Climate Change as Wildcard in Invasive Species Management:

Opportunities for Action

April 21, 2009
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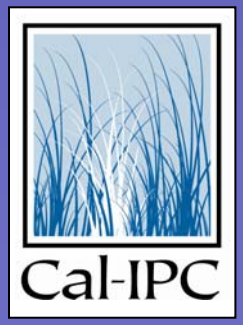
www.cal-ipc.org



Outline

1. **Invasive Species (IS) in CA**
2. **How climate change (CC) will impact IS problem**
3. **How we can most effectively protect biodiversity**

Invasive species problem

George Hartwell

Plants

Muskegon Chronicle

Aquatic organisms

CA Oak Mortality Task Force

Pests and diseases

Impacts

Wildlife

Recreation

Infrastructure

Agriculture

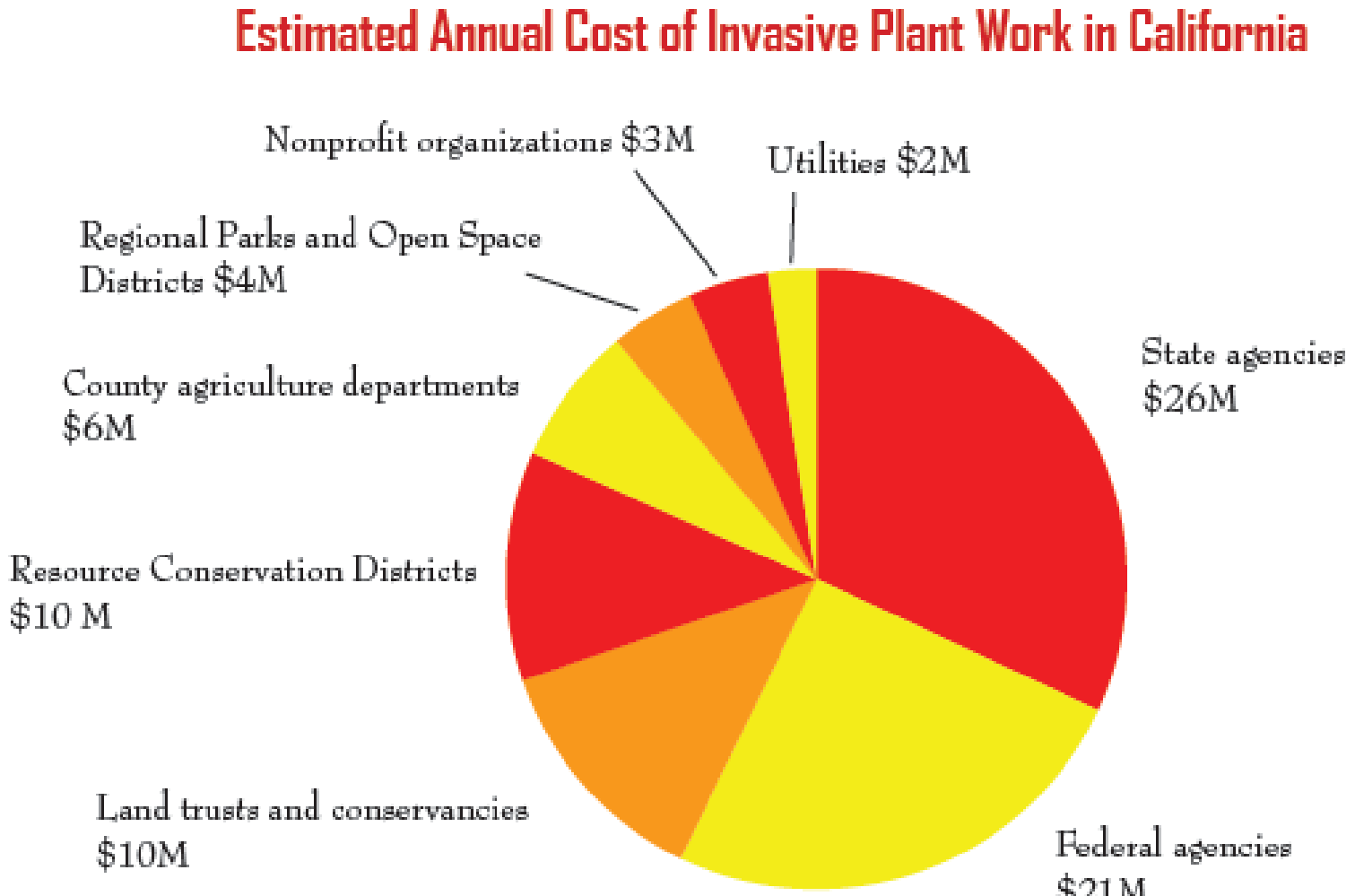
Water

Fire

Ecological impacts

- **Food webs**
  - Competition
  - Other trophic levels
- **Abiotic**
  - Disturbance regimes (e.g. fire)
  - Nutrient cycling and soil chemistry
  - Hydrology and geomorphology

Organizational landscape



Totals $82M. From Cal-IPC Survey 2008

Teams forming

- **Weed Management Areas** (WMAs)
- **Cal-IPC** (cal-ipc.org)
- **CA Invasive Species Council** (state agencies, with stakeholder advisory cmte)
- **CA Environmental Coalition on Invasive Species** (partnership of nonprofit org'ns)

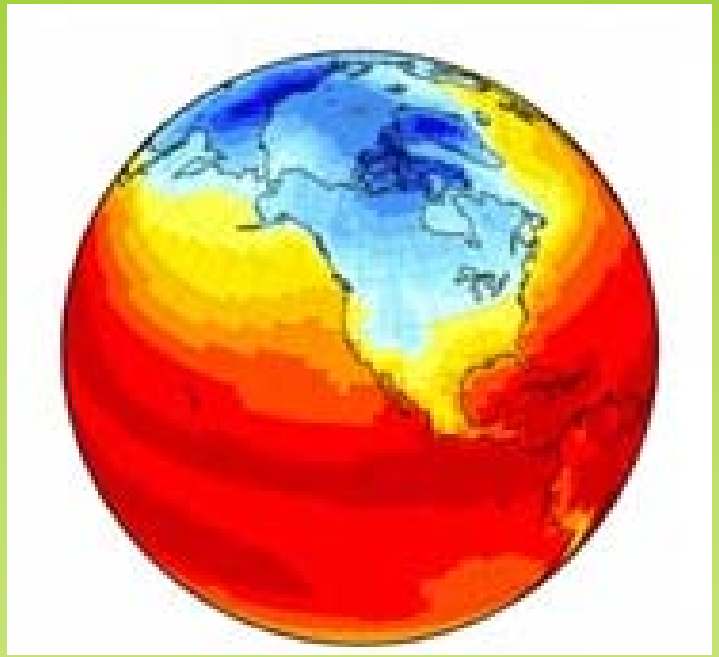
Non-traditional partnerships

- **CA Horticultural Invasives Prevention partnership** (plantright.org)
- **CA Rangeland Conservation Coalition** (carangeland.org)

Nationally

- **National Environmental Coalition on Invasive Species** (necis.org)
- **National Association of Exotic Pest Plant Councils** (naeppc.org)
- **National Network of Invasive Plant Centers** (invasiveplantcenters.org)

Climate change



Climate change as wildcard

- **Could it make existing problems worse?**
  - Helping invasive species
  - Compromising native species
- **Could it bring in new problem species?**
  - Make habitat more suitable
  - Increase vectors
- **Could it present restoration opportunities?**
  - Range reduction

Invasive characteristics

Generalists with…

- **High reproductive capacity**
- **Successful dispersal strategies**
- **Genetic flexibility**

Major factors

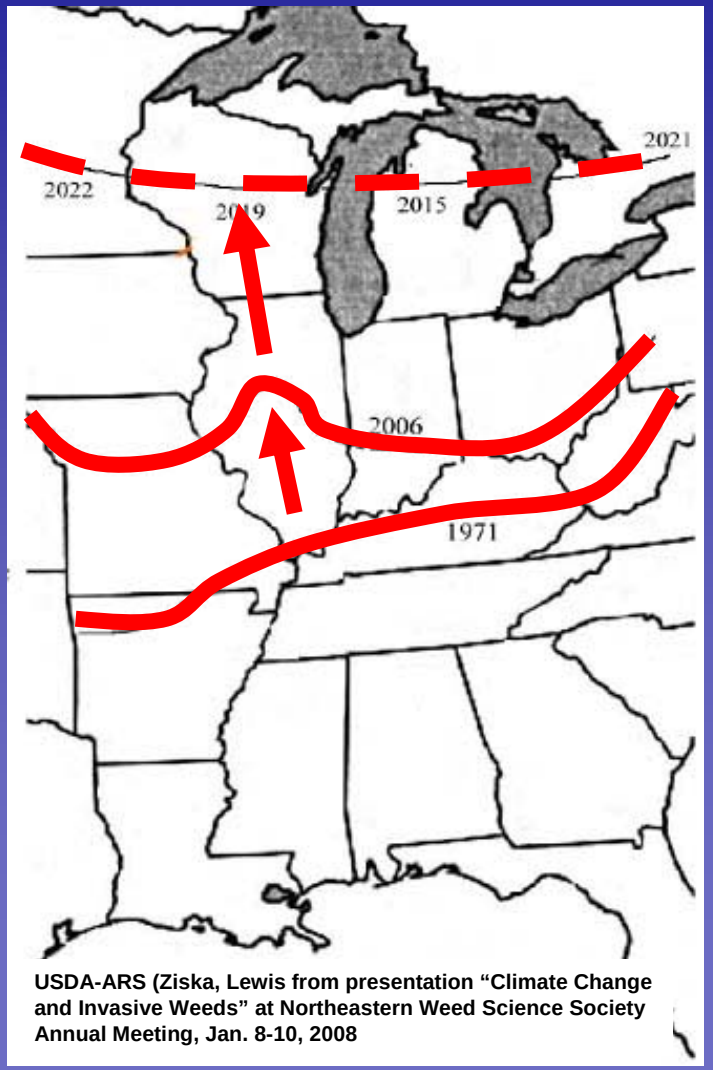
- Warmer temperatures
- Altered precipitation timing and amount
- Increased CO_2
- Increased fire and other extreme events
- Sea level rise

Also…

- Biofuels
- Water conveyance over long distances
- Drought-tolerant ornamentals
- New routes and longer season for shipping

Shift toward higher latitudes

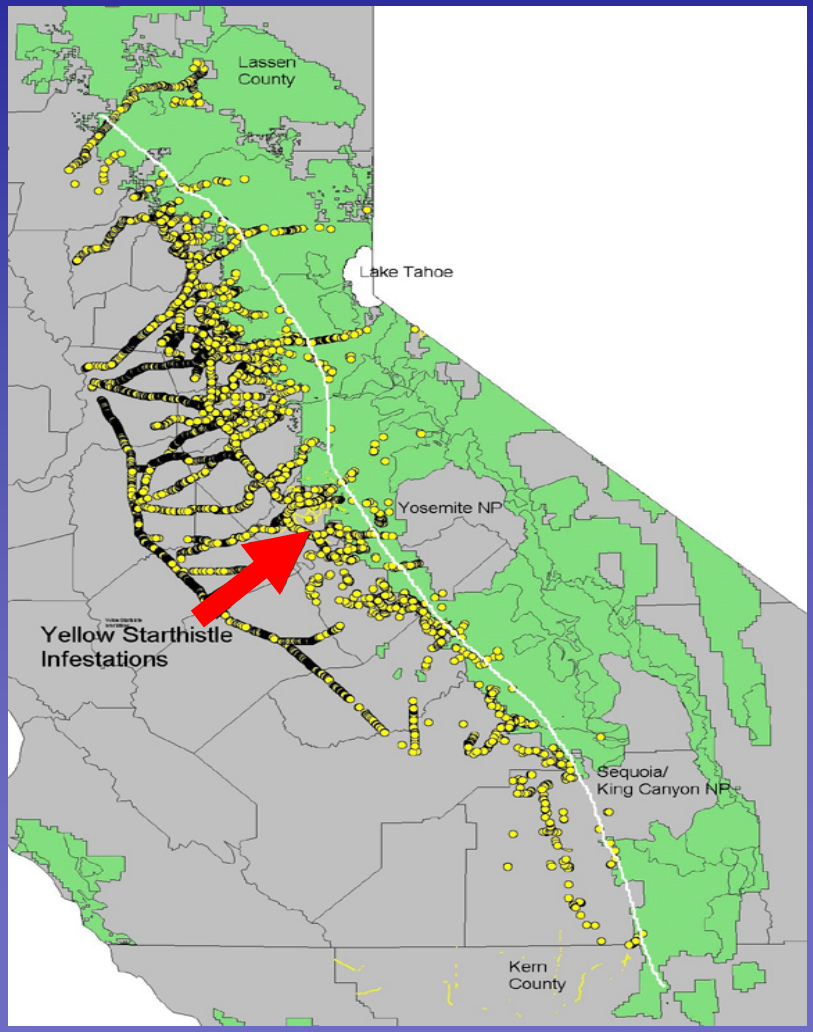
Kudzu moving north…



USDA-ARS (Ziska, Lewis from presentation "Climate Change and Invasive Weeds" at Northeastern Weed Science Society Annual Meeting, Jan. 8-10, 2008

Shift to higher elevations

Yellow starthistle moving up into the Sierra Nevada…



CDFA

More CO_2 = increased plant growth

Canada thistle shows 70% increase

Janet Garcia

Also…

- **Increased water efficiency**
- **Increased combustibility**
- **Decreased palatability**
- **Reduced herbicide effectiveness**

Increased fire

Increased extreme events

Storms, floods, landslides, and fires provide

- **Disturbance and habitat openings**
- **Dispersal**
- **Nutrient pulse**

And, clean up activities can be a vector!

Native communities

- **Communities disaggregating** as ranges shift in different directions for particular species.
- **Species interactions decoupling** as timing of phenological events (breeding, biomass production) shifts.
- **CA's flora** is rich in endemism (2,387 species!), but up to two-thirds of these plants are expected to lose 80% of their habitat. (Loarie et al, PLOS One 2008)

Restoration opportunities?

Some IS may lose range:

- **Yellow starthistle -** increases range
- **Tamarix –** stays the same
- **Cheatgrass, spotted knapweed –** lose some range, gain more ★
- **Leafy spurge –** loses some range ★★

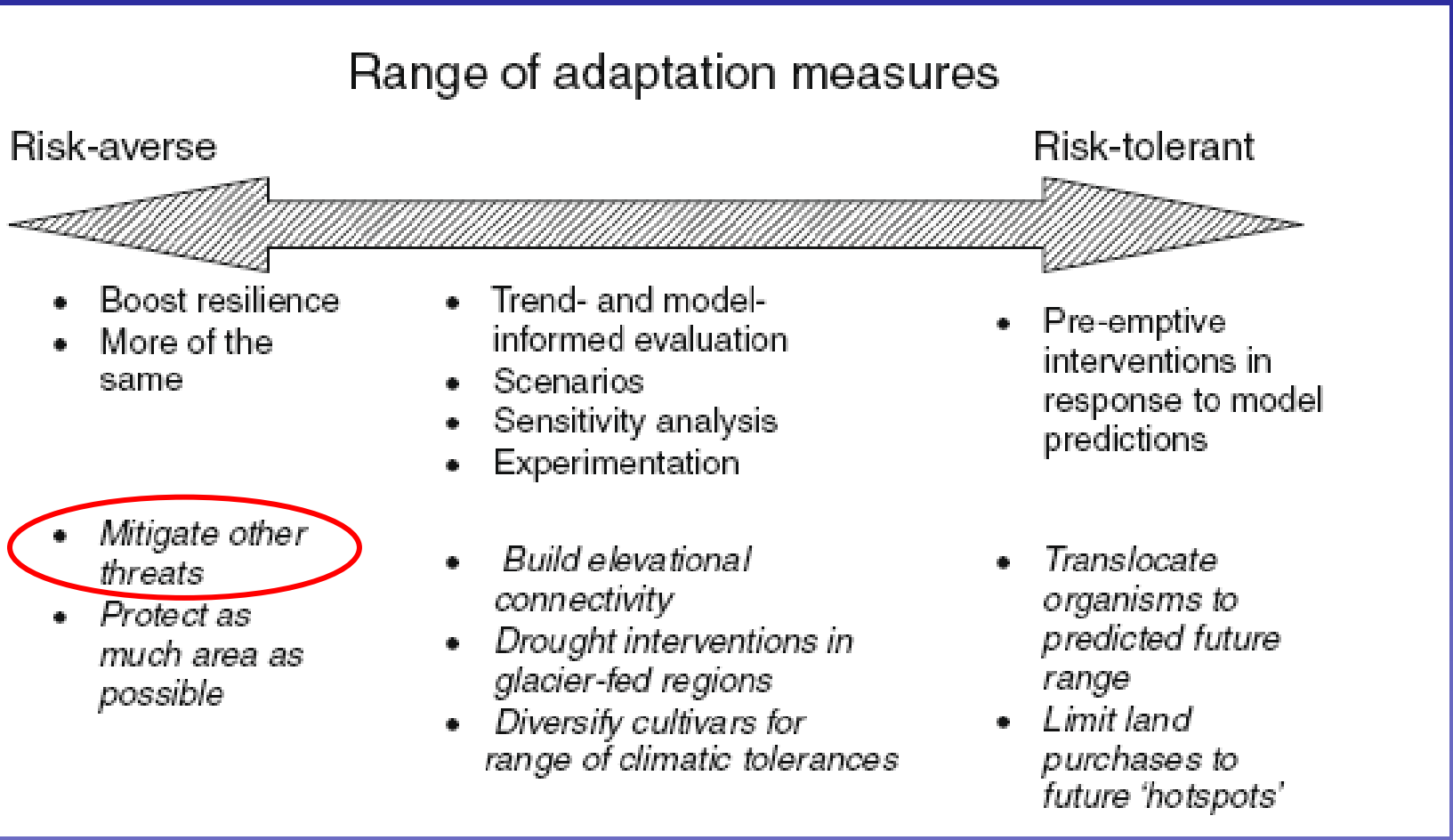
(Bradley et al, *Global Change Ecology* 2009))

Common recommendations

- **Review of last 22 years of articles on conservation measures to address climate change:**
  - **Increase connectivity (reserve design)**
  - **Include CC in all planning**
  - **Reduce stressors like IS**
  - **Improve inter-agency, regional coordination**
  - **Improve predictive capacity**

Heller and Zavaleta, *Biological Conservation,* January 2009

Adaptation portfolio



Heller and Zavaleta, *Biological Conservation*, January 2009

Broaden scope

In general, we'll need greater integration of planning and resource management…

- **across wider geographic areas,**
- **on longer time-scales, and**
- **involving more diverse actors**

…than in current practice.

Heller and Zavaleta, *Biological Conservation,* January 2009

Rec's for CALFED

- Set restoration targets for long-term ecosystem **adaptability** rather than historical verisimilitude
- Commit to long-term **monitoring** of restoration and impacts
- **Integrate** further across disciplines, observations, models, and across the study area
- Undertake more manipulative **experiments**
- **Include** climate-change in all efforts undertaken by the program

Dettinger and Culberson, *San Francisco Estuary and Watershed Science*, 2008

Opportunities for Action

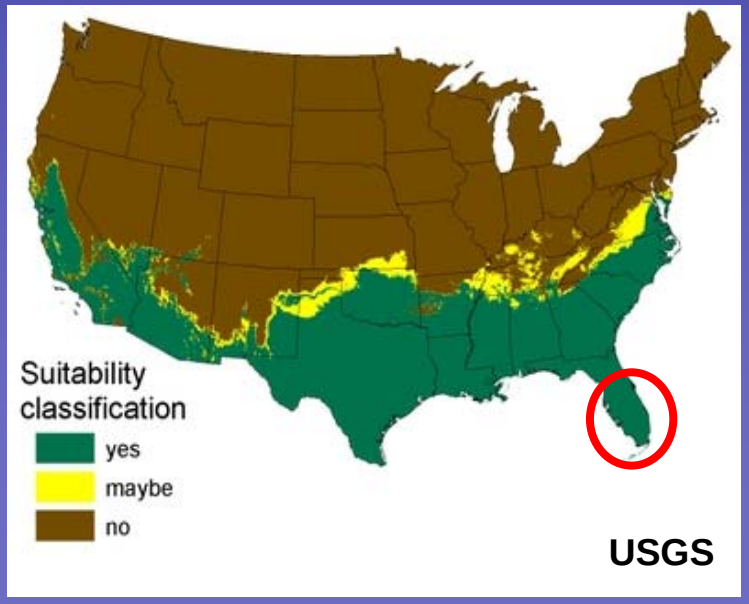
1. **Big picture programmatic actions**

2. **Project assessment criteria**

Prevention

1. **Work with nursery, pet and aquarium trades to control imports.**

Burmese pythons



Prevention

2. **Develop regulations and outreach campaigns to seal off vectors based on results of OPC's pathways study.**

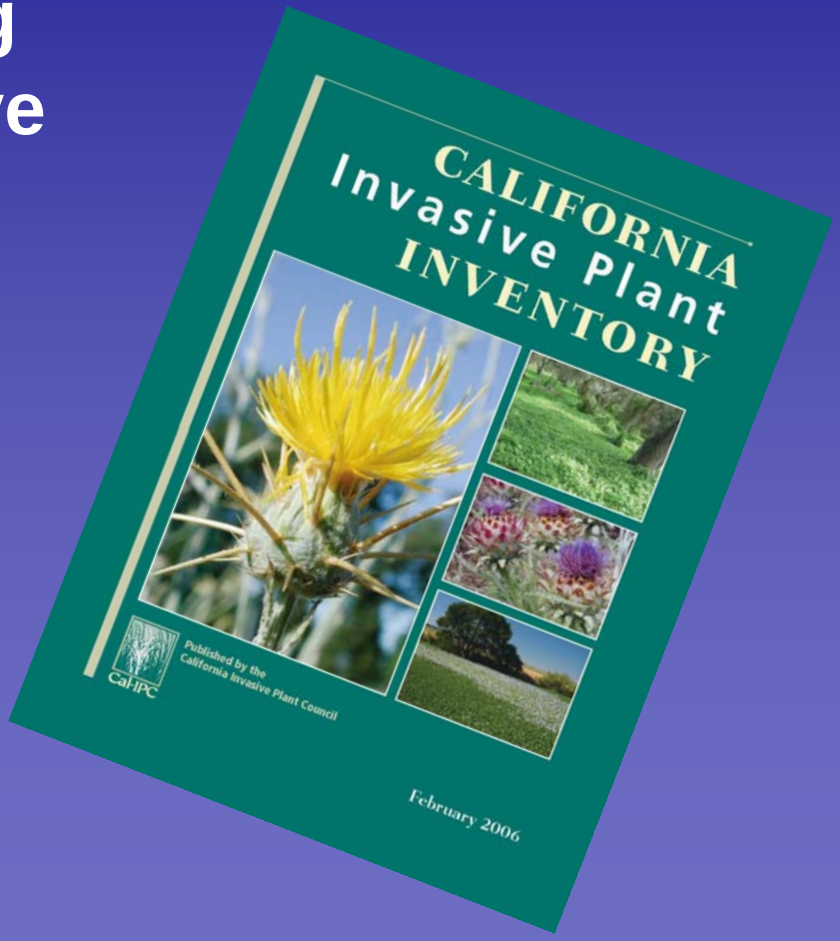
Early detection & response

3. **Train staff and partners in all regions to ID a range of invasive species to provide an early detection network.**

4. **Set up a funding mechanism for rapid response.**

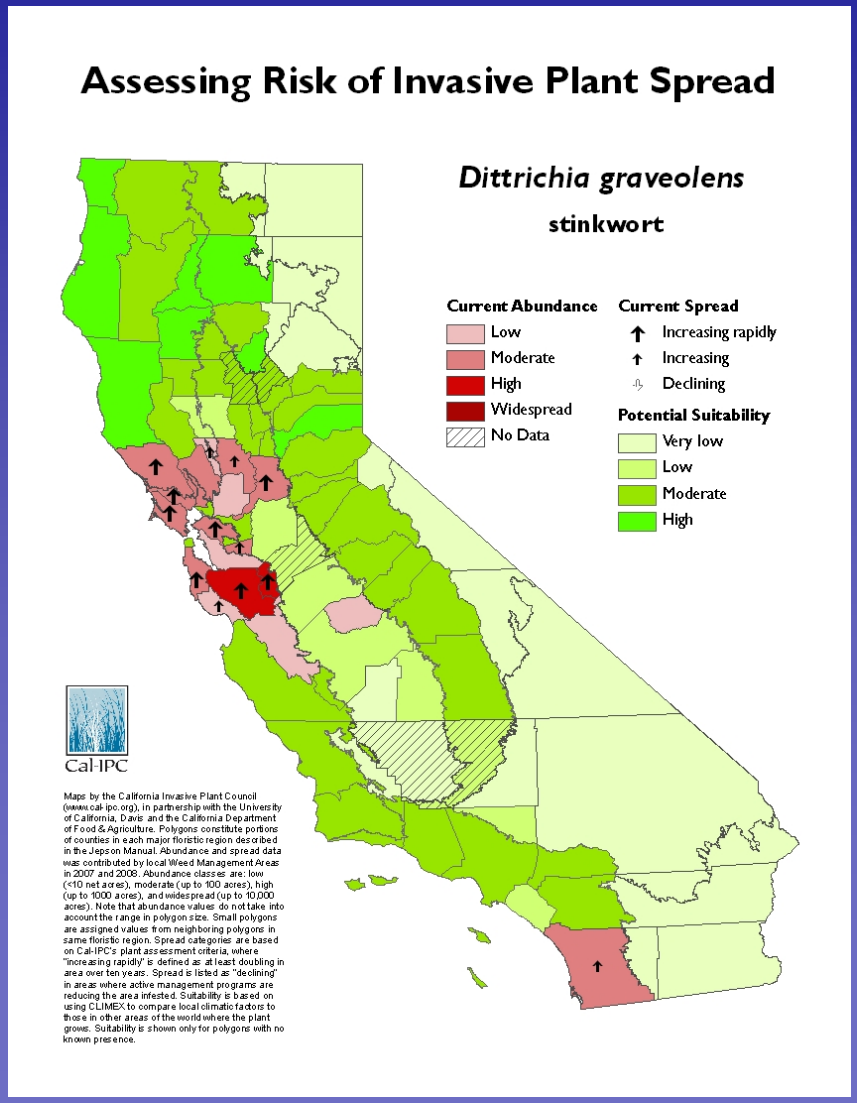
Risk assessment

5. **Update state listing process for invasive species.**



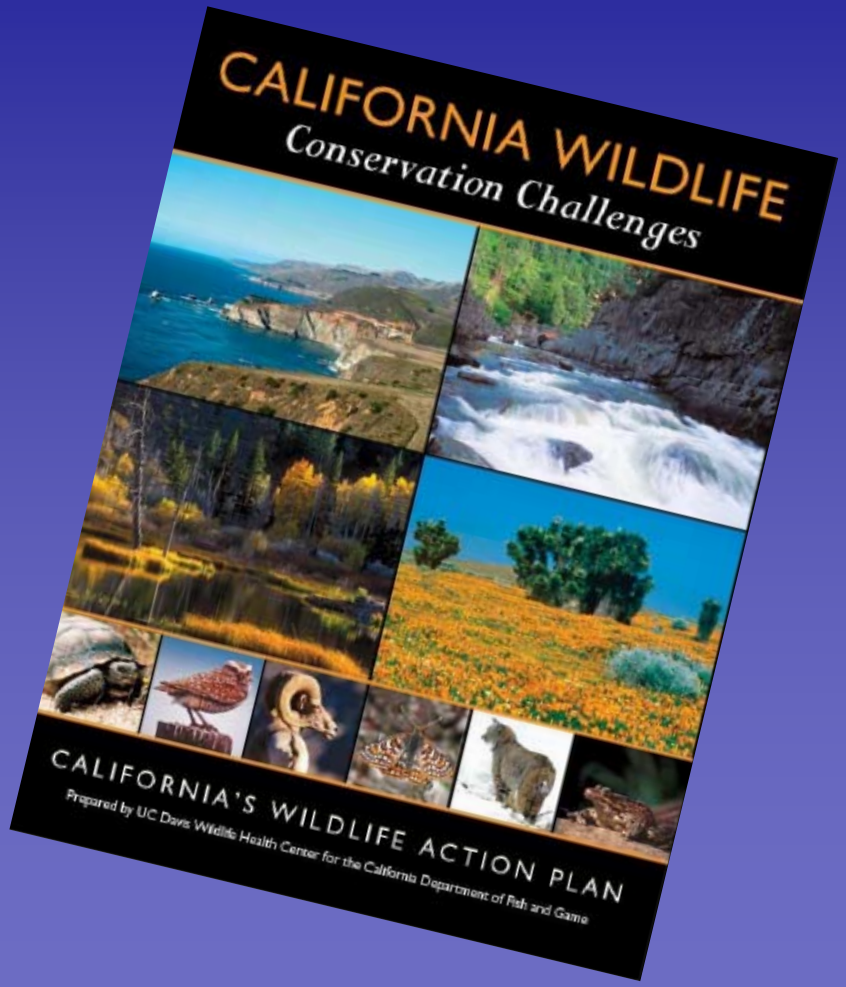
Risk assessment

6. **Map the distribution and predicted spread of invasive species.**



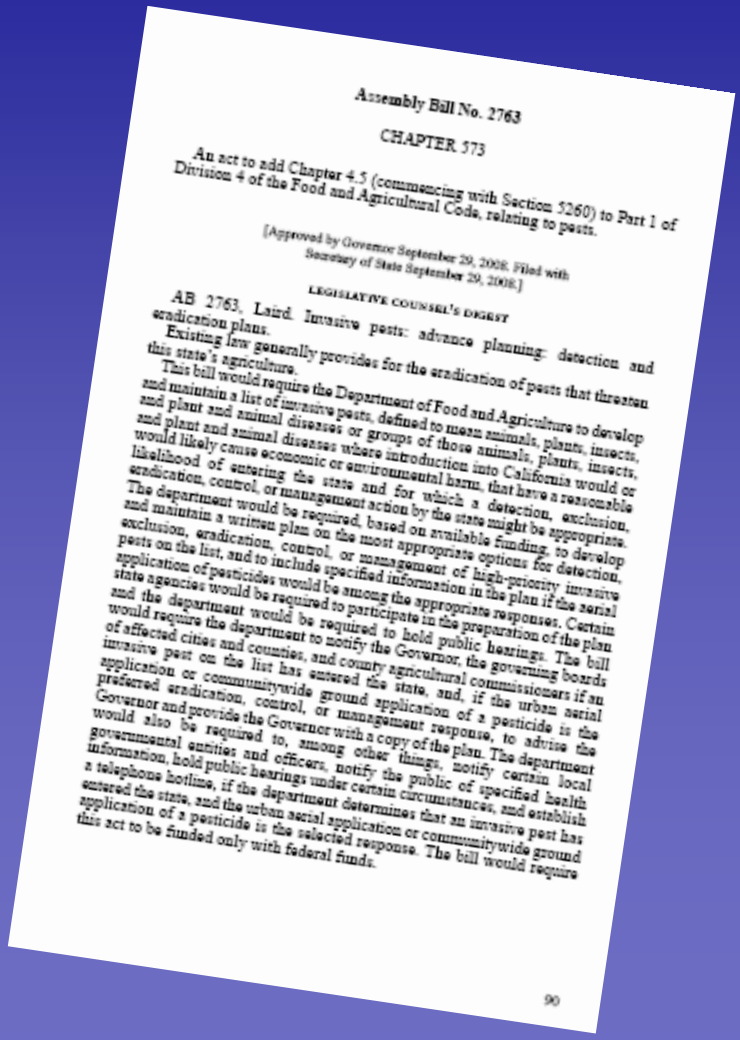
Risk assessment

7. **Prioritize wildlife conservation targets using invasive species information.**



Risk assessment

8. Work on "advance planning" for potentical new IS, as specified in AB 2763 (Laird).



Assembly Bill No. 2763

CHAPTER 373

An act to add Chapter 4.5 (commencing with Section 5260) to Part 1 of Division 4 of the Food and Agricultural Code, relating to pests.

[Approved by Governor September 29, 2008. Filed with Secretary of State September 29, 2008.]

LEGISLATIVE COUNSEL'S DIGEST

AB 2763, Laird. Invasive pests: advance planning: detection and eradication plans.

Existing law generally provides for the eradication of pests that threaten this state's agriculture.

This bill would require the Department of Food and Agriculture to develop and maintain a list of invasive pests, defined to mean animals, plants, insects, and plant and animal diseases or groups of those animals, plants, insects, and plant and animal diseases where introduction into California would or would likely cause economic or environmental harm, that have a reasonable likelihood of entering the state and for which a detection, exclusion, eradication, control, or management action by the state might be appropriate. The department would be required, based on available funding, to develop and maintain a written plan on the most appropriate options for detection, exclusion, eradication, control, or management of high-priority invasive pests on the list, and to include specified information in the plan if the aerial application of pesticides would be among the appropriate responses. Certain state agencies would be required to participate in the preparation of the plan and the department would be required to participate in the preparation of the plan. The bill would require the department to notify the Governor, the governing boards of affected cities and counties, and county agricultural commissioners if an invasive pest on the list has entered the state, and, if the urban aerial application or communitywide ground application of a pesticide is the preferred eradication, control, or management response, to advise the Governor and provide the Governor with a copy of the plan. The department would also be required to, among other things, notify certain local governmental entities and officers, notify the public of specified health information, hold public hearings under certain circumstances, and establish a telephone hotline, if the department determines that an invasive pest has entered the state, and the urban aerial application or communitywide ground application of a pesticide is the selected response. The bill would require this act to be funded only with federal funds.

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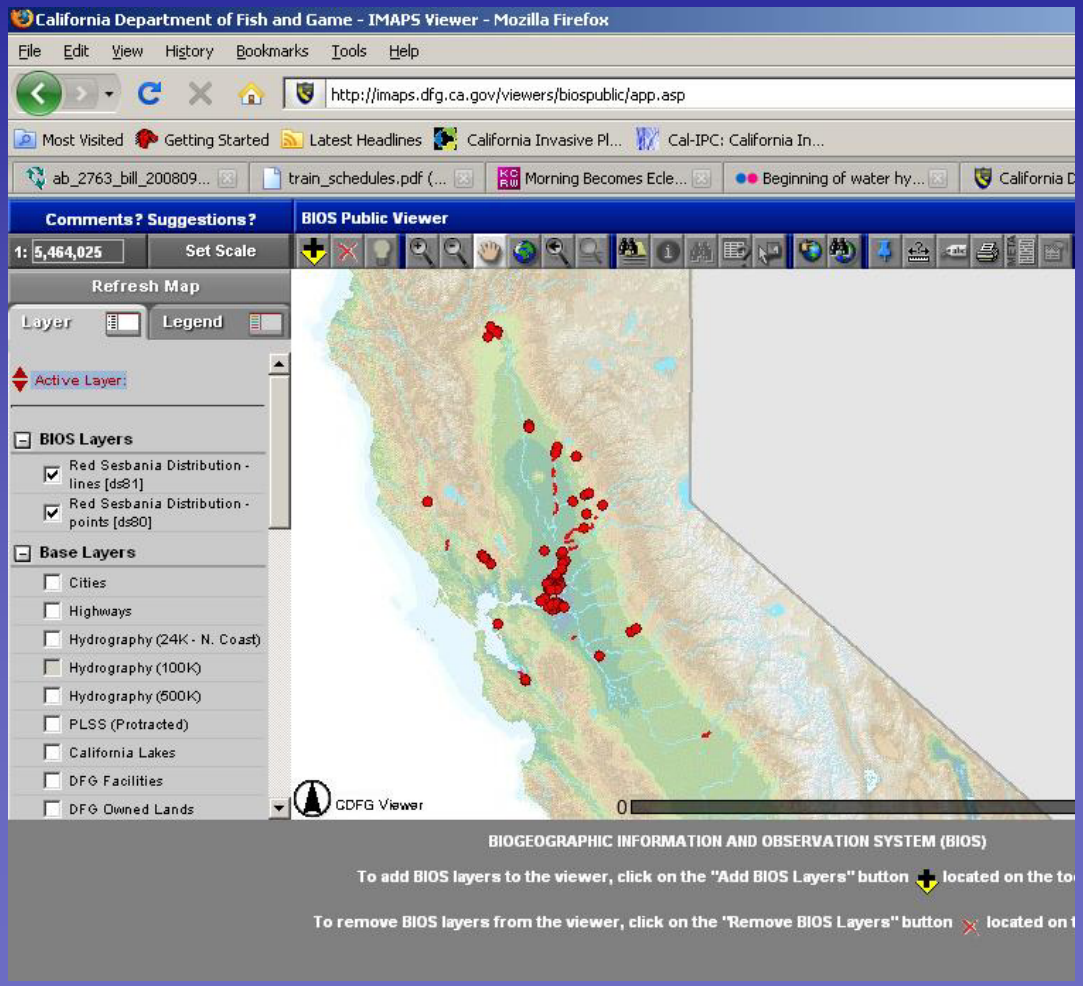
Mapping

9. **Aggregate invasive species spatial data.**



Management

10. **Undertake resource management programs for top-priority IS populations.**

Leadership & Coordination

11. Support action of the new statewide interagency Invasive Species Council and its corresponding stakeholder advisory committee.

Policy

12. Support state and federal initiatives

- **HR 669 - Nonnative Wildlife Invasion Prevention Act** to regulate import of wildlife.

Funding

13. Budget for IS

Proposed water bond acts for ~$10 B include :

- **$1.2 billion** for Delta conservation, including IS
- **$85 million** to DFG for IS
- **$1 billion** for watershed restoration statewide

Using bond funds

1. **Eradication of regional population**
   - **Regional is great, but rare or costly**
   - **Local is more common and affordable**
   - **Spatial scale depends on potential for reinfestation**
2. **Major reduction in regional population**
   - **Commitment, capacity and coordination** required to contain population at new low level after initial reduction.

Project selection

1. Effectively protect conservation targets

- Requires a model for assessing trends over time.
- Requires a system for overlaying conservation target criteria (eg UHGP)

Project selection

2. Effectively reduces IS stressor

- Comprehensive design
  - Revegetation if needed
  - Genetic and species diversity
- Adequate follow-up
  - Monitoring and ongoing maintenance
- Low risk of re-infestation
  - Low propagule pressure

Project selection

3. Learn from project

- Incorporation of long-term assessments
  - Community change over time
  - Active experiments

Conclusion

- **Addressing IS is one of the most productive actions we can take immediately to support adaptation to CC.**
- **Agencies like the SCC will play a central role at the statewide planning level and at the regional project level.**