



ADAPTIVE MANAGEMENT OF STINKNET (*Oncosiphon piluliferum*) IN COASTAL SAGE SCRUB

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The Biodiversity Reserve is home to many important species

- 900 acres
- Coastal Sage Scrub Habitat
- Located adjacent to San Diego Zoo Safari Park



Stinknet: Invasive and prolific

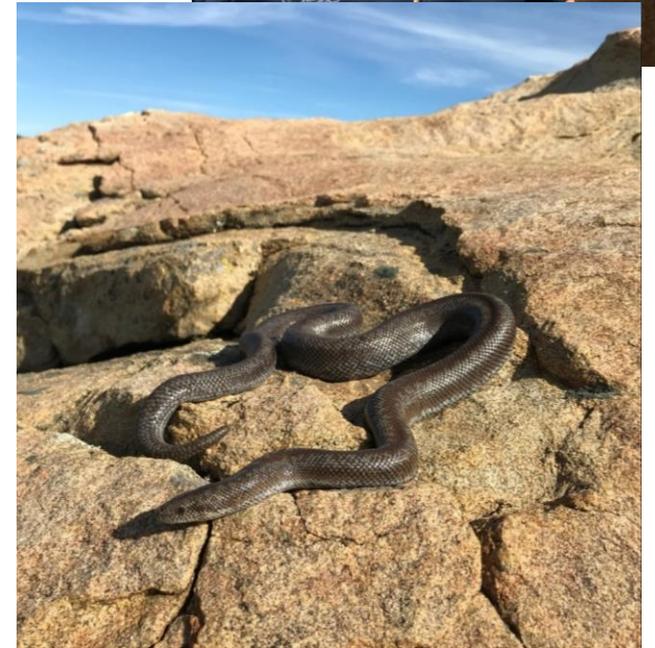
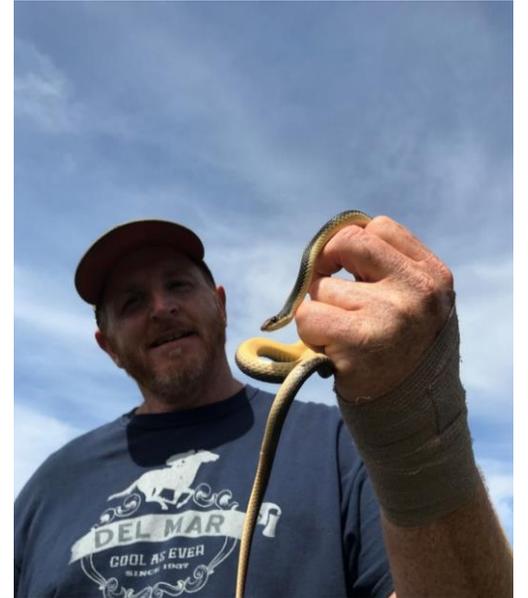
- AKA globe chamomile
- Annual Aster
- Flowers March-June, produces hundreds of tiny seeds
- Native to South Africa
- Problem in Australia
- In US, invasions in Arizona and southern California



Stinknet distribution

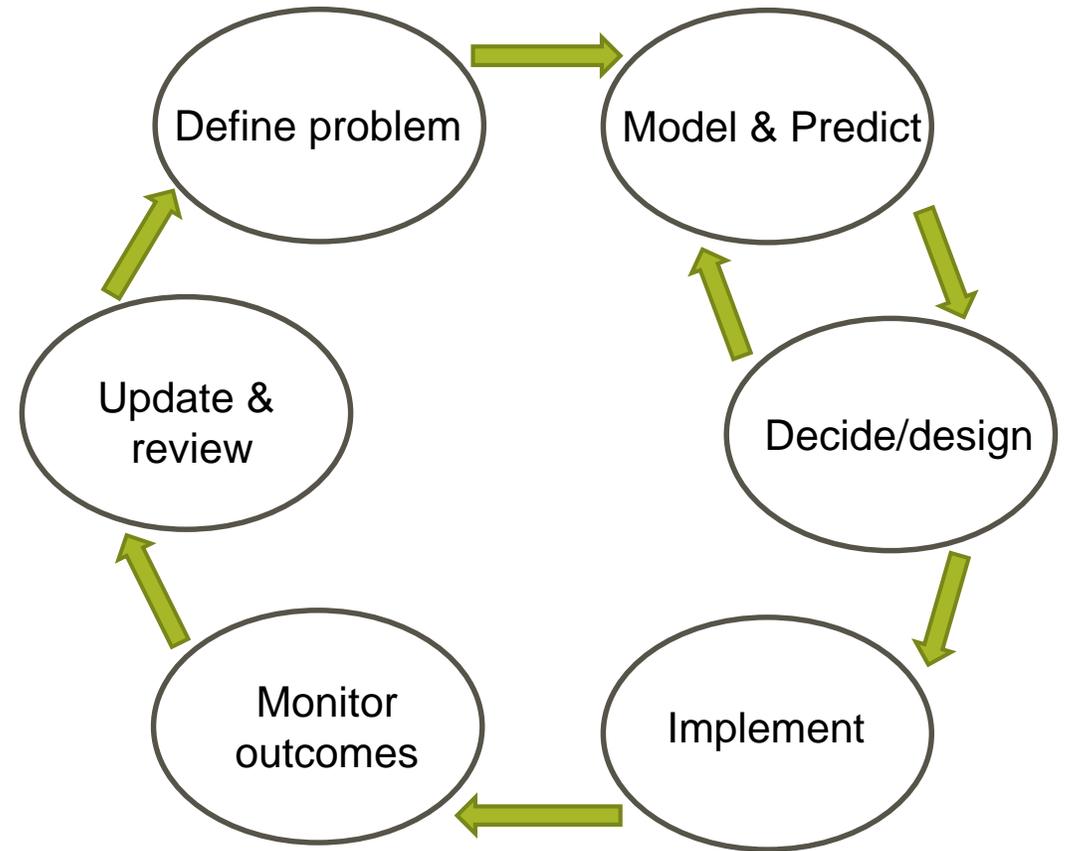
- ~200 out of 900 acres
- Mixed densities
- Favors south facing slopes
- First record – 1997
- Stinknet boom – 2017





Adaptive management approach

- Began in Fall 2018 planning landscape level treatment
- Priority areas
- Budget, feasibility and logistics
- Execution
- Monitoring
- Interpret results
- Adapt management

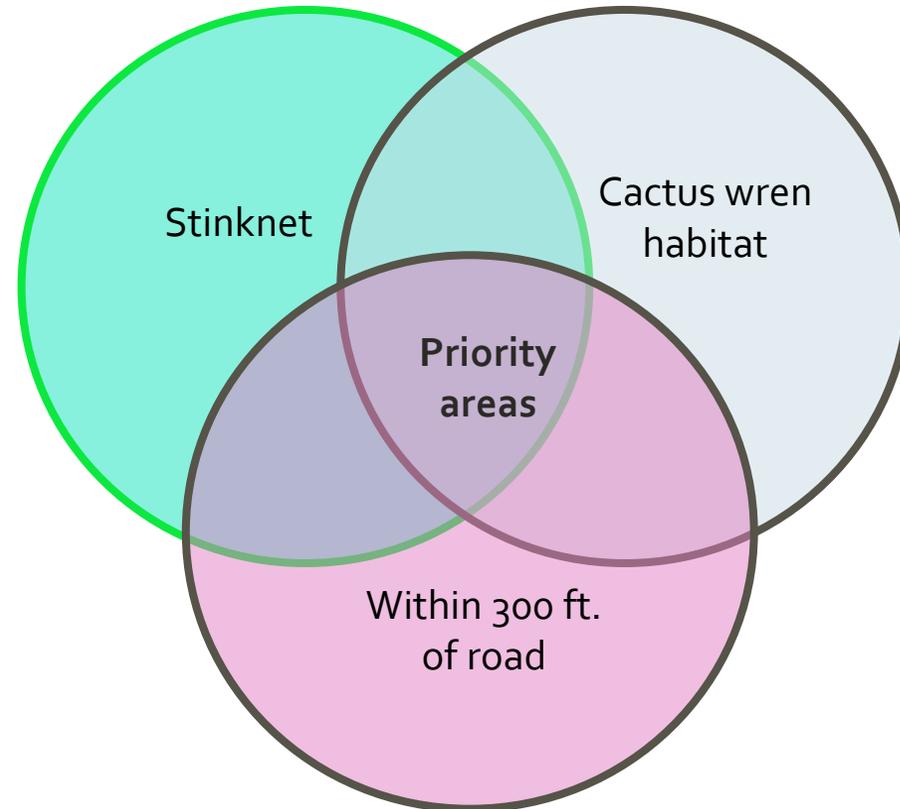


McCarthy et al (2012, Reintroduction Biology)

Prioritization

Decide/design

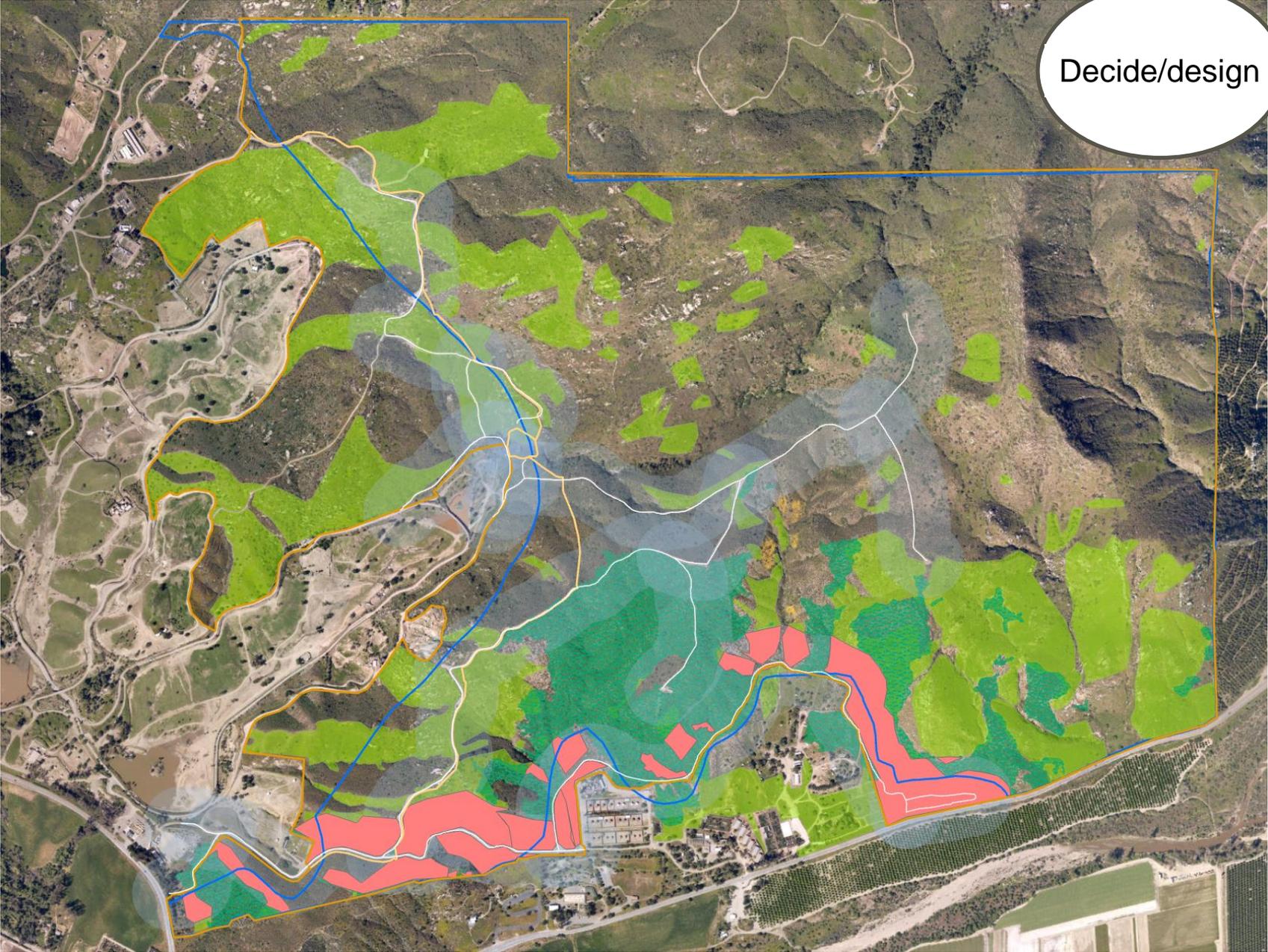
- Previously managed areas
- Critical habitat
- Most likely to spread
- Ease of access
- Where do these places intersect?



Prioritization Map

- Cactus Extent
- Stinknet
- Roadside Buffer
- Intersection
- MHPA boundary

*The southernmost road served as our first area of focus



Treatment Execution

- Hired 9 ACE crew and 2 crew leaders, plus me
- 10 with backpack sprayers, 2 operating spray rig
- Herbicide mixture: max rate Transline and Gallery, 2% MSO
- Late February to early March with rain days rescheduled
- Plants were in pre-bud to bud stage
- Treated a little over 19 acres plus a re-treat of one area.



Implement

Acres Treated 2019



➤ Stinknet



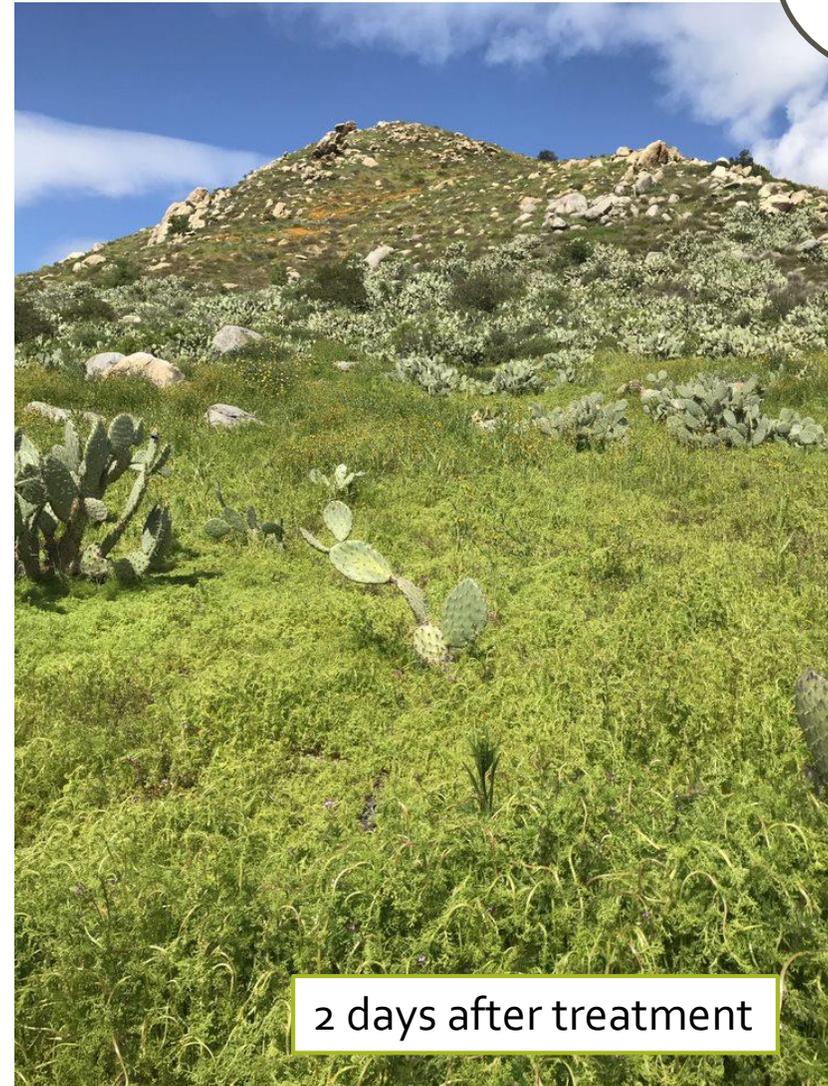
➤ Area Treated

• 19.5 acres



Monitoring and Results

- 2 days after treatment, plants were wilted
- 2 weeks after treatment, about half appeared dead and half made a comeback and flowered with slight differences in morphology
- Re-treated first area treated and that second treatment had no effect (plants had flowers)
- Overall, maybe about 50% success rate



Monitor
outcomes



2 weeks after treatment



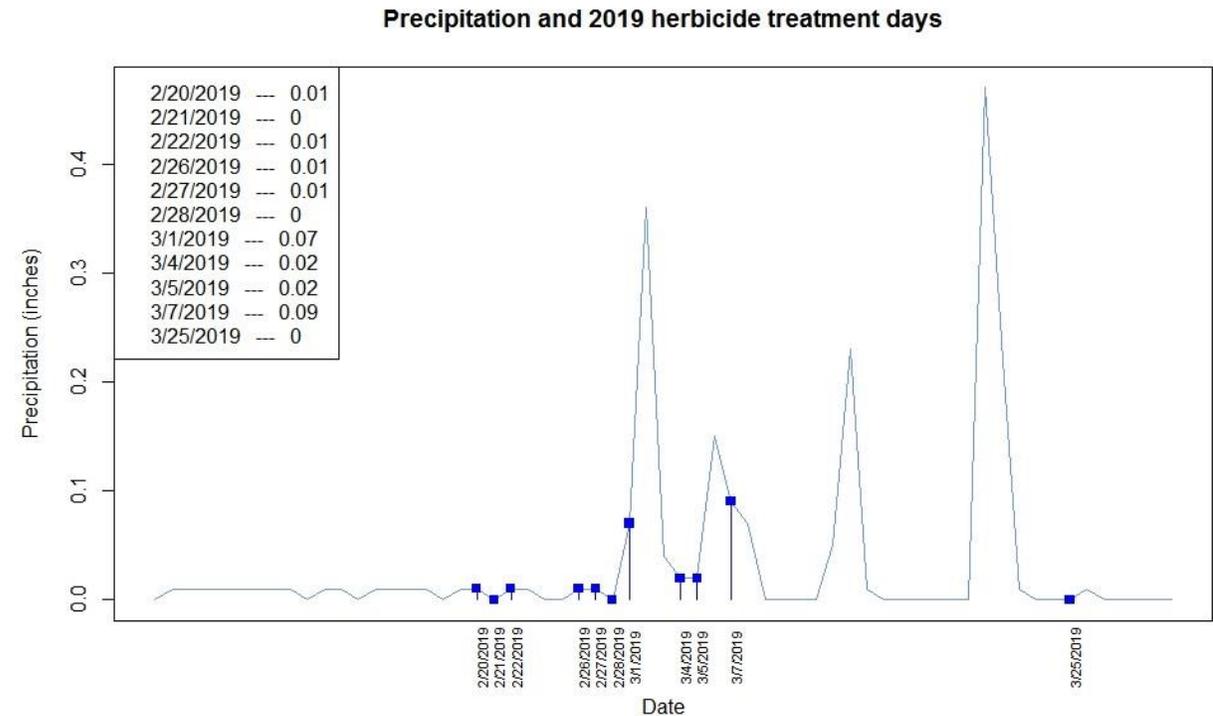
1 month after treatment

Monitor outcomes

Brainstorm – What Went Wrong?

Update &
review

- Faulty application
- Timing of treatment
- Wrong choice of herbicide or surfactant
- Weird reaction in mixture
 - Jar test
- Heavy rains may have diluted or washed away herbicide



Management Adaptations

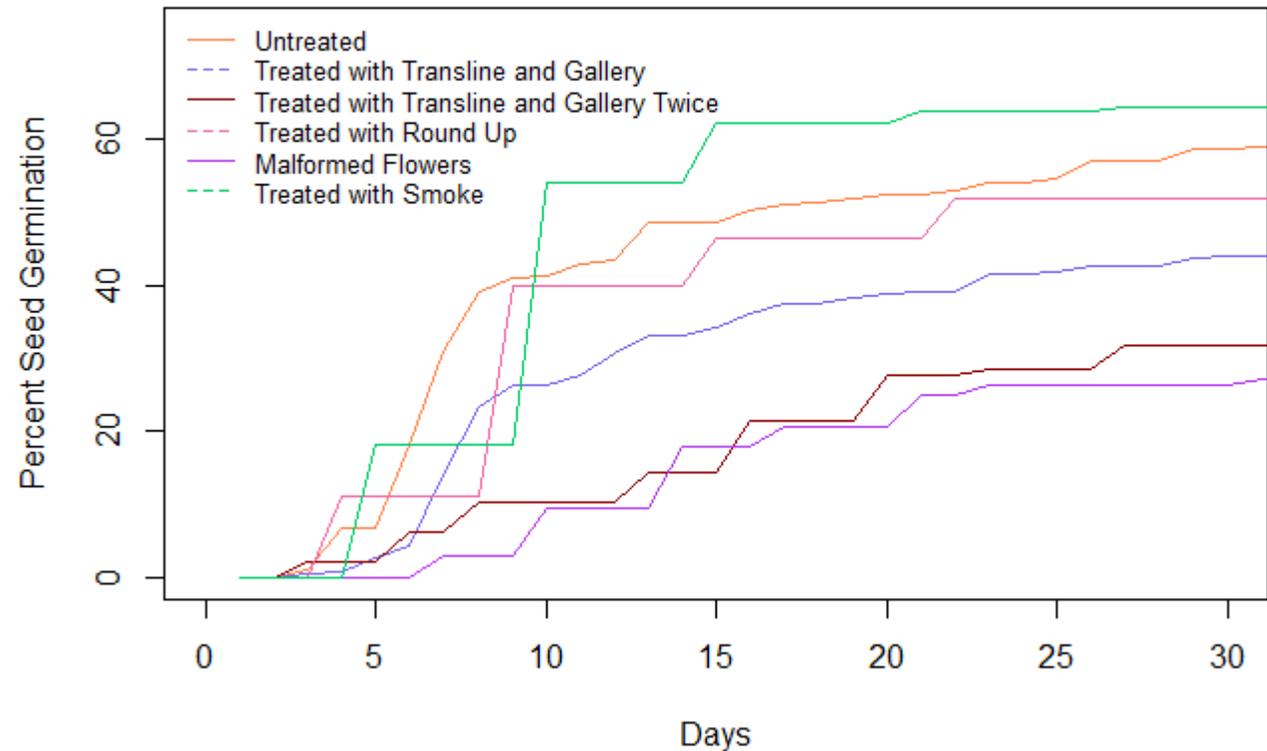
- How do we achieve a more reliable treatment method?

Germination Trials

Update &
review

- Collected seeds from different sites
 - Sprayed once with Transline and Gallery 44.72%
 - Never sprayed 59.35%
 - Imbibed in smoke water 64.5%
- Monitored in germination chamber
- From this, we saw a bigger picture of our treatment
- Future germination trials in store*
 - Seed longevity
 - Rain events
 - Wildfire

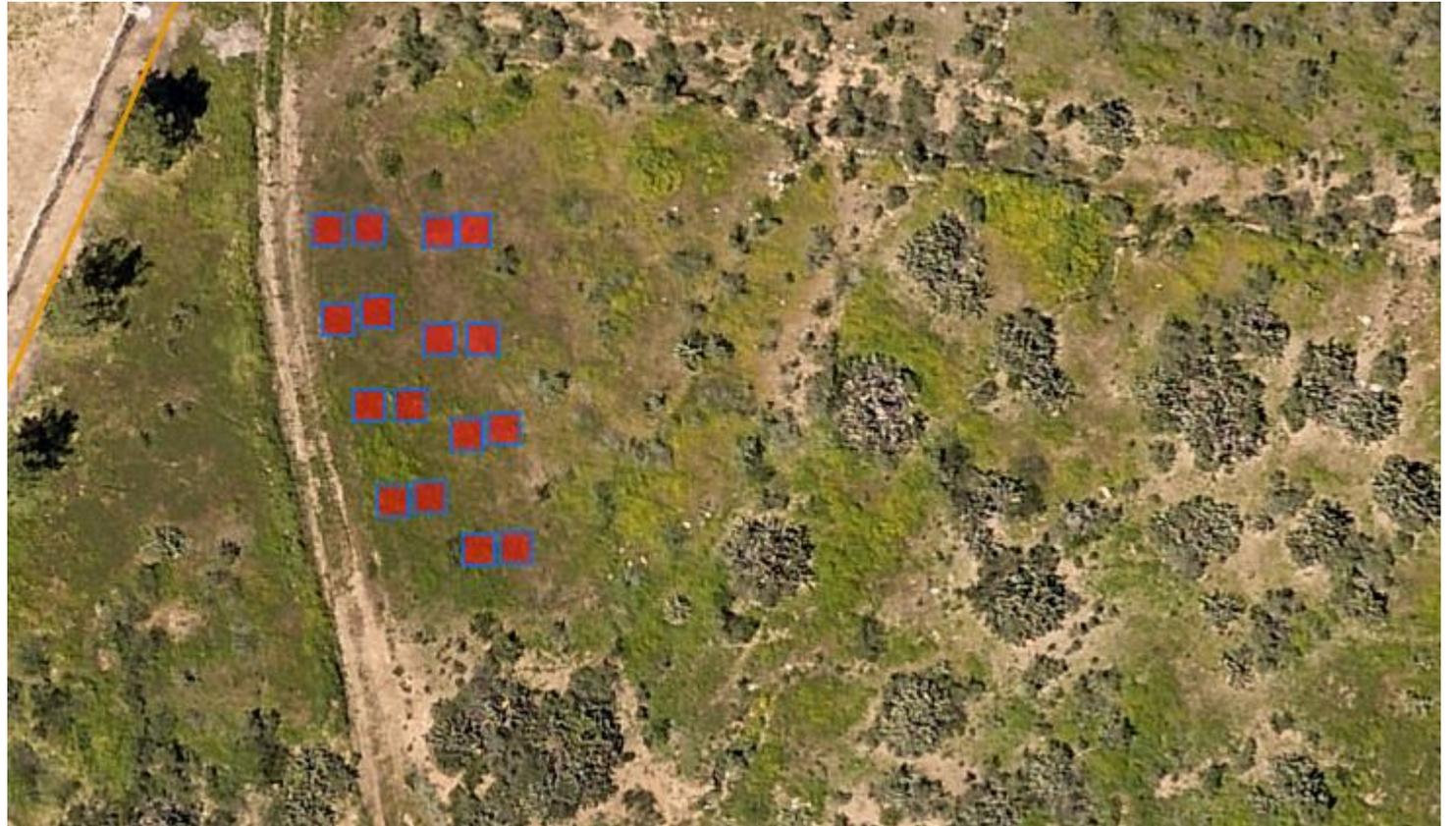
Percent Germination of Stinket over 30 days



Work in progress: what else do we need to know?

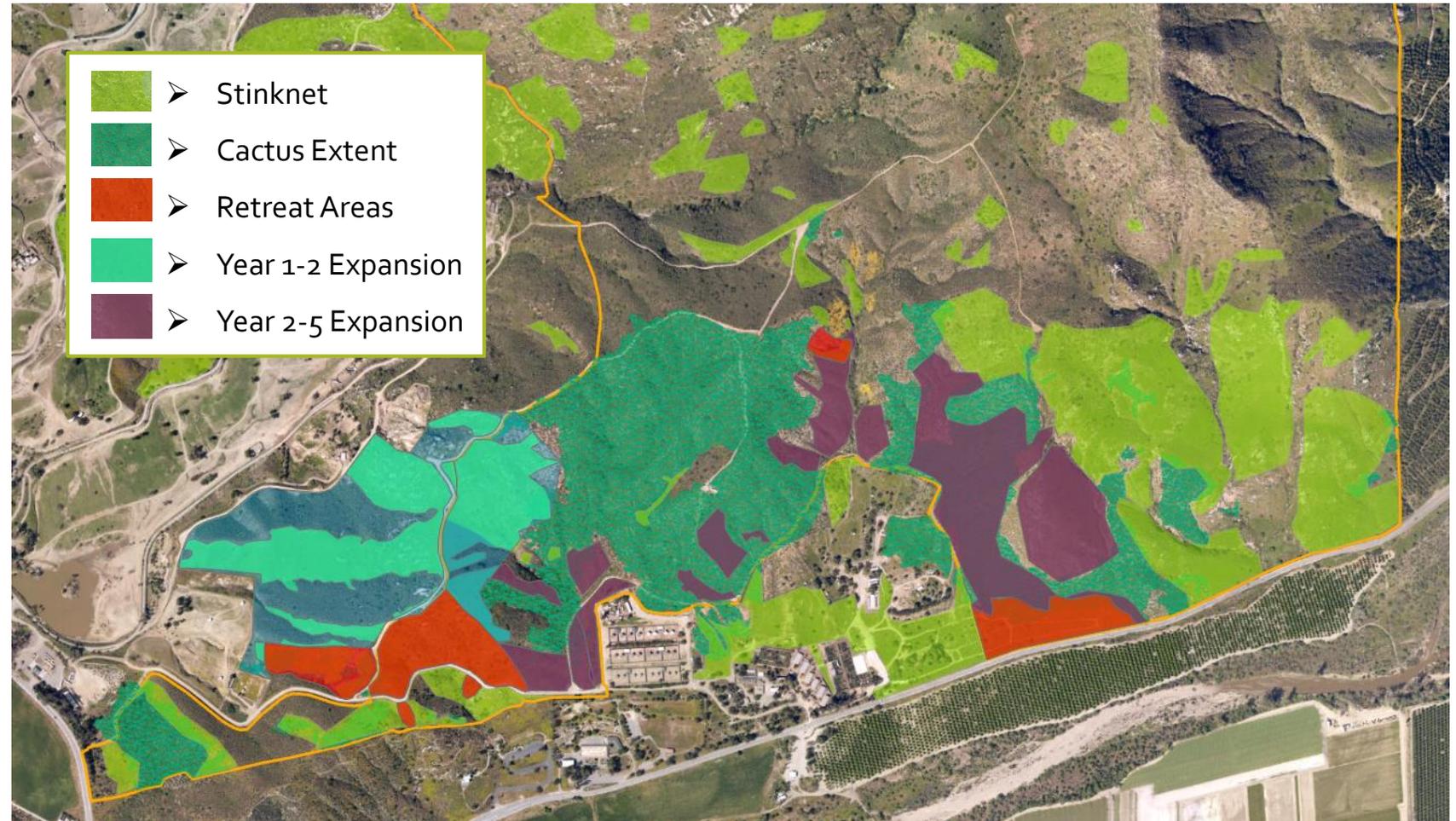
Update &
review

- Testing post-emergent herbicides
 - Transline, Milestone & Princep
- ¼ acre area to house 5 x 5 m plots
- After natural germination, during landscape treatment
- Monitor and record results
- Collaborate



Future treatments over next 5 years

- February 2020, earlier than 2019, using milestone and adjusting as necessary
- Retreat previously treated areas and expand acreage with more crews and \$



Thank You!