Prioritizing Weed Populations for Eradication

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Research Objectives

- Identify reasons to prioritize weed populations for eradication
- Develop a method to prioritize populations
- Test the prioritization tool on CDFA A-rated weeds
- Provide implementation strategy for the prioritization tool
Reasons to Prioritize Populations

• CDFA and County Ag Depts. 100 years of eradications
• Budget cuts decrease weed programs statewide
• Species-level assessments have limitations
• CDFA tracking over 1,700 active populations
• Need strategic process to identify the highest priority populations of the high-priority species
Steps to Build a Prioritization Tool

- Identify and inventory (GIS) weeds
- Choose ranking criteria
- Weight ranking criteria
- Score ranking criteria
- Rank populations
- Assess available resources
- Choose eradication targets

*Biddy-biddy*
Identify and Inventory Weeds

- CDFA A-rated Weeds
- WMA Dirty Dozen
- Cal-IPC High Alerts

Active A-rated Weed Sites in California

Fertile capeweed
Choose Ranking Criteria

• Choose criteria that contribute most to the decision to eradicate
  – Impact
  – Invasiveness (potential rate of spread)
  – Feasibility of Eradication

• Arrange in a hierarchy
Ranking Criteria Hierarchy

Priority

Impact
- Wildlands
- Agriculture
- Humans
- Region

Invasiveness
- Spread Rate
- Propagules
- Spread Vector

Feasibility
- Reproduction
- Detectability
- Effective Control
- Accessibility
- Size
- Cost

Purple – Major criteria
Blue – Species-level
Green – Population-level

Common crupina
Weight Ranking Criteria

• Analytical Hierarchy Process
  – Mathematical process utilizing paired comparisons of criteria to calculate weights
• Used by Parks Victoria, Australia (1992) and Santa Monica Mtns NRA (2007)
Ranking Criteria Weights

- Impact: 0.38
- Invasiveness: 0.23
- Feasibility: 0.39

Wildlands: 0.34
Agriculture: 0.24
Humans: 0.11
Region: 0.31

Spread Rate: 0.36
Propagules: 0.25
Spread Vector: 0.39

Reproduction: 0.18
Detectability: 0.12
Effective Control: 0.19
Accessibility: 0.15

Size: 0.25
Cost: 0.11

Purple – Major criteria
Blue – Species-level
Green – Population-level

Musk thistle
Score Ranking Criteria

- Scale to emphasize high priority attributes
  - 10 = very high; 6 = high; 3 = medium; 1 = low
- Species-level assessments
  - Cal-IPC Plant Assessment Forms
  - *Weeds of CA and other Western States*
  - Expert interviews
- Population-level assessments
  - ArcGIS geoprocessing models
Calculate Overall Priority Rank

- Major criteria = \( \Sigma (\text{Score} \times \text{Weight})_{\text{sub}} \)

- Overall = \( \Sigma (\text{Score} \times \text{Weight})_{\text{major}} \)

Scotch thistle
Assess Resources
Choose Targets

- Consider external circumstances
- Use WeedSearch™ tool to estimate cost & probability of success
- 60:30:10 approach
- Track progress using performance measures
  - Pete Holloran, Cal-IPC 2006 Proceedings
- Re-evaluate as more data become available

Skeletonweed
Preliminary Results

- Preliminary findings
  - Distribution of scores: 7.7 – 3.7
  - Species do not clump
  - Component scores not significantly correlated

- Further Analysis
  - Model validation
  - Sensitivity analysis

- Future Refinements
  - Data quality
  - Cost function
  - Decision Points
Conclusions

• Regional eradication achieves clear benefits
• Prioritization tools focus resources
• Species-level assessments do not allow for regional and population-level consideration
• This prioritization scheme is designed to address eradication of individual populations
• By strategically targeting weed populations, we minimize future spread and mitigate future impacts

Perennial sowthistle
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Musk thistle
Thank you!

Dalmatian toadflax

Punagrass

Fertile capeweed

Halogeton

Diffuse knapweed

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