The Role of Fire in Managing Invasive Species at the Santa Rosa Plateau Ecological Reserve

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Center for Natural Lands Management
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The Nature Conservancy

Cal-IPC Mini Symposium
Cal Poly Pomona
June 13, 2022
The Role of Fire in Managing Invasive Species at the SRPER

• Prescribed fire and managing non-native annual grasses
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- Prescribed fire and yellow starthistle (*Centaurea solstitialis*)
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• Managing stinknet (*Oncosiphon pilulifer*) after wildfire
Santa Rosa Plateau Ecological Reserve

- Western Riverside County
- Murrieta, CA
- Various parcels are owned by CDFW, The Nature Conservancy and Riverside County Parks and Open Space District
- Natural Resources are managed by CNLM
- ~3,500 acres of grassland
Grassland Management

- Vegetation Management Plan with CAL FIRE
- 14 mgmt. units
- 2 control units
- 83 vegetation transects
Characteristic Native Grassland Species

Stipa pulchra bunches and Calochortus splendens

Sidalcea malviflora

Fritillaria biflora

Dichelostemma capitatum

Viola pedunculata

Escholtzia californica

Lasthenia californica

Clarkia purpea

Amsinckia species

Sisyrinchium bellum

Escholtzia californica

Viola pedunculata
Characteristic Non-native Grassland Species

• **Forbs**
  - *Hirshfeldia incana*
  - *Lactuca serriola*
  - *Carduus pycnocephalus*
  - *Cirsium vulgare*
  - *Erodium species*
  - *Vicia sp.*

• **Grasses**
  - *Avena fatua*
  - *Bromus diandrus*
  - *Bromus madritensis*
  - *Festuca perennis*
  - *Festuca myuros*
  - *Aegilops cylindrica*
SRPER Vegetation Cover 2001-2021

**NF, NNF, NG, NNG cover significantly changed over time**

**NF, NNF, NNG, and Total cover significantly changed with precipitation**

<table>
<thead>
<tr>
<th>Year</th>
<th>NF</th>
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</table>
SRPER Vegetation Cover 2001-2021

**NF, NNF, NG, NNG cover significantly changed over time**

**NF, NNF, NNG, and Total cover significantly changed with precipitation**

SRPER Vegetation Cover
2001-2021

Year

Percent Cover

Precipitation (Inches)
SRPER Vegetation Cover 2001-2021

*NF, NNF, NG, NNG* cover significantly changed over time

*NF, NNF, NNG, and Total* cover significantly changed with precipitation

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**SRPER Vegetation Cover 2001-2021**

- **Native forb**
- **Nonnative forb**
- **Precipitation**

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**Year**
- 2001
- 2002
- 2003
- 2004
- 2005
- 2006
- 2007
- 2008
- 2009
- 2010
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
- 2019
- 2020
- 2021

**Percent Cover**
- 0
- 25
- 50
- 75
- 100
- 125
- 150
- 175
- 200

**Precipitation (Inches)**
- 0
- 5
- 10
- 15
- 20
- 25
- 30
- 35
- 40
SRPER Vegetation Cover 2001-2021

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SRPER Vegetation Cover
2001-2021

Year

Percent Cover

Precipitation (Inches)

Native forb
Nonnative forb
Native grass
Precipitation
SRPER Vegetation Cover 2001-2021

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NF, NNF, NNG, and Total cover significantly changed with precipitation

SRPER Vegetation Cover
2001-2021

Percent Cover

Year


Precipitation (Inches)

Native forb
Nonnative forb
Nonnative grass
Native grass
Precipitation
Fire and NNG: 6 years post 2003 Rx fire

- Significant changes to cover for NF and NNF (due to precip, not fire), NG decreased and never returned to pre-fire totals, NNG decreased one year.
Fire and NNG: Drought

- NNG significantly (p<0.001) decreased one-year post-fire and was also significantly different the second year after fire. No significant changes in other functional groups.
Fire and NNG: Summary

- Prescribed fire is effective at controlling NNG at least one year after fire, especially followed by a dry year
- Not sustainable as a reoccurring tool due to loss in fuel from year to year
- Challenges to timing the fires to target the NNG seeds
- More research and experiments are needed
Fire and Weeds at the Santa Rosa Plateau Ecological Reserve

- Prescribed fire and managing non-native annual grasses
- Prescribed fire and yellow starthistle (*Centaurea solstitialis*)
### Fire and YST: Hines Treatment Area

<table>
<thead>
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<th>Year</th>
<th>Treatments in <strong>Yellow</strong></th>
<th>Treatments in <strong>Blue</strong></th>
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<tbody>
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<td>Prescribed Fire and Mowing</td>
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<tr>
<td>2021</td>
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<td>Prescribed Fire and Mowing</td>
</tr>
<tr>
<td>2022</td>
<td>Mowing</td>
<td>Herbicide and Mowing</td>
</tr>
</tbody>
</table>

Dead standing YST, blooming YST, and mustards in 2020
Fire and YST: Cover Before and After

Mean of Native Forb Cover

![Graph showing mean percent cover for native forbs before and after treatment.](image)

Mean of Non-native Grass Cover

![Graph showing mean percent cover for non-native grasses before and after treatment.](image)

Mean of Yellow Starthistle Cover

![Graph showing mean percent cover for yellow starthistle before and after treatment.](image)

Mean of Native Forb Cover

![Graph showing mean percent cover for native forbs before and after treatment.](image)

Mean of Non-native Grass Cover

![Graph showing mean percent cover for non-native grasses before and after treatment.](image)

Mean of Yellow Starthistle Cover

![Graph showing mean percent cover for yellow starthistle before and after treatment.](image)

\[ R^2 = 0.59 \quad P = 0.001 \]

\[ R^2 = 0.31 \quad P = 0.03 \]
Fire and YST: Ground Cover

Transect 6 2021 before fire

Transect 6 2022 after fire

Mean of Bare Ground

Mean of Grass Litter

Mean of Forb Litter

PreBurn  Post Fire and Mow

PreBurn  Post Fire and Mow

PreBurn  Post Fire and Mow
Fire and YST: Summary

• Yellow starthistle density is patchy throughout project site, may not be representative in the transects

• Prescribed fire helped reduce NNG cover, but increased NNF cover, and NF cover

• Additional treatments of mowing and herbicide will follow prescribed fire
Fire and Weeds at the Santa Rosa Plateau Ecological Reserve

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- Managing stinknet (*Oncosiphon pilulifer*) after wildfire
Fire and Stinknet

• Stinknet
  • Annual forb
  • Invades grasslands, roadsides, and post-fire chaparral habitat

• Multiple occurrences at the SRPER after Fire
  • 2021 Hines Prescribed Fire
  • 2021 Wildfire at Vernal Pool Parking Lot 2021 (5 acres)
  • 2019 Tenaja Fire
Fire and Stinknet: Tenaja Fire 2019

• ~1,700 acres
• Burned through oak woodlands, grasslands, riparian, and chaparral vegetation communities
Fire and Stinknet: Spring 2020

- Detected through Early Detection Rapid Response (EDRR)
- Hand pulled ~500 plants
- Covered ~400/1,700 acres

Stinknet plants every 25 ft
Fire and Stinknet: Fall 2020

- Created priority areas, walked a grid system
- Found **200 senesced plants**

First generation senesced stinknet plant
Fire and Stinknet: Winter 2021

• Manage aerial seed bank
• Sprayed ~1-meter radius around first generation plant with Milestone at a rate of 0.5 oz/acre
Fire and Stinknet: Spring 2021

- Checked winter herbicide treatments
- Mapped **533 new stinknet points** (first and second generation)
Fire and Stinknet: 2022 Treatment

- 652 occurrences checked prior to herbicide treatment Winter 2022
- 446 occurrences treated with Milestone Winter 2022
- Additional 302 occurrences mapped Spring 2022
Fire and Stinknet: Summary

• Stinknet is a strong competitor after fire, but with persistence and a plan can be managed!

• Looking for additional funding for treatment

• Long term planning for managing stinknet

Treated for 2 years with Milestone

Untreated for 3 years
Thank you!

Special thanks to:
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All images were captured by HLaskey and/or KKlementowski