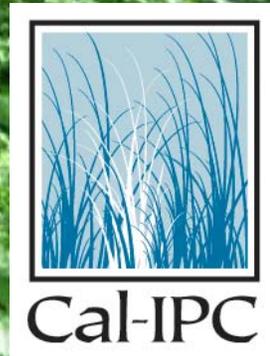


Predicting the Spread of Invasive Plants in California

Elizabeth Brusati¹, Doug Johnson¹,
and Joseph DiTomaso²

¹California Invasive Plant Council

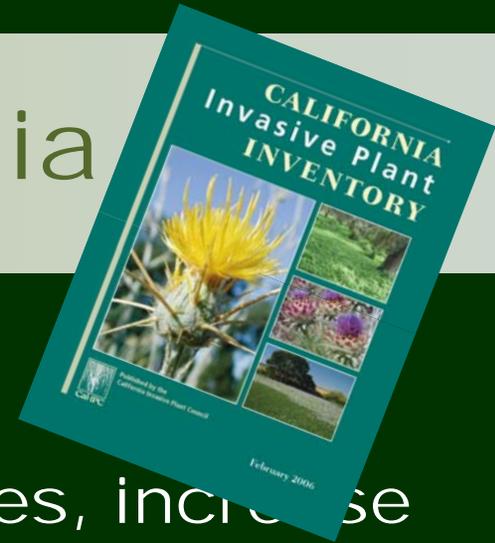
²UC Davis Weed Science Program



Invasive Plants in California

200+ plants invade wildlands

- Impacts: displace native species, increase fire, block waterways, decrease recreational opportunities...
- Predicting future spread complicated by diverse geography
- Predictive models help early detection and rapid response programs



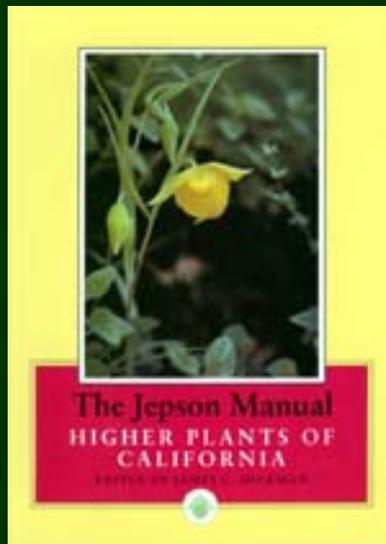
Climate change and weeds

- Distributions shift to higher elevations and higher latitudes
- Increased CO₂ → increased growth
- Increased fire → habitat type conversion
- 66% of native CA plants could lose >80% of their range (Loarie et al. 2008)

Predicting weeds' spread

1. Where are weeds now?
Survey data from Weed Management Areas
2. Where could they spread?
Models with climate change
3. What else could invade?
Weeds from other Mediterranean-type regions
- not discussed here

Data based on
counties and
floristic
regions



Map: UC Berkeley Jepson Herbarium

Where are weeds now?

Current Abundance



Low



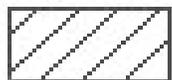
Moderate



High



Widespread



No Data

Current Spread



Increasing rapidly



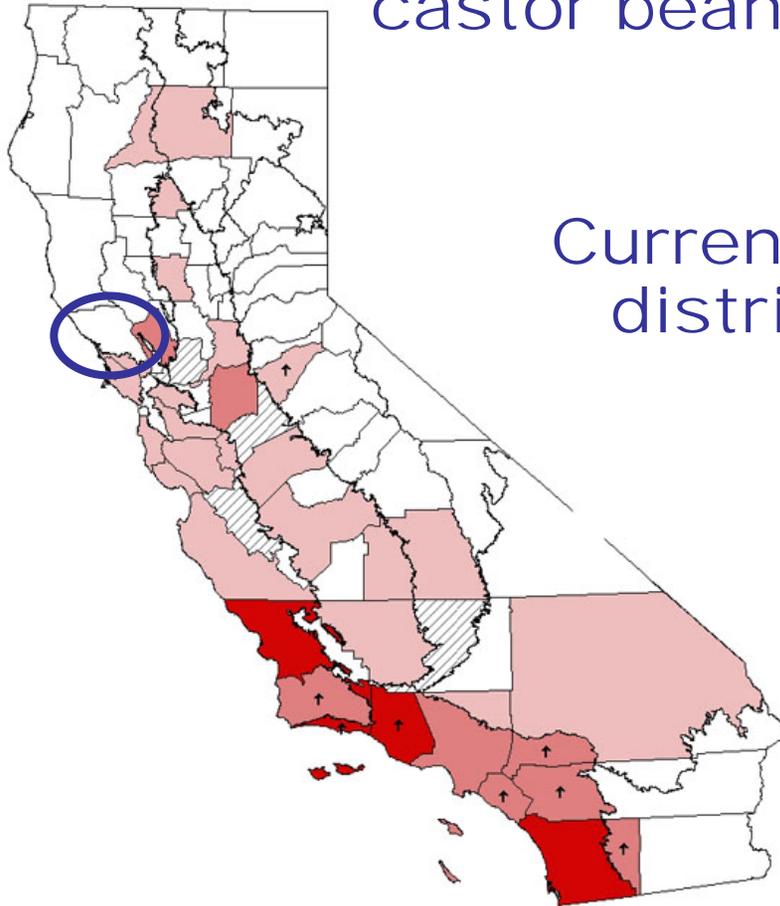
Increasing



Declining

Ricinus communis

castor bean



Where could weeds spread?

Climate is most basic determinant of where a plant can grow

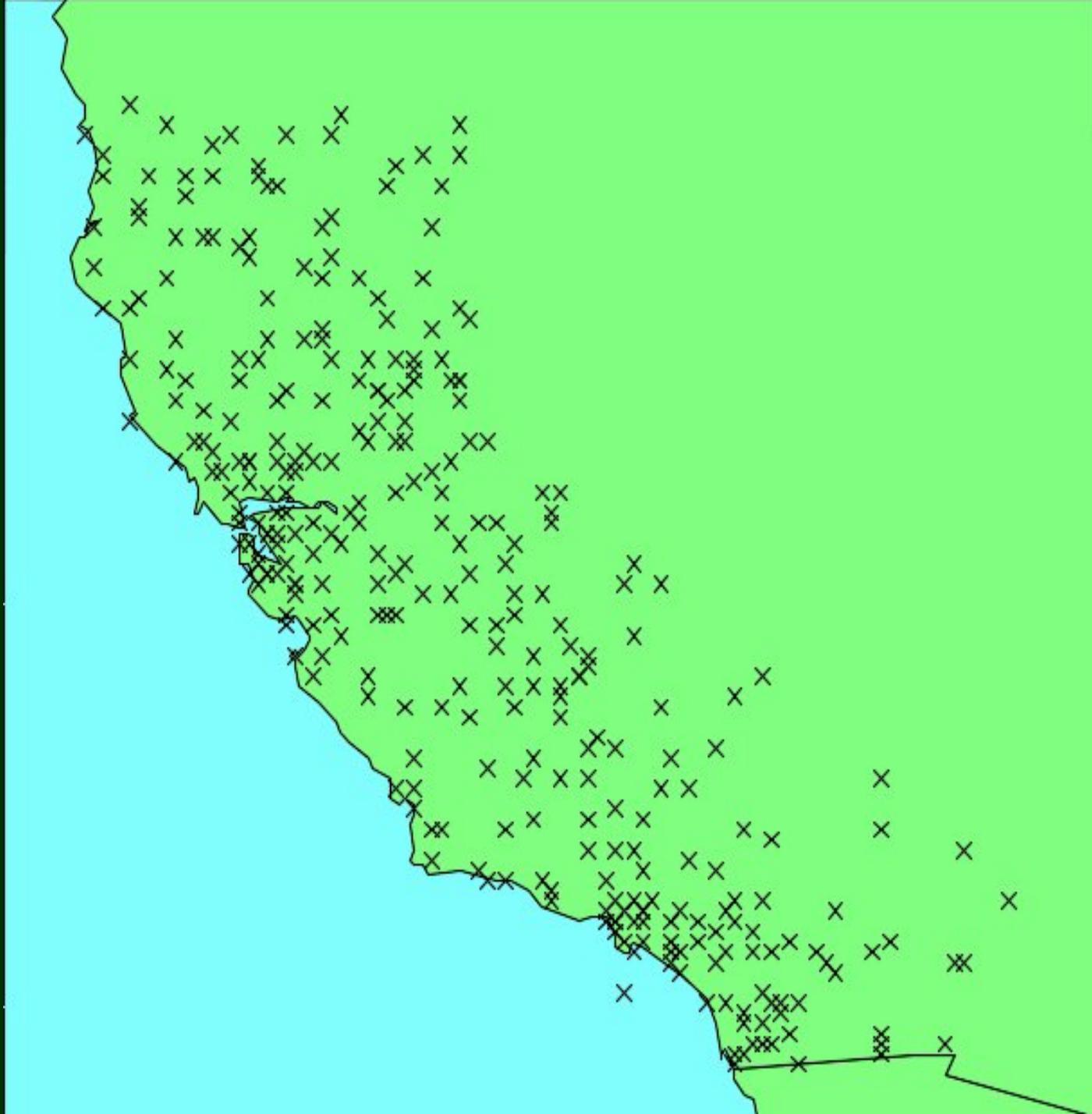
Models predict where plants can spread based on where they already grow

- Compare native and introduced ranges
- Calculate temp. and moisture tolerance

Modeling plants' spread

- 36 plants from Cal-IPC Inventory
 - **Researched native and intro ranges**
- California weather station data added into Climex software
 - **“Ecoclimatic index” 0 – 100**
- Climate change based on 3° C increase

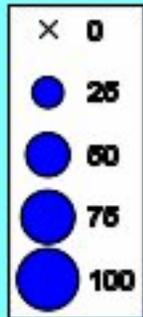
322
NOAA
weather
stations



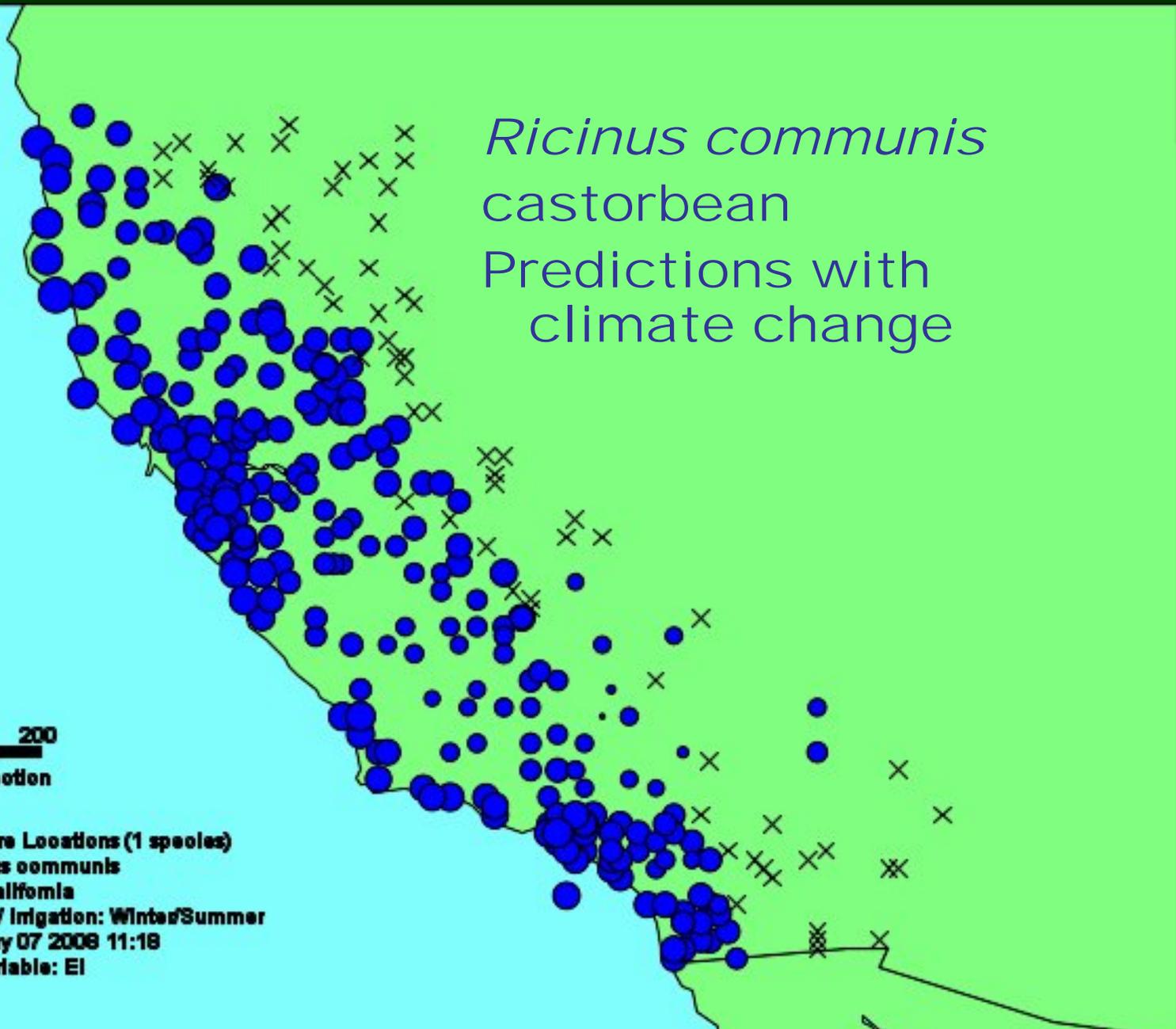
Ricinus communis
Castor bean
Predictions under
current conditions



Ricinus communis
castorbean
Predictions with
climate change



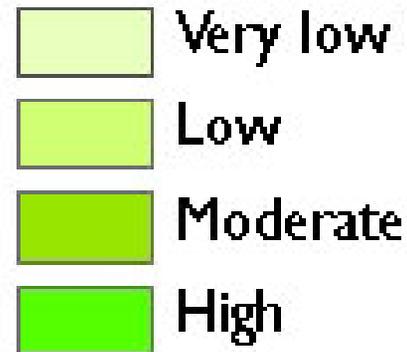
CLIMEX - Compare Locations (1 species)
Ricinus communis
California
+3 deg Temperature / Irrigation: Winter/Summer
Run on May 07 2008 11:18
Variable: EI



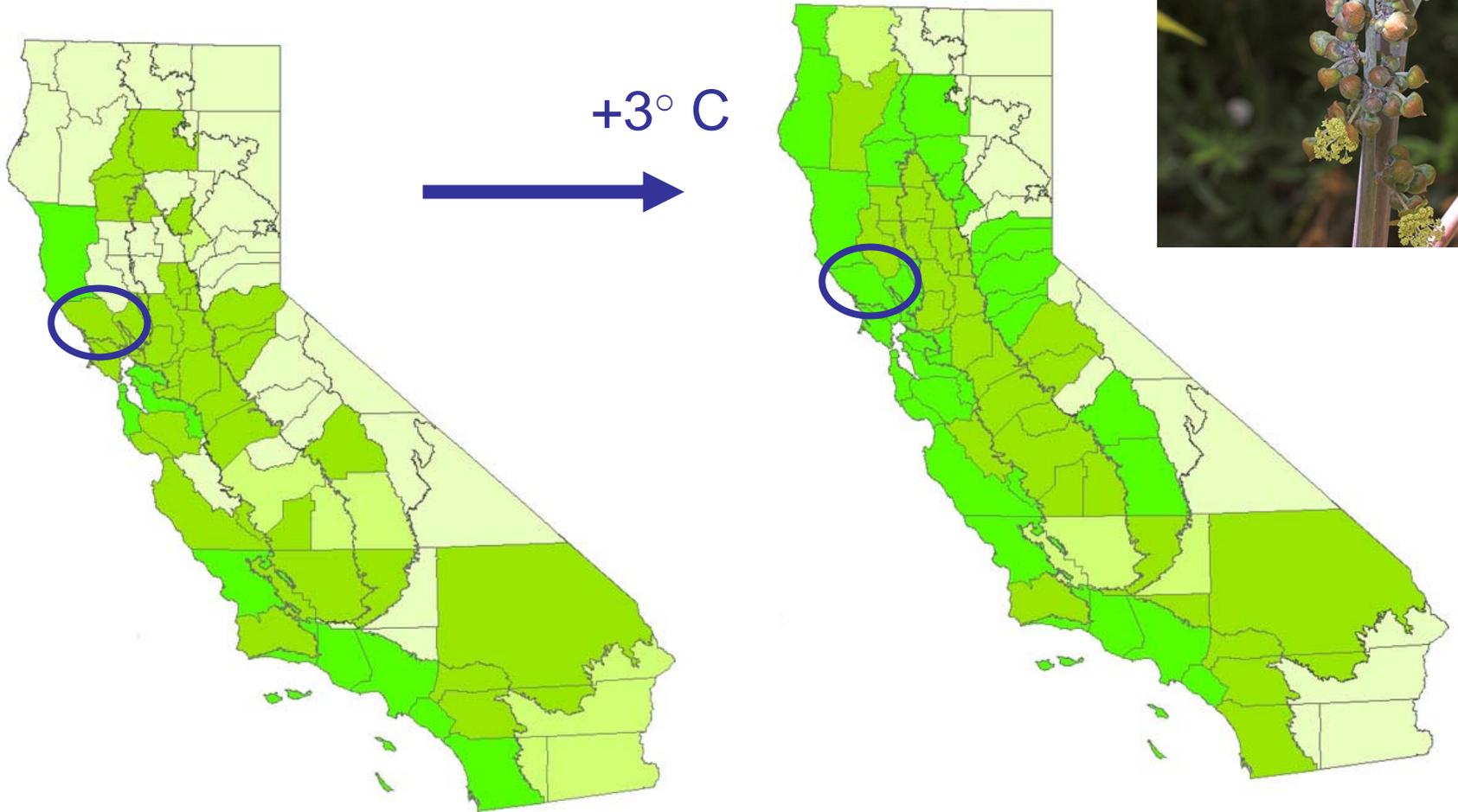
Ricinus communis castor bean



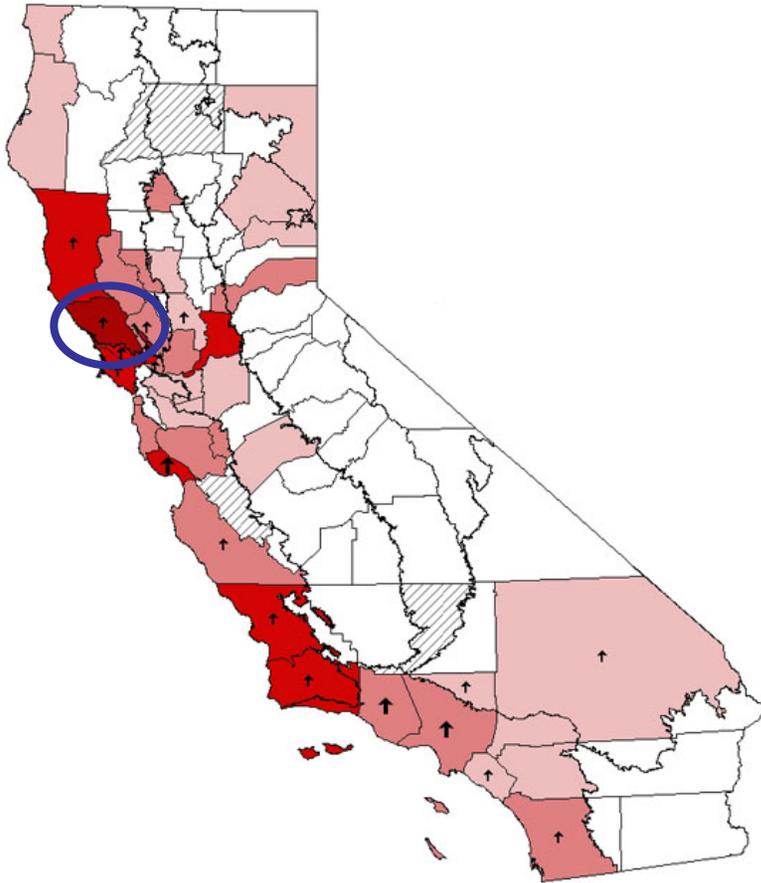
Potential Suitability



Ricinus communis castor bean



Phalaris aquatica Hardinggrass

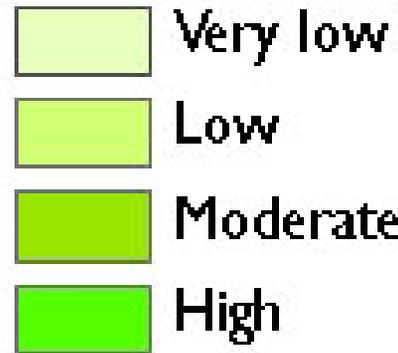


Phalaris aquatica

Hardinggrass

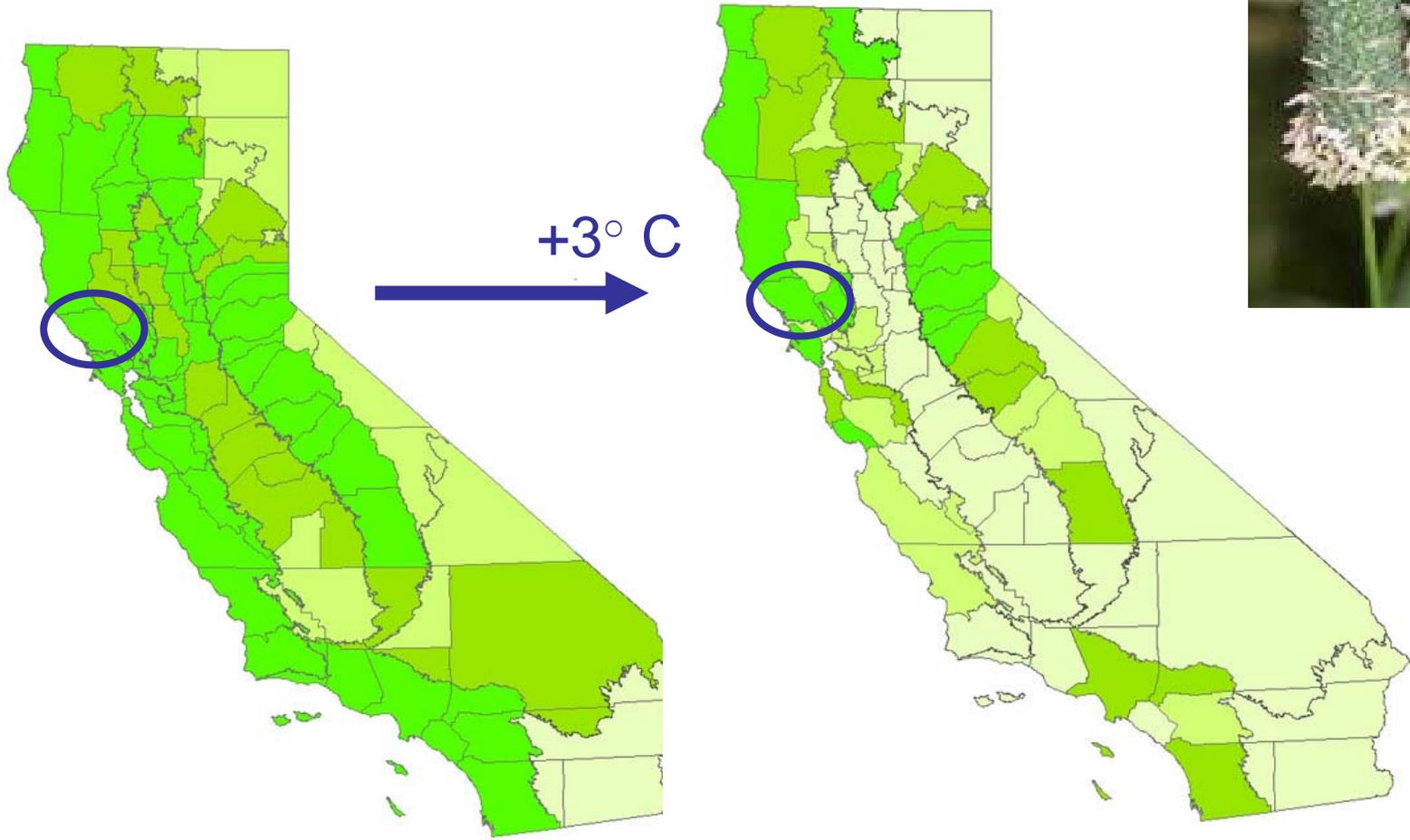


Potential Suitability

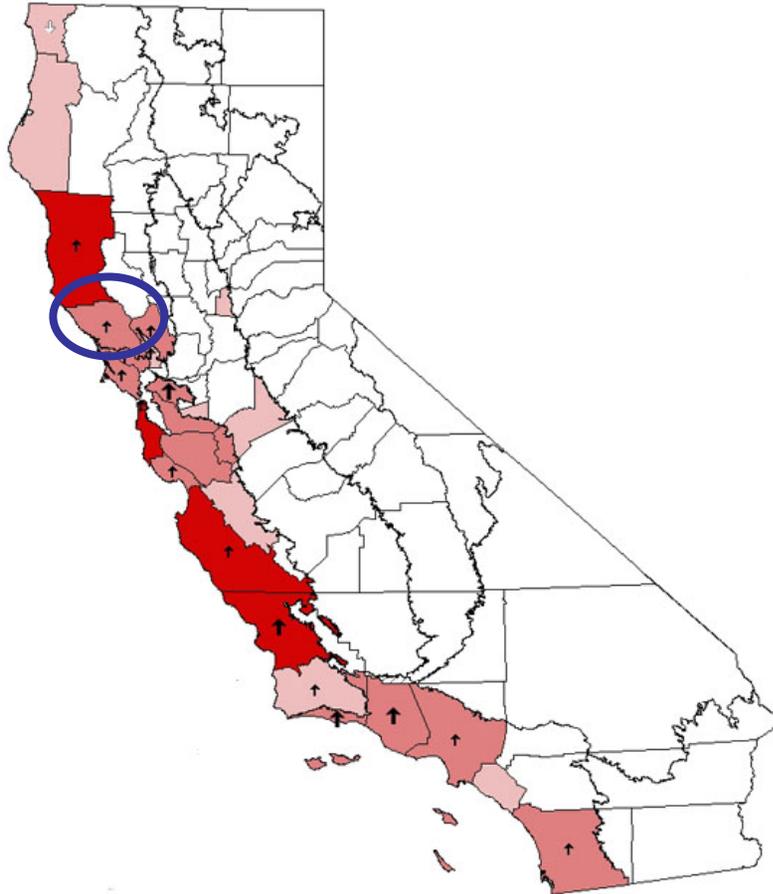


Phalaris aquatica

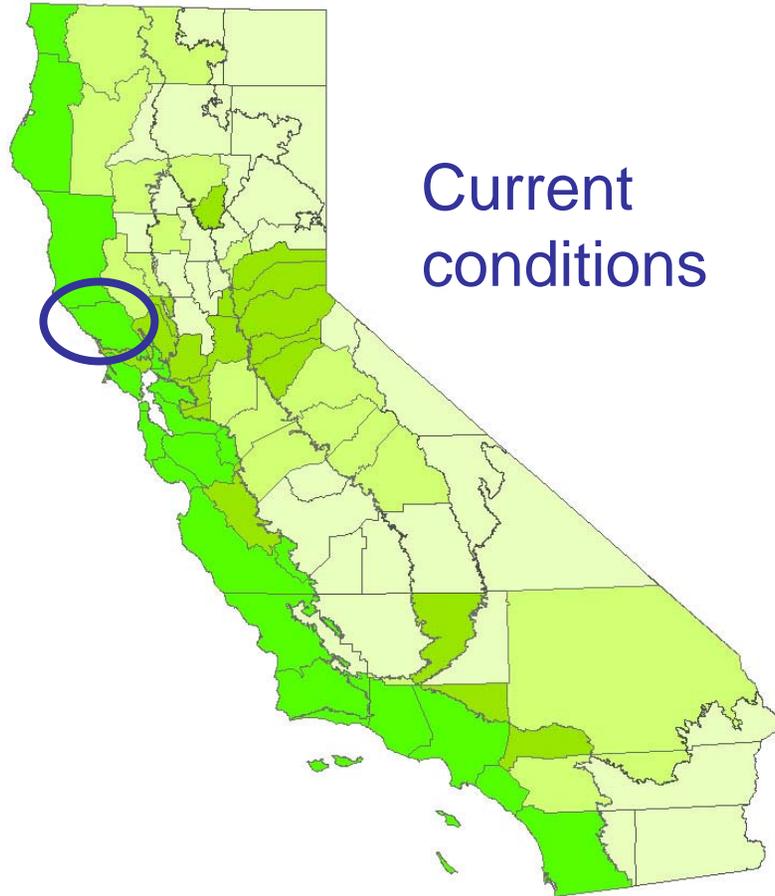
Hardinggrass



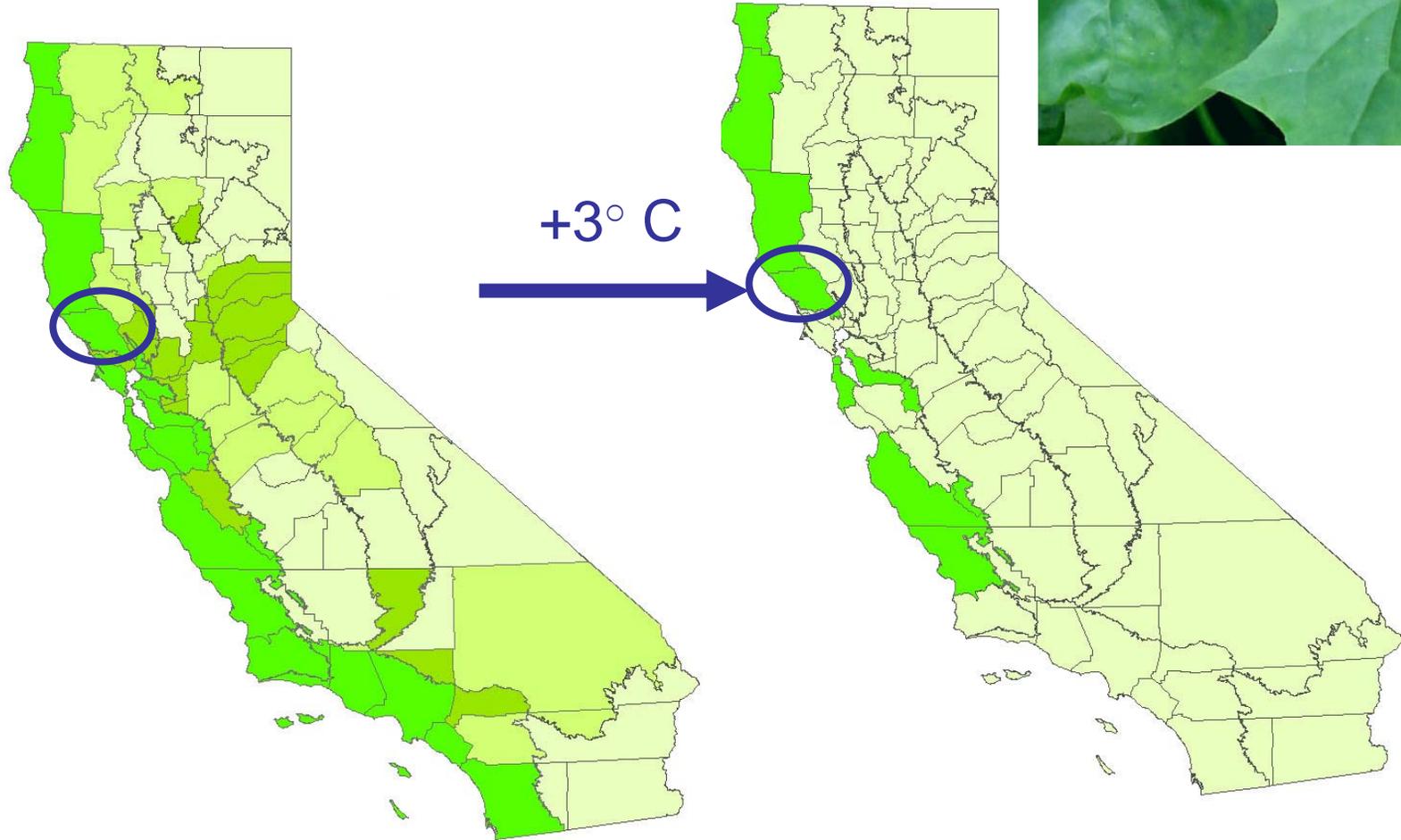
Delairea odorata Cape ivy



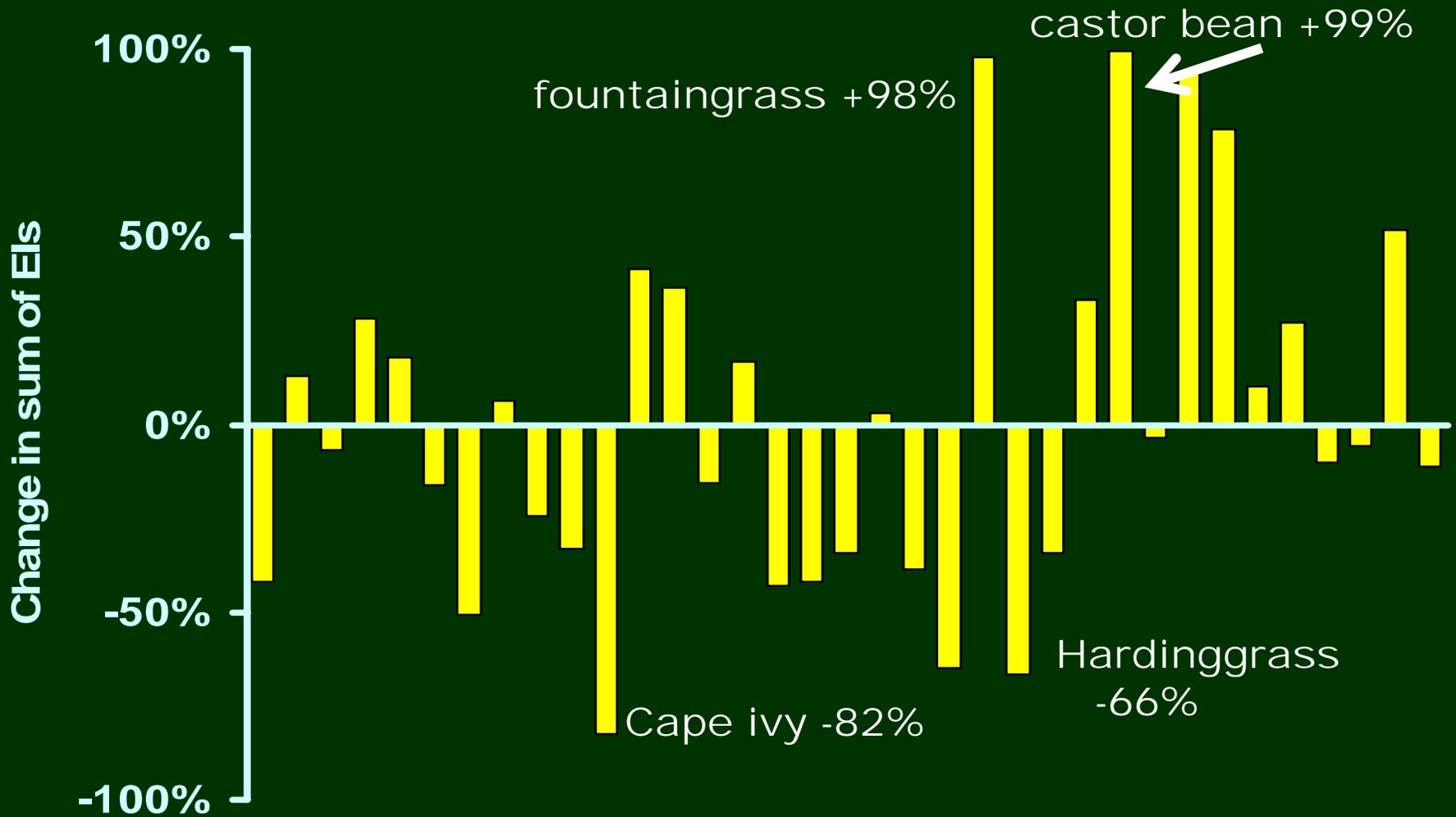
Delairea odorata Cape ivy



Delairea odorata Cape ivy



Change in climate suitability

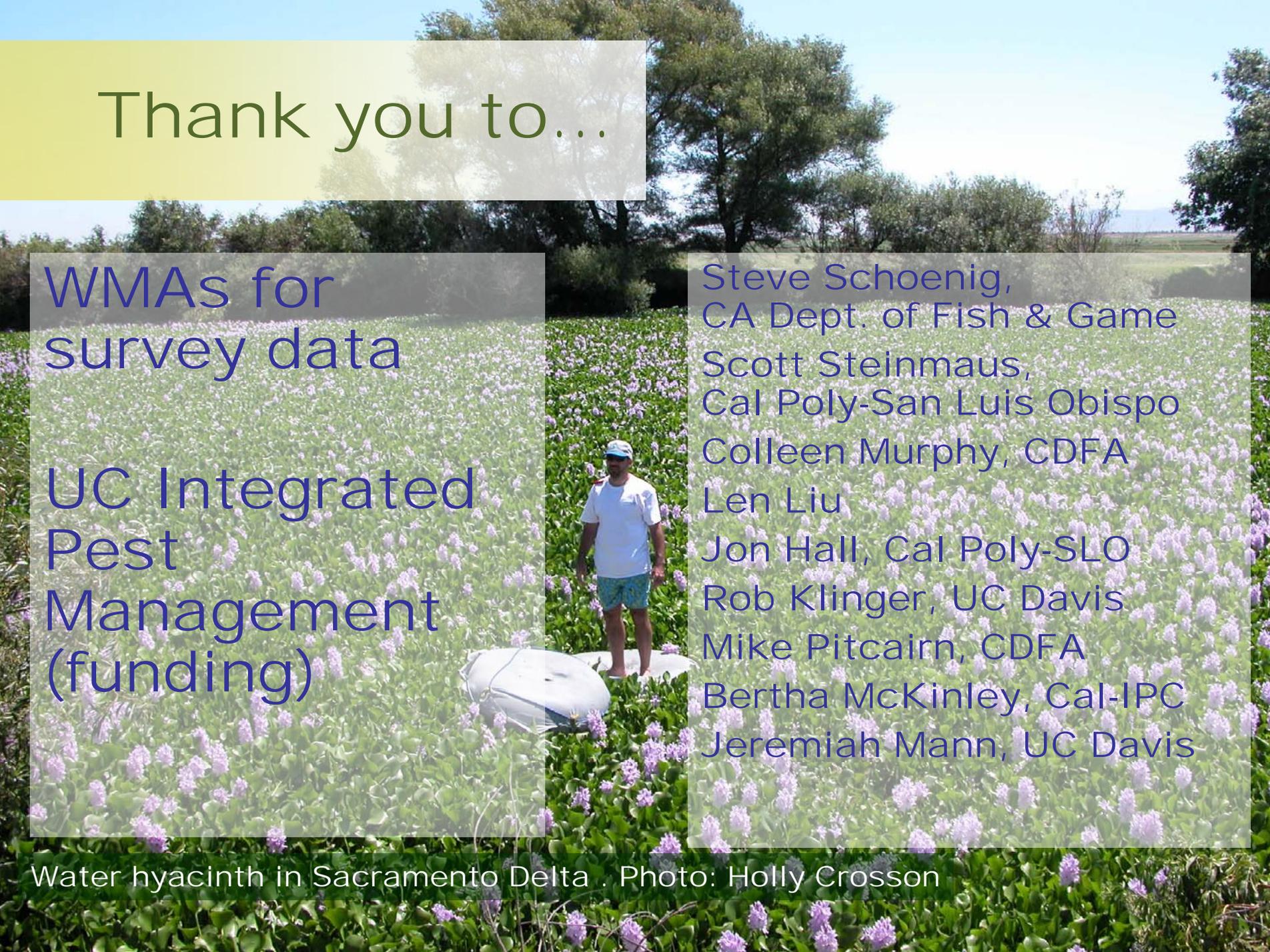


A few cautions

- Weather station data are individual points, while WMA surveys extrapolate to entire county
- Not all predicted spread is due to climate change
- Does not consider other factors
 - **Soils, competition, geographic barriers to dispersal**

Native plant conservation

- Where will a particular invasive plant compete with natives?
- What happens as native species' ranges collapse?
- What are the implications for assisted migration?

A man wearing a white t-shirt, blue shorts, and a blue cap stands in a field of water hyacinth flowers. The field is dense with green leaves and numerous small purple flowers. In the background, there are trees and a clear blue sky. A white bag or container is on the ground near the man.

Thank you to...

WMAs for
survey data

UC Integrated
Pest
Management
(funding)

Steve Schoenig,
CA Dept. of Fish & Game
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Colleen Murphy, CDFA
Len Liu
Jon Hall, Cal Poly-SLO
Rob Klinger, UC Davis
Mike Pitcairn, CDFA
Bertha McKinley, Cal-IPC
Jeremiah Mann, UC Davis

Water hyacinth in Sacramento Delta . Photo: Holly Crosson

www.cal-ipc.org

Research → Risk Assessment



California Invasive Plant Council

Cal-IPC

Protecting California's wildlands through research, restoration, and education

- About Us
- Invasive Plants
 - Definitions & Impacts
 - California Inventory
 - Management
 - Research**
 - Mapping & Early Detection
- Symposium
- Field Courses
- Public & Advocacy

Across California, invasive plants damage wildlands. Invasive plants displace native plants and wildlife, increase wildfire and flood danger, consume valuable water, degrade recreational opportunities, and destroy productive range and timber lands. Cal-IPC works with land managers, researchers, policy makers, and concerned citizens to protect the state from invasive plants. [More info...](#)

Quick Links

- Plant Profiles** - Information on CA's invasive plants...
- Don't Plant a Pest!** - For wildland-safe landscaping...
- Membership** - Join, renew or donate...
- Store** - Books, brochures, reports and more...

New at Cal-IPC.org...

- **Cal-IPC 2008 Symposium:** October 2-4 in Chico. Register now! (Sign up by September 5 to receive the Early Registration discount.) [More info...](#)
- **Symposium Photo Exhibit:** Submit entries by September 1. [Read instructions \(pdf\)...](#)

