Prioritizing Weed Populations for Eradication

Gina Darin, Steve Schoenig,
Jacob Barney & Joe DiTomaso

cdfa
CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

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

Alligatorweed

Diffuse knapweed

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

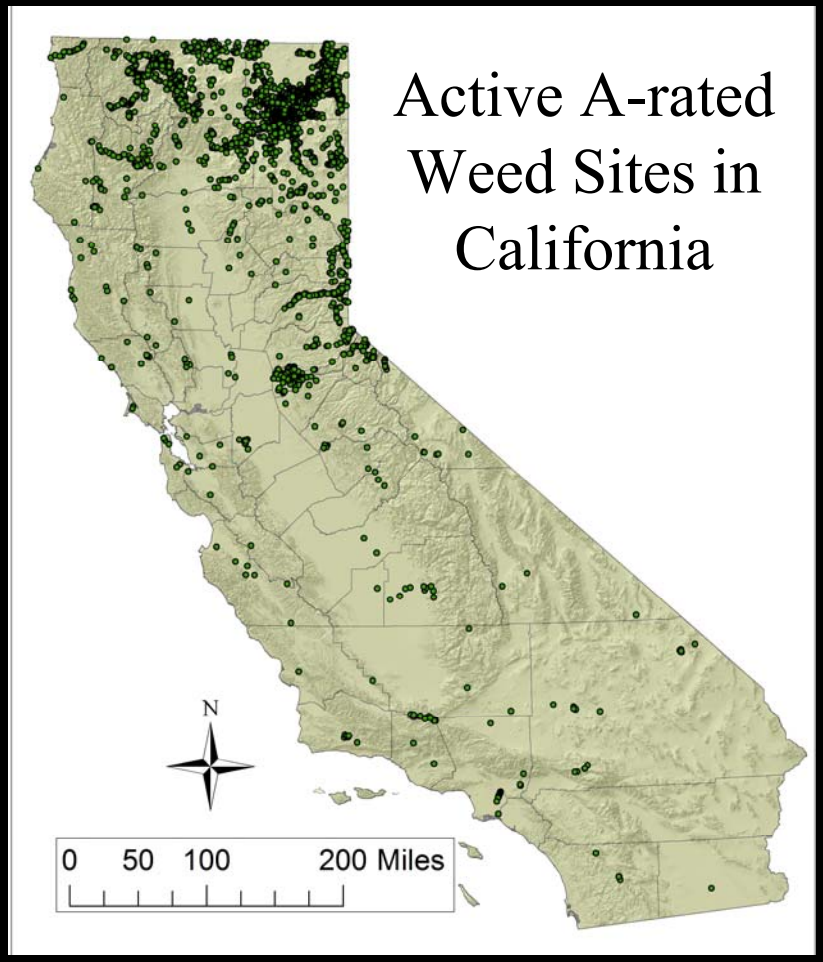
Leafy spurge

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

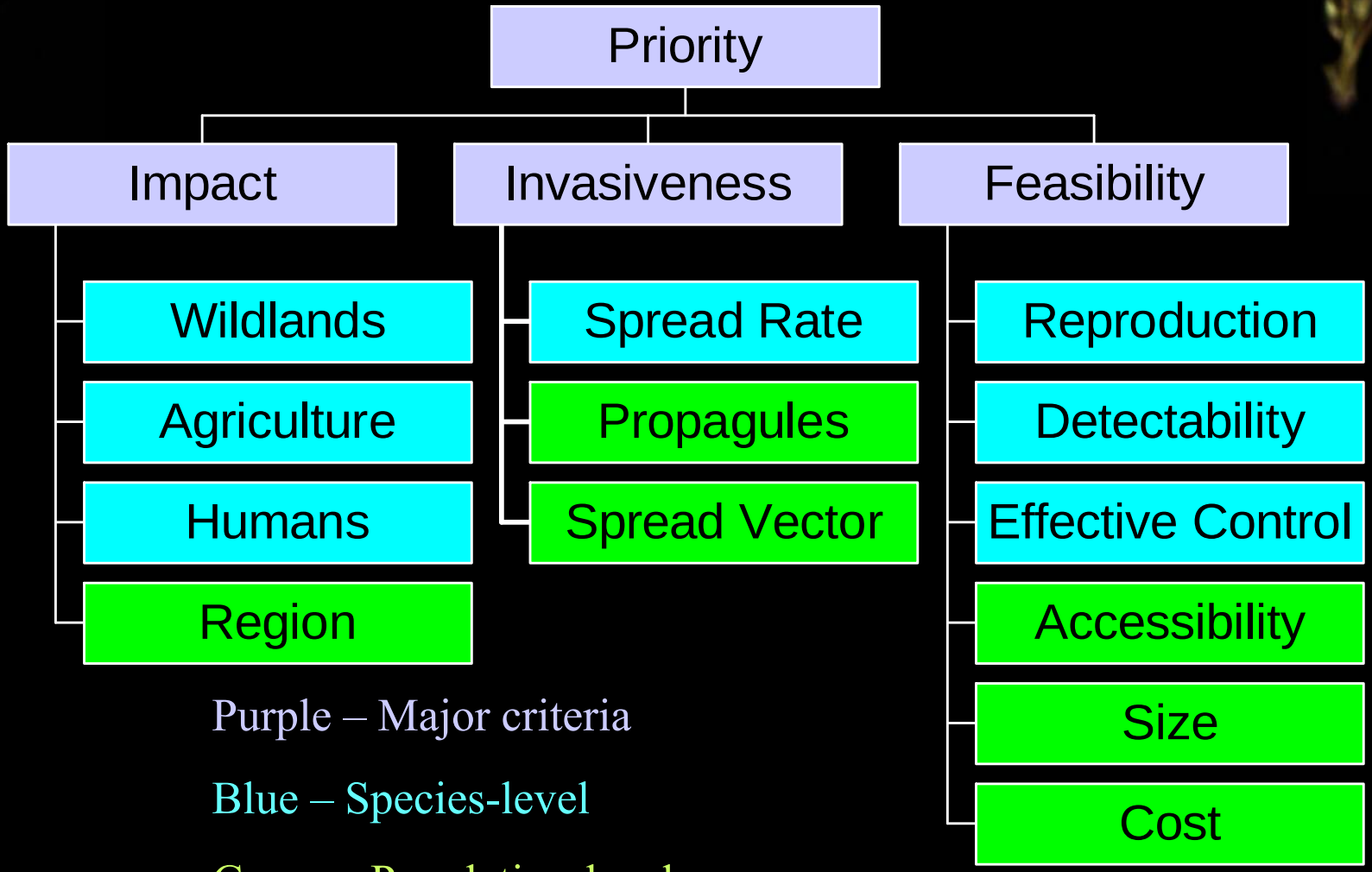
Fertile capeweed

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

Halogeton

Ranking Criteria Hierarchy



Purple – Major criteria

Blue – Species-level

Green – Population-level

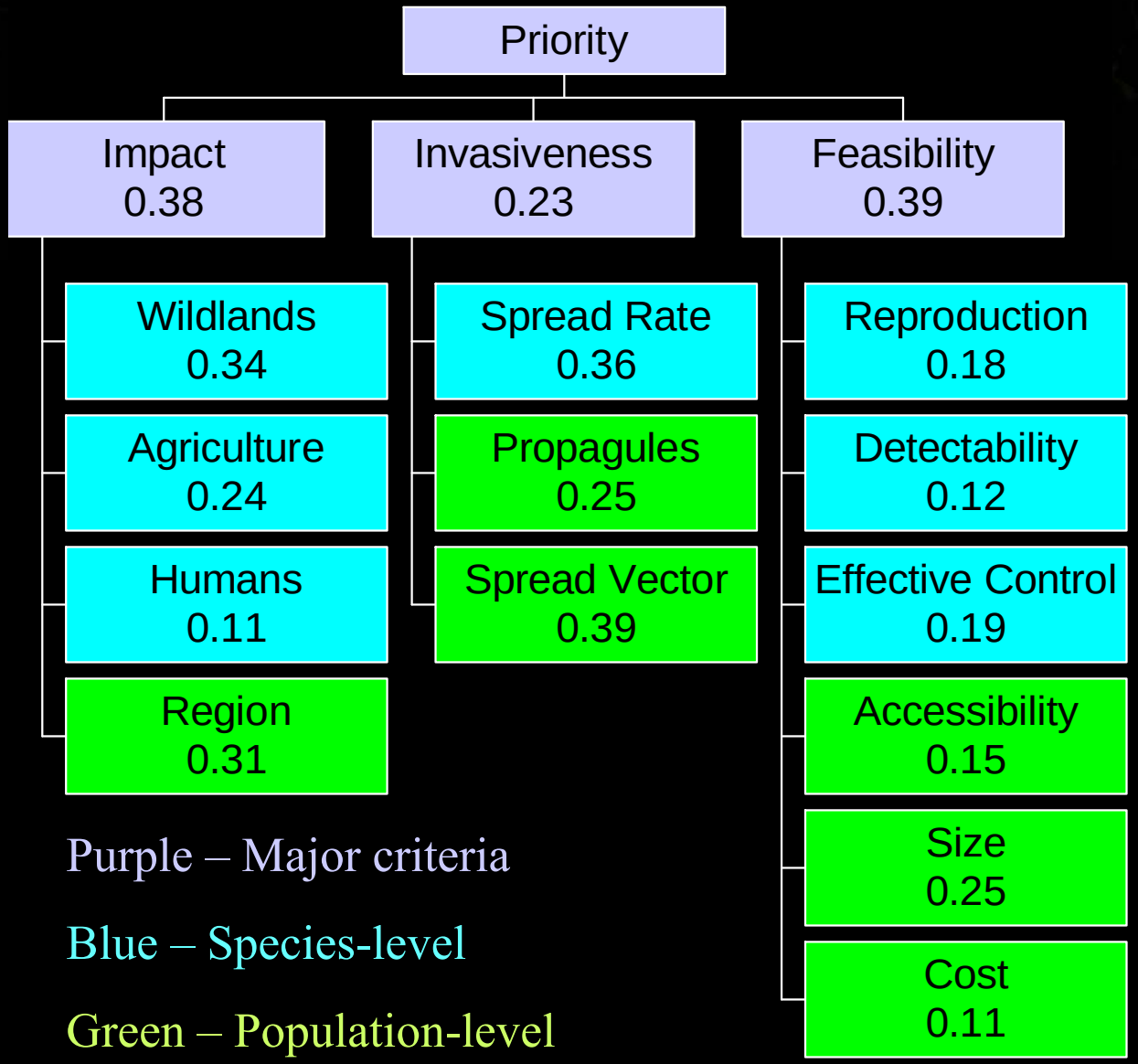
Common crupina

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)

Iberian starthistle

Ranking Criteria Weights



Purple – Major criteria

Blue – Species-level

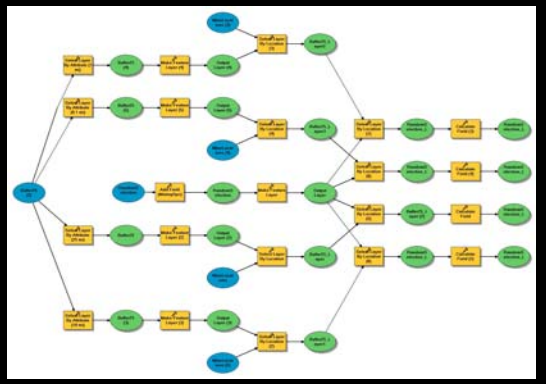
Green – Population-level

Musk thistle

Score Ranking Criteria

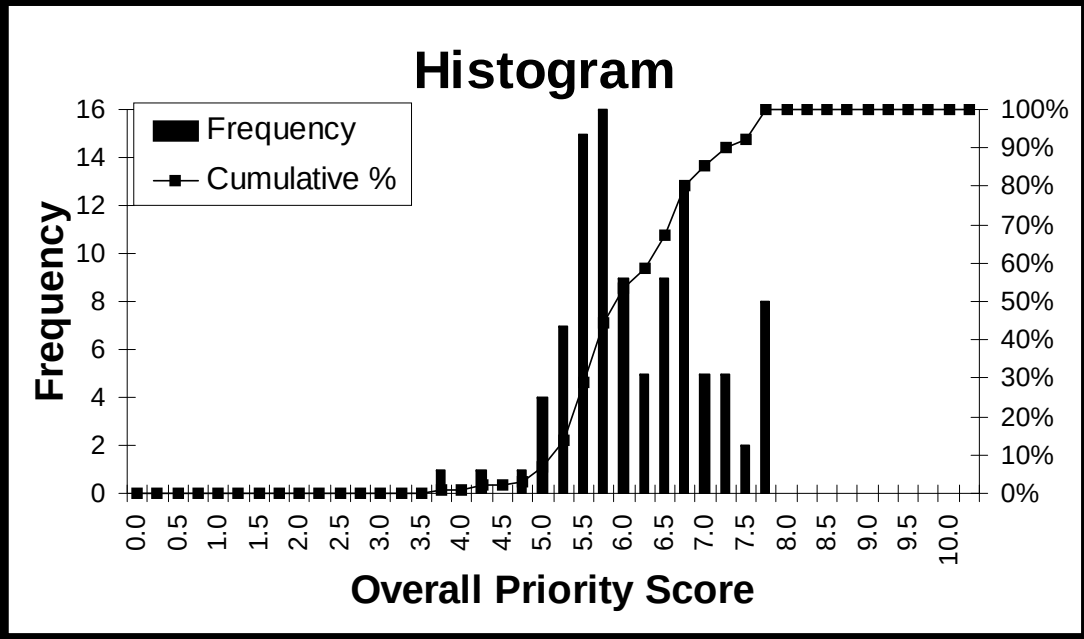
- Scale to emphasize high priority attributes
  - 10 = very high; 6 = high; 3 = medium; 1 = low
- Species-level assessments
  - Cal-IPC Plant Assessment Forms
  - *Weeds of CA and other Western States*
  - Expert interviews
- Population-level assessments
  - ArcGIS geoprocessing models

Illyrian thistle



Calculate Overall Priority Rank

- Major criteria = $\Sigma(\text{Score} * \text{Weight})_{sub}$
- Overall = $\Sigma(\text{Score} * \text{Weight})_{major}$



Assess Resources
Choose Targets

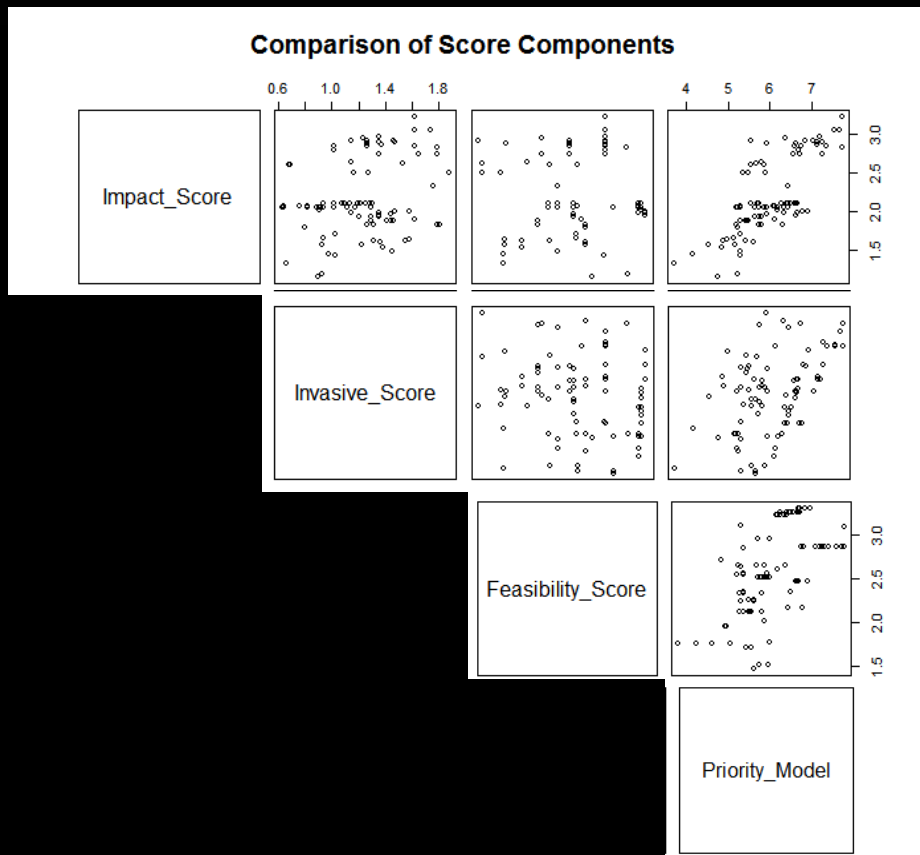
- Consider external circumstances
- Use WeedSearch™ tool to estimate cost & probability of success
- 60:30:10 approach
- Track progress using performance measures
  - Pete Holloran, Cal-IPC 2006 Proceedings
- Re-evaluate as more data become available

Skeletonweed

Preliminary Results

Wormleaf salsola

- 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

Acknowledgements

- MS Committee: Joe DiTomaso, John Randall, Richard Plant
- Subject Matter Experts
- CDFA Integrated Pest Control Branch
  - Colleen Murphy-Vierra and Dan Mitchell
- US Forest Service, State and Private Forestry
- UC Davis, Dept. of Plant Sciences
- NSF IGERT Short-term Fellowship
- UC Davis Graduate Student Association

Musk thistle

Thank you!

Dalmatian toadflax

Fertile capeweed

Punagrass

Halogeton

gdarin@cdfa.ca.gov

Diffuse knapweed