



# Prioritizing Invasive Species Eradication in the Bay Area National Parks

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# Invasive Species Early Detection Program (ISED)

- Goal: early detection/rapid response (EDRR)
- Survey all roads and trails in network parks every 3 years
- Golden Gate NRA, John Muir NHS, Muir Woods NM, Point Reyes NS, Pinnacles NP
- Priority list of potentially invasive species for each park



# Why EDRR?

## Intervention hierarchy

- Prevention
- Early detection
- Risk assessment
- Rapid response
- Eradication
- Control



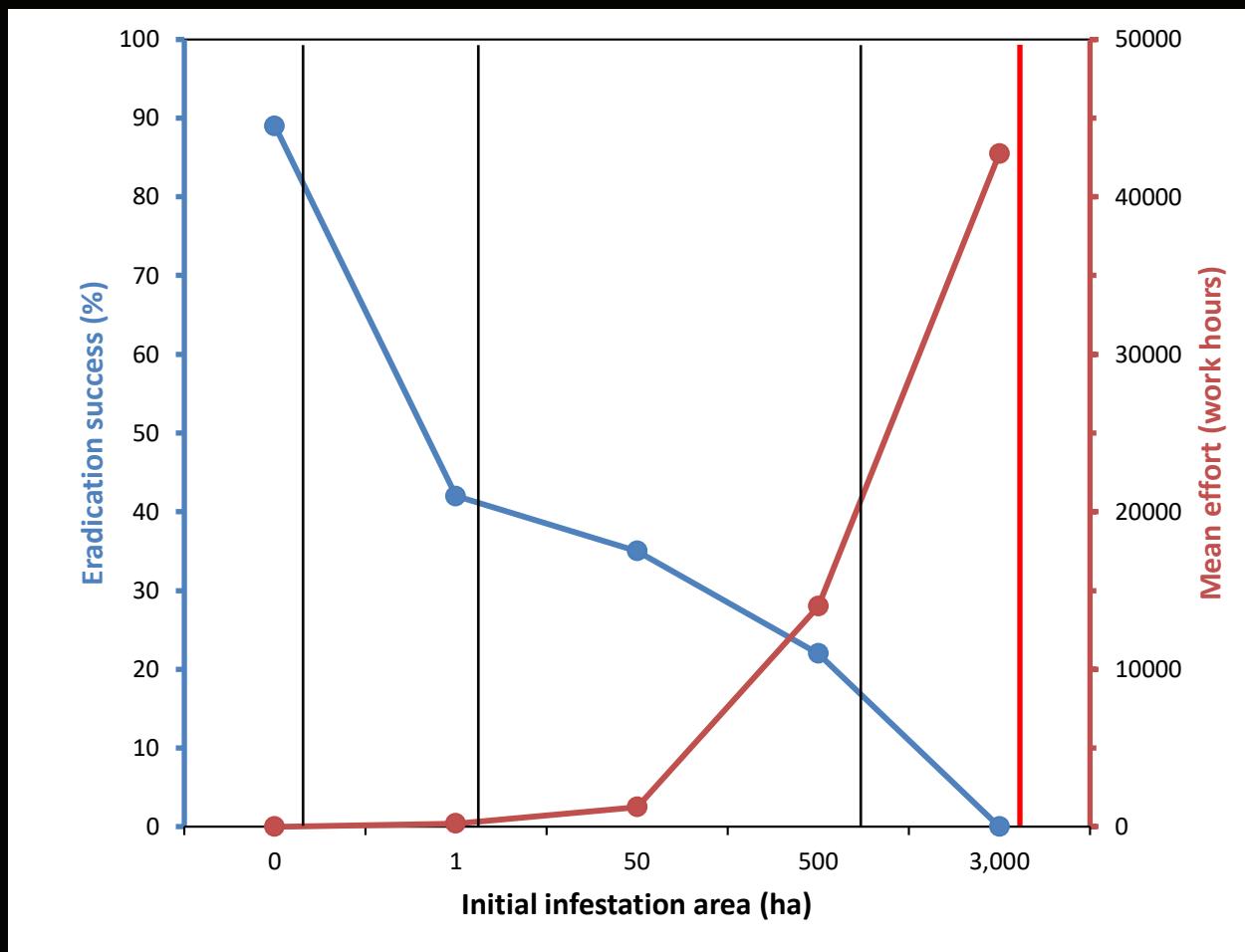
### Eradication:

removal of every reproducing individual of a species from an area –  
Eliminates further impacts

### Control:

ongoing intervention to remove a proportion of individuals from an area – reduces further impacts

# When is eradication a realistic goal?

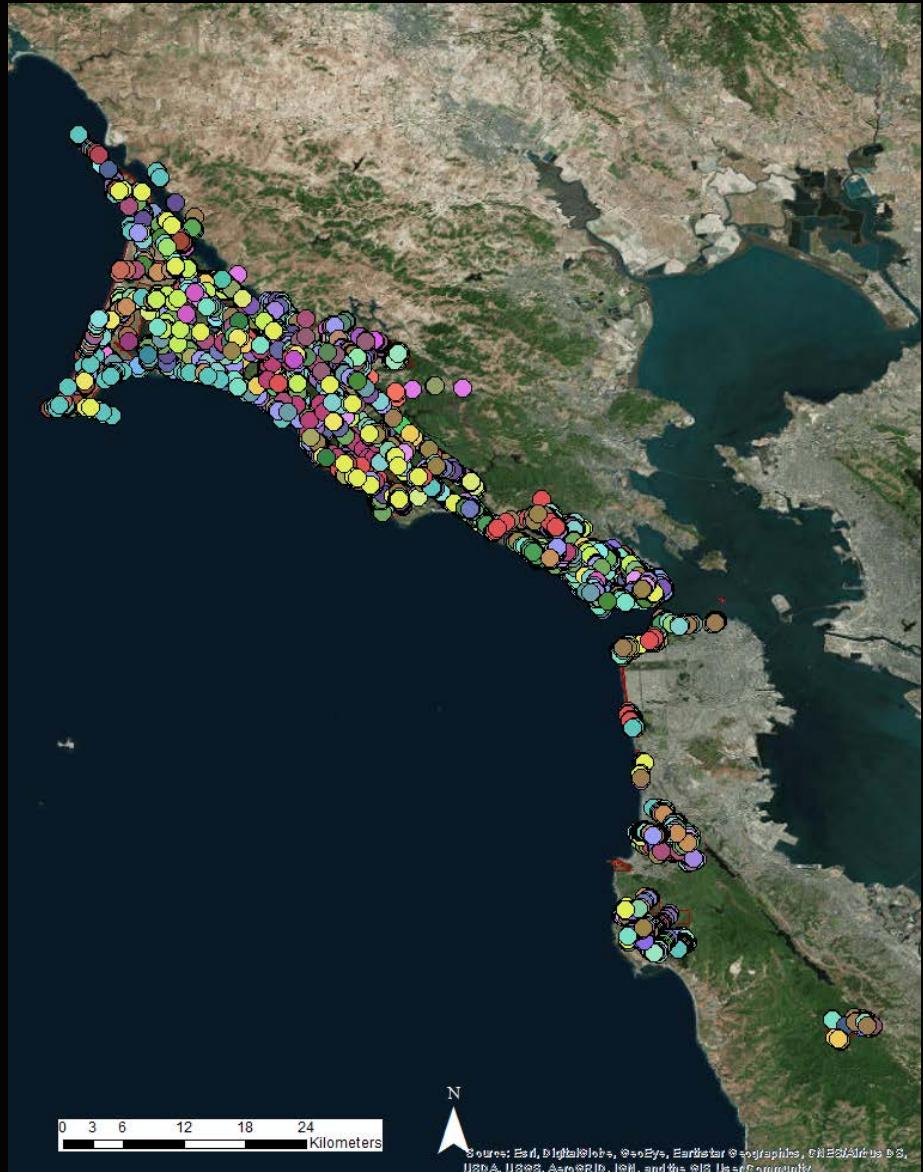


Rejmanek &  
Pitcairn  
(2002)

- CDFA early detection/rapid response program
- 18 “A” rated species
- 53 infestations

# Which species?

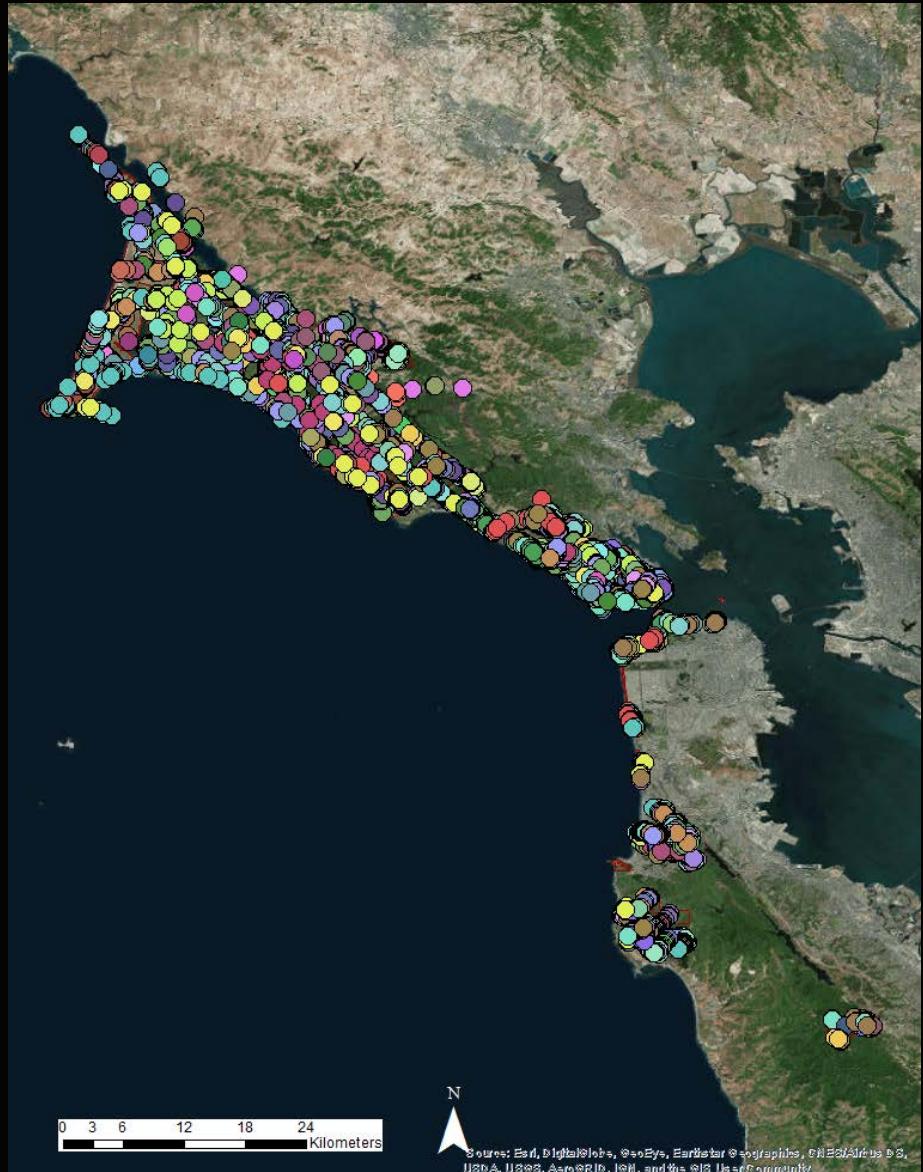
- 10 years of ISED surveys
- Excellent frequency & abundance data on 100+ species
- Keep finding new introductions
- Which species pose the greatest threat to resources?



# Prioritization

- Chose priority species
- Inventory
- Species risk assessments
- Prioritize control
- Risk/abundance

Incomplete information on impacts and invasiveness of many species on our priority lists



# Plant Risk Evaluation (PRE) Tool

- For species of unknown invasiveness in California
  - Invasive history and climate matching
  - Impact on plant and animal communities
  - Reproductive strategies
  - Dispersal
- Cal-IPC Evaluated 200 watch list species in 2016

**Plant Evaluated**



© Smithsonian Institution  
Image by Richard A. Howard

Plant: *Berberis darwinii* Hook.

**PRE Evaluation Summary**

Region: California

PRE Score: 18 ✗

Questions Answered: 20

This evaluation is valid ✓

Screener's Confidence: 85 %

Status: Completed

 PUBLIC by California Invasive Plant Council (Cal-IPC)

# Cal-IPC Plant Assessment Form (PAF)

|   | Overall Score?        | Documentation?                             |
|---|-----------------------|--|
|   | Score                 |  |
| 1.1 ?Impact on abiotic ecosystem processes                          | A                     | Impact?<br>Four-part score<br><b>AAAD</b>  |
| 1.2 ?Impact on plant community                                      | A. Severe             | Total Score<br><b>A</b>                    |
| 1.3 ?Impact on higher trophic levels                                | A. Severe             |  |
| 1.4 ?Impact on genetic integrity                                    | D. None               |  |
| 2.1 ?Role of anthropogenic and natural disturbance in establishment | B. Moderate           | Invasiveness?<br>Total Points<br><b>17</b> |
| 2.2 ?Local rate of spread with no management                        | A. Increases rapidly  | Total Score<br><b>A</b>                    |
| 2.3 ?Recent trend in total area infested within state               | A. Increasing rapidly |  |
| 2.4 ?Innate reproductive potential<br>(see Worksheet A)             | B. Moderate           |  |
| 2.5 ?Potential for human-caused dispersal                           | A. High               |  |
| 2.6 ? Potential for natural long-distance dispersal                 | A. Frequent           |  |
| 2.7 ?Other regions invaded  | C. Already invaded    |  |
| 3.1 ?Ecological amplitude/Range<br>(see Worksheet C)                | B. Moderate           | Distribution?<br>Total Score<br><b>B</b>   |
| 3.2 ?Distribution/Peak frequency<br>(see Worksheet C)               | C. Low                |  |

# Assigning risk factors

| Cal-IPC Rating | PRE Score | Risk Factor |
|----------------|-----------|-------------|
| High           | 19-25     | 100         |
| Moderate       | 16-18     | 75          |
| Limited        | 13-15     | 50          |
| N/A            | <13       | 1           |

Combine Cal-IPC Rating and PRE Scores to assign risk factors to spp.

|                              |     |
|------------------------------|-----|
| <i>Aegilops triuncialis</i>  | 100 |
| <i>Ageratina adenophora</i>  | 75  |
| <i>Ailanthus altissima</i>   | 75  |
| <i>Albizia lophantha</i>     | 75  |
| <i>Ammophila arenaria</i>    | 100 |
| <i>Anthoxanthum odoratum</i> | 75  |
| <i>Arctotheca calendula</i>  | 100 |
| <i>Arctotheca prostrata</i>  | 75  |
| <i>Arundo donax</i>          | 100 |
| <i>Berberis darwinii</i>     | 75  |
| <i>Bromus tectorum</i>       | 100 |
| <i>Buddleja davidii</i>      | 100 |
| <i>Calendula arvensis</i>    | 50  |
| <i>Carduus acanthoides</i>   | 50  |
| <i>Carex pendula</i>         | 75  |

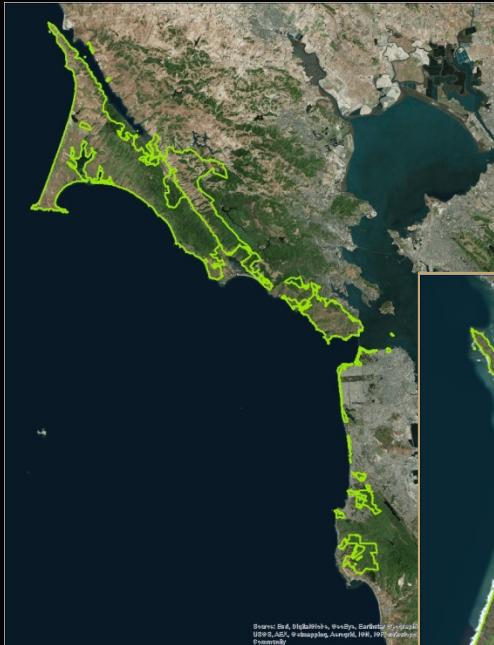
# Eradication Prioritization: Point Reyes

## Factors

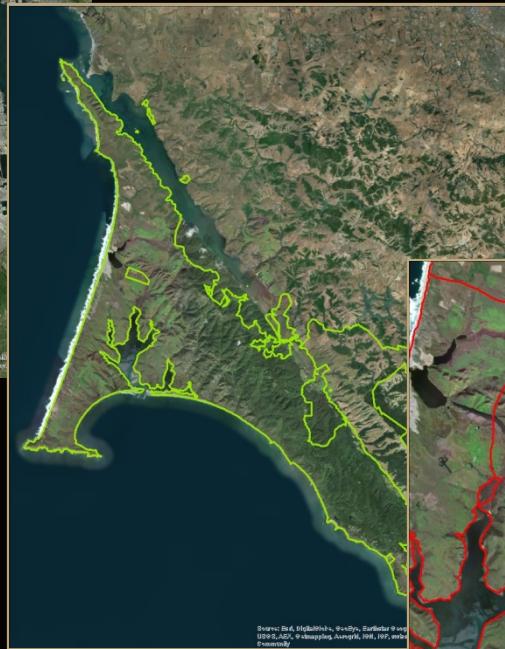
- Risk of invasiveness
- Distribution
- Abundance
- **Risk / Abundance = Eradication Priority**

| Eradication |  |            |                        |
|-------------|--|------------|------------------------|
| Rank        | Species                                    | RiskFactor | Area (m <sup>2</sup> ) |
| 1           | <i>Bromus tectorum</i>                     | 100        | 1                      |
| 2           | <i>Sorghum halepense</i>                   | 100        | 1                      |
| 3           | <i>Marrubium vulgare</i>                   | 50         | 1                      |
| 4           | <i>Carex pendula</i>                       | 75         | 3                      |
| 5           | <i>Rhamnus alaternus</i>                   | 75         | 4                      |
| 6           | <i>Verbena bonariensis</i>                 | 75         | 6                      |
| 7           | <i>Buddleja davidii</i>                    | 100        | 13                     |
| 8           | <i>Spartina alterniflora</i>               | 100        | 20                     |
| 9           | <i>Ageratina adenophora</i>                | 75         | 5                      |
| 10          | <i>Ailanthus altissima</i>                 | 75         | 25                     |
| 11          | <i>Berberis darwinii</i>                   | 75         | 16                     |
| 12          | <i>Hypericum grandifolium</i>              | 75         | 23                     |
| 13          | <i>Stipa miliacea</i> var. <i>miliacea</i> | 50         | 26                     |
| 14          | <i>Arundo donax</i>                        | 100        | 81                     |
| 15          | <i>Scabiosa atropurpurea</i>               | 75         | 21                     |
| 16          | <i>Aegilops triuncialis</i>                | 100        | 79                     |
| 17          | <i>Ligustrum lucidum</i>                   | 100        | 200                    |
| 18          | <i>Datura stramonium</i>                   | 75         | 200                    |
| 19          | <i>Salsola soda</i>                        | 75         | 110                    |
| 20          | <i>Linaria vulgaris</i>                    | 75         | 217                    |

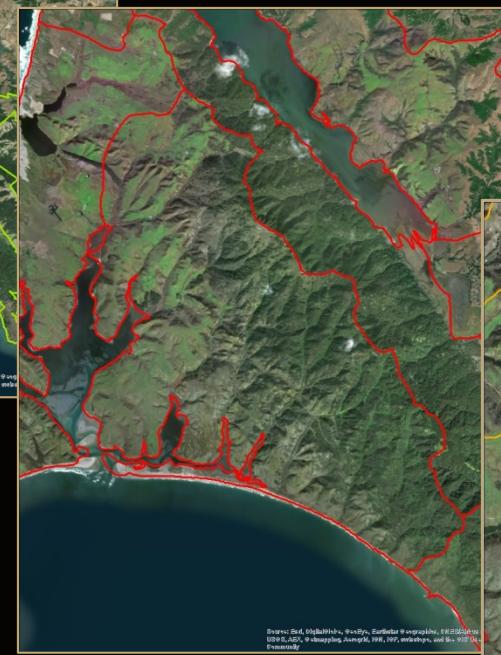
# Scaling prioritization areas



Region

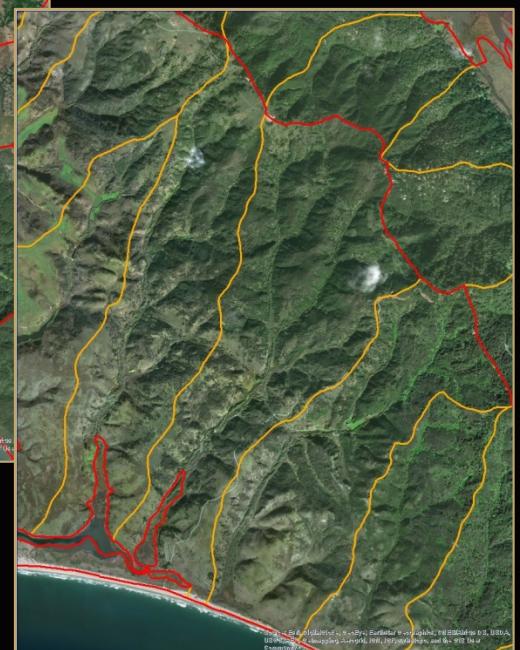


Park



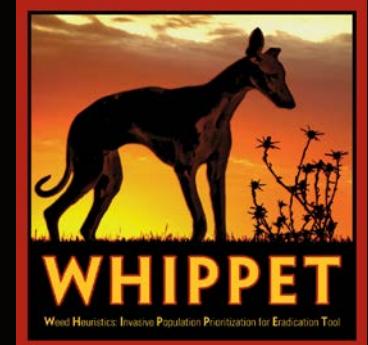
Watershed

Subwatershed

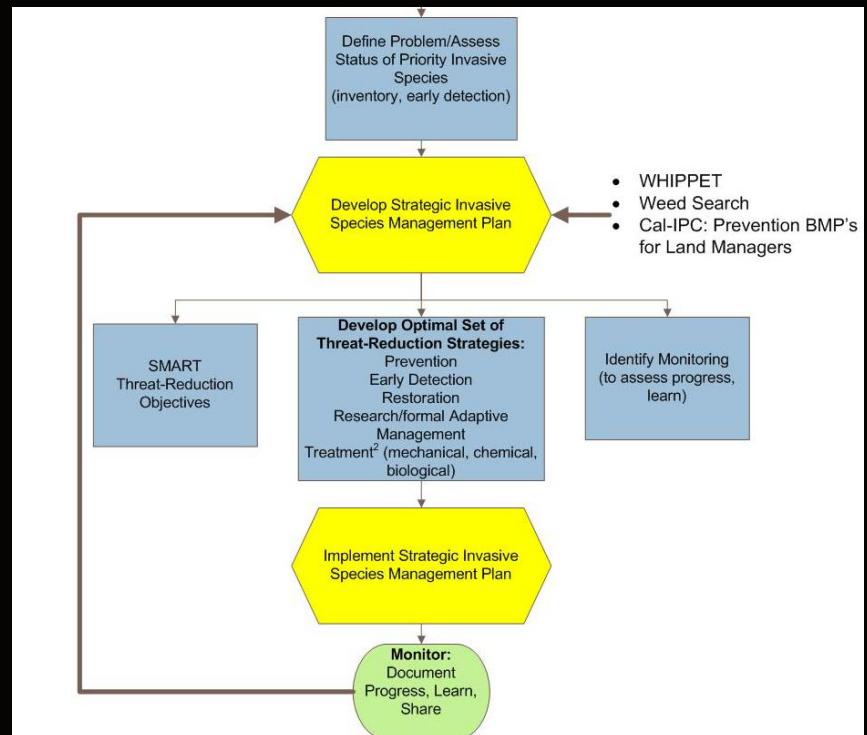


# Next steps

Year 1: Treat highest priority species of very low abundance



Year 2 – on: Monitor and refine priorities using WHIPPET, a population based eradication prioritization tool.



# Thanks!



Many thanks to the ISED staff and volunteers and staff of Golden Gate National Recreation Area, Point Reyes National Seashore, Muir Woods National Monument, John Muir National Historic Site, and Pinnacles National Park!