GIS-Pro 2012
URISA's 50th Annual Conference for GIS Professionals
#gispro

CalWeedMapper

Mapping the Spread of Invasive Plant Species

Karsten Vennemann

TERRA GIS
TERRESTRIAL ENVIRONMENT REGIONAL ANALYSIS

Seattle

- The CalWeedMapper Project

  this presentation is about these 2 parts:
  - expert online editing tool and
  - the follow-up public tool
- Approach
  - Organizational
  - Technical Tools ⇨ design
- Technical make-up: online tools

CalWeedMapper

- Project by CAL-IPC

  „map the spread to stop the spread“

- Multiple (non-profit) Partners

  CALIPC, CALFLORA, BAEDN,
  Sonoma Ecology Center

- Funding

  American Reinvestment and Recovery Act (ARRA)
  and others…
  USDA Forest Service, State and Private Forestry Program, California Department of Food & Agriculture, National Fish and Wildlife, Resources Legacy Fund, Richard and Rhoda Goldman Fund

California Invasive Plant Council

Cal-IPC

Protecting California's wildlands through science, education, and policy

CALIPC - a non profit with the goal to protect California's wildlands

Calflora

information on **wild California plants** for conservation, education, and appreciati

1700 Shattuck Ave. #198, Berkeley, CA 94709 • 510 528-5426 • Send Us Email

Bay Area Early Detection Network

B.A.E.D.N.

Revolutionizing invasive plant management in the San Francisco Bay Area

SONOMA ECOLOGY CENTER

SONOMA ECOLOGY CENTER

Internal Tool Approach

- Organizational
- Technical tools ⇨ design
- Goal: data collection

Data collection efforts

- schedule field staff for interviews

  edit sessions with plant species experts
- reference USGS mapping quad

  boundaries
- 200 plant species (4 priority levels)
- many to many relationships

  over time many records per species / quad combination
- supported by online tools

California Weed Management Areas (WMA)

California Department of Food and Agriculture

Interview partners

mostly biologists & land managers

NPS, USFS, BLM, Military

US Fish and Wild Life Service

Caltrans

Agriculture Departments

CA Fish & Game

Cattlemen associations & some tribes

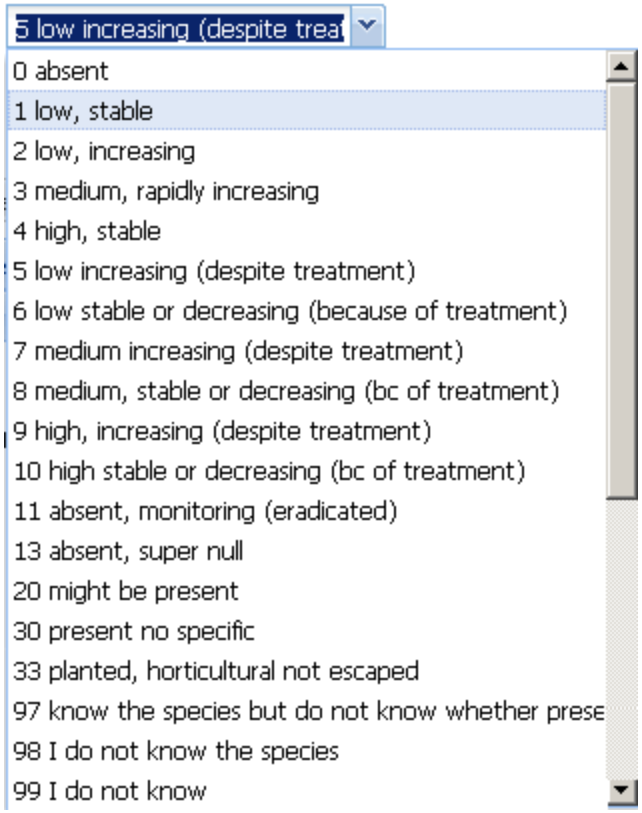
University of California University Extension

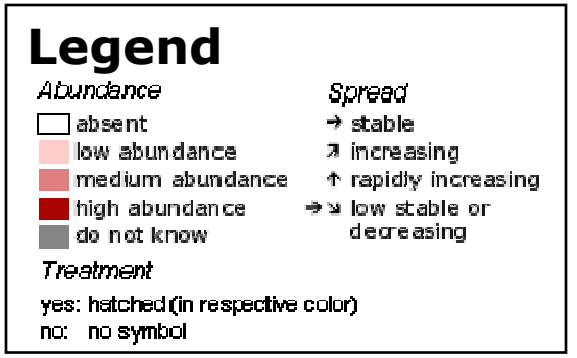
some private contractors working for these orgs

Workflow data entry

- Define work area
  (pre-selection)
- Enter session information
- Enter species information :
  observation values
- Records are saved in
  PostGIS database
- Session submitted

- **Map Layer is updated according to priorities**
  -> multiple options





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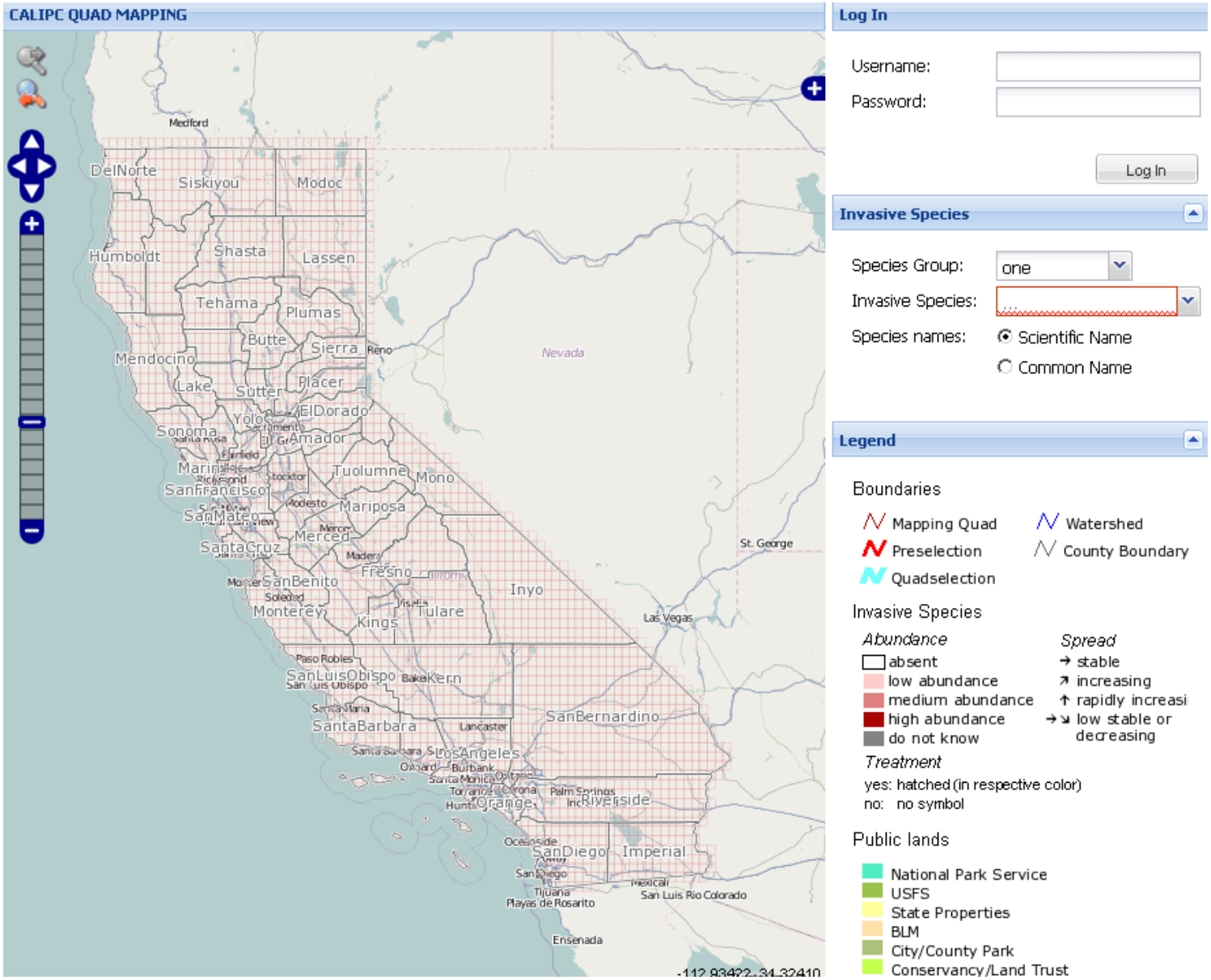
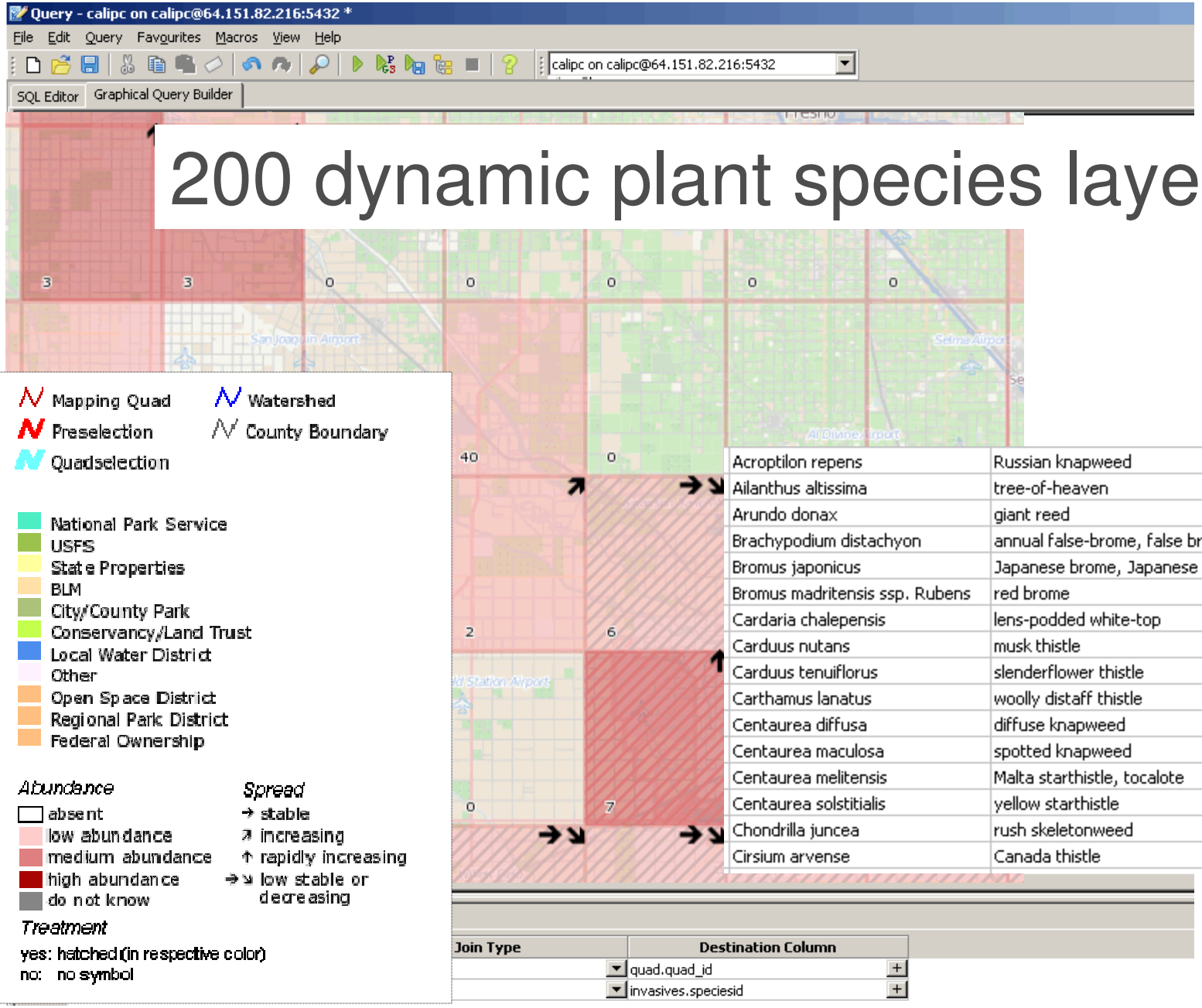
Internal CalWeedMapper Online Tool

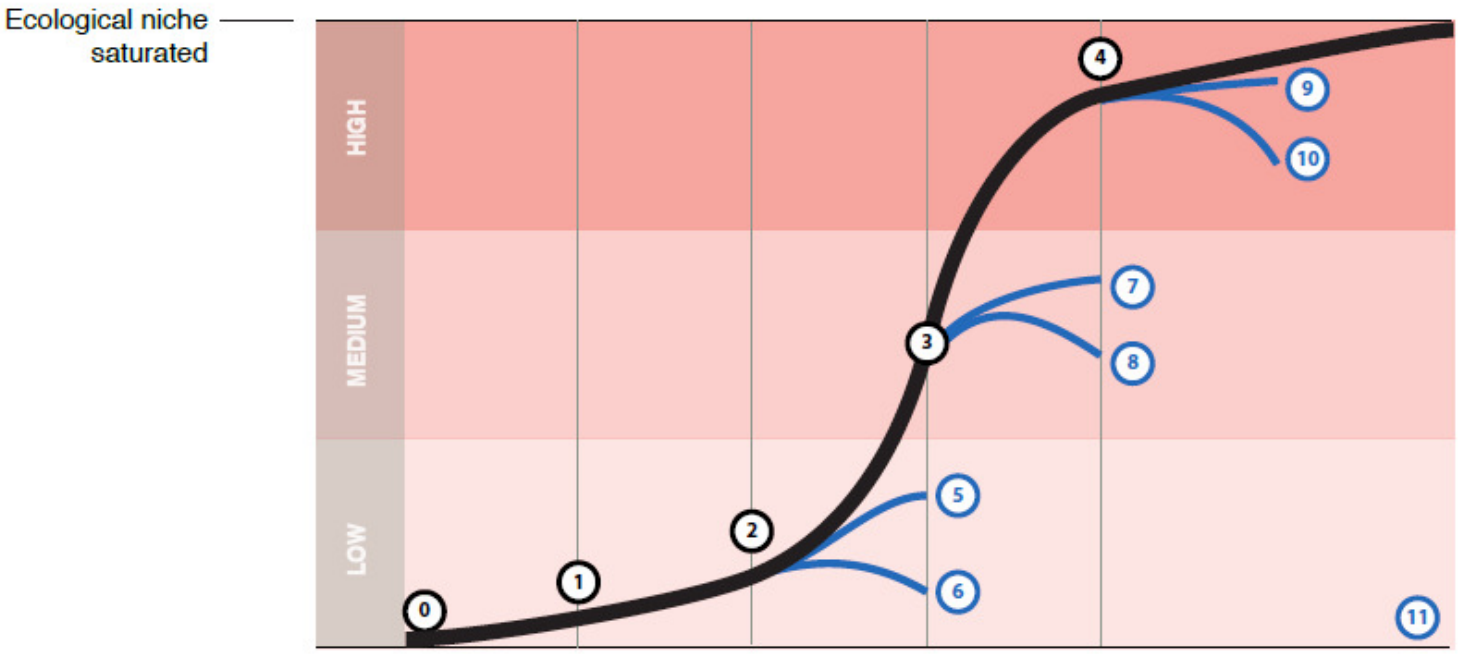


200 dynamic plant species layers



Qualitative Data Collection Tool

Source: CALIPC 2011/2012



No management
Below descriptions are for abundance, spread

- 0 Suspected absent
- 1 Low, stable
- 2 Low, increasing
- 3 Medium, increasing rapidly (doubling in ten years)
- 4 High, stable (saturated ecological niche)

Under management
Below descriptions are for abundance, spread

- 5 Low, increasing
- 6 Low, stable or decreasing
- 7 Medium, increasing
- 8 Medium, stable or decreasing
- 9 High, increasing
- 10 High, stable or decreasing
- 11 Absent, monitoring (species eradicated)

Other

- 20 Suspect that it is present
- 30 Present, no specific information

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CalWeedMapper BETA

public web site

Map the Spread

CalWeedMapper provides a dynamic tool for mapping inva plant distribution at the landsc level using expert knowledge. Learn more about how to use maps >>

Submit Spatial Data

Contribute your GIS or observ data to Calflora for plant occurrences. Learn more abo submitting spatial data and ho our systems work together >>

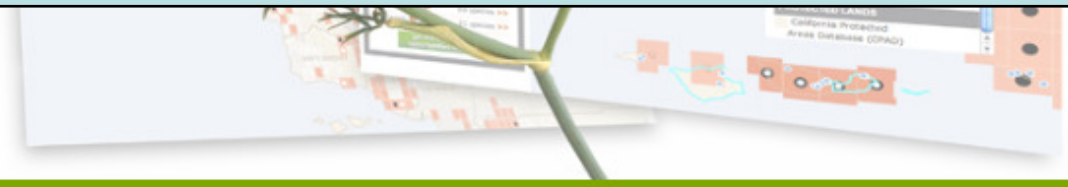
News and Events

- Planning regional strategy CalWeedMapper
- Interested in an online trai on CalWeedMapper?
- 21rst Annual Cal-IPC Symposium

Goals

- involve public in data collection
- make results available to experts and the public

⇨ weed management recommendations



CalWeedMapper

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BETA

basic | advanced

SEARCH BY COMMON NAME

SEARCH BY SCIENTIFIC NAME

indicates suitable range map is available in advanced mode

Photo courtesy of David Chang

***Acroptilon repens* (Russian knapweed)**

Cal-IPC Rating: **Moderate**

Other Ratings: **CDFA B, BAEDN**

species description

Get Species Map Report

CREATE A REPORT | LEGEND

base map

GLENN | BUTTE | SIERRA | MENDOCINO | LAKE | SUTTER | YOLO | SONOMA | NAPA | SOLANO | MARIN | SAN FRANCISCO | SAN MATEO | SANTA CLARA

Create reports by region or by species for your planning.

Explore the map by selecting a species and a county. Use the map to identify management opportunities based on current distribution.

Use **Advanced Mode** to customize maps, view occurrence observations, explore suitable range and climate change, and update quad data.

Close

100 km
50 mi

-121.50034, 36.12953

Mapping Invasive Plant Species

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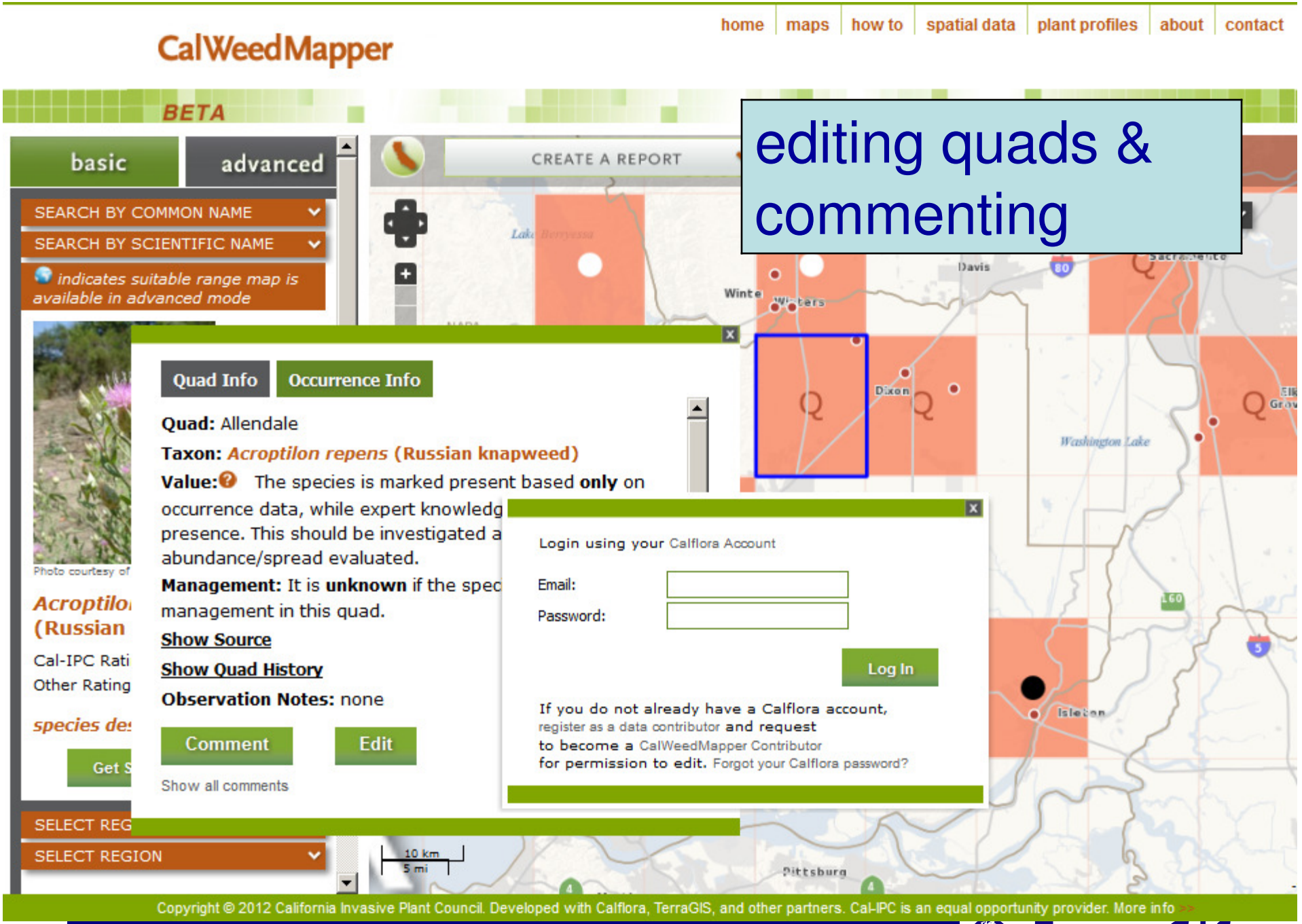
Weed Management Recommendations

Picture source: CALIPC March 2011 Prioritizing Regional Response to Invasive Plants in the Sierra Nevada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SEARCH BY COMMON NAME
SEARCH BY SCIENTIFIC NAME
indicates suitable range map is available in advanced mode
CREATE A REPORT
editing quads & commenting
Quad Info
Occurrence Info
Quad: Allendale
Taxon: Acroptilon repens (Russian knapweed)
Value: The species is marked present based only on
occurrence data, while expert knowledg
presence. This should be investigated a
abundance/spread evaluated.
Management: It is unknown if the spec
management in this quad.
Show Source
Show Quad History
Observation Notes: none
Comment
Edit
Show all comments
Photo courtesy of
Acroptilo
(Russian
Cal-IPC Rati
Other Rating
species des
Get S
Login using your Calflora Account
Email:
Password:
Log In
If you do not already have a Calflora account,
register as a data contributor and request
to become a CalWeedMapper Contributor
for permission to edit. Forgot your Calflora password?
SELECT REG
SELECT REGION
Davis
Dixon
Washington Lake
Pittsburg
10 km
5 mi
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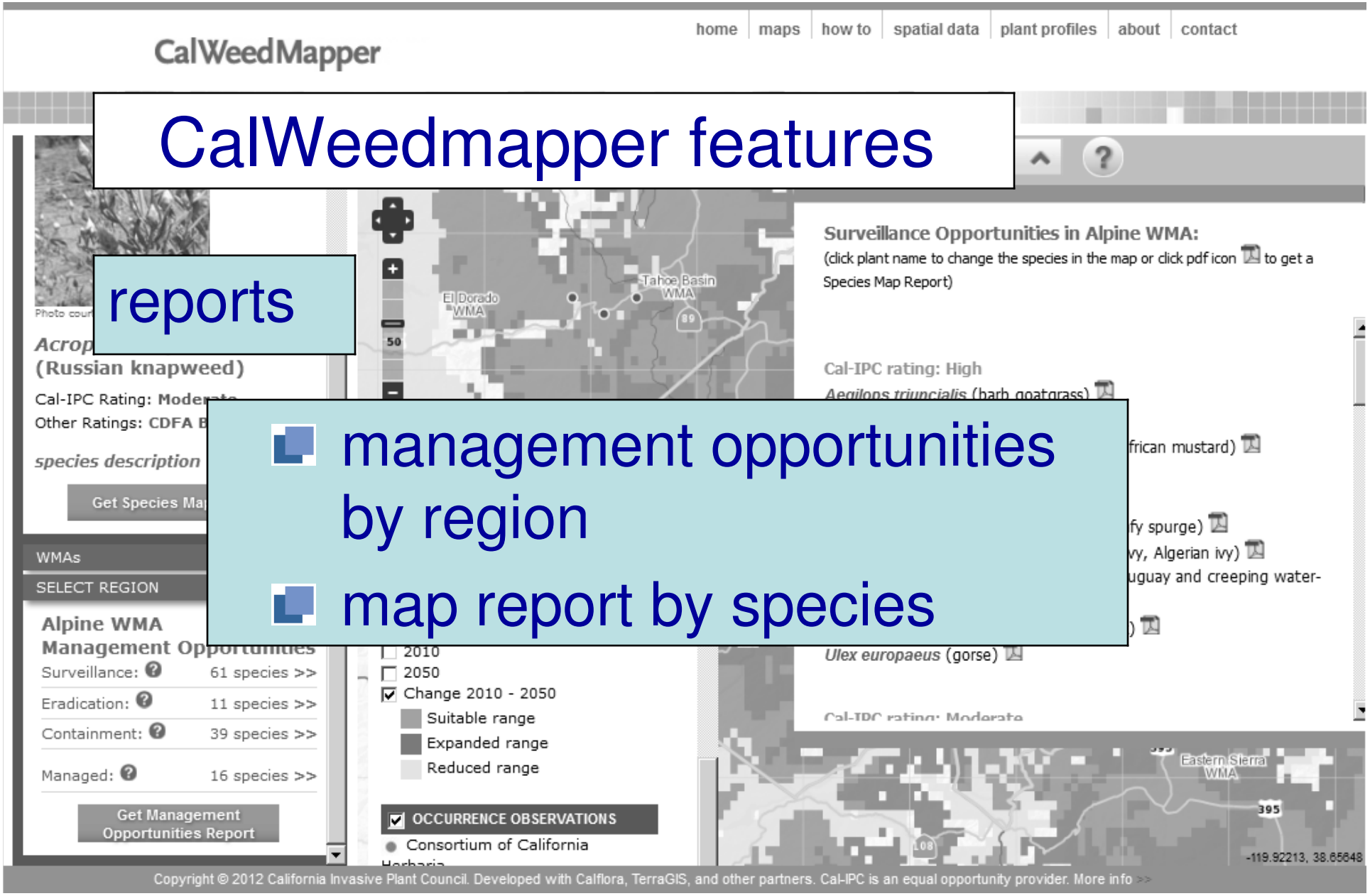
CalWeedmapper features



reports

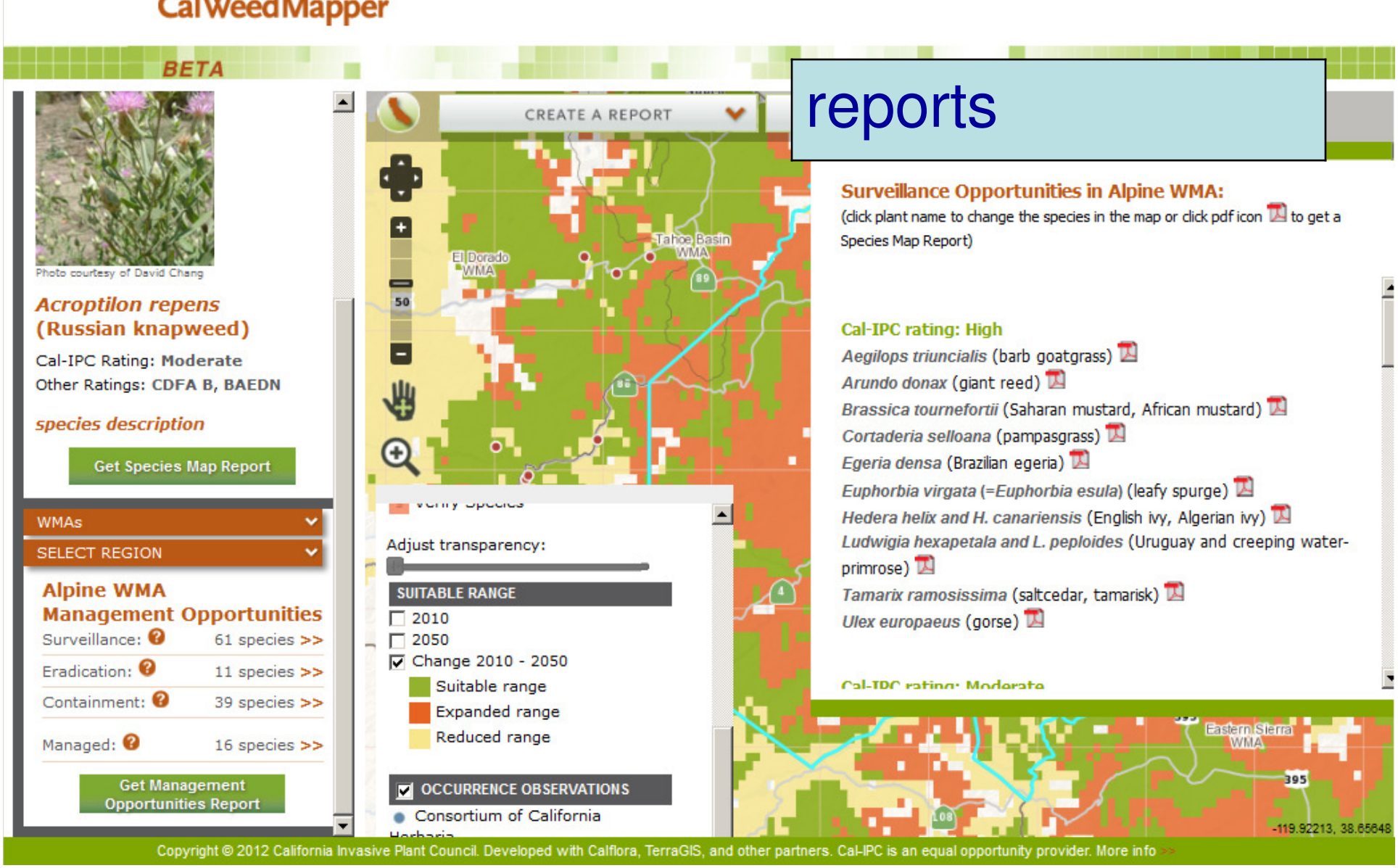

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Photo courtesy of David Chang
Acroptilon repens
(Russian knapweed)
Cal-IPC Rating: Moderate
Other Ratings: CDFA B, BAEDN
species description
Get Species Map Report
WMAs
SELECT REGION
Alpine WMA
Management Opportunities
Surveillance: 61 species >>
Eradication: 11 species >>
Containment: 39 species >>
Managed: 16 species >>
Get Management Opportunities Report
CREATE A REPORT
El Dorado WMA
Tahoe Basin WMA
Adjust transparency:
SUITABLE RANGE
2010
2050
Change 2010 - 2050
Suitable range
Expanded range
Reduced range
OCCURRENCE OBSERVATIONS
Consortium of California
Surveillance Opportunities in Alpine WMA:
(click plant name to change the species in the map or click pdf icon to get a Species Map Report)
Cal-IPC rating: High
Aegilops triuncialis (barb goatgrass)
Arundo donax (giant reed)
Brassica tournefortii (Saharan mustard, African mustard)
Cortaderia selloana (pampasgrass)
Egeria densa (Brazilian egeria)
Euphorbia virgata (=Euphorbia esula) (leafy spurge)
Hedera helix and H. canariensis (English ivy, Algerian ivy)
Ludwigia hexapetala and L. peploides (Uruguay and creeping water-primrose)
Tamarix ramosissima (saltcedar, tamarisk)
Ulex europaeus (gorse)
Cal-IPC rating: Moderate
Eastern Sierra WMA
-119.92213, 38.65648
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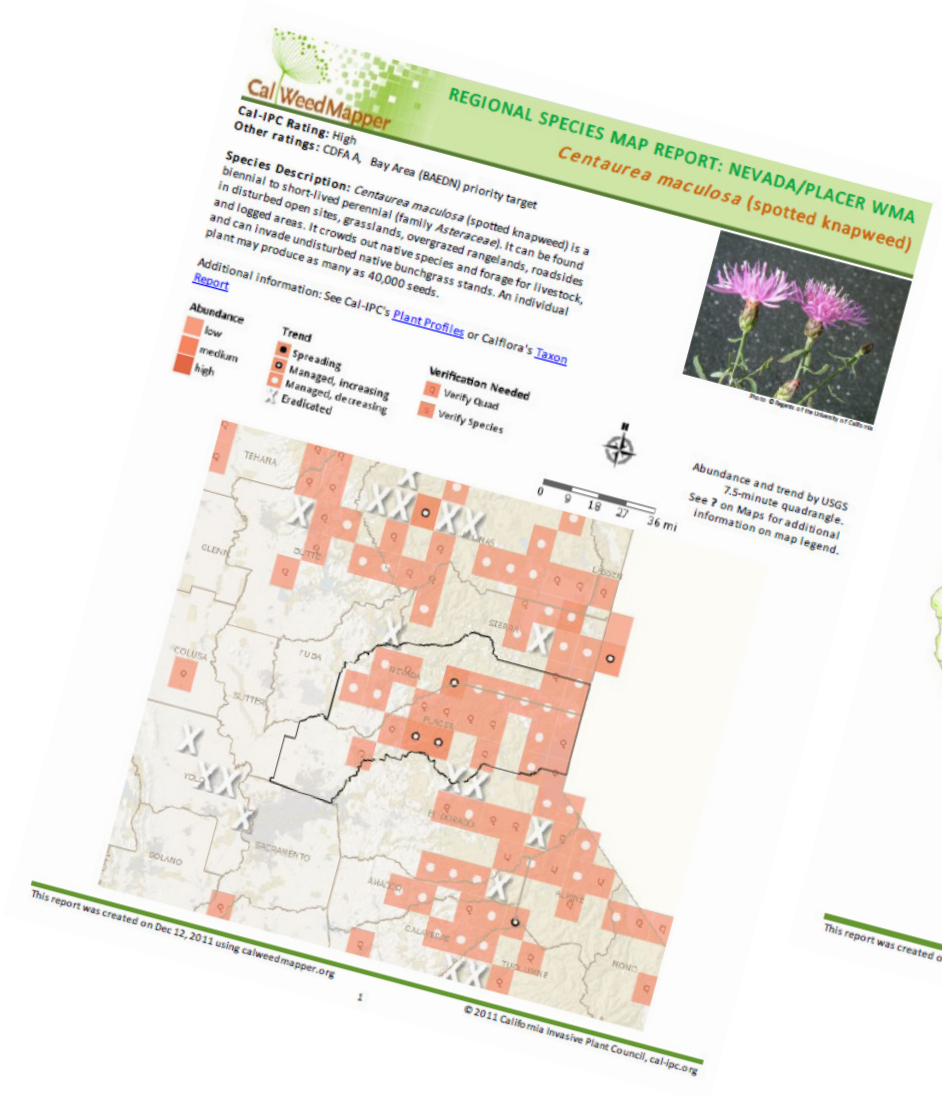
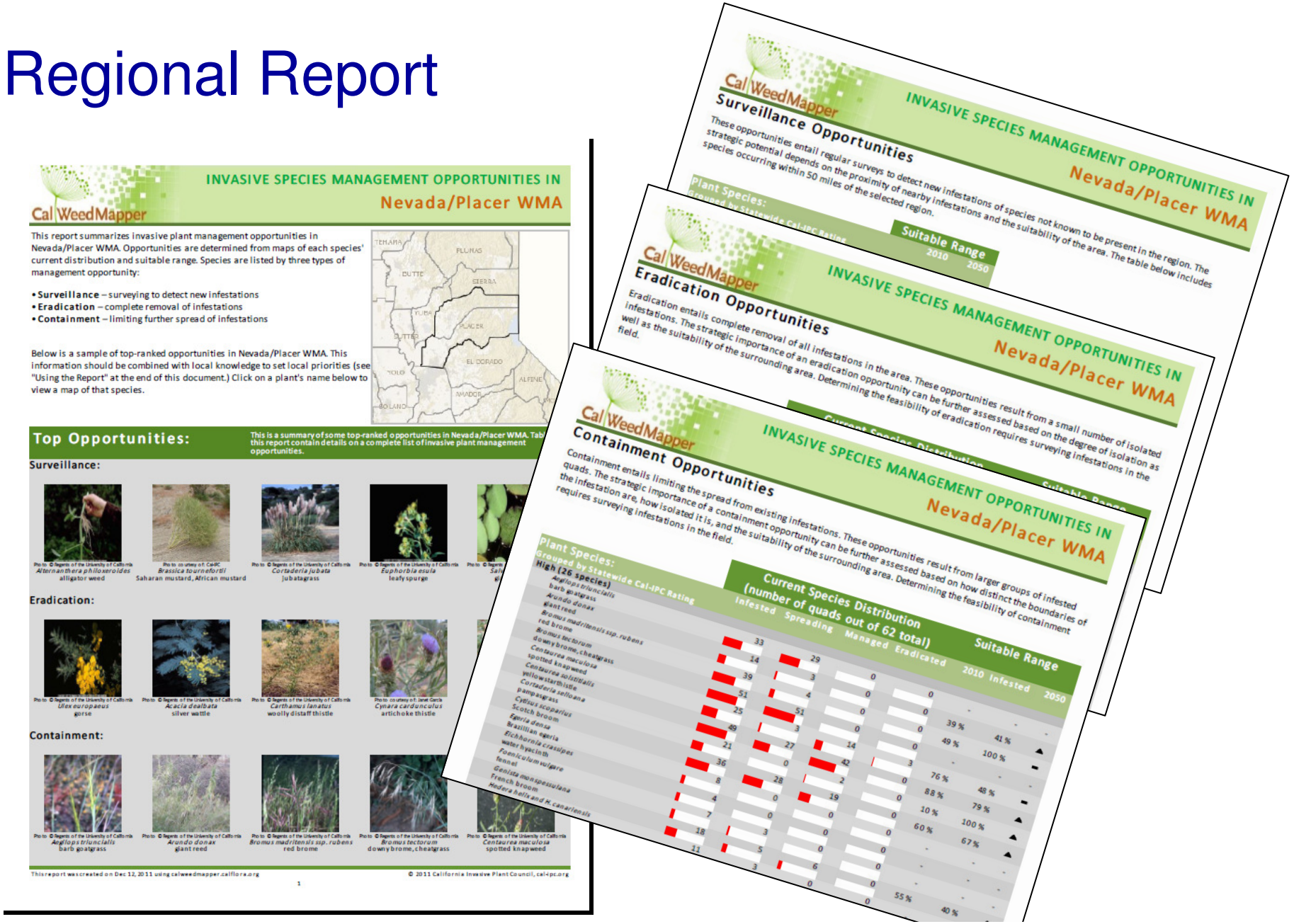
Regional Species Map Report



Source: Cynthia Powell, CALIPC 2012, Introducing CalWeedMapper! Slides

Regional Report



Mapping Invasive Plant Species

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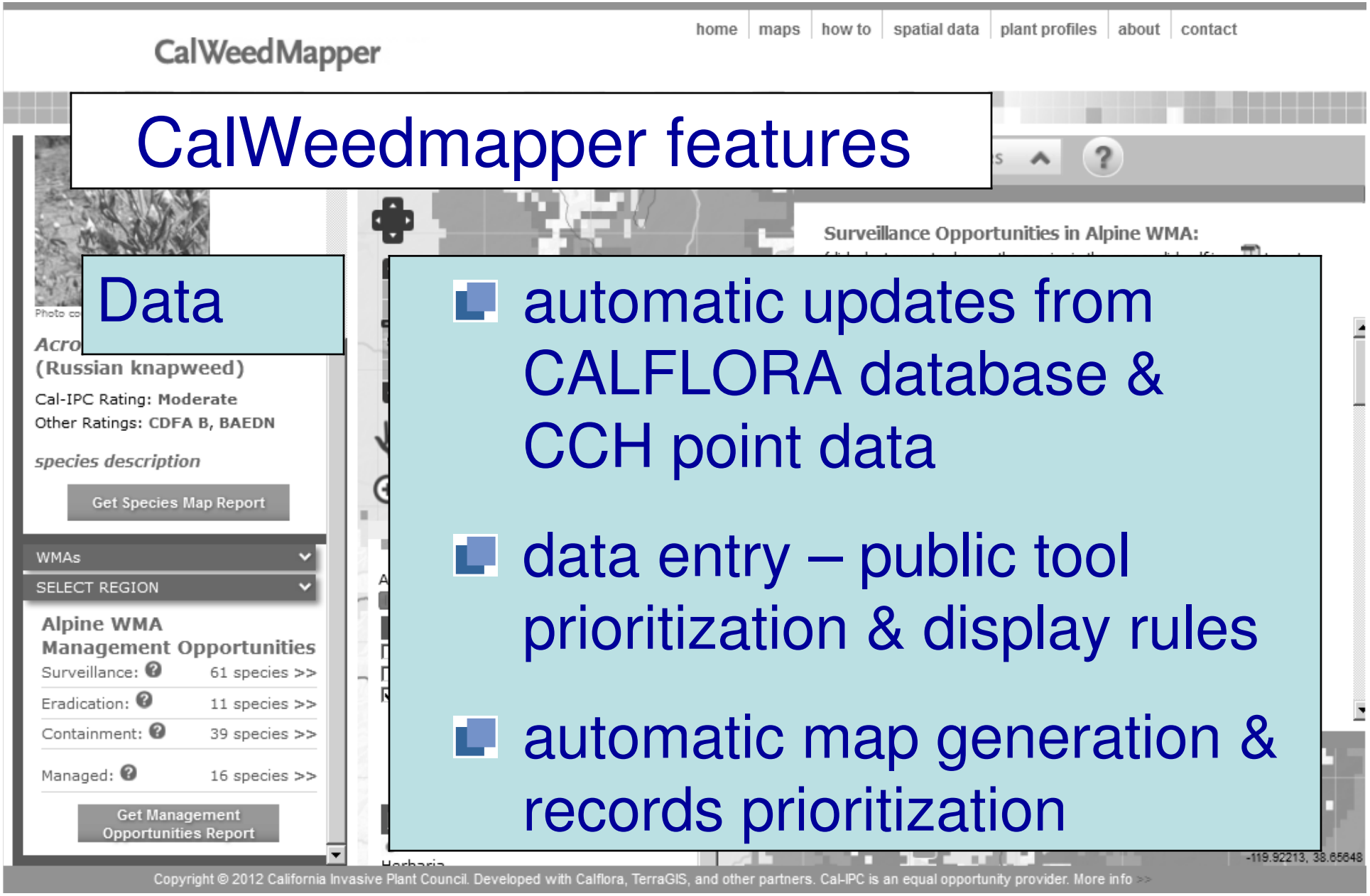
CalWeedmapper features

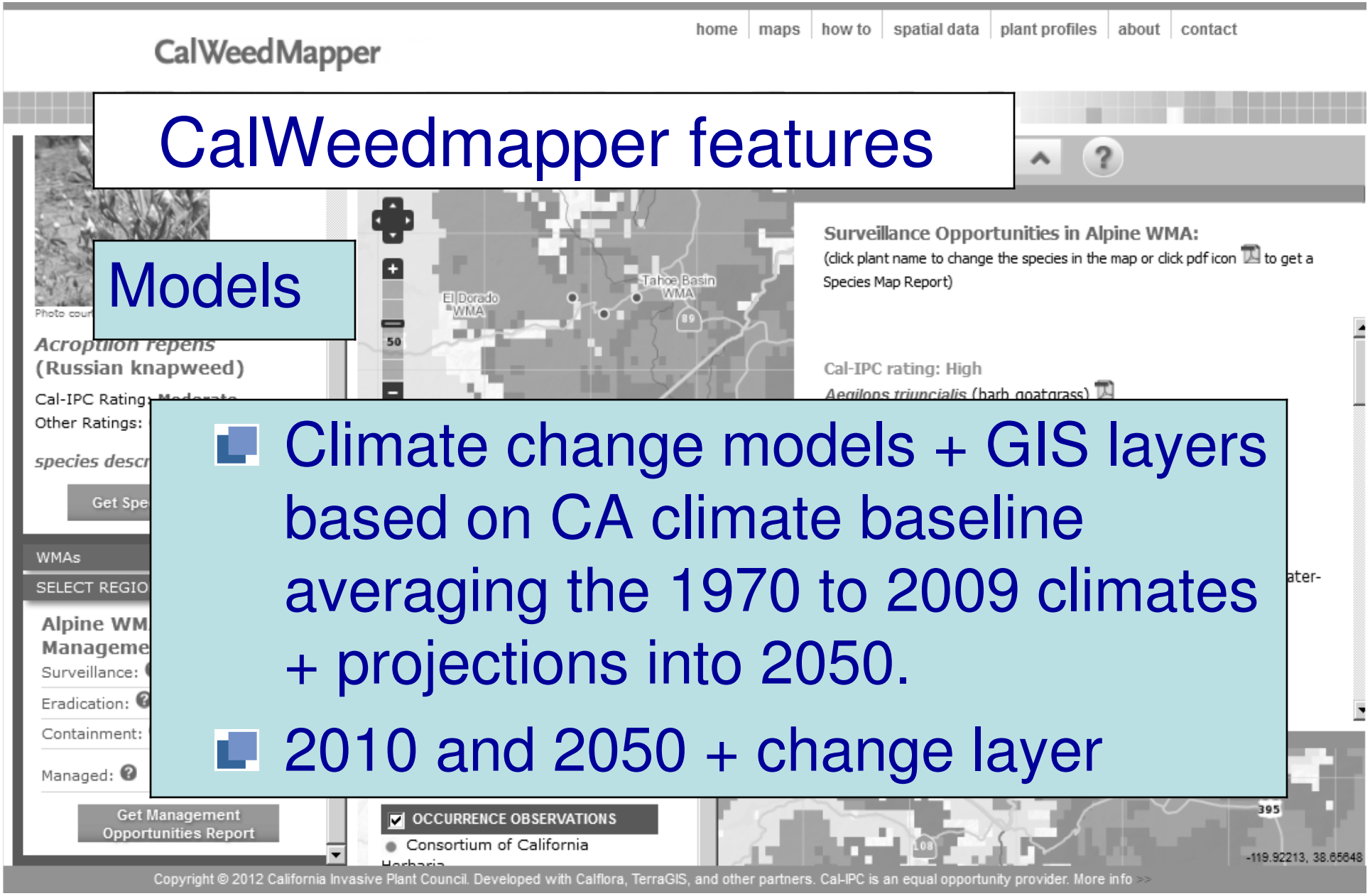


Data

- automatic updates from CALFLORA database & CCH point data
- data entry – public tool prioritization & display rules
- automatic map generation & records prioritization

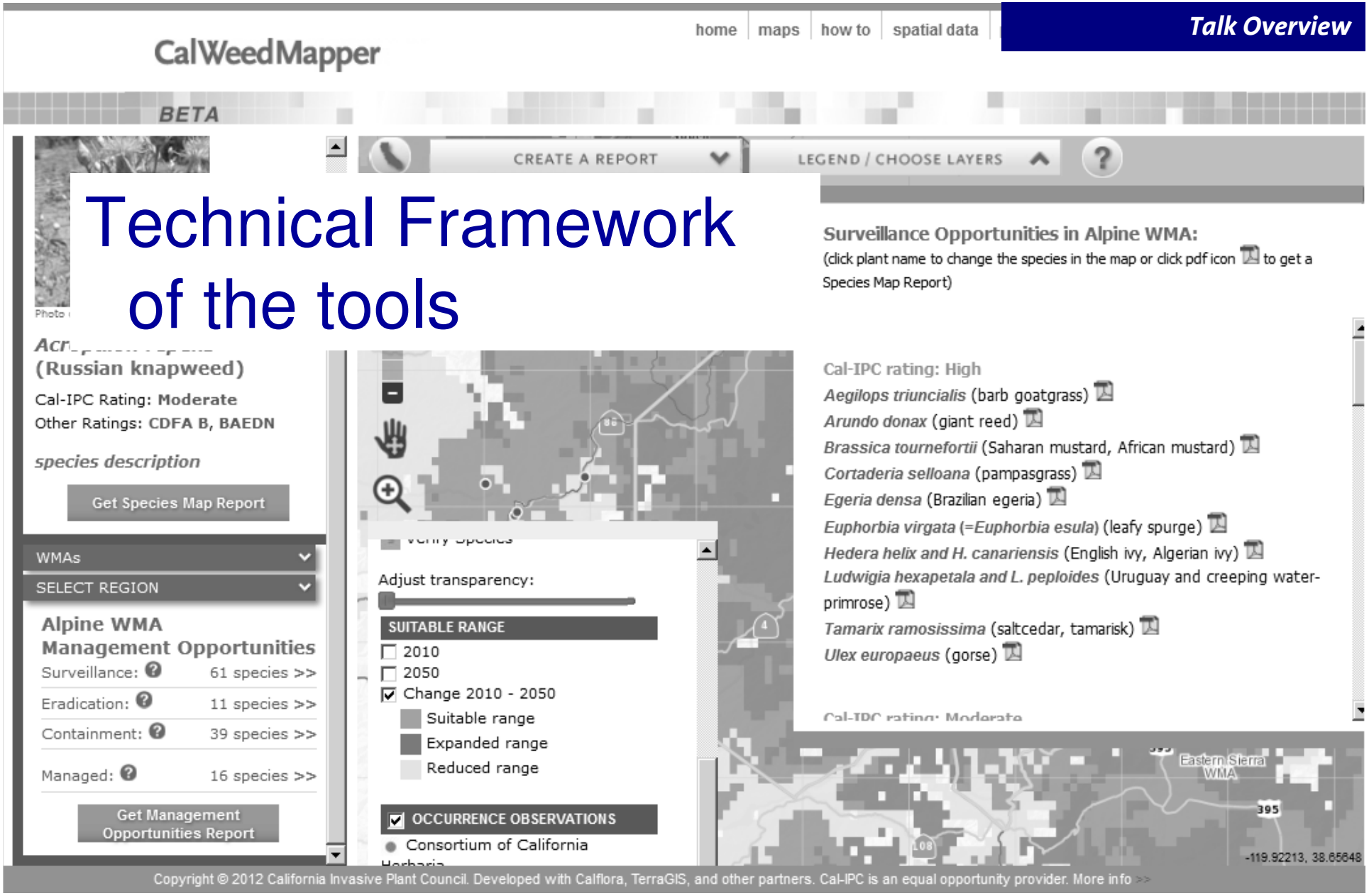
CalWeedmapper features

Models



- Climate change models + GIS layers based on CA climate baseline averaging the 1970 to 2009 climates + projections into 2050.
- 2010 and 2050 + change layer

Technical Framework of the tools



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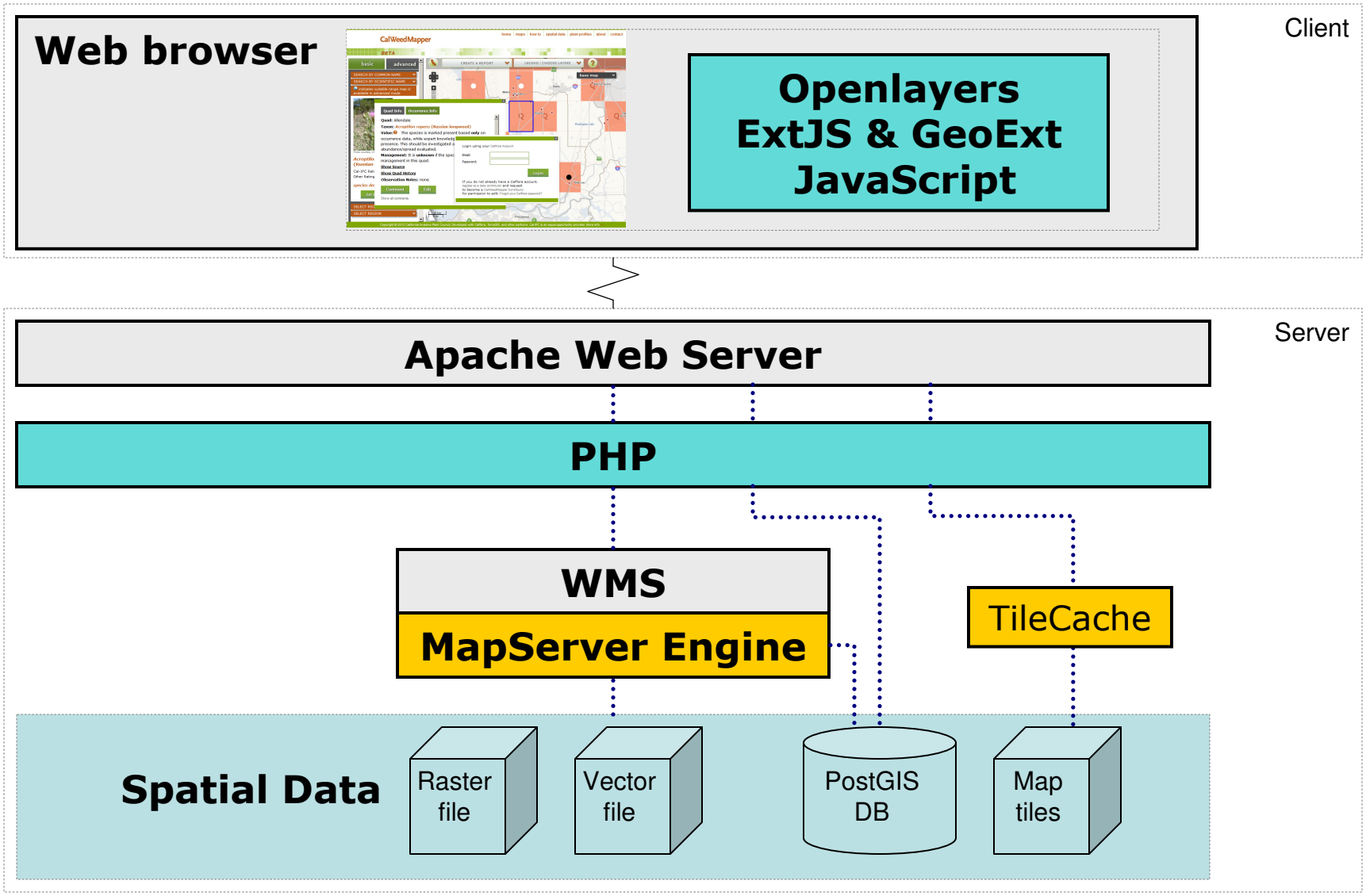
Technical Framework

- Server running Apache on HostGIS Linux (Slackware)
- PostGIS database
- MapServer (University of Minnesota)
  Map rendering engine
- OpenLayers Viewer
- ExtJS + GeoExt JavaScript libraries for GUI

CalWeedMapper Public Web Tool



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Map rendering Engine

Originally developed at the University of Minnesota (UMN), short "MapServer"

- one of the most mature open source projects
- written in C

Main Focus

- rendering spatial data
- development environment for spatially-enabled internet applications

Map output

- CGI mapserv (Linux) and mapserv.exe (windows)
- MapScript API available for Python, PHP, Perl, and Java
- Map/Layer configuration text file .map

Formats

- In: PostGIS, Oracle Spatial ArcSDE, WMS, GDAL and OGR formats
- Out: GIF, JPG, PNG, all GDAL formats, WFS and WMS

PostGIS – Spatial Database

- PostGIS is an extension for PostgreSQL
- adds support for geographic objects to PostgreSQL
- enables PostgreSQL server to be used as a backend spatial database for GIS
- Spatial operations and analysis simply mean running a (spatial) SQL query in the database
- Similar functions as SDE and much more …,

Open Layers

OpenLayers

Main supporter "MetaCarta"

- object-oriented JavaScript library (using Prototype.js and Rico library)

Lets you add maps to any web page by embedding OpenLayer.js

- no server-side dependencies
- Easily reusable component
  …similar to Google Maps and MSN Virtual Earth Web Mapping APIs
- "Slippy map style"

Input Formats

- Tile sources: Bing, Worldwind, Yahoo & Google Maps, WMS
- Vector layer input: KaMap, MapServer, GeoRSS, WFS, [KML]

Standard Tools

- Google-like zoom bar,
  standard functions
  like zoom in/out pan