Challenges Managing the Novel Large-Scale Invasion of Stinknet (*Oncosiphon* pilulifer) at the Santa Rosa Plateau Ecological Reserve

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Santa Rosa Plateau Ecological Reserve











Vegetation Communities

- Sycamore and black willow riparian areas
- Vernal Pools
- Engelmann Oak and Coast Live Oak Woodlands
- Chaparral
- Purple needle grass perennial grasslands

Tenaja Fire 2019

- September 4, 2019
- ~1,700 acres
- Burned through oak woodlands, grasslands, riparian, and chaparral vegetation communities



Post Fire: Early Detection Rapid Response

- Search fire area for:
 - Sahara mustard (*Brassica tournefortii*)
 - Stinkwort (*Ditricchia graveolens*)
 - Yellow starthistle (*Centarea solstitialis*)
 - Stinknet



First EDRR Detection

- March 17, 2020
- While conducting EDRR surveys on fire fighting lines, two stinknet plants were found on an established trail





Stinknet

- Annual herb from South Africa
- First spotted in Southern California 1981
- Blooms from March-July
- Can grow up to 1 meter tall by 1 meter wide with hundreds of flowering heads
- Can also be a carpet of individual small flowering plants

- In California, it is found in San Diego, LA, Riverside, San Bernardino, and Orange Counties
- Spreading around Arizona (Tucson & Phoenix), Baja California, AND Australia
- Coastal sage scrub, annual grasslands, agricultural areas, roadsides, saguaro cactus

Stinknet at the SRPER before 2020

- One occurrence on the road in 2018
- Never found within the fence line or within Tenaja Fire scar



In the Tenaja Fire scar we found stinknet in:

- Riparian areas
- On top of rocks
- Growing within chaparral skeletons
- Covered in dodder (*Cuscata californica*)



Spring 2020 Survey Results

- April 2 May 29, 14 workdays
- Eight volunteers total (max of 4 at a time)
- Covered ~500 acres
- 540 points collected
- ~1000 stinknet plants removed



Shortcomings



- Data gaps—using multiple mapping tools
- 1,200 acres remaining—too many acres, not enough resources
- Very likely that more stinknet was in the burn area

Future Management

- Create a containment boundary
- Expand search beyond spring 2020 in high priority areas
- High priority areas: sensitive species habitat, perennial grasslands
- ~400 acres



Survey Strategy

- Set up a 10x10 meter grid system over the priority areas (50-meter grid shown on map due to spatial extent)
- Used ArcCollector to see grid boundaries
- Tracked steps
- Searched grids





First generation senesced stinknet plant



Searching for a slightly gray/brown bunch in a gray/brown post-fire landscape

Fall Survey Results

- Two staff, seven days, 68 combined miles
- Covered approximately 400 acres
- Mapped 204 stinknet plants, flagged each point to help winter treatment relocation efforts
- Found throughout chaparral, oak woodlands, and riparian habitat
- Did not find it in the grasslands!







- Revisited fall 2020 points from February-March 2021
- Found thousands of cotyledons around first generation stinknet plants
- Bagged the remaining seeds on the first generation plant





- Scooped up seeds if they were too dense
- Brushed seeds off granite onto the ground, brushed off boots
- Sprayed ~1-meter radius around first generation plant with Milestone at a rate of 0.5 oz/acre





- Chose Milestone for the active ingredient aminopyralid's pre- and post-emergent formula
- Pre-emergent to target future germinating seeds in the soil
- Post-emergent to target cotyledon to budding stage stinknet



- Able to relocate and treat 95% of fall 2020 mapped points
- Unable to locate some points because flags were missing, and the GPS was off
- Second-generation plants easier to find once while blooming

Spring 2021: Goals

Maintain containment within high priority areas by:

- Mapping second generation plants
- Treating second generation plants
- Checking on winter 2021 herbicide treatment



Spring 2021: Mapping within Spring 2020 Treatment



- Re visited spring 2020 treatment area for second generation plants
- Mapped 261 points spring 2021
- Points were majority firstgeneration plants surrounded by second generation
- Other points were second generation plants 50-100 meters from first generation plants

Spring 2021: Treating Second Generation Plants



- Chose to prioritize hand pulling efforts within spring 2021 mapped area
- When the Plateau is open, the area is highly trafficked
- Take advantage of fire closure to establish containment within areas accessible to the public

Spring 2021: Treating Second Generation Plans



- Removed first generation plant with seeds, placed a pin flag where first generation plant was
- Pulled second generation plants, flagged a perimeter to spray
- Took very descriptive notes within GPS to assist with herbicide applications in fall/winter 2021 & 2022

Spring 2021: Follow-up on Winter 2021 Treatment







Spring 2021: Follow-up on Winter 2021 Treatment





Reasons why herbicide treatment was not 100% effective (0 plants):

- Cotyledons were too dense
- Herbicide application in budding stage, more foliage in this stage and not enough herbicide application

Spring Survey Summary

- Mapped 533 new stinknet points (first and second generation)
- Treated 85% of mapped plants
- Plants found under recovering scrub oak and coast live oak canopies
- No plants found within the grasslands



Lessons Learned

- Establish an EDRR data collection plan for all—from staff to volunteers
- Track steps to keep tabs on covered vs uncovered area
- Take precautions when entering burned areas to reduce the spread of weeds, even those being treated

- Stinknet can quickly spread in newly disturbed areas if one generation is left untreated
- Stinknet can invade chaparral and oak woodlands after fire
- Milestone is an effective tool when sprayed on stinknet before flowering

Questions?

Thank you to:

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