Prioritization of Resources.

1. Prevention and Exclusion.

2. Early Detection and Eradication.

3. Management of Impacts and Spread.
Weed Increase Over Time and Control Potential

- **(1)** Prevention or Eradication simple
  - Absent or off-site

- **(2)** Eradication feasible
  - Few locations

- **(3)** Eradication unlikely; intense effort required
  - Many locations

- **(4)** Local control and management only
  - At or near biological potential
  - Public awareness typically begins

**Time**

**Acres Infested**

**Control Costs**
The Marin-Sonoma WMA’s EDRR Program

• Locate pops of “known” weeds.
  – Collaborate with local experts.
  – Recruit and train volunteers.

• Address “sleeper weeds.”
  – Identify potential sleeper weeds.
  – Use species lists to locate populations.

• Eradicate outlier populations and sleeper weed species.
“Sleeper Weeds” versus Outliers.

- Outliers are vicariant populations of known harmful invaders.

- Sleeper weeds are outbreaking species that we’re not yet aware of.

- SF Bay Area is a center of new introductions, potentially many hidden outbreaking species.
How do we identify sleeper weeds?

• Environmental matching as a predictor of invasion potential.

• Propagule pressure as a determinant of probability of establishment.

• Species characteristics as predictors of invasion.

• Expert opinion encompassed in detailed species-specific analyses.

• Evaluation of existing weed lists???
Evaluation using existing weed lists.

Species invasive in one location are more likely to be invasive elsewhere?

Find lists of plant species invasive elsewhere. Compare with local floras to identify outbreaking species.
Distribution in California is predicted by the number of Global Compendium of Weeds data sources.

$R^2 = 0.16, \ p < 0.0001$
“The Usual Suspects”

RANDOM SAMPLE
Acacia dealbata
Acacia verticillata
Agrostis avenacea
Agrostis capillaris
Avena fatua
Briza maxima
Eucalyptus globulus
Lathyrus aphaca
Oxalis pes-caprae
Proboscidea louisianica
Rumex obtusifolius
Verbascum virgatum
Verbena litoralis
Vicia cracca
Zizania palustris var. interior
Widespread “old” weed species.

Random sample:
- Amaranthus albus
- Ailanthus altissima
- Cerastium glomeratum
- Chenopodium ambrosioides
- Chenopodium murale
- Digitaria sanguinalis
- Hordeum murinum
- Melilotus indica
- Poa compressa
- Spergula arvensis
- Avena barbata
- Digitaria sanguinalis
- Mentha spicata var. spicata
- Stellaria media
- Vulpia myuros
“California” weeds

RANDOM SAMPLE
Alyssum strigosum
Chamaesyce maculata
Cistus creticus
Cistus monspeliensis
Danthonia pilosa
Epipactis helleborine
Heteranthemis viscidehirta
Ipomoea mutabilis
Kochia scoparia
Lonicera etrusca
Myosotis micrantha
Nicotiana acuminata var. multiflora
Phalaris caroliniana
Pyracantha coccinea
Tetragonia tetrogonioides
Potential alert species

RANDOM SAMPLE
Acacia retinodes
Allium cepa
Arctotheca calendula
Armoracia rusticana
Barbarea verna
Brassica juncea
Carthamus leucocaulos
Diplotaxis muralis
Bellardia trixago
Lathyrus cicera
Panicum hillmanii
Pyrus communis
Rosa canina
Solanum carolinense
Trifolium tomentosum
Cal-IPC Red Alert Species

![Graph showing the relationship between Number of Counties and Number of Sources for Cal-IPC Red Alert Species. The graph is a scatter plot with data points in different colors representing varying numbers of counties and sources. The x-axis is labeled 'Number of Sources' and the y-axis is labeled 'Number of Counties.' The title 'Cal-IPC Red Alert Species' is displayed at the top of the image.]
Statewide Red alert status is predicted by the number of GCW occurrences.

$\chi^2 = 48.8, \ p < 0.0001$
Red Alert Species in Marin and Sonoma

- **Lavatera cretica** smaller treemallow
- **Centaurea maculosa** spotted knapweed
- **Atriplex semibaccata** Australian saltbush
- **Cardaria chalepensis** lens-podded hoary cress
- **Euphorbia oblongata** eggleaf, oblong spurge
- **Spartina densiflora** dense-flowered cord grass
- **Arctotheca calendula** Capeweed
- **Carthamus lanatus** woolly distaff thistle
- **Crupina vulgaris** common crupina, bearded creeper
- **Euphorbia esula** leafy spurge
- **Helichrysum petiolare** licorice plant
- **Hydrilla verticillata** hydrilla
- **Ilex aquifolium** English holly
- **Leucanthemum vulgare** ox-eye daisy
- **Lythrum salicaria** purple loosestrife
- **Myriophyllum aquaticum** parrotfeather
- **Polygonum cuspidatum** Japanese knotweed, fleeceflower
- **Polygonum sachalinense** giant knotweed
- **Spartina anglica** cord grass
- **Spartina patens** salt-meadow cord grass
Next steps

• Obtain additional non-local weed lists and repeat analysis.

• Conduct intensive examination and expert review of potential sleeper weeds.

• Screen local floras for identified target species.

• Bayesian analysis of multiple data types?
There are a lot of potential data sets.
Occurrence reporting: all invasions are local!!

<table>
<thead>
<tr>
<th>Location, Date</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>county</strong></td>
<td>-select one-- California</td>
</tr>
<tr>
<td><strong>location description</strong></td>
<td>Text description of location (up to 255 characters). Example: Little River, Van Damme State Park, Bog Trail</td>
</tr>
<tr>
<td><strong>collection</strong></td>
<td>A short name for a group of your observations. For example, for a checklist, it might be a short version of the location description. Example: Loe Santor Trail South</td>
</tr>
<tr>
<td><strong>elevation</strong></td>
<td>-select units--</td>
</tr>
<tr>
<td><strong>elevation precision</strong></td>
<td>±</td>
</tr>
<tr>
<td><strong>habitat description</strong></td>
<td>Description of habitat where this observation was made. Example: South side of steep canyon, 30 feet from seasonal creek</td>
</tr>
<tr>
<td><strong>observation date</strong></td>
<td>Oct 04 2005 Year is required.</td>
</tr>
</tbody>
</table>

**Georeference**

Please fill out one of the following location types AND datum AND precision. Adding georeference data to your observations makes them much more useful to Calflora users.

<table>
<thead>
<tr>
<th>latitude and longitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>latitude</td>
</tr>
<tr>
<td>longitude</td>
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</table>
Here’s how we will fix the biological invasion crisis.

• Prevention and Exclusion.
• Early Detection and Rapid Response.
• Establishing a National Center for Invasive Species Management.
Today’s Cal-IPC Working Groups

❖ Horticulture

❖ Invasive Plant Inventory

❖ Mapping

❖ Outreach

❖ Discussion Groups:
  • Riparian, wetland & sensitive habitats
  • Grasses
  • Trees & shrubs
  • Fire, fuels treatments, & weeds