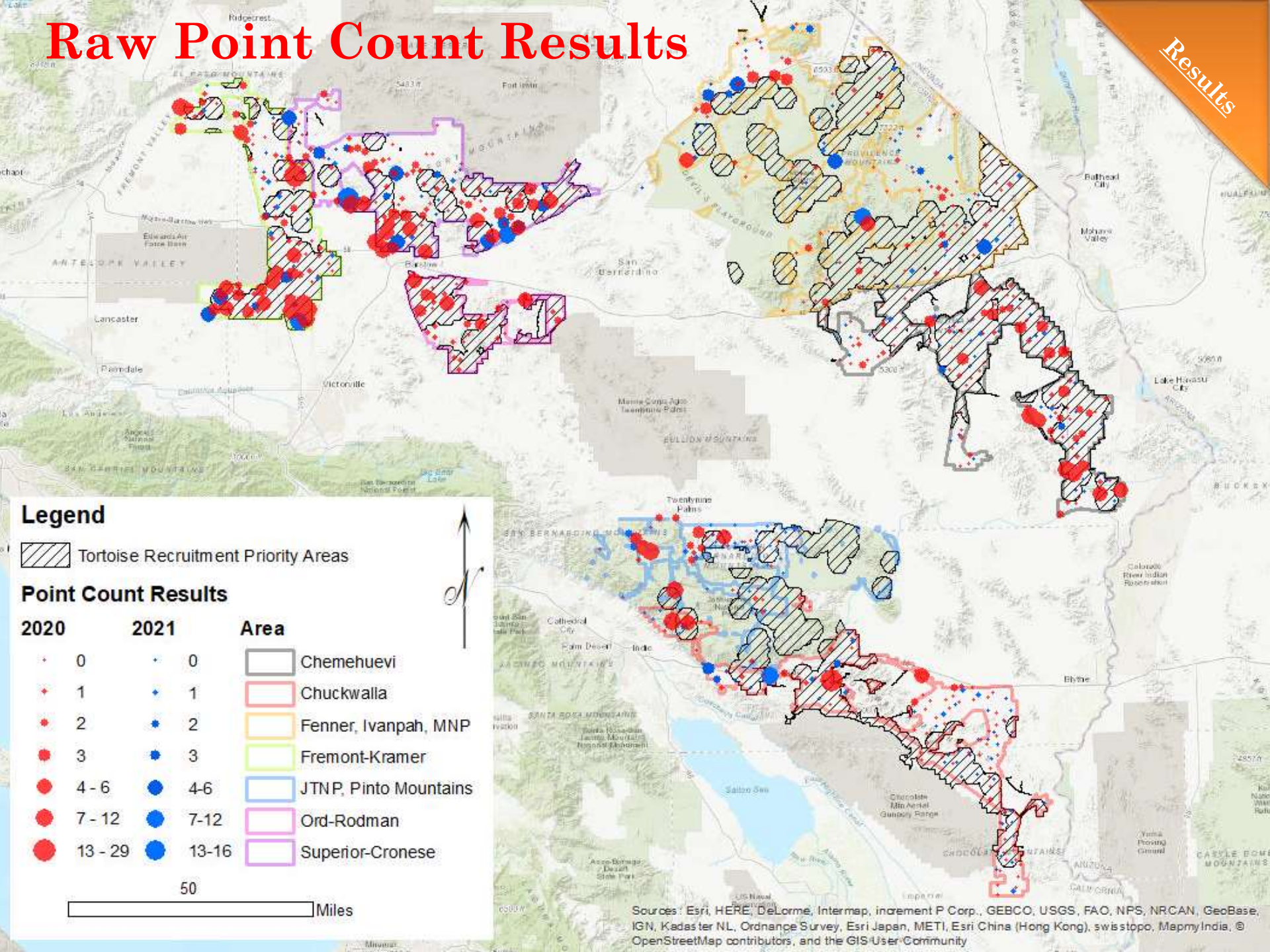


Adaptive Conflict Resolution Cycle



Raw Point Count Results

Results



Legend

Tortoise Recruitment Priority Areas

Point Count Results

2020	2021	Area
0	0	Chemehuevi
1	1	Chuckwalla
2	2	Fenner, Ivanpah, MNP
3	3	Fremont-Kramer
4 - 6	4-6	JTNP, Pinto Mountains
7 - 12	7-12	Ord-Rodman
13 - 29	13-16	Superior-Cronese

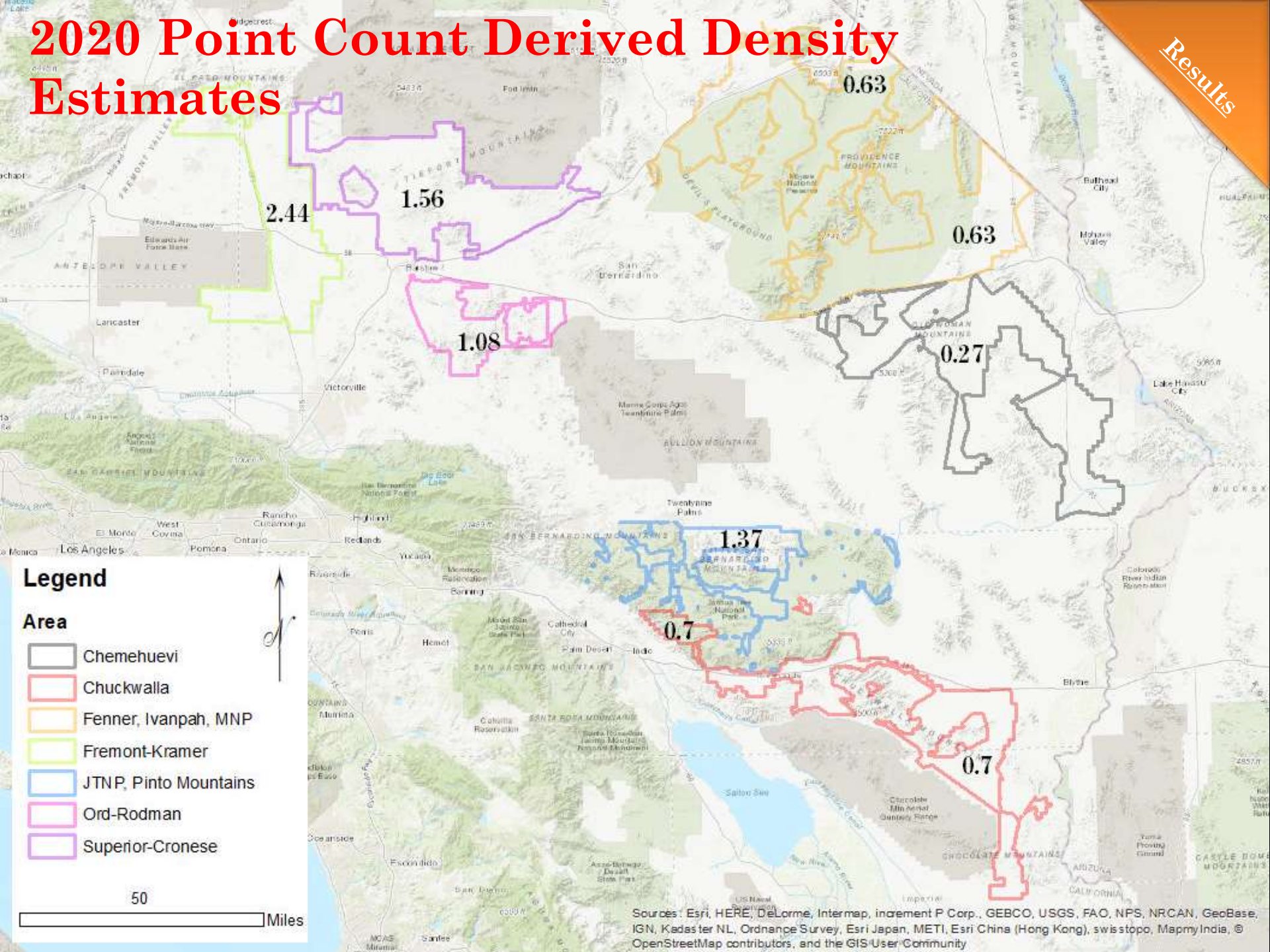
50

Miles

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

2020 Point Count Derived Density Estimates

Results



Legend

- Area**
- Chemehuevi
 - Chuckwalla
 - Fenner, Ivanpah, MNP
 - Fremont-Kramer
 - JTNP, Pinto Mountains
 - Ord-Rodman
 - Superior-Cronese

50 Miles

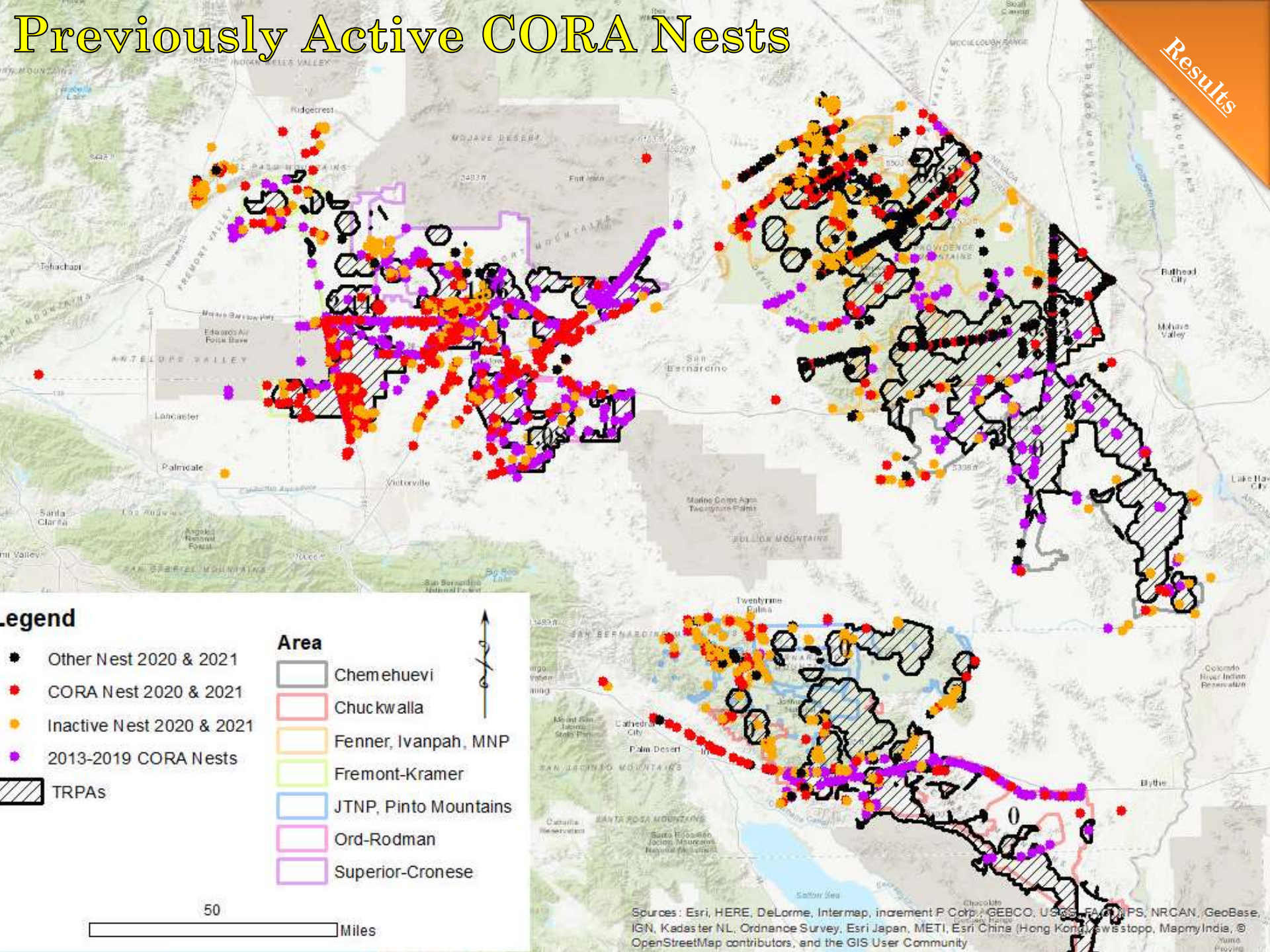
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

2020 & 2021 Density Summary

CORA Monitoring Areas	km ²	Mean Density 2020	Mean Density 2021	95% UCL Density 2020	95% UCL Density 2021	2020 Mean Abundance Estimate	2021 Mean Abundance Estimate
Chemehuevi	2,328.34	0.27		0.75		628.65	
Fenner, Ivanpah, MNP	4,040.54	0.63	0.65	1.14	1.12	2,545.54	2,626.35
Fremont-Kramer	1,701.40	2.44	1.12*	4.49	1.96*	4,151.42	1,905.57
Ord-Rodman	702.44	1.08	NA	1.95	NA	758.64	NA
Superior-Cronese	2,215.36	1.56	1.32	2.61	2.33	3,455.95	2,924.27
JTNP, Pinto Mountains	736.59	1.37		3.32		1,009.13	
Chuckwalla	1,797.89	0.70		2.08		1,258.52	
Totals	13,522.56					13,807.85	
Averages		1.15	0.99	2.33	1.73		

Previously Active CORA Nests

Results



- Legend**
- Other Nest 2020 & 2021
 - CORA Nest 2020 & 2021
 - Inactive Nest 2020 & 2021
 - 2013-2019 CORA Nests
 - ▨ TRPAs

- Area**
- Chemehuevi
 - Chuckwalla
 - Fenner, Ivanpah, MNP
 - Fremont-Kramer
 - JTNP, Pinto Mountains
 - Ord-Rodman
 - Superior-Cronese

50 Miles

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, MNP, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), Swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

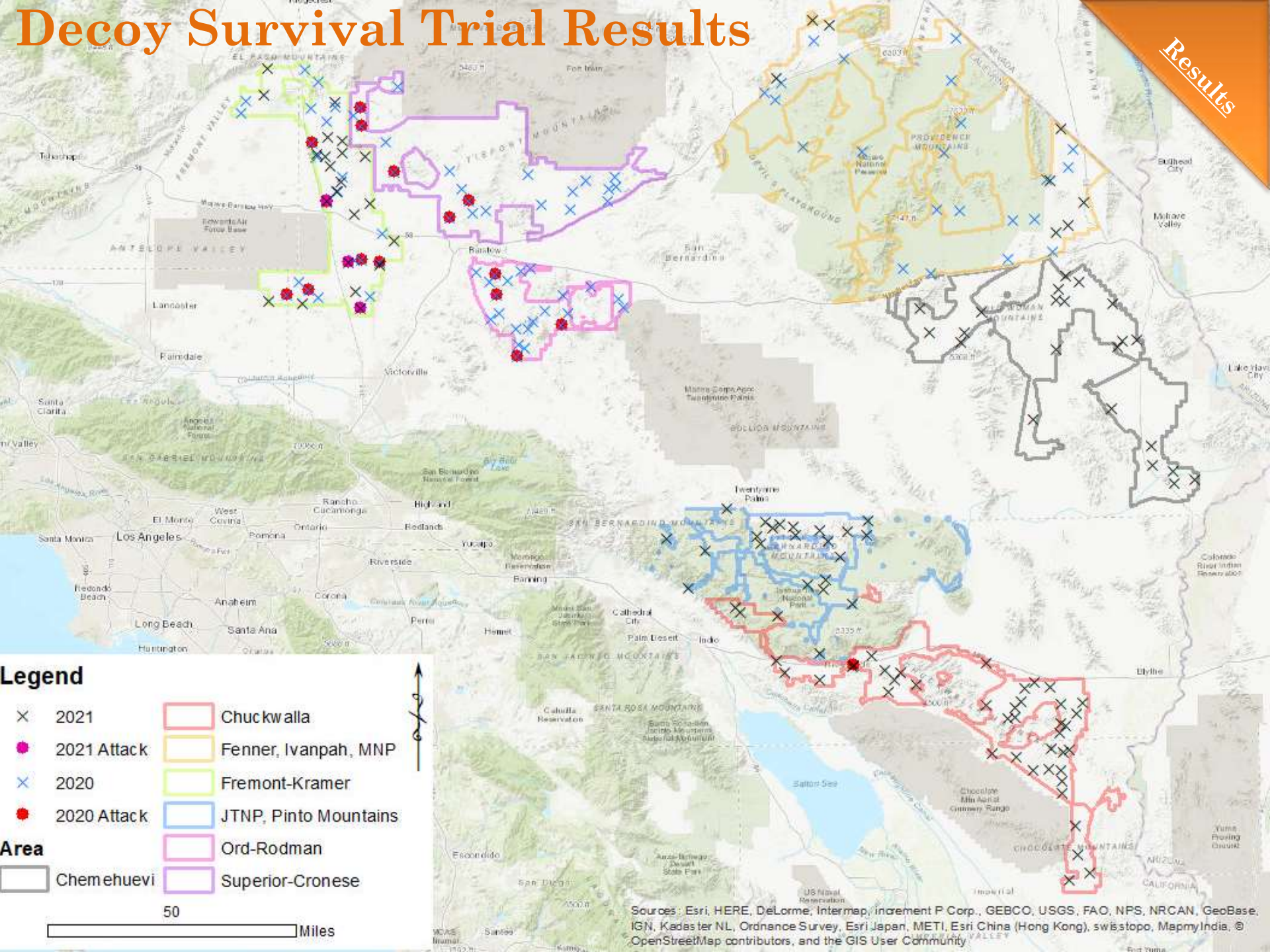
Estimate Prey Vital Rate

❖ ~15 April & September days

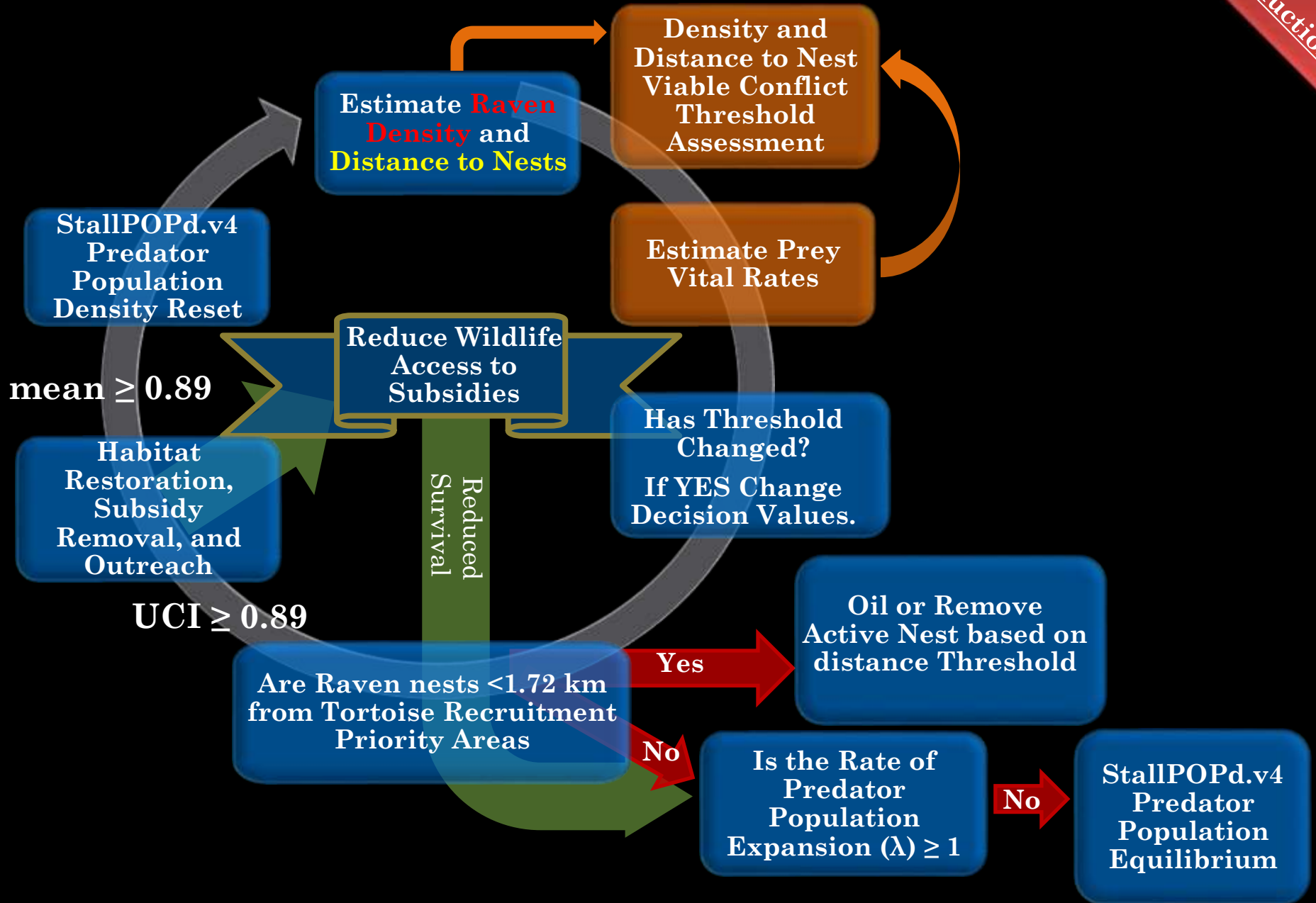


Decoy Survival Trial Results

Results



Adaptive Conflict Resolution Cycle



StallPOPd V3 Web Interface

StallPOPdV4
☰

- 🏠 Welcome and User Tutorial
- 📍 Your System of Interest
- 📊 Matrix Situation
- 📍 Geographical Area
- 📊 Potential Treatment Strategies
 - Density Dependent System
 - Density Independent System
- 📄 The Take Away
- 📄 Download My Results

Initiate your Geographical Area

Enter the characteristics of target area for population treatment(s). Once you like your entries, proceed to the Potential Treatment Strategies tab to view computational results.

Enter the geographical expanse of the area
 Area is defined in square kilometers.
The initial (example) area represents a critical habitat unit in the Mojave Desert, California, USA (K. Holcomb, unpublished data).

Enter the current density of individuals in the area
 Density is defined as the number of individuals per square kilometer.
The initial (example) density represents that of common raven in a critical habitat unit in the Mojave Desert, California, USA (K. Holcomb, unpublished data).

Enter the target density of individuals in the area
 Target density is defined as the individuals per square kilometer.
Target density for common ravens is 0.4 individuals per square kilometer from Coates, P.S., S.T. O'Neill, B.E. Briscoe, M.A. Roca, P.J. Jackson, J.B. Grwko, K.B. Howe, A.M. Meyer, L.J. Foster, D.J. Delehanty. 2020. Broad-scale impacts of an invasive native predator on a sensitive native prey species within the shifting grass community of the North American Great Basin. *Biological Conservation* 243: 108409.

$$L = \begin{bmatrix} 0 & 0 & a_{13} \\ a_{21} & (a_{22}) & (a_{23}) \\ 0 & a_{32} & a_{33} \end{bmatrix}$$

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

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

StallPOPdV4
Wildlife Health Lab at Cornell University

Density Reset and Maintenance Removal

Action

Reset					
Strata	Eggs/ Hatch Year	Non- Breeders	Breeders	2020 Totals	Total Take Required
FK-2020	1,486	531	2,132	4,149	
FK-Traget	542	193	778	1,513	
Take Target	944	338	1,354		2,636
2020 Take	1027	0	59		1,086
Strata	Eggs/ Hatch Year	Non- Breeders	Breeders	2020 Totals	Total Take Required
FK-2021	1,486	531	2,132	4,149	
FK-Traget	542	193	778	1,513	
Take Target	944	338	1,354		2,636
2021 Take	426	0	7		433
Maintenance					
Strata	Eggs/ Hatch Year	Non- Breeders	Breeders	2020 Totals	Total Take Required
FK-202x	542	193	778	1,513	
FK-Traget	407	174	700	1,280	
Take	136	19	78		233



Egg Addling (oil application) Efforts & Effects Summary

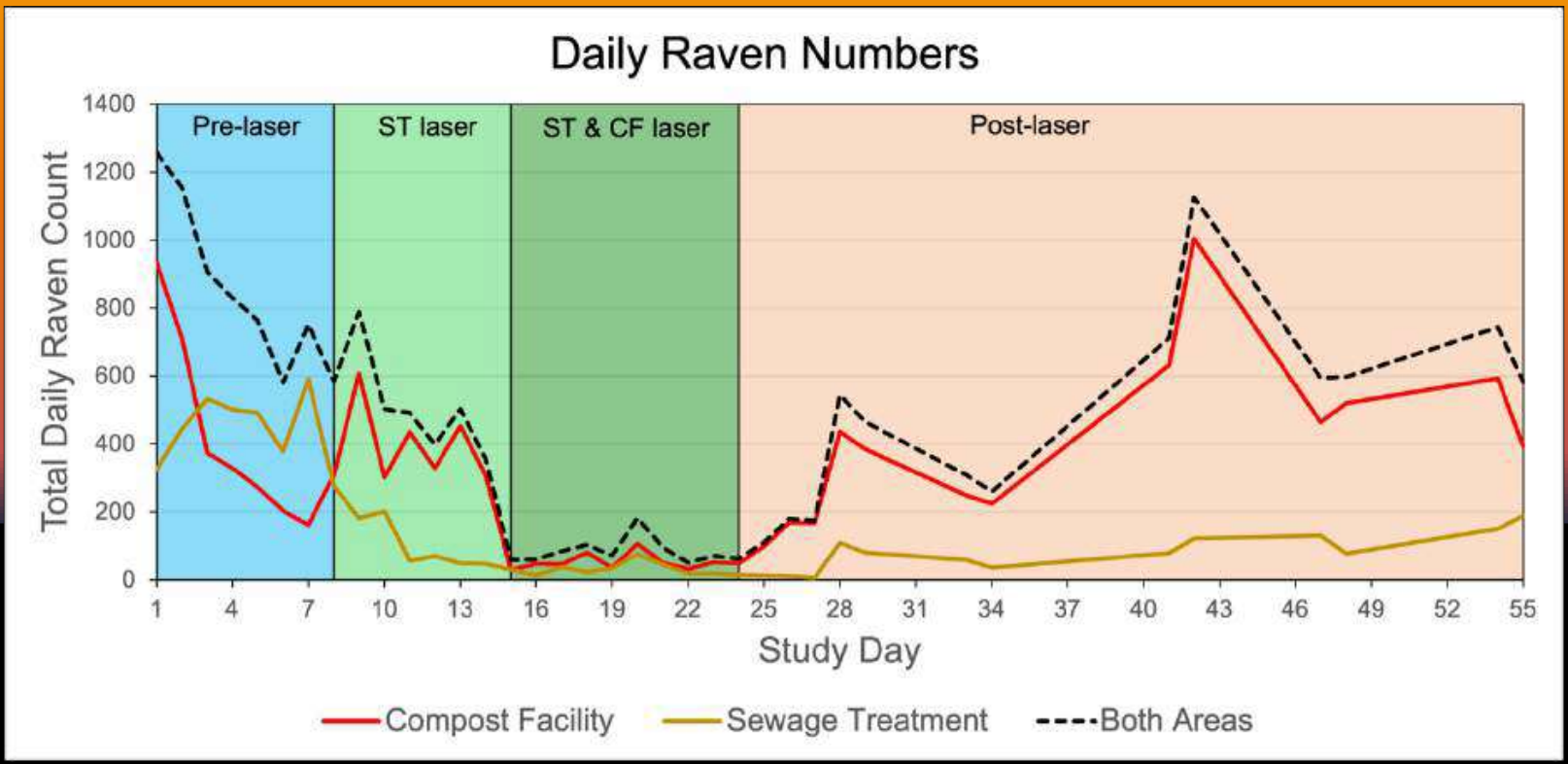
Action

CORA Monitoring Areas	Eggs Oiled in 2019	Eggs Oiled in 2020	Eggs Oiled in 2021	Eggs Oiled in 2022 (4/16)	2019 Cost per Egg	2020 Cost per Egg	2021 Cost per Egg	2022 Egg Take Target
Chemehuevi	46	31	55	0	\$1,493.07	\$3,764.19	\$1,099.85	0
Fenner, Ivanpah, Mojave NP	33	140	104	47	\$4,349.30	\$1,714.60	\$1,041.96	228
Fremont-Kramer	NA	843	426	363	NA	\$279.01	\$365.81	944
Ord-Rodman	200	281	NA	103	\$775.60	\$699.67	NA	48
Superior-Cronese	237	267	377	137	\$687.43	\$610.14	\$412.81	532
JTNP, Pinto Mountains	53	105	166	80	\$2,475.87	\$1,233.54	\$713.55	127
Chuckwalla	NA	NA	55	0	NA	NA	\$1,651.25	193
Total	569	1667	1128	730				2,072
Average					\$1,956.25	\$1,383.53	\$880.87	
Percent of Target Egg Take	27.46%	80.45%	54.44%	35.23%				100.00%
Percent Total Eggs	10.22%	29.94%	20.26%	13.11%				37.21%
Expected Population Expansion Rate -oiling Only	1.106	1.080	1.093					1.012
Percent of Breeding Adults Taken By WS	1.25%	1.25%	2.79%					10.78%
Expected Population Expansion Rate -oiling & WS	1.097	1.071	1.072					0.986
Max Expected Population Expansion Rate Decrease	0.049							0.134
Expected Population Expansion Without Action	1.119							

Reduce Wildlife Access to Subsidies



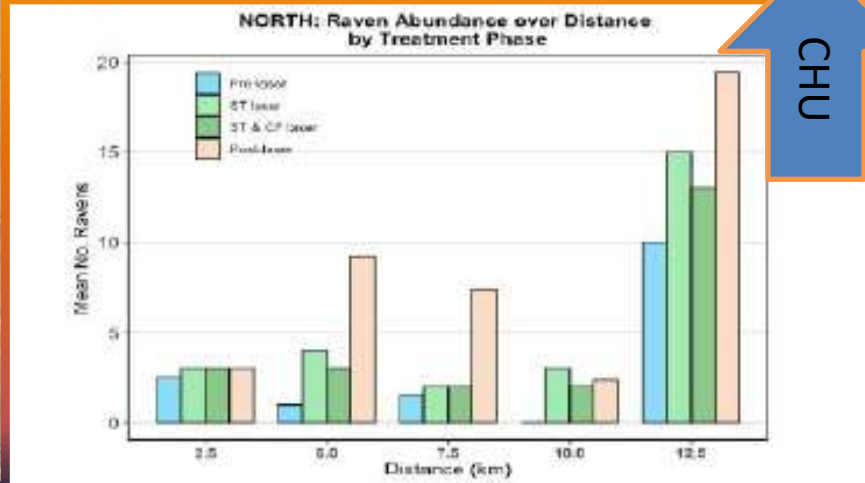
Reduce Wildlife Access to Subsidies



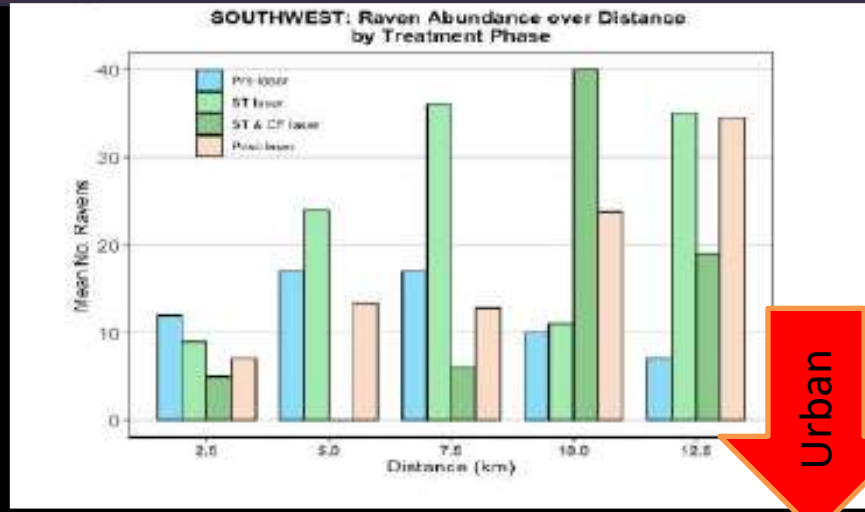
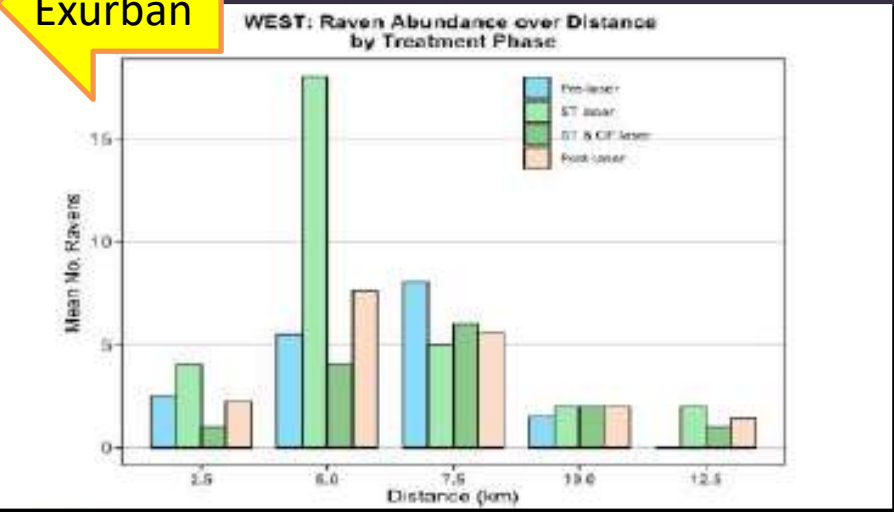
Raven Dispersal in Response to Subsidy Denial



Exurban



CHU



Urban

Side-by-side TechnoTort Decoy and Mojave Desert Tortoise Headstarted Juvenile Survival Comparison

Action



REAT Raven Subaccount Summary

PROPERTY	FEDERAL FISCAL YEAR										
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	CHU Total
MOJAVE - TOTALS	\$258,396.00	\$135,501.00	\$175,000.00	\$343,445.00	\$469,704.75	\$411,543.45	\$659,547.78	\$911,643.46	\$419,830.63	\$525,589.26	\$4,310,201.33
Superior-Cronese CHU/Fort Irwin Conservation Area	\$195,000.00	\$135,501.00	\$175,000.00	\$129,195.00	\$172,386.00	\$60,244.00	\$162,921.50	\$239,785.58	\$155,630.00	\$154,417.72	\$1,580,080.80
Ord-Rodman CHU	\$0.00	\$0.00	\$0.00	\$77,500.00	\$70,645.00	\$78,982.50	\$155,119.50	\$196,605.89	\$0.00	\$31,197.38	\$610,050.27
Mojave National Preserve/Ivanpah CHU/Fenner CHU	\$0.00	\$0.00	\$0.00	\$136,750.00	\$135,042.50	\$142,704.80	\$143,526.78	\$240,043.63	\$108,363.75	\$143,149.88	\$1,049,581.34
DTRNA	\$63,396.00	\$0.00	\$0.00	\$0.00	\$0.00		\$0.00	included	included	included	\$63,396.00
Fremont-Kramer CHU (incl EAFB)/DTRNA	\$0.00	\$0.00	\$0.00	\$0.00	\$91,631.25	\$129,612.15	\$197,980.00	\$235,208.36	\$155,836.88	\$196,824.28	\$1,007,092.92
COLORADO - TOTALS	\$137,927.00	\$143,002.01	\$173,269.00	\$128,119.13	\$124,376.46	\$133,273.65	\$237,900.00	\$281,288.00	\$269,761.25	\$139,079.00	\$1,767,995.50
Chemehuevi CHU	\$0.00	\$86,632.65	\$92,223.00	\$79,247.10	\$73,822.75	\$64,067.40	\$106,679.00	\$116,690.00	\$60,492.50	\$0.00	\$679,854.40
Joshua Tree National Park/Pinto Mountains CHU	\$0.00	\$0.00	\$0.00	\$48,872.03	\$50,553.71	\$69,206.25	\$131,221.00	\$129,522.00	\$118,450.00	\$139,079.00	\$686,903.99
Chuckwalla CHU	\$137,927.00	\$56,369.36	\$81,046.00	\$0.00	\$0.00	\$0.00	\$0.00	\$35,076.00	\$90,818.75	\$0.00	\$401,237.11
Grand Total	\$396,323.00	\$278,503.01	\$348,269.00	\$471,564.13	\$594,081.21	\$544,817.10	\$897,447.78	\$1,192,931.46	\$689,591.88	\$664,668.26	\$6,078,196.83
	Approximate Total deposites	Total expenses for this Program	Balance (09/30/21)	Deposits Since 09/30/22	Balance after 2021 Expenses & Deposits						
REAT Agencies Raven Management Account	\$9,004,437.89	\$6,078,196.83	\$2,377,209.00	\$596,870.40	\$2,309,411.14						

Acknowledgments

