

# 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





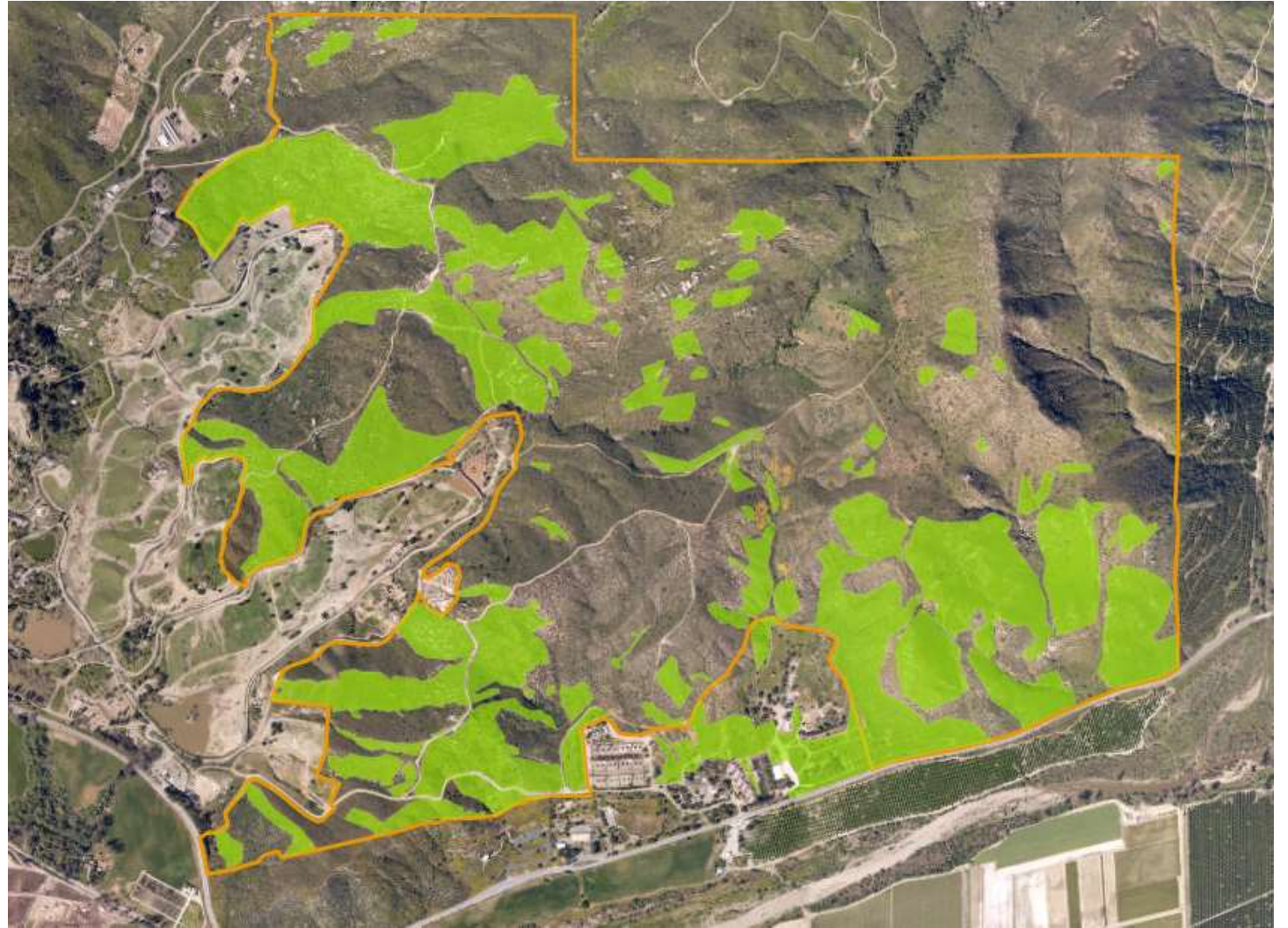
# Stinknet: Invasive and prolific

- 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 (Riverside, Escondido, San Pasqual Valley, +)

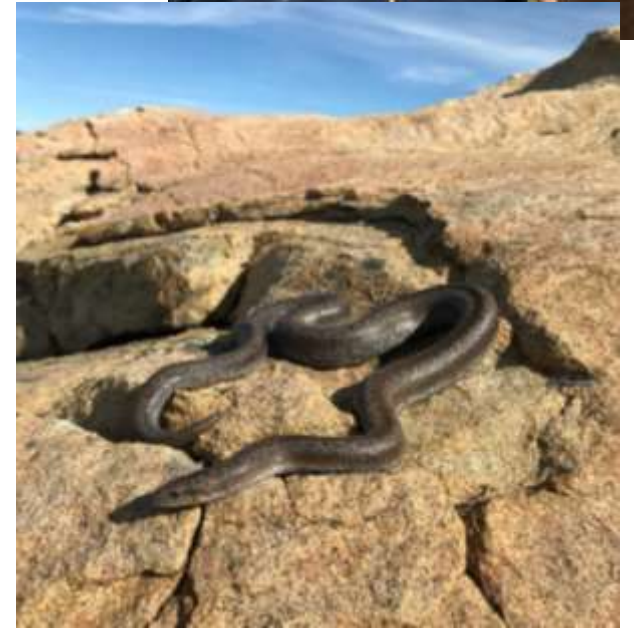


# Stinknet distribution

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

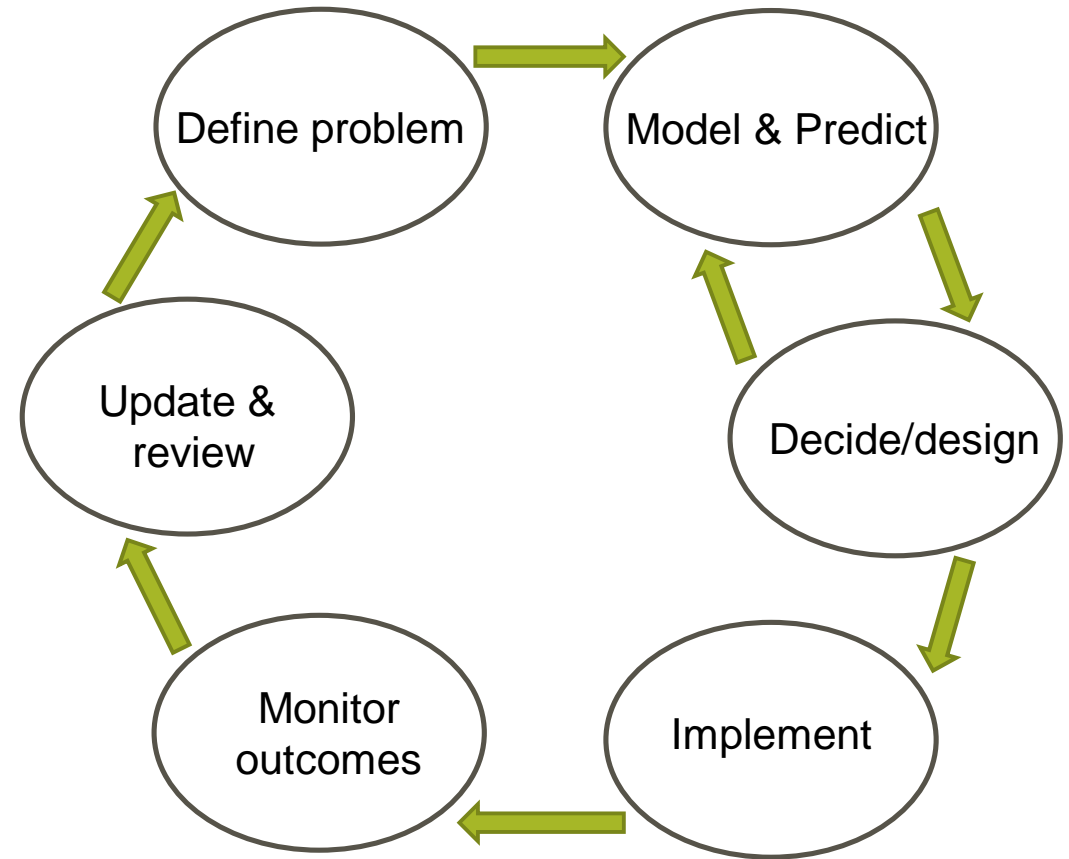






# Adaptive management approach

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

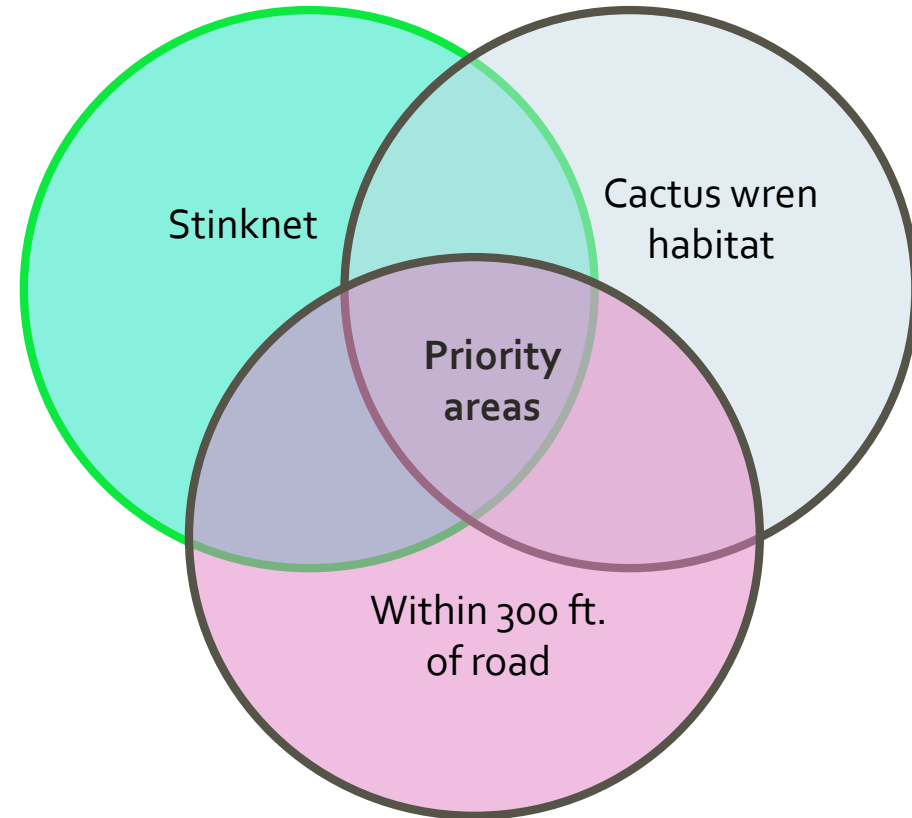


*McCarthy et al (2012, Reintroduction Biology)*

# 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





# Planning our treatment

Decide/design

- Timing (when are plants susceptible to herbicide treatment)
- Ease of access
- Manpower
- Cost
- Estimated a treatment of 20 acres with 11 people within 2 weeks



# 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 days after treatment





2 weeks after treatment



1 month after treatment



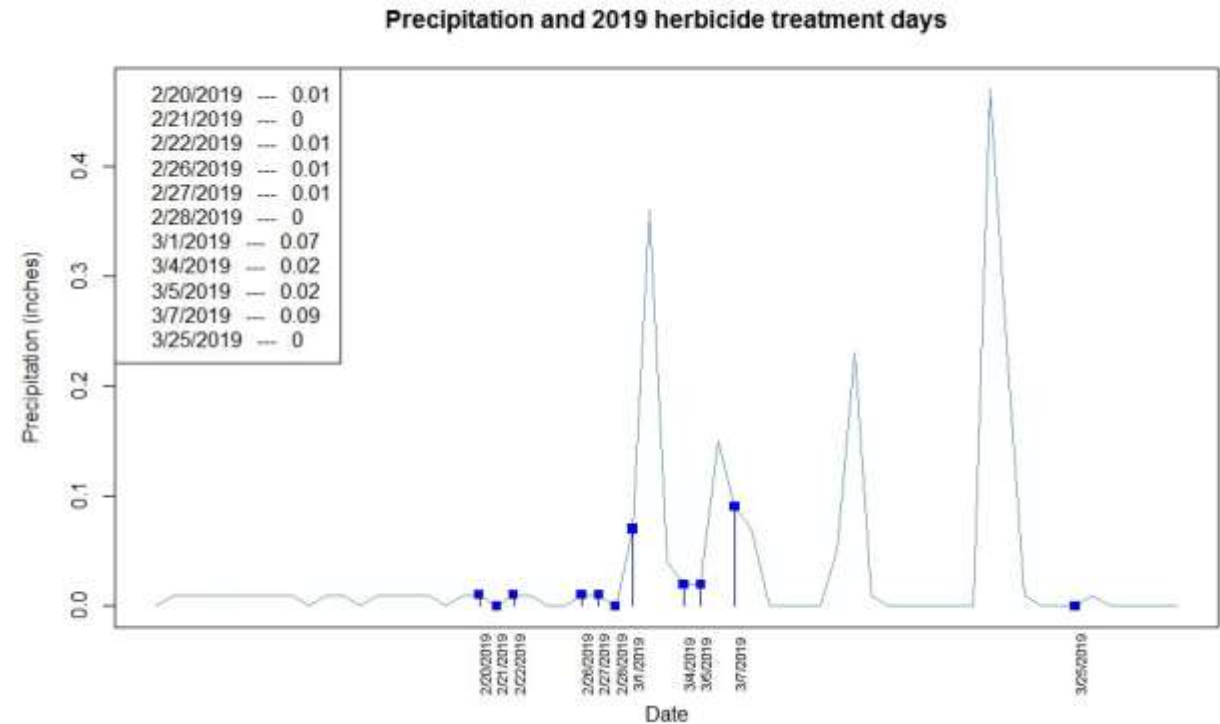
Monitor  
outcomes



# 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





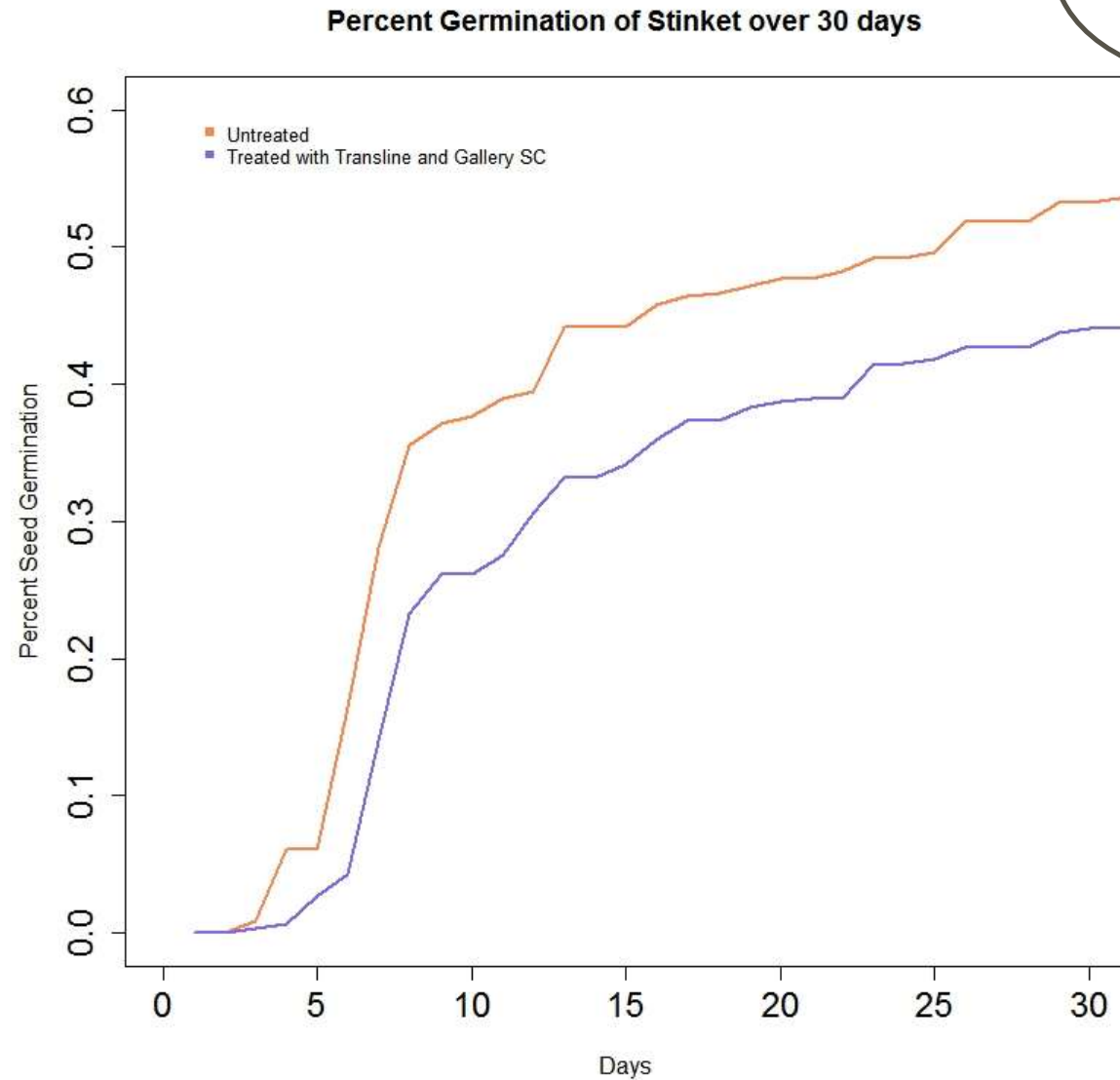
# Management Adaptations

- How to we get to a more reliable treatment method?
- We need to know more about stinknet

# Germination Trials

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

Update &  
review

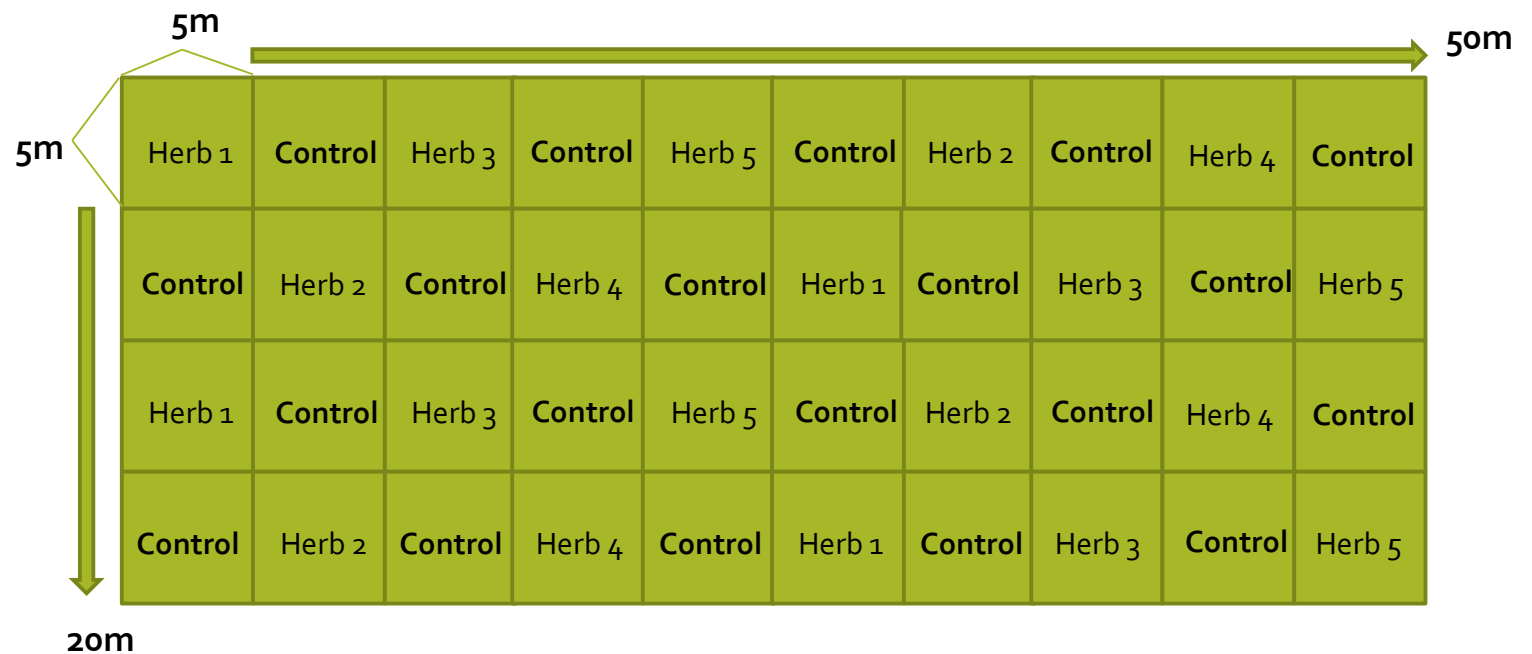




# Work in progress: what else do we need to know?

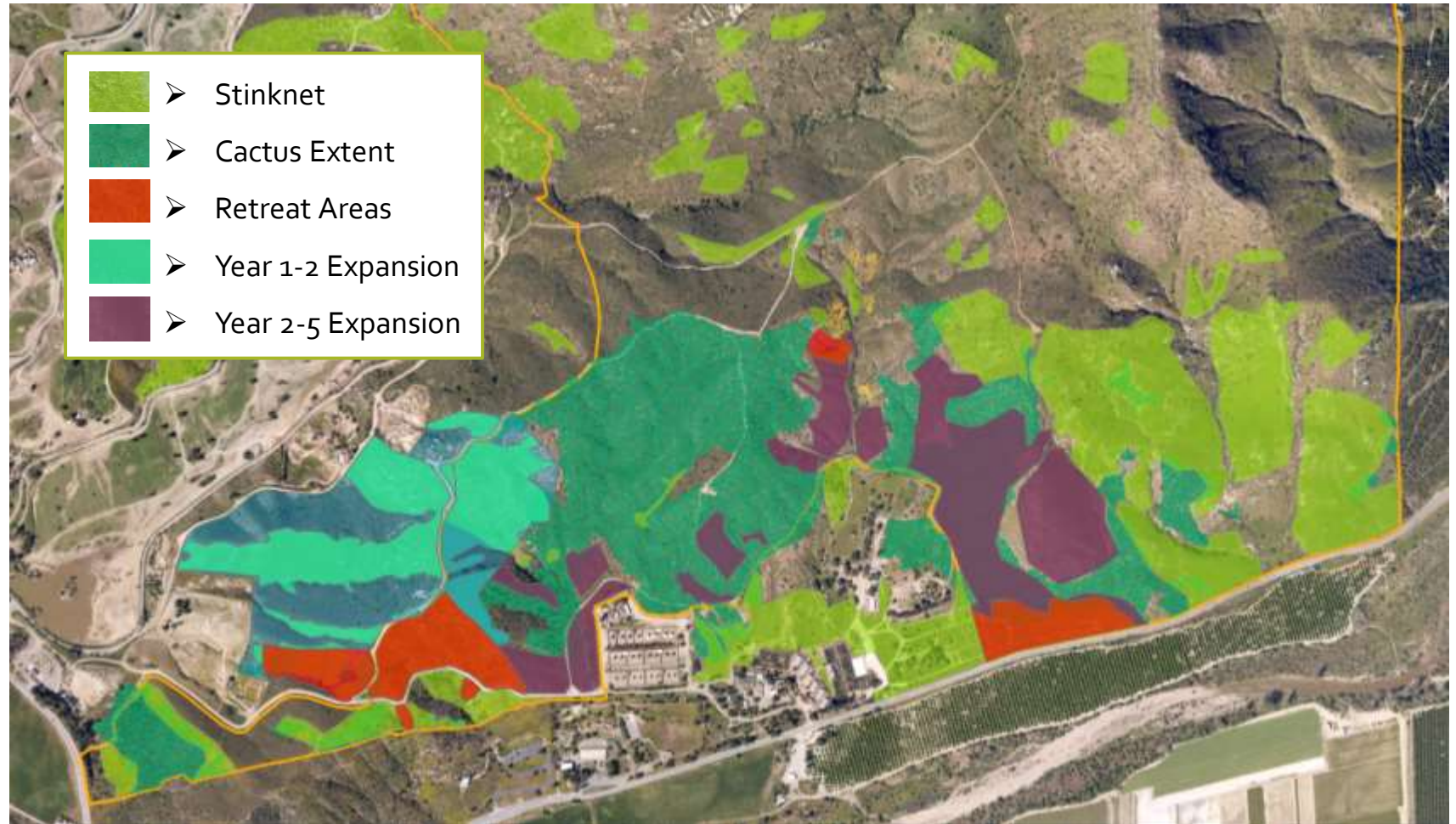
Update &  
review

- Testing 5 herbicides
  - 2 pre-emergent: Gallery & Esplanade
  - 3 pre/post-emergent: Transline, Milestone & Princep
- Irrigating  $\frac{1}{4}$  acre area to house 5 x 5 m plots
  - 4 repeats for each treatment plus controls
- Apply pre-emergent, irrigate, apply post-emergent once stinknet germinates
- Monitor and record results



# Future treatments over next 5 years

- Focus on roads
- Expand acreage, close gaps
- Use herbicide trial results to select herbicide





Thank You!