2025 Desert Tortoise Drone Surveys on the BCCE

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[1]Resi Solutions

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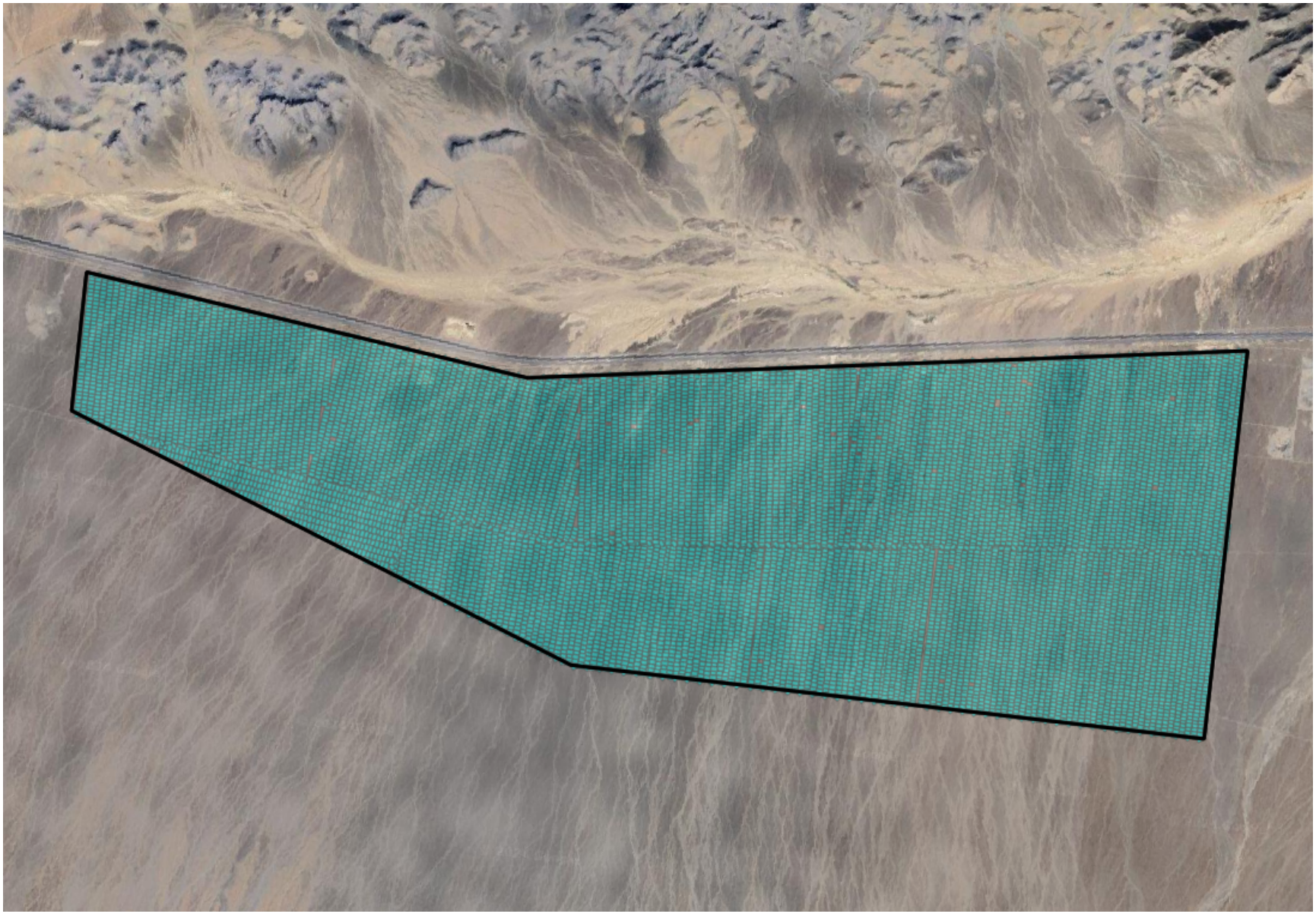
Drone Surveys

Drone Surveys



Tortoise Model:

- n=657
- Trained on *agassizii* (n=384), *flavomarginatus* (243), and some styrotorts (n=30)
- Segregate training (80%) and validation (20%) sets
- Recall=89% (+5%)

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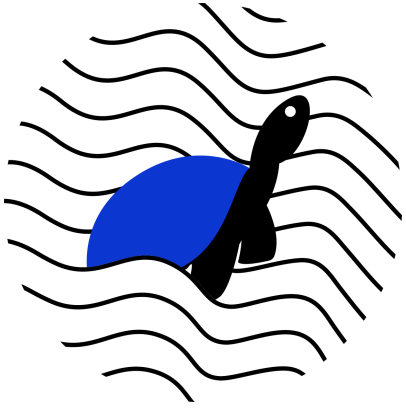

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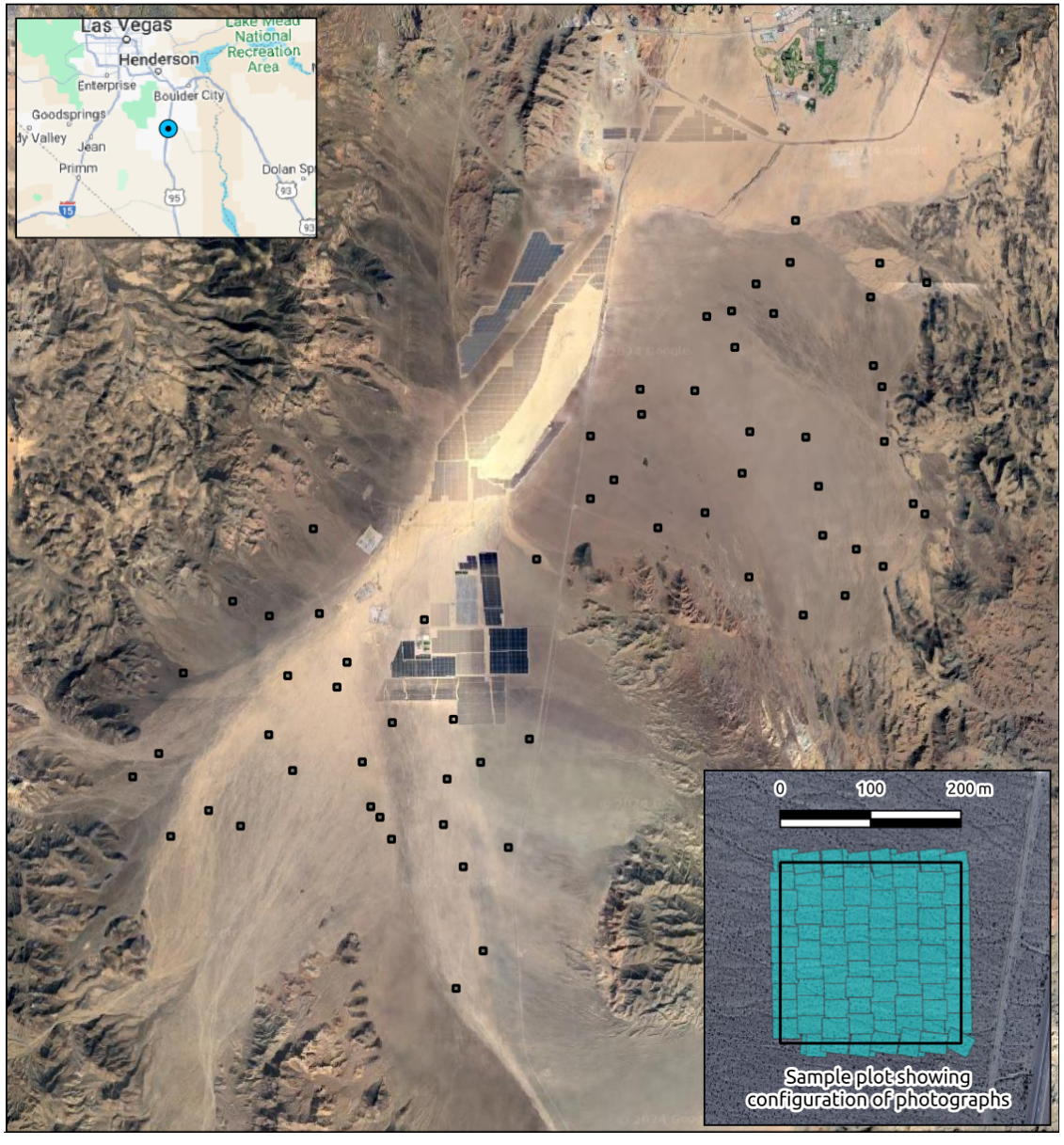
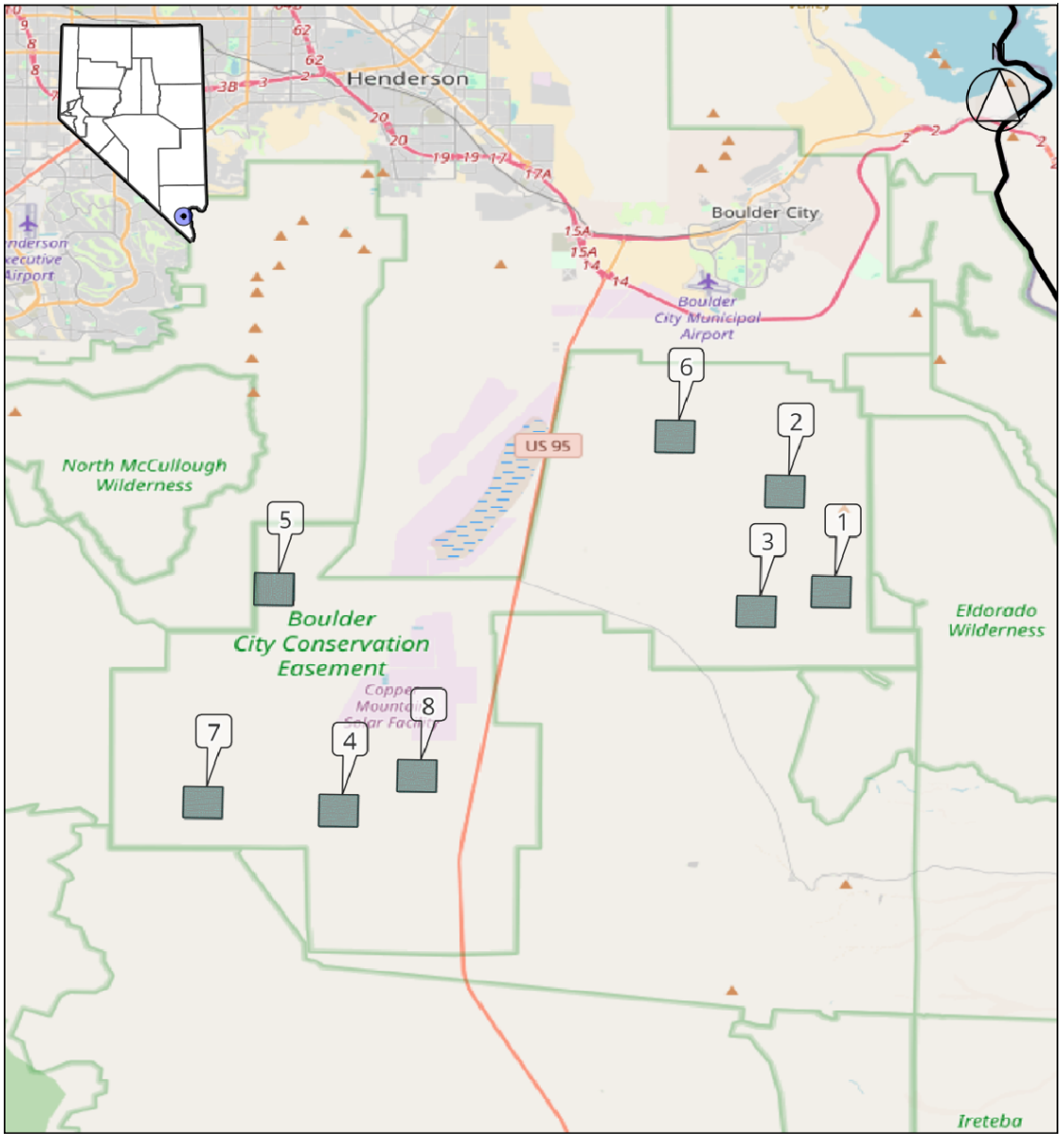
2024 Surveys



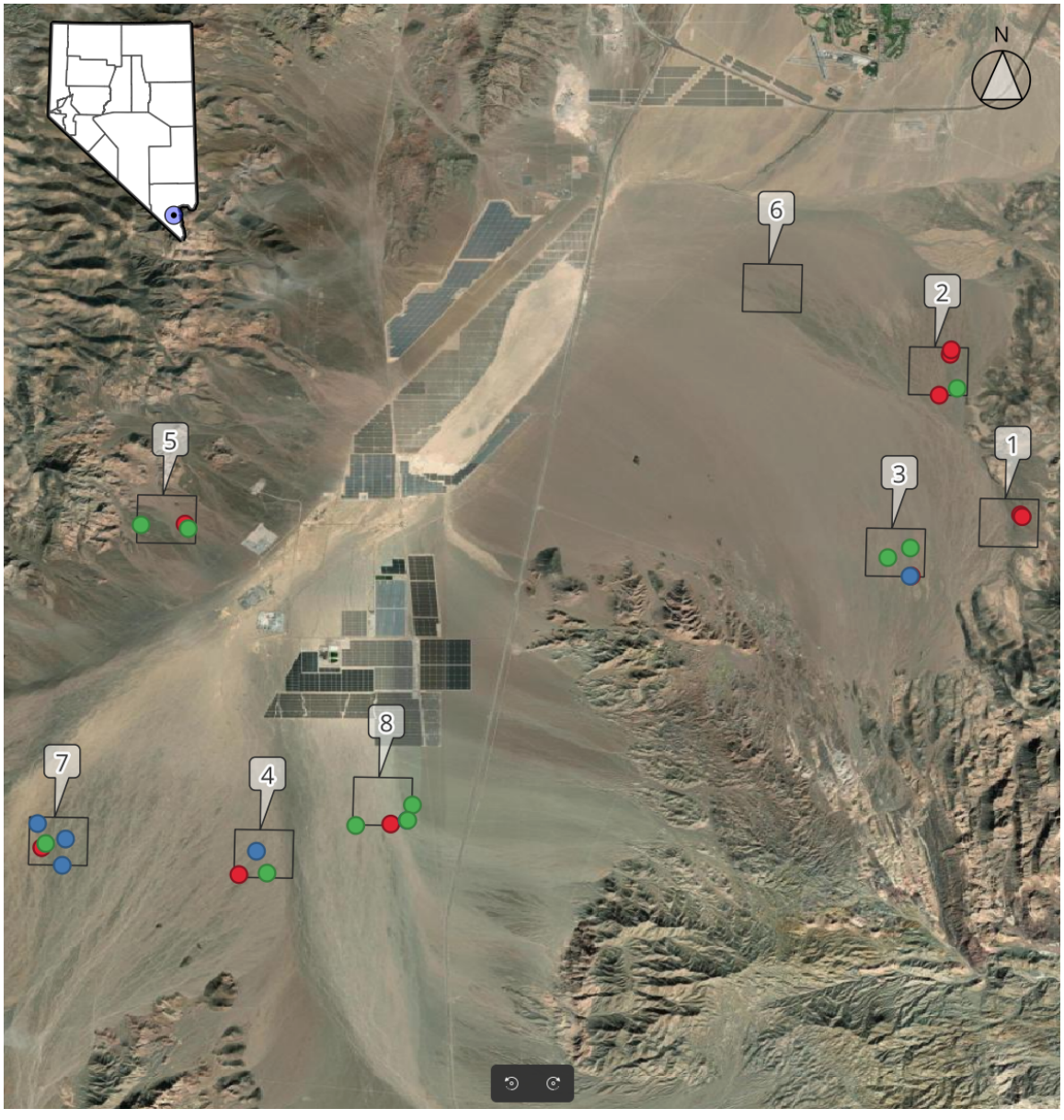
- 59 plots + 5 partial
- Each plot ~ 12.1 ac
- Each plot was flown 3 times
- 2,244 total acres flown
- 34 survey days
- 66 ac/day

2025 Appproach

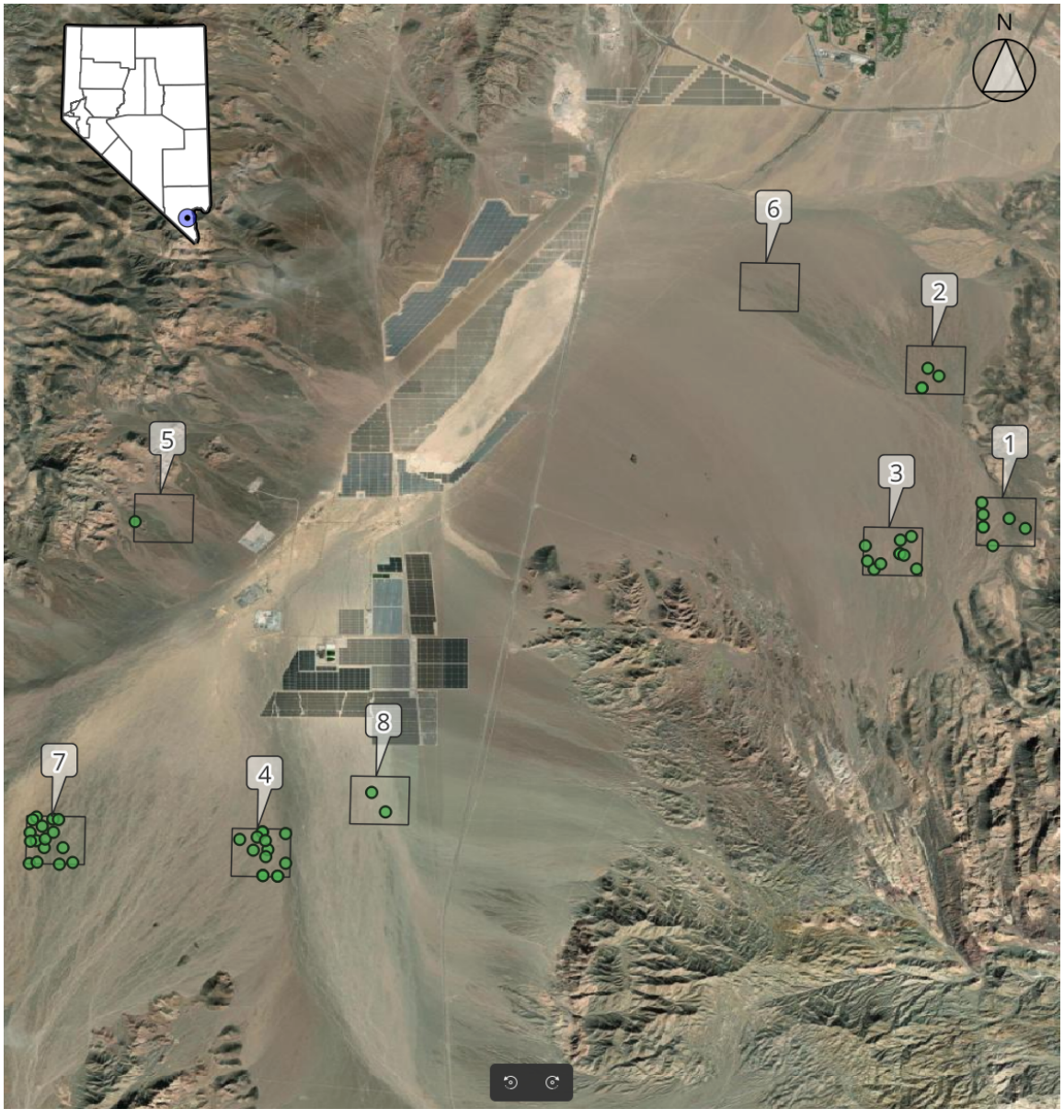


- 8 plots
- Each plot ~ 500 ac
- Each plot was flown 3 times
- 12,230 total acres flown
- 15 survey days
- 815 ac/day
- 6x area in half the time
- 12x efficiency

2025 Results



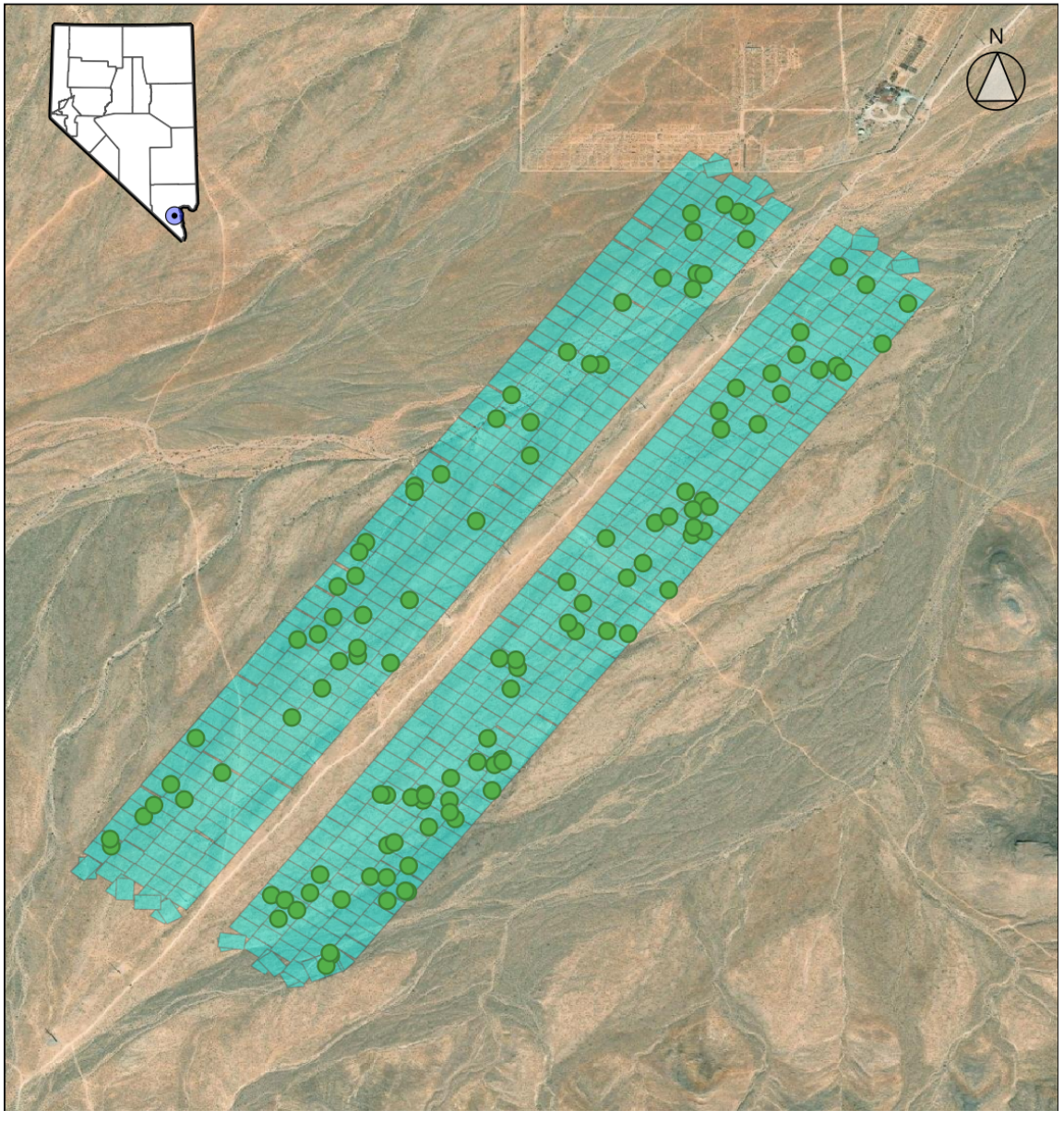
- 15 unique tortoise detections
  - 10 adults
  - 5 juvenile
  - 10 carcasses
- 2.1 detections / pilot-day



- Soil burrows
- 50 active and/or in good condition

	Drone Detectability (g_0)	Pedestrian Detectability (g_0)	Dates	Num Observations	Drone Survey Days
Period 1	3%	67%	4/10-4/22	39	5
Period 2	5%	61%	4/23-5/4	56	5
Period 3	20%	82%	5/6-5/10	22	5

- Cold spring, dry winter - Mojave Max emerged on 5/8
- Analysis limited to 3rd survey period on or after 5/6
- 5/15 survey days
- 4,080 acres flown



- New camera/flight altitude requires new detection curve
- USFWS training arena flown on April 19
- 82% of adult surrogates detected

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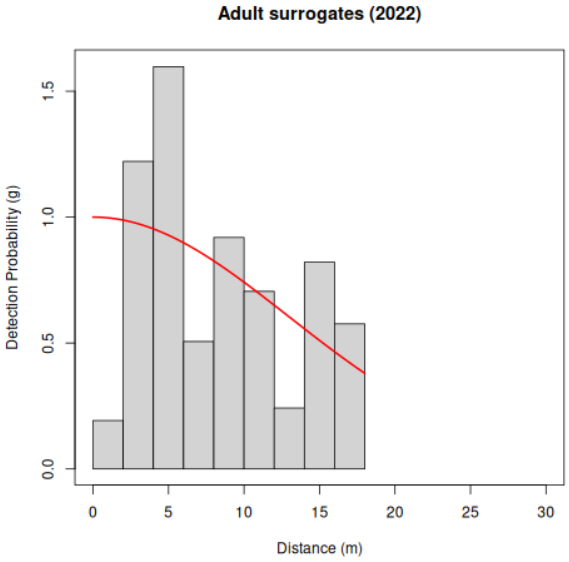
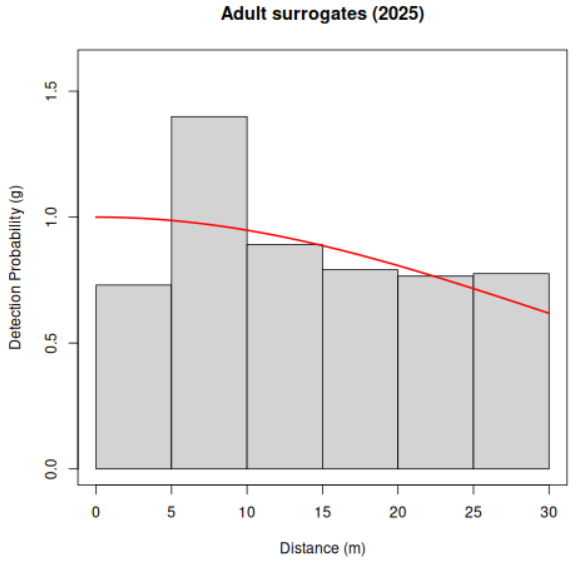
Detection Curve





2022 2025

Detection function calculated from flights at USFWS training arena in 2022 and 2025

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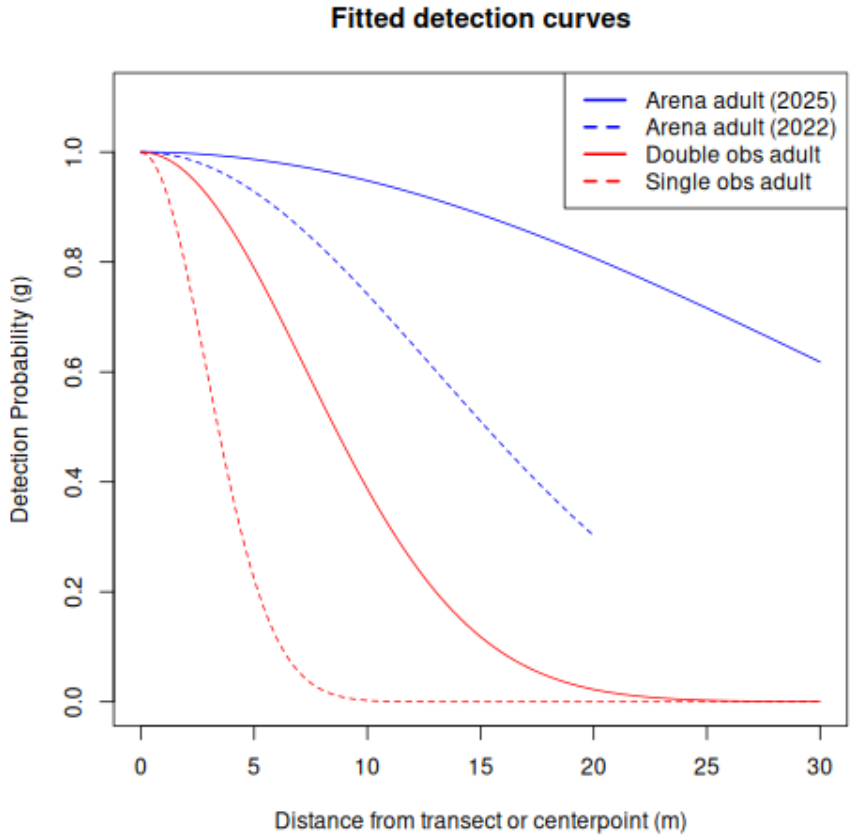

Detection function calculated from flights at USFWS training arena in 2022 and 2025

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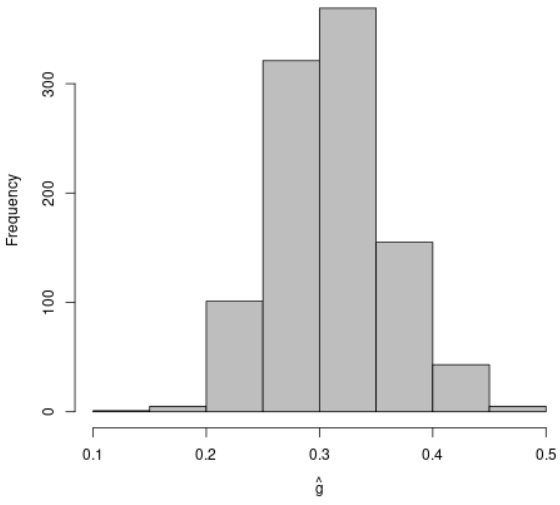
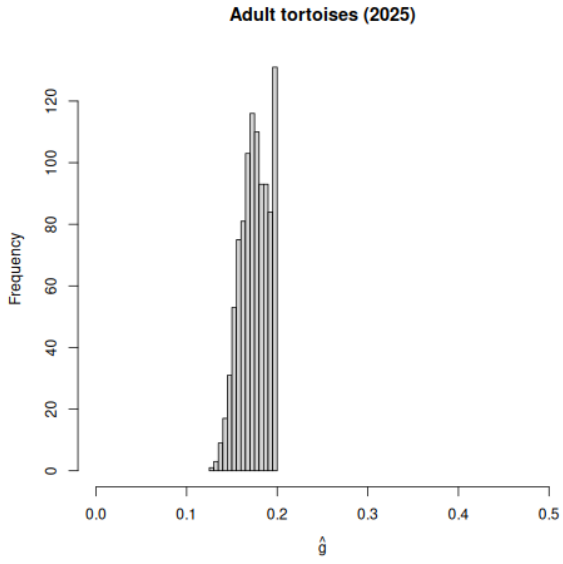
Mean Overall Detection Rate ($\hat{g}$)



$2024 = 0.29$



$2025 = 0.16$

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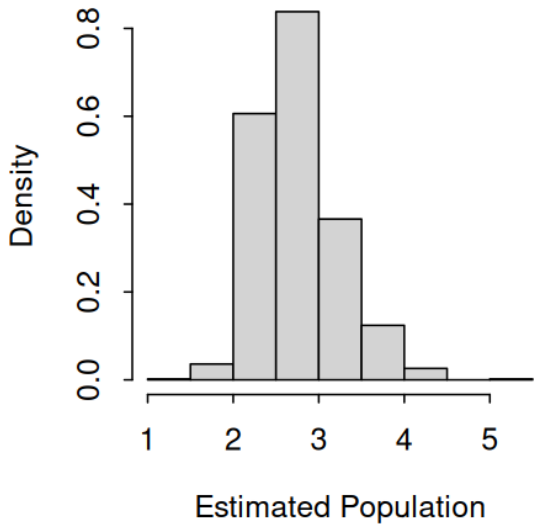
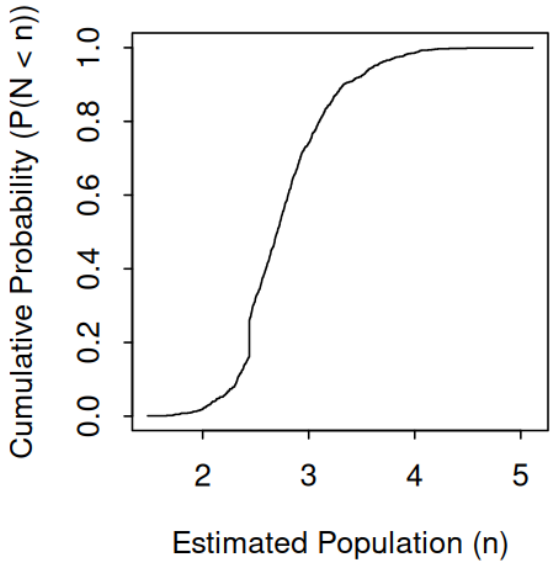
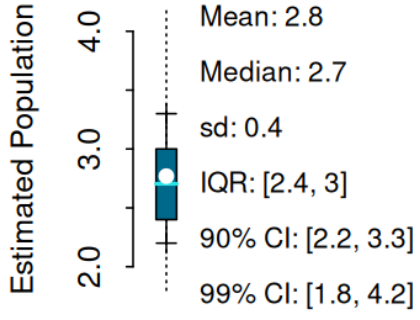
Density







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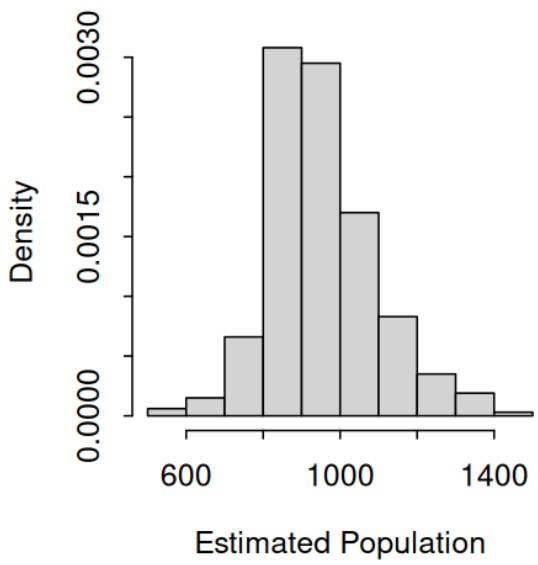
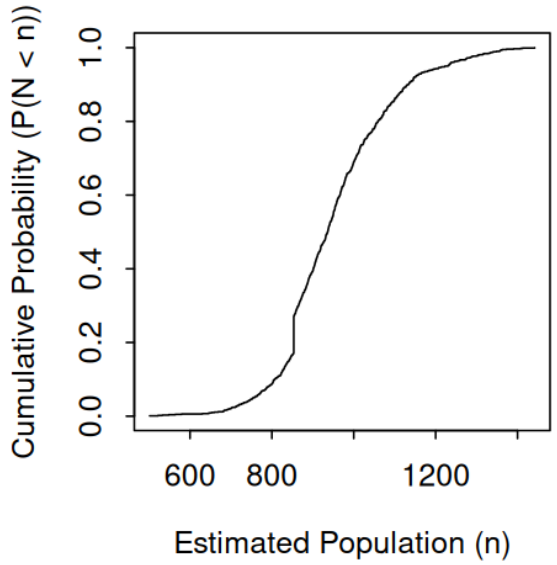
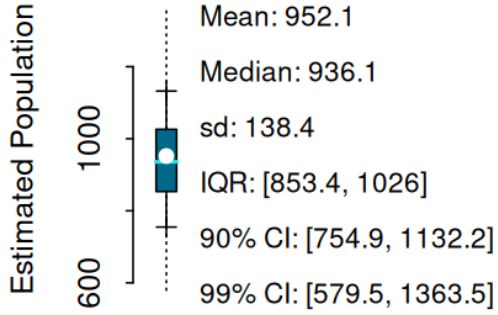
Abundance







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- The drone/AI method is very successful at locating tortoises when they are available for detection
- 2025 approach was 12x more efficient
- Successful survey was possible despite drought conditions
- Easement-wide abundance estimate was possible
- Effort was wasted on survey during low visibility periods
  - This needs to be addressed in future efforts

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