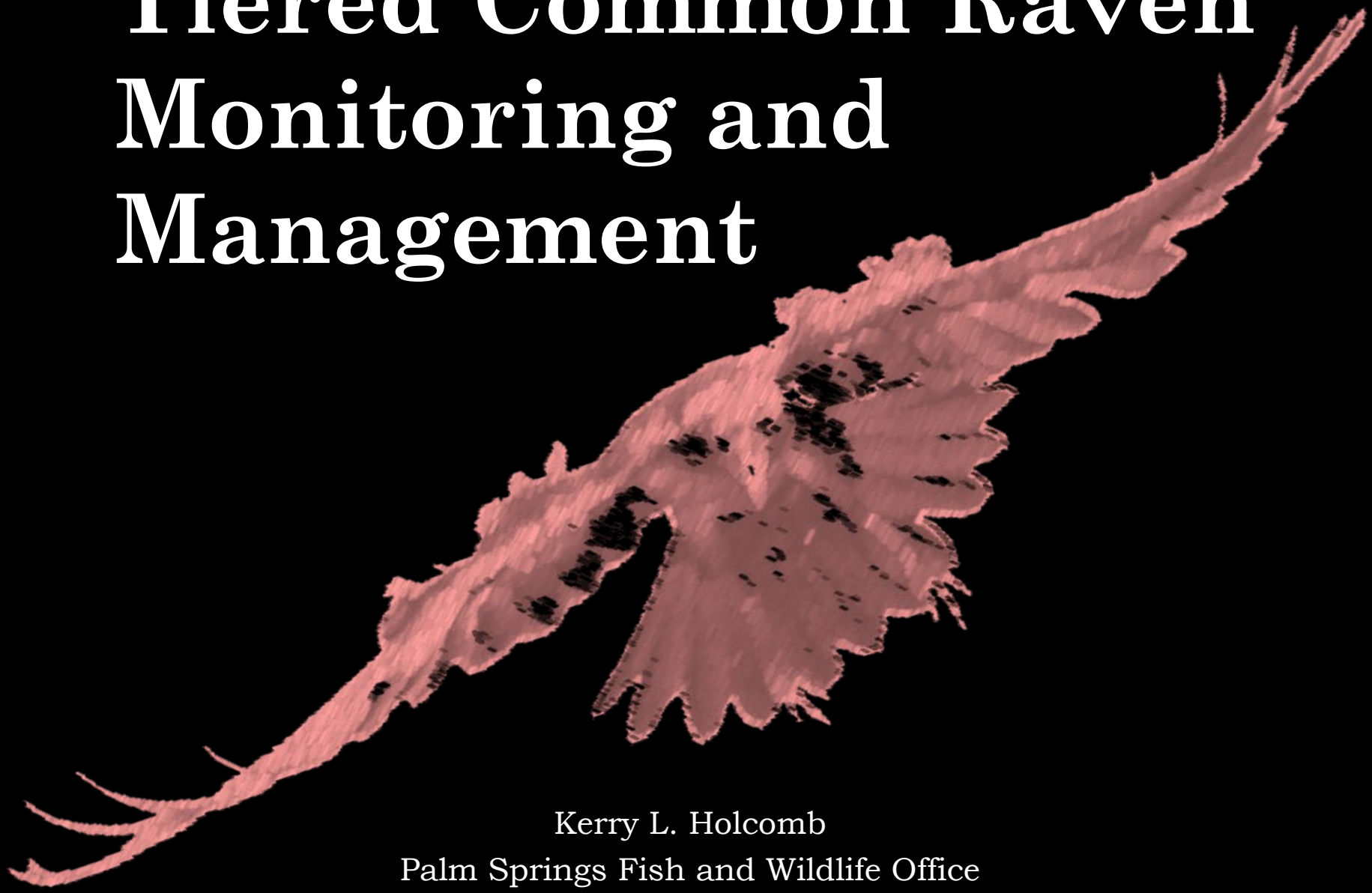
Tiered Common Raven Monitoring and Management



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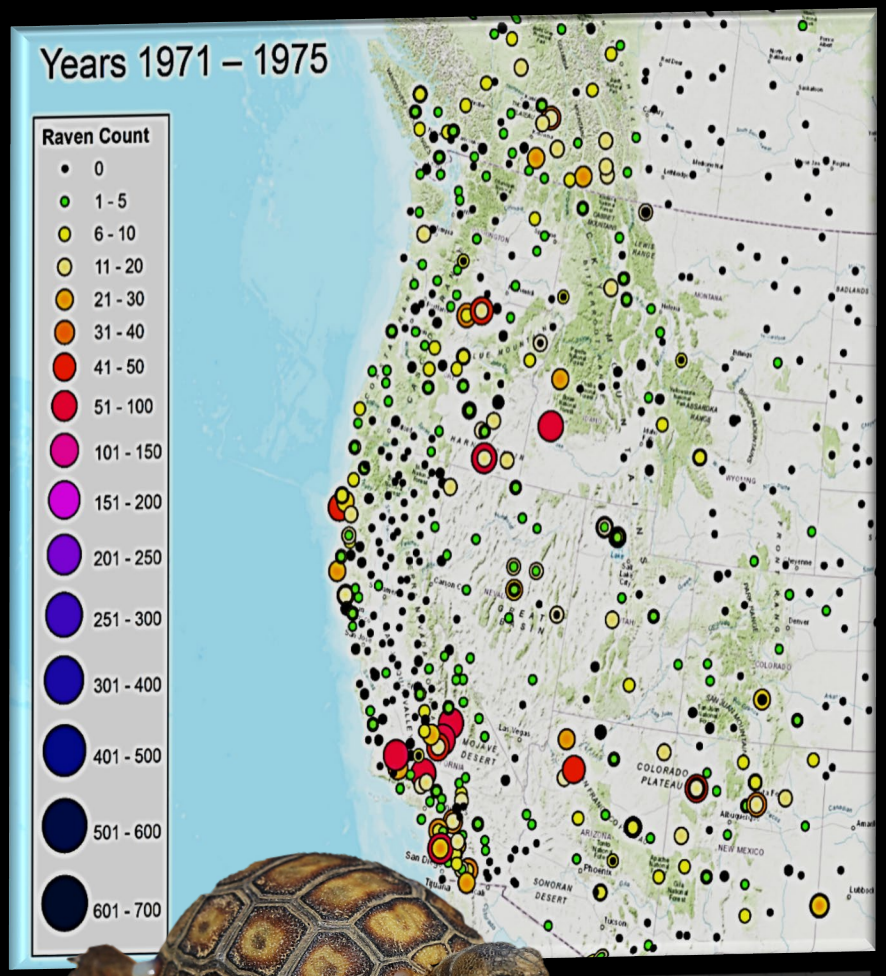
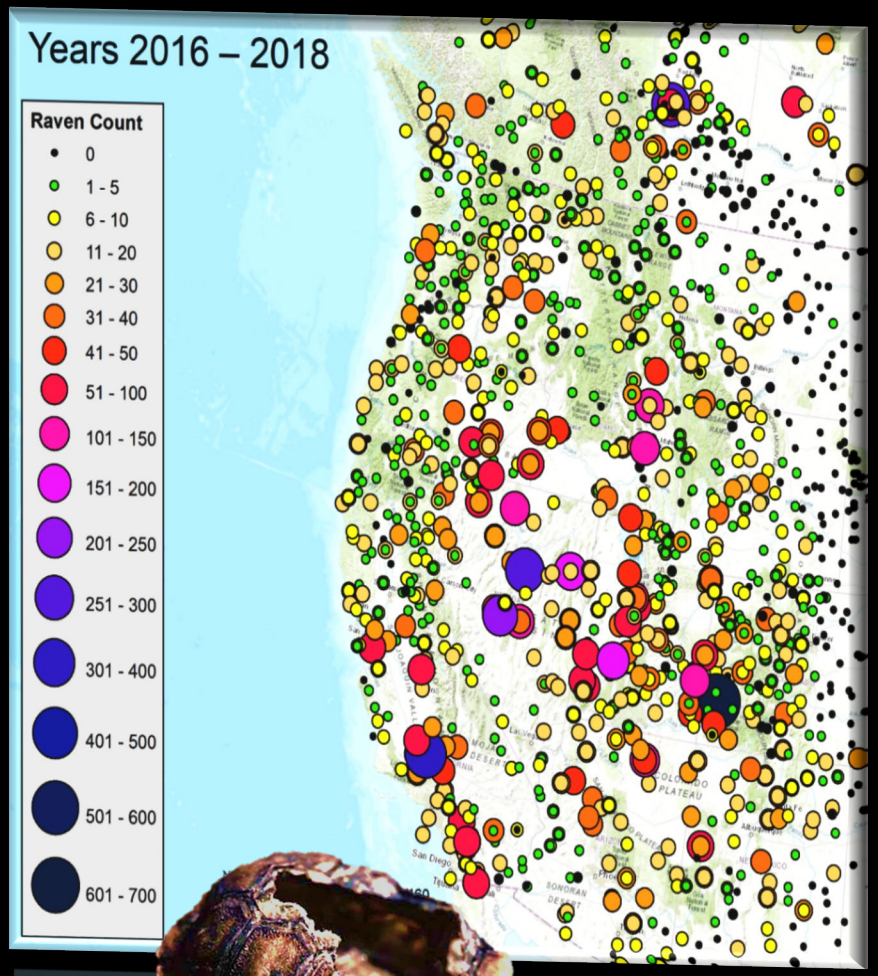
Abbreviations, concepts, etc.

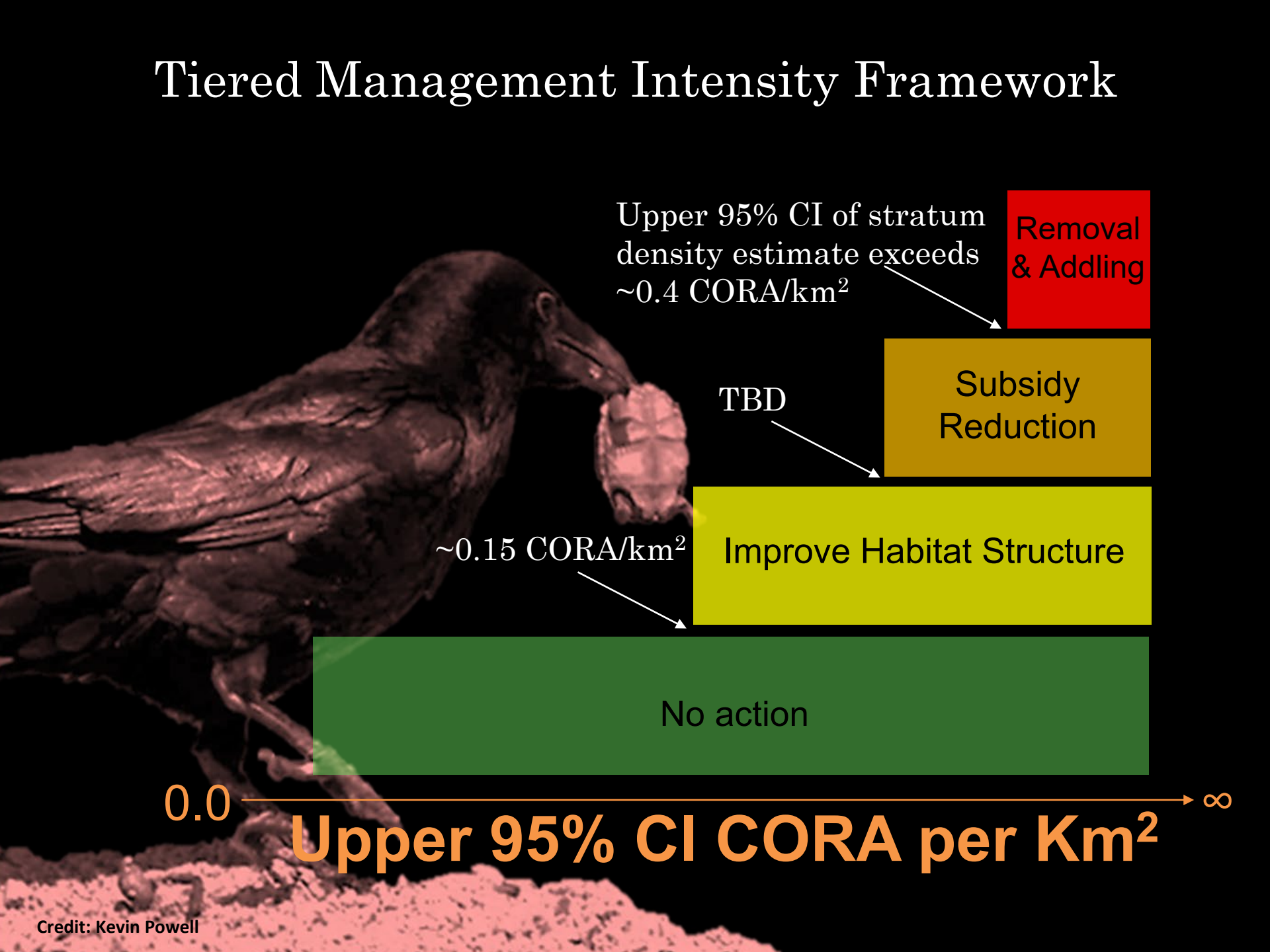
- **CORA** = Common Raven
- **Threshold** = A population viability threshold, where the density dependent risk of raven depredation unsustainably depresses the survival of 0 to 9 year-old tortoises
- **CI** = Confidence Interval
- **Upper 95% CI** = 5% probability of a false negative, according to statistical decision theory

Breeding Bird Survey Results for Common Raven



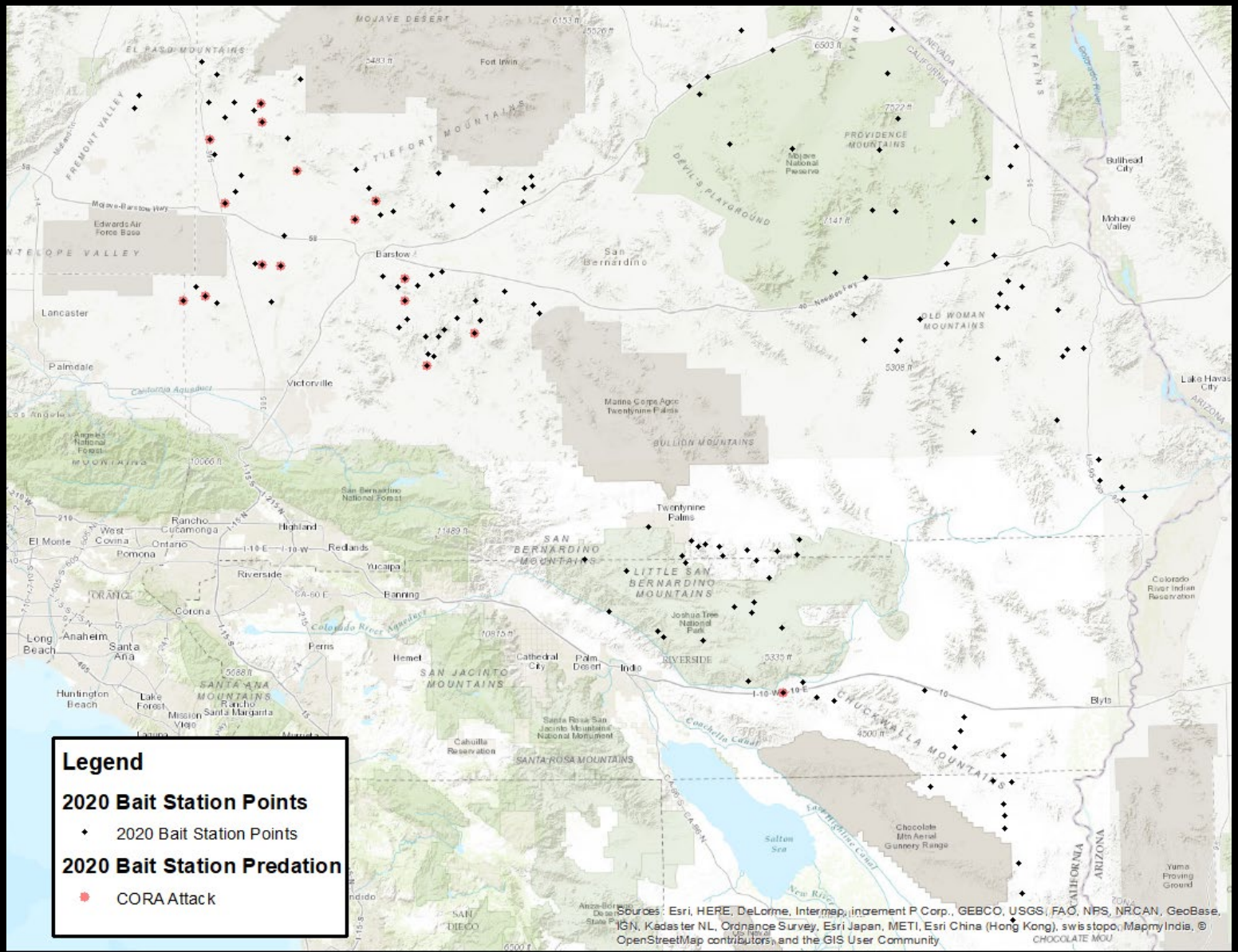


Tiered Management Intensity Framework



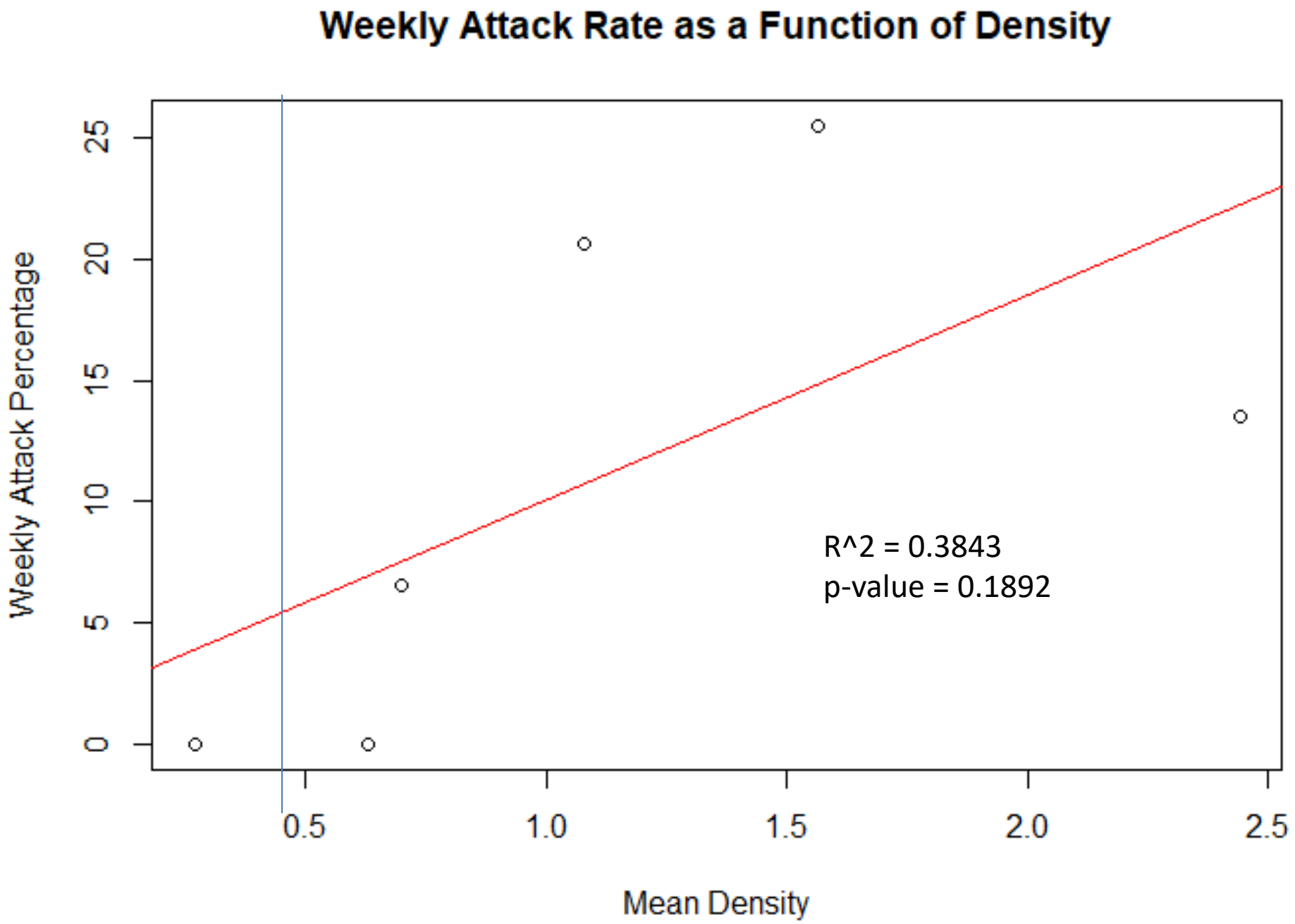
Credit: Kevin Powell

Desert Tortoise Specific Population Viability Threshold Development: 2020 Bait Station Results

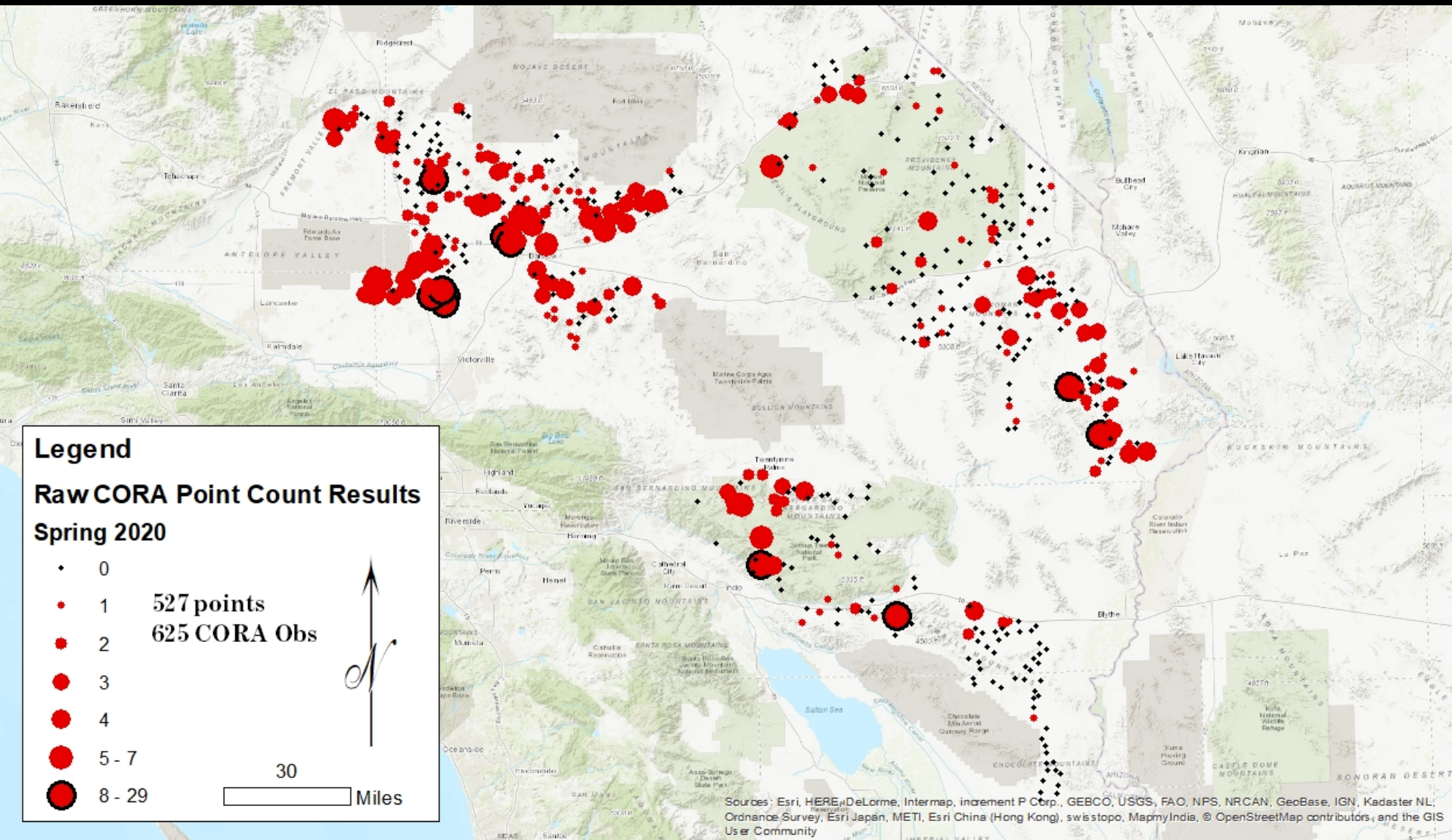


Desert Tortoise Specific Population Viability Threshold Development: 2020 Bait Station Results

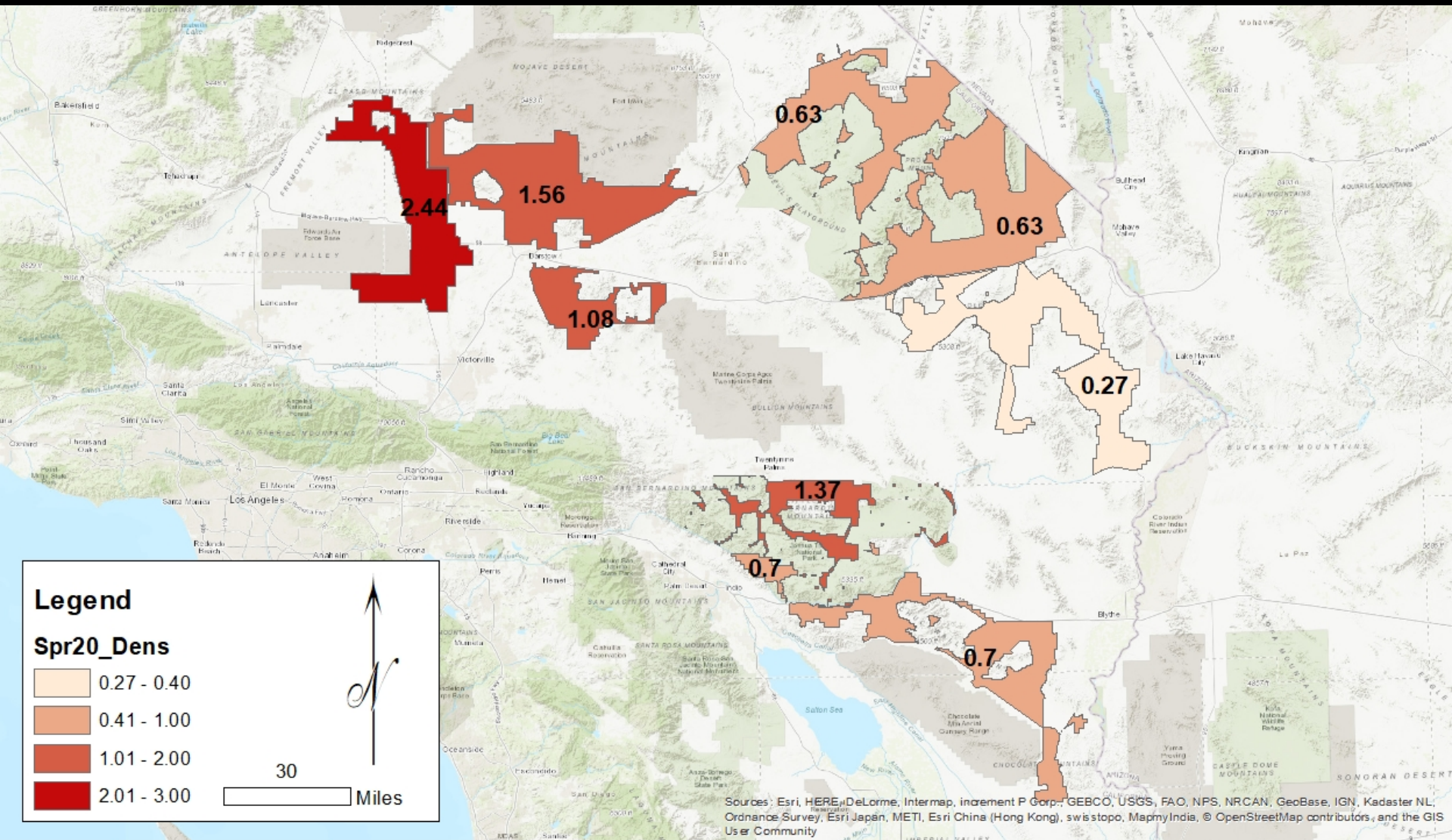
2020 CORA Monitoring Stratum	# of 12hr Periods	Attacks	Weekly Attack Probability	Mean Density (CORA/km^2)	Upper 95% Confidence Limit (CORA/km^2)
Fenner, Ivanpah, MNP	289.78	0.00	0.00	0.63	1.14
Fremont-Kramer	722.95	7.00	13.56	2.44	4.49
Ord-Rodman	542.53	8.00	20.64	1.08	1.95
Superior-Cronese	603.71	11.00	25.51	1.56	2.61
Chuckwalla	425.00	2.00	6.59	0.70	2.08
JTNP, Pinto Mountains	564.86	N/A	N/A	1.37	3.32
Chemehuevi	228.70	0.00	0.00	0.27	0.75


Weekly Attack Rate as a Function of Density
Weekly Attack Percentage
0
5
10
15
20
25
0.5
1.0
1.5
2.0
2.5
Mean Density
R^2 = 0.3843
p-value = 0.1892

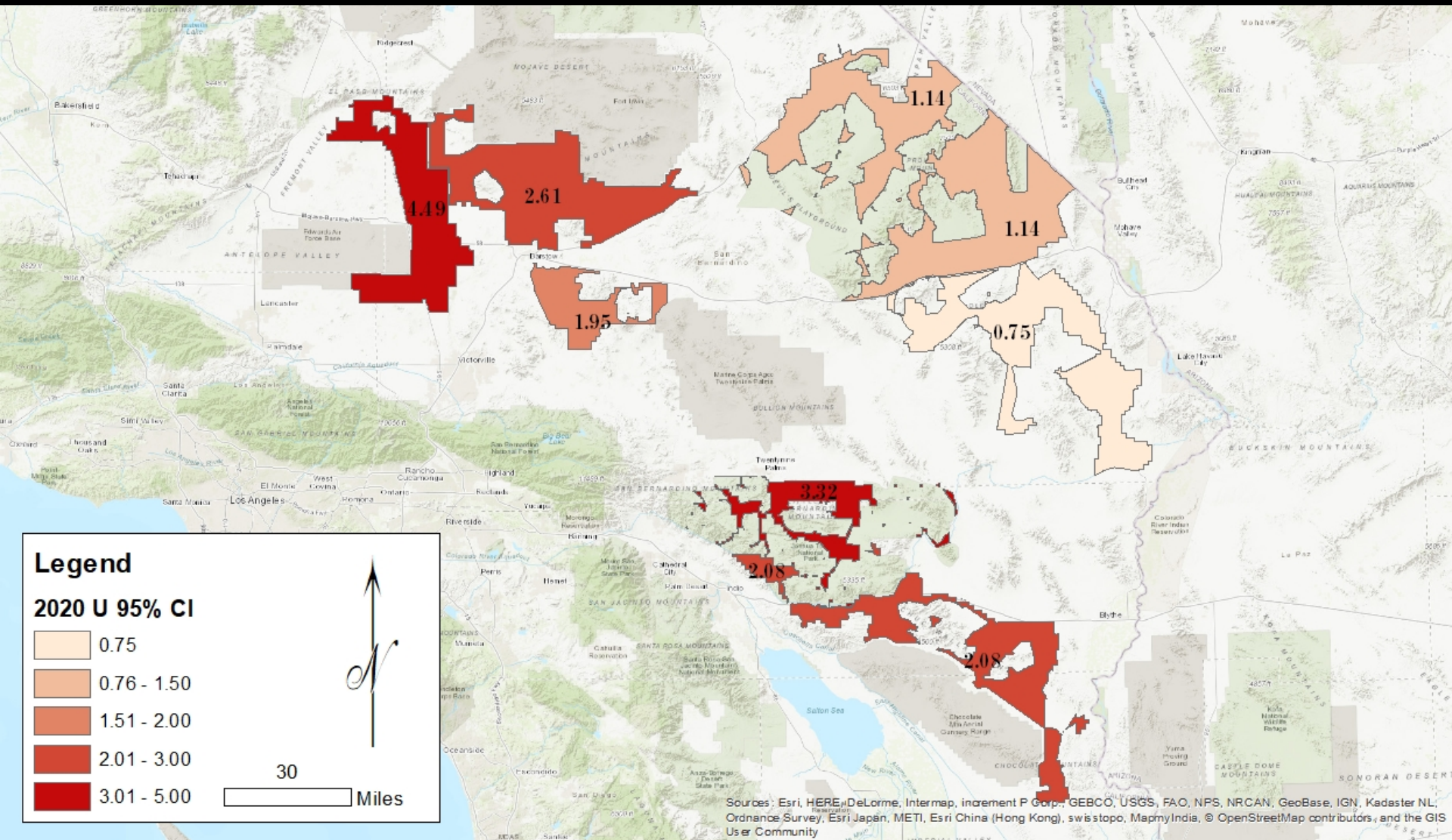
2020 Common Raven Variable Radius Point Count Results



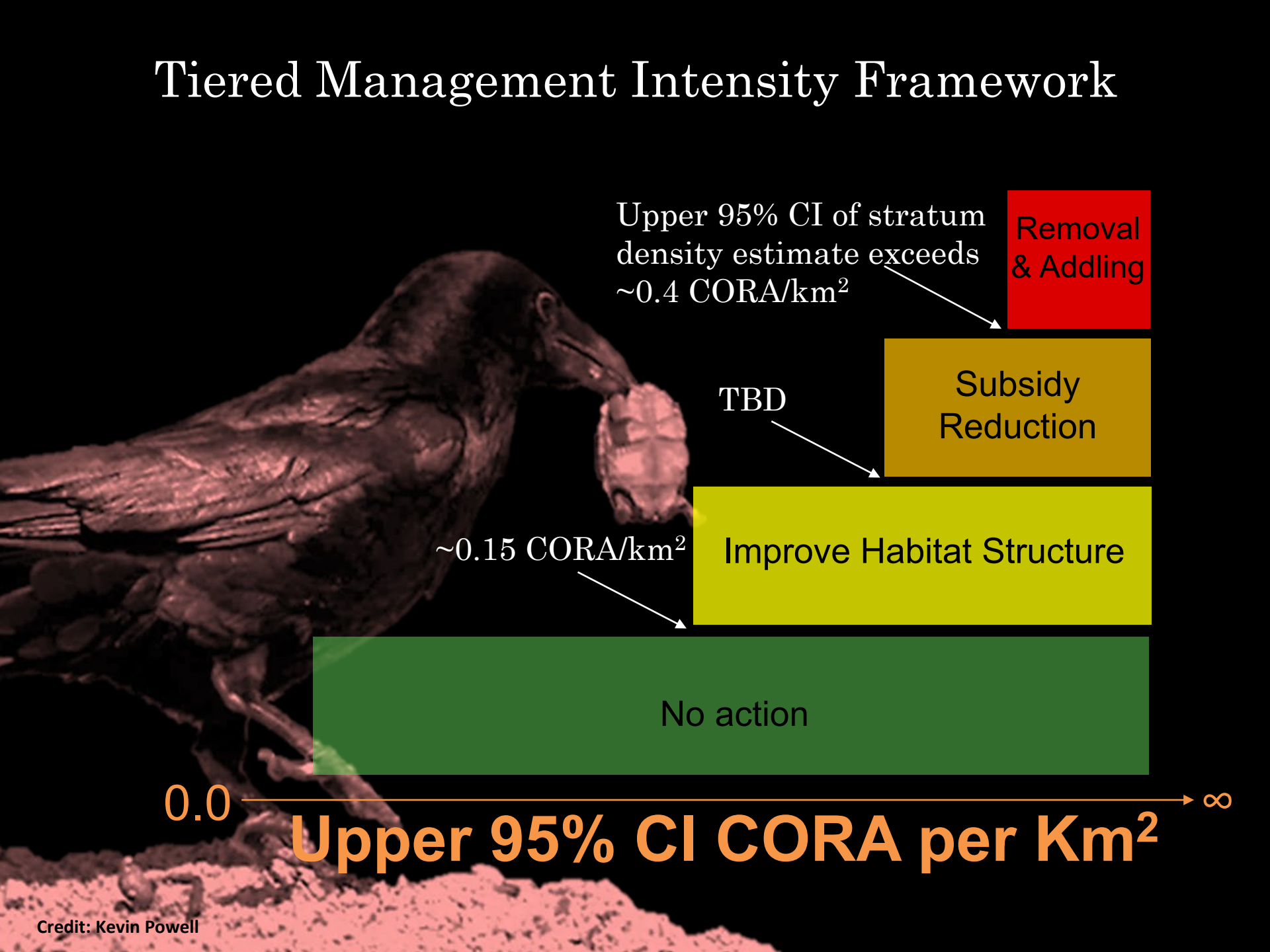
Mean Common Raven Density Estimates



Upper 95% CI of 2020 Common Raven Density Estimates



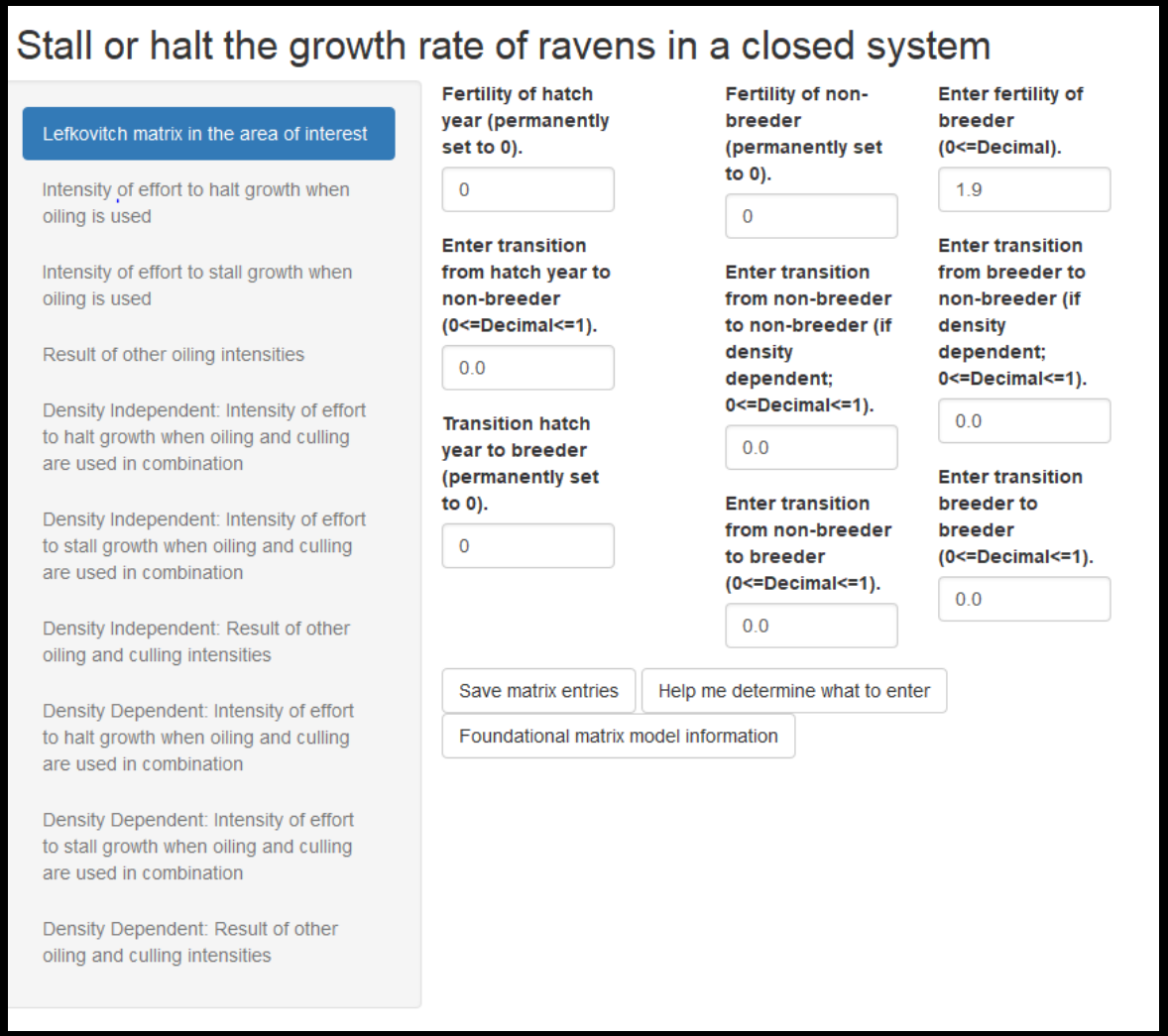
Tiered Management Intensity Framework



Credit: Kevin Powell

StallPOPd V3 Web Interface

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



https://ecommons.cornell.edu/handle/1813/65718.3

StallPOPd V3 Input Survival Data

f	s_{HY}	s_J	s_{NB}	s_{BR}	λ
Heavily Subsidized					
0.78	0.40	0.80	0.80	0.80	1.00
0.78	0.40	0.80	0.80	0.96	1.11
Moderately Subsidized					
0.62	0.20	0.80	0.80	0.80	
0.62	0.30	0.80	0.80	0.80	
0.62	0.20	0.80	0.80	0.96	
0.62	0.30	0.80	0.80	0.96	
Minimally Subsidized					
0.47	0.20	0.80	0.80	0.80	
0.47	0.10	0.80	0.80	0.80	
0.47	0.20	0.80	0.80	0.96	
0.47	0.10	0.80	0.80	0.96	

Photo credit: Tim Shields

Kristan & Boarman 2005

Removal Targets by Stratum & Removal Rates

2020 CORA Monitoring Stratum	km^2	95% CL	# of Eggs	# Non-breeders	# Breeders	Total Take
Chemehuevi	2,328.34	0.75	292	104	419	815
Fenner, Ivanpah, MNP	4,040.54	1.14	1,071	383	1,537	2,991
Fremont-Kramer	1,701.40	4.49	2,492	890	3,576	6,958
Ord-Rodman	702.44	1.95	390	140	559	1,089
Superior-Cronese	2,215.36	2.61	1,753	626	2,516	4,895
JTNP, Pinto Mountains	736.59	3.32	770	275	1,105	2,150
Chuckwalla	1,797.89	2.08	1,082	386	1,552	3,020
		Reset Totals:	7,850	2,804	11,264	21,918

Options	Eggs/ yr	Non-breeders/ yr	Breeders/ yr	Total
4 years	1,962.5	701.0	2,816.0	4,498.3
6 years	1,295.3	462.7	1,858.6	2,968.8
8 years	981.3	350.5	1,408.0	2,249.1