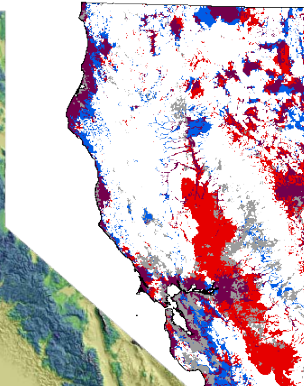
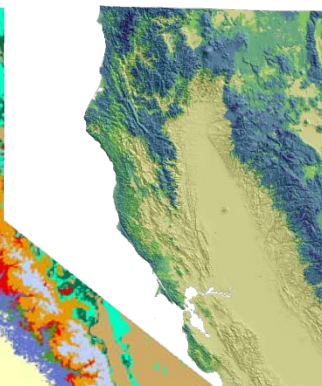
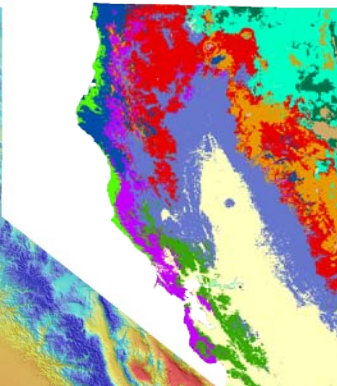
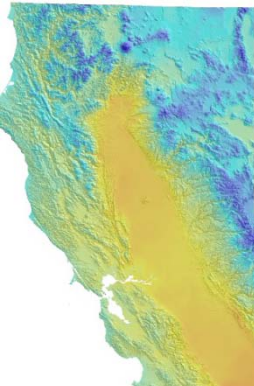




prbo

PRBO Conservation Science



Photos by Peter LaTourrette and PRBO

Decision support systems for the California Landscape Conservation Cooperative - highlights from year 1

Grant Ballard

PRBO Conservation Science

Science to improve conservation outcomes

- Founded in 1965
- 120 staff and seasonal biologists
- 2009 Budget: ~\$6.7m



Petaluma headquarters



A Collaborative Effort



What I'll cover

- What is a Decision Support System in the context of the California Landscape Conservation Cooperative?
- Overview of the California Avian Data Center (CADC) as a Decision Support System
- Examples of Decision Support Tools being developed for CA LCC hosted at CADC

What is a DSS?

- Decision Support Systems (DSS) are tools that support business and organizational decision-making activities.
- A DSS is an interactive system that helps decision makers compile useful information from raw data, documents, personal knowledge, and/or models to identify and solve problems and make decisions.
- DSS's should help the CA LCC bring data and partners together in a common adaptive conservation framework.

Technical requirements for DSS development

Three fundamental components of DSS architecture:

1. the database or knowledge base
 2. the model (i.e., the decision context and user criteria), and
 3. the user interface.
- The users themselves and experts outreaching to these users are also important components of the architecture.

Decision Support Tools

- Individual components of a DSS tailored to specific audience and specific decision (or set of decisions) to be made.
- Three broad categories:
 - 1. Scenario evaluation – what if...?
 - 2. Performance evaluation – report cards, dashboards...
 - 3. Recommendations for specific circumstances
- A DSS should support responsive generation of DST's as new needs arise.

What is the California Avian Data Center?

CALIFORNIA AVIAN DATA CENTER

a partner of Avian
Knowledge
Network



CADC is a regional node of the [Avian Knowledge Network \(AKN\)](#) hosted by [PRBO Conservation Science](#).

CADC integrates data on birds and ecosystems to improve conservation outcomes today and in the future.

CADC's goal is to make timely and relevant scientific data and analyses readily accessible to habitat managers, conservation practitioners, scientists, and the public.

The California Avian Data Center today

www.prbo.org/cadc



- > 100 projects for dozens of partner organizations
- 81M observed birds
- Point counts, area surveys, banding data, at sea surveys, etc...
- Passerines, shorebirds, seabirds
- Tools for field work, managing data, analyzing results, DST's
- Conservation plans

We grow toward the needs of our users/partners

CADC is a node of the Avian Knowledge Network

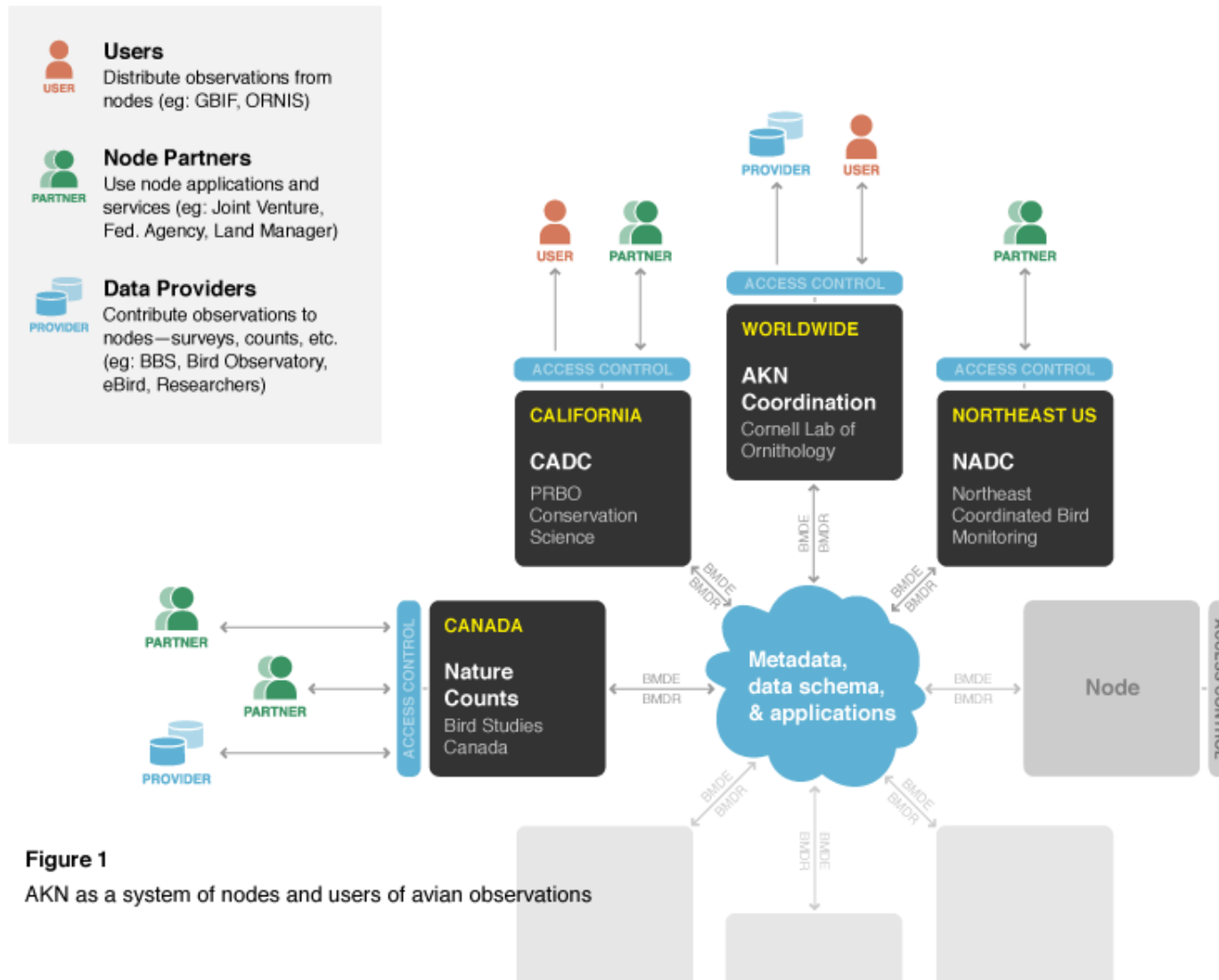


Figure 1

AKN as a system of nodes and users of avian observations

The CADC Data Lifecycle

CADC as a Decision Support System:
capturing, managing, analyzing, and
visualizing avian observation data and
associated environmental data



Create project

Capturing the study design

The screenshot shows the 'Project Leader' web application in a Mozilla Firefox browser. The interface is divided into a left sidebar and a main map area.

Left Sidebar:

- Project Leader** (Logo)
- Navigation tabs: Home, Sampling Units, Review Field Observations, Log
- Edit a Sampling Unit** (Section Header)
- *Select your project: CLRL
- As part of: No d
- Edit** (Section Header)
- *Type(s) of sampling unit: Study Area (Area)
- *Create a name for this sampling unit: CORK
- *Give this sampling unit a short name: CORK
- Description: Near Steinberger Slough
- Geometry: MULTIPOLYGON(((37.5035183395,-122.225358029+37,5165328627&p=Lat
- Buttons: Add to CalPit (optional), update, cancel

Main Map Area:

- DEJU Mapping - Mozilla Firefox
- URL: http://data.prbo.org/apps/projectleaders/deju.php?pointfield=Point&polygonfield=Polylinegon&entrytype=polygon&pointval=POINT(-122.225358029+37,5165328627&p=Lat
- Map controls: Zoom to, Go, Map, Satellite, Show labels
- Map content: Aerial view of San Carlos Bay with a red polygon highlighting a study area. Labels include Belmont Channel, Redwood Slough, Steinberger Slough, Redwood Creek, San Carlos Airport, El Camino Real, Bayshore Pkwy, Seaport Blvd, West Slough, First Slough.
- Buttons: zoom box, keep it, close, undo, start over, help



Capture Observations

Adding data interactively or in bulk

Biologist - Add Area Search/Survey Observations 2 - Mozilla Firefox

File Edit View History Bookmarks Tools Help

 **Biologist**

Home Locating Your Study Site **Entering and Proofing Data**

Dummy data in Plumas/Lassen (DUMM) > Hickman Gulf(HIGU) > Hickman Gulf Site 1(HIGU01)

Visit: 0 Date: 2009-02-13 Start time: 08:00:00 End time: 08:20:00

You are logged in as **mfitzgibbon@prbo.org**
[log out](#)
[Give Us Your Feedback](#)

copy table to: [CSV](#) [HTML](#) [DOC](#) [PDF](#)

Bird	Common Name	Total	Tally of Indiv	Forage	Flock	Copulate	Display	Pair	Material	Food	Nest	Fledge
AMRO	American Robin	12	12C				X					
NOMO	Northern Mockingbird	3	3D							X		
CAGO	Canada Goose	55	55C	X								
SACR	Sandhill Crane	10	10V									

4 rows

Add New Observations

*Species Code or Name ?

*Observation Data ?

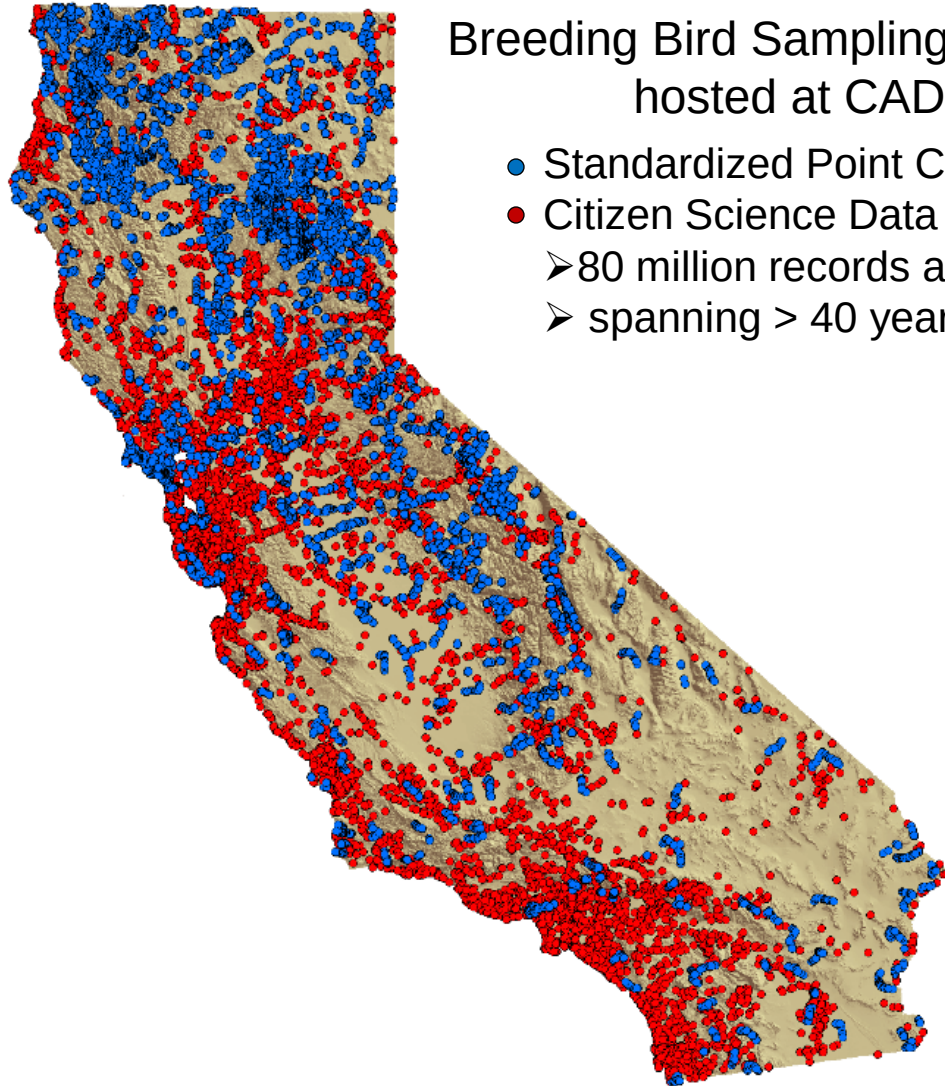
Behavior ?

Observ. Comments ?

[save + next species](#)

BLPH - Black Phoebe
 GHOW - Great Horned Owl
 HOFI - House Finch (e.g., woodpeckers)), H (Wing whir (e.g., hummingbirds,
 HOLA - Horned Lark g), V (Visual)
 HOSP - House Sparrow ? Display ? Pair ? Material ? Food ? Nest ? Fledge ?
 HQWR - House Wren
 RSHA - Red-shouldered Hawk

Data-rich California



Breeding Bird Sampling Locations hosted at CADC

- Standardized Point Counts
- Citizen Science Data (eBird)
 - 80 million records available
 - spanning > 40 years



© Keith Hansen

Audubon

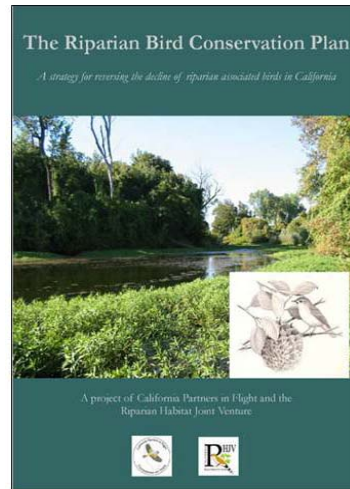
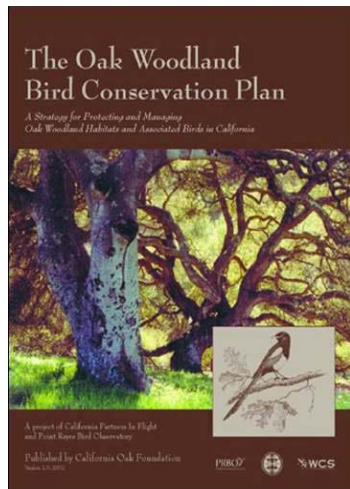
The Cornell Lab
of Ornithology



Objectives for year 1 LCC projects at CADC

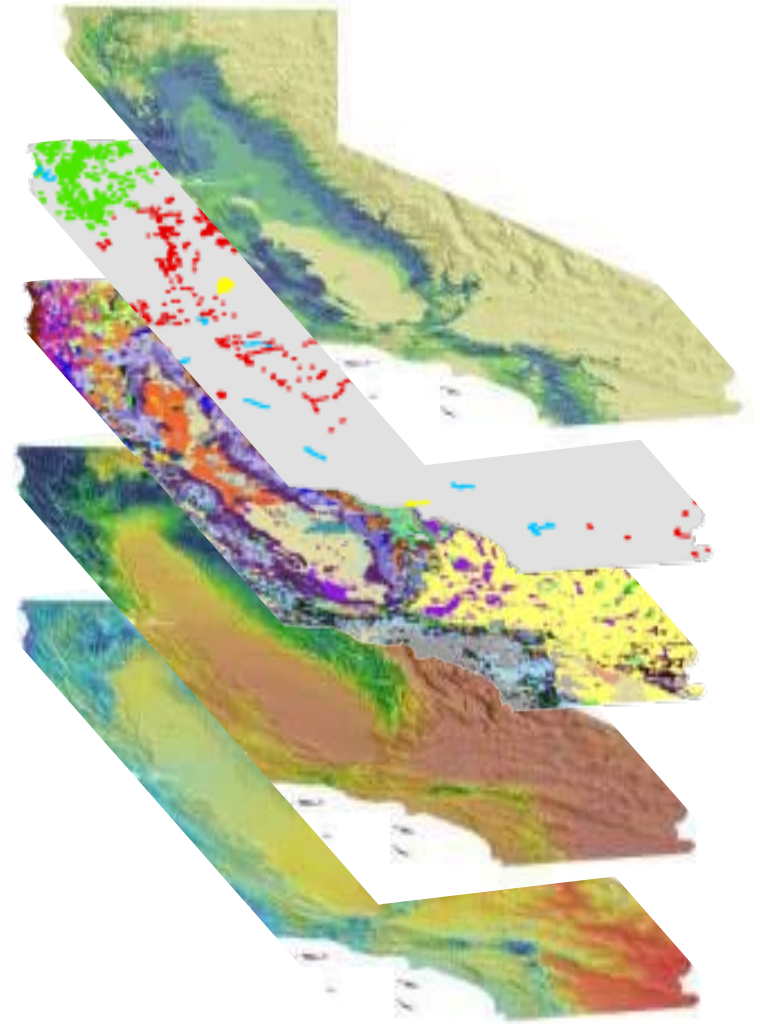
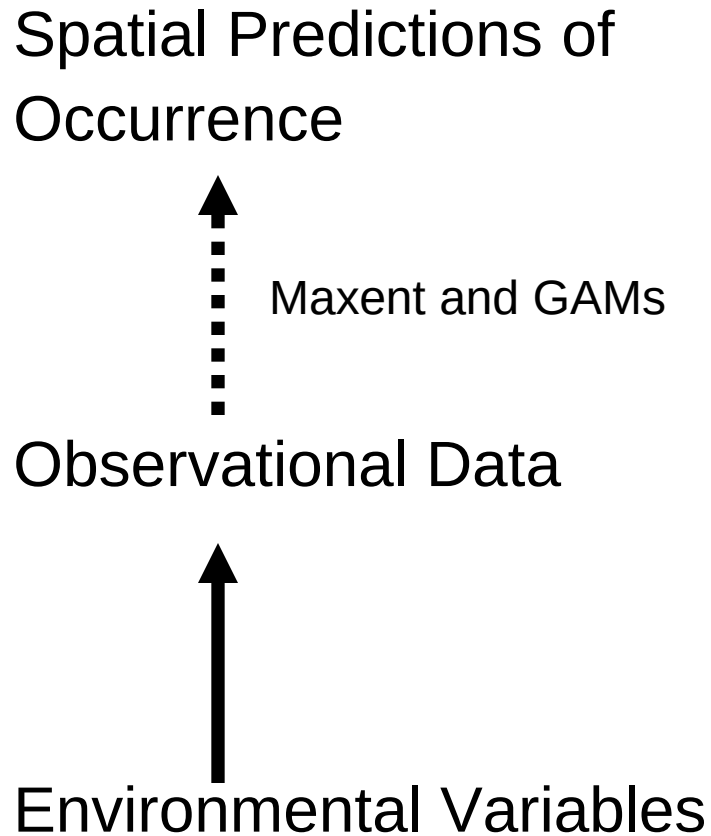
Use downscaled regional climate model projections, estimates of sea level rise, and other projections of physical environment to:

1. Project future shifts in bird distributions and population dynamics
2. Inform conservation priorities for California avifauna in climate change context
3. Inform monitoring priorities for California avifauna in a climate change context



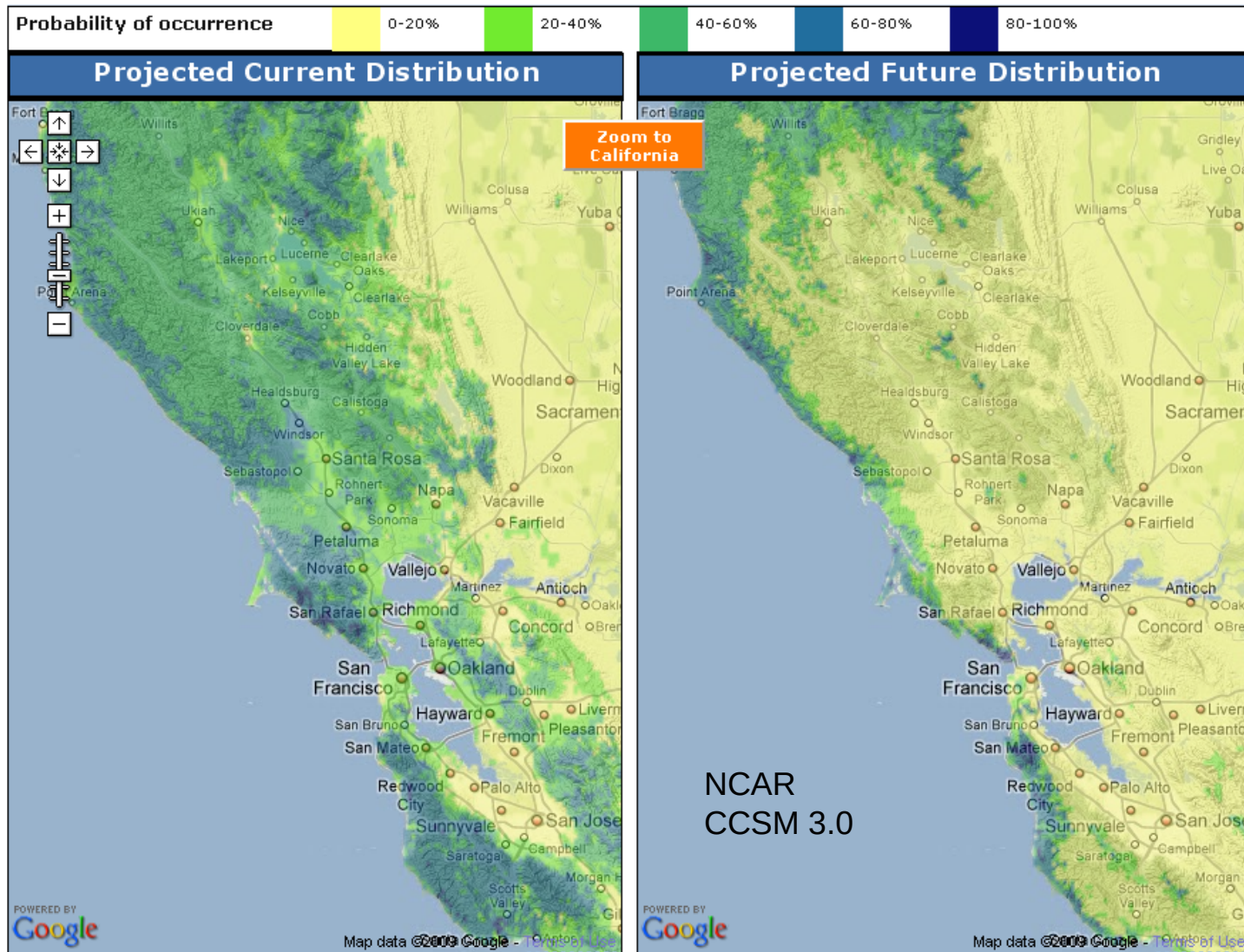
Projecting Future Bird Distributions

www.prbo.org/cadc



Projecting Future Bird Distributions

www.prbo.org/cadc



Purple Finch



Photo (c) [Peter LaTourrette](#)

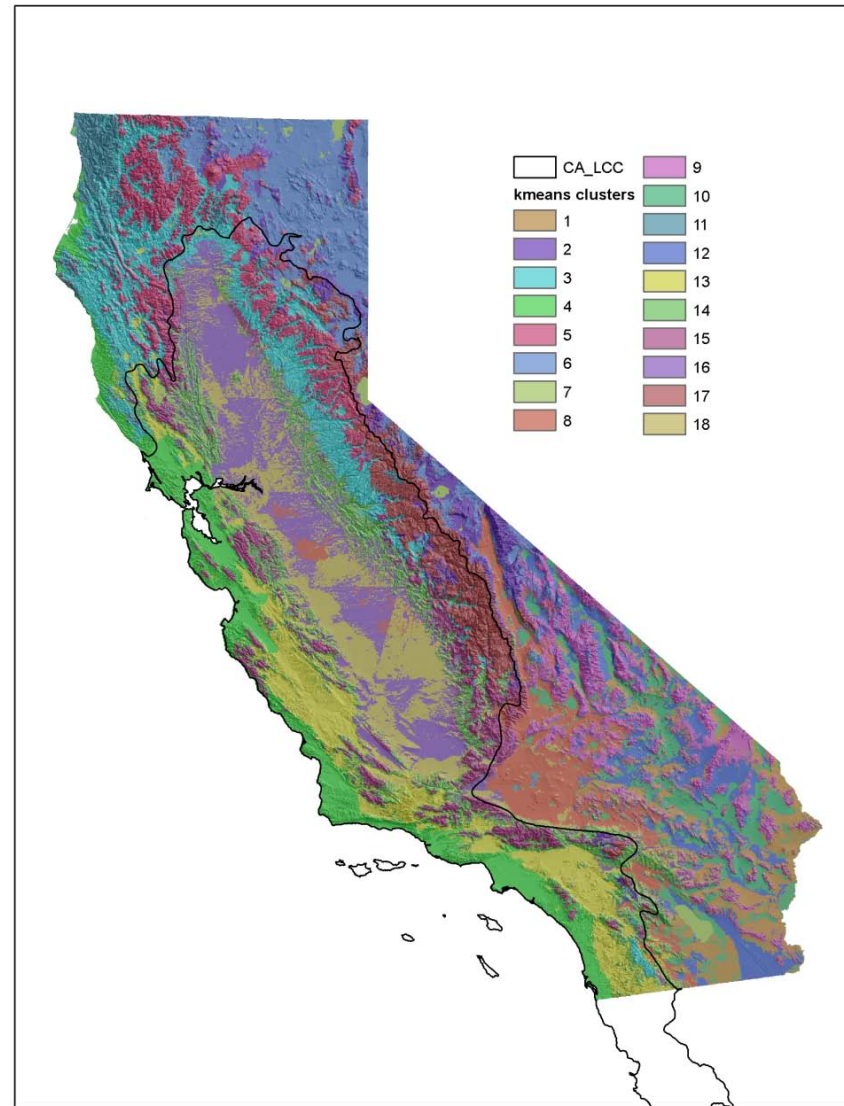
Learn more about the **Purple Finch** at [All About Birds](#) or read the [Partners In Flight](#) species account

Variables in order of Importance ?

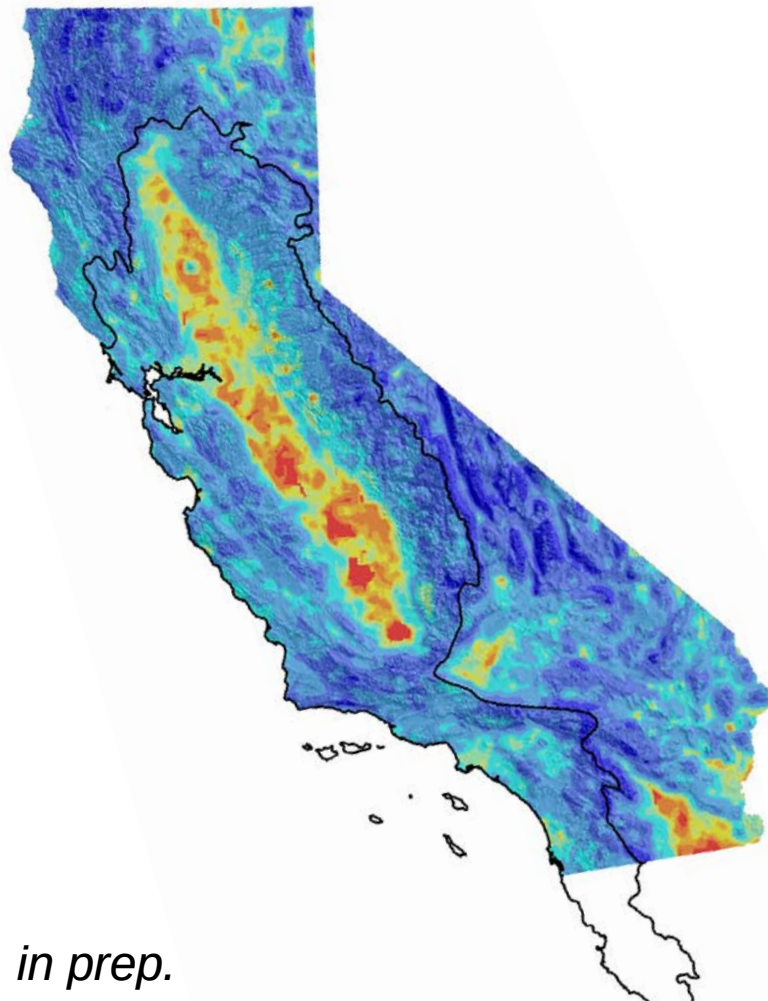
1. Vegetation
2. Annual precipitation
3. Distance to stream
4. Annual mean temperature
5. Precipitation seasonality
6. Precipitation of driest quarter
7. Temperature seasonality
8. Mean temperature of the warmest quarter
9. Mean diurnal range
10. Isothermality

? - variable definitions

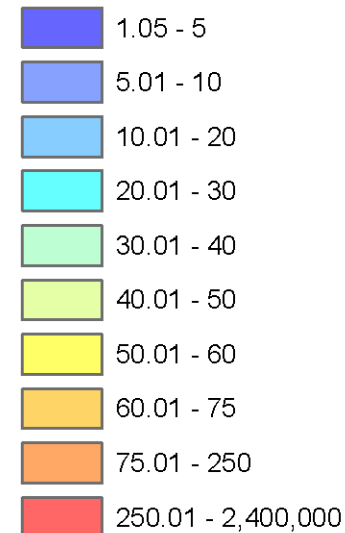
“Climate Clusters” – places with similar climate, soil, and topographic conditions



Assessing where there will be the most change from a wildlife and habitat perspective

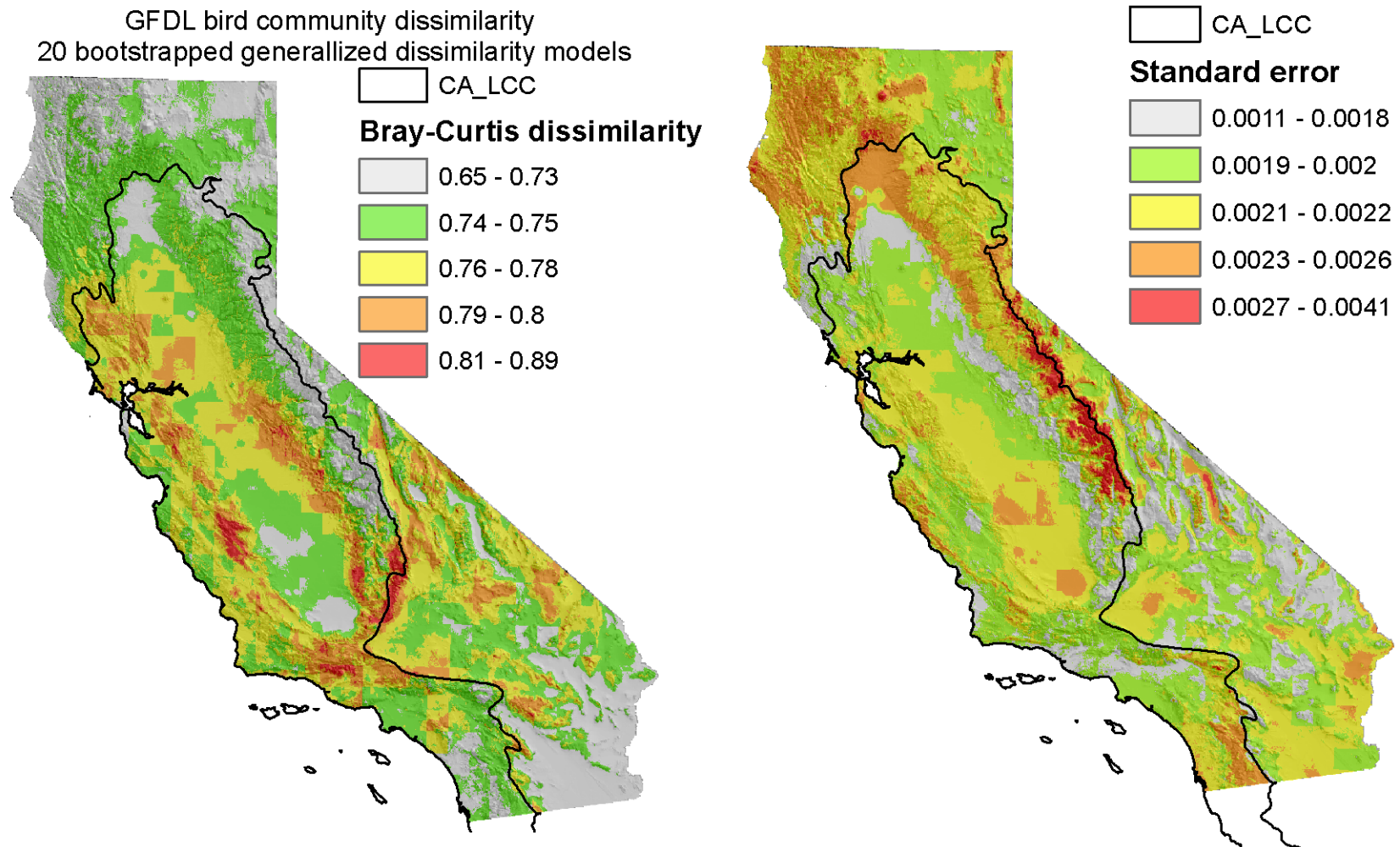


Standardized euclidean distance



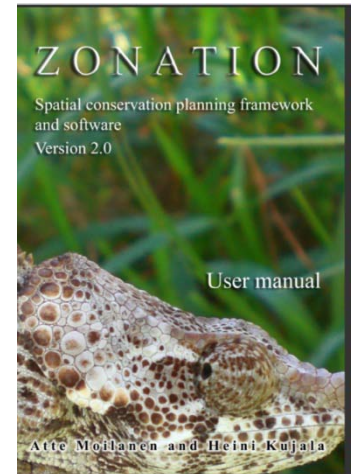
(2000 – 2070)

Changes in Bird Communities and Uncertainty – informing priorities for monitoring programs

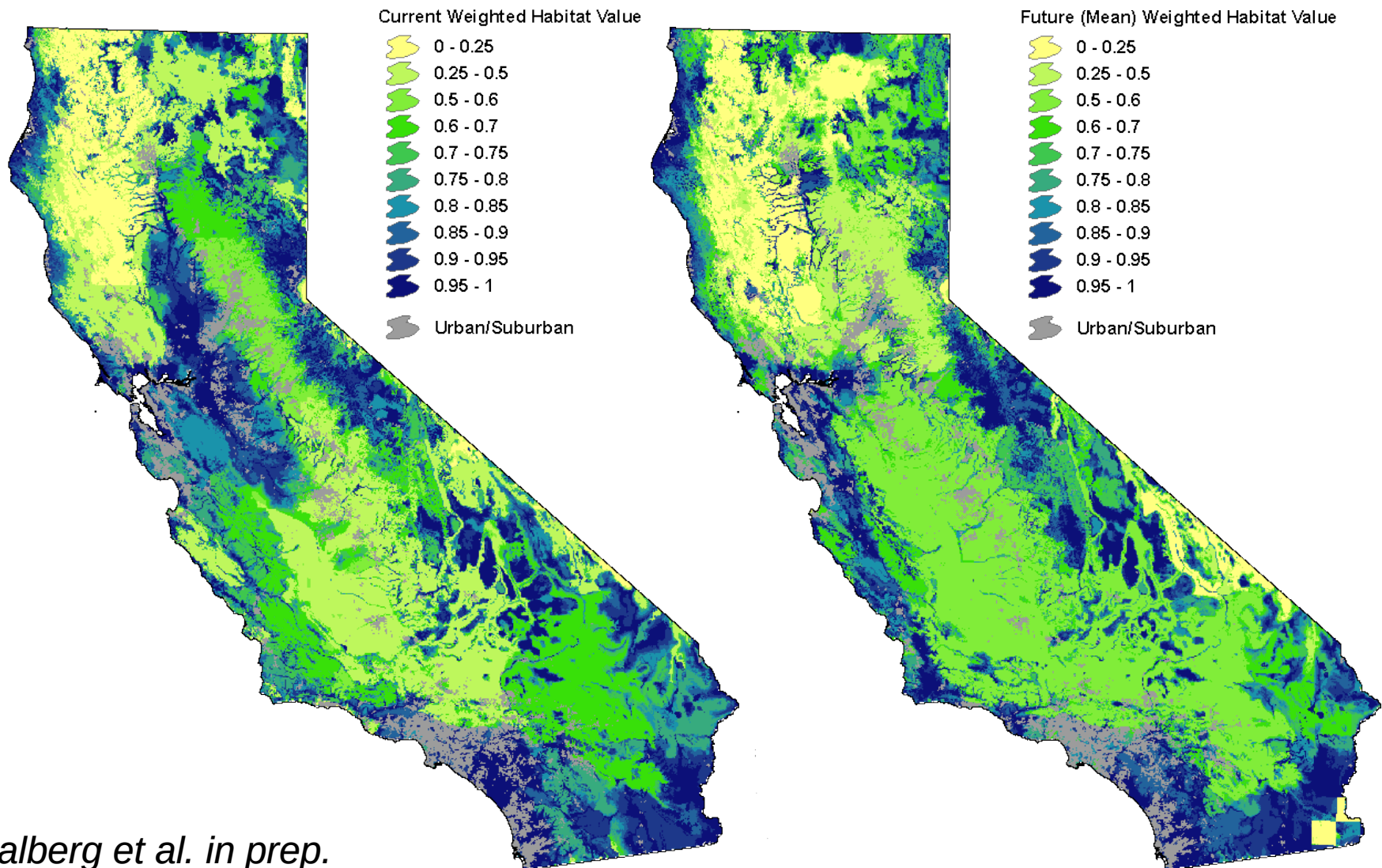


Systematic Conservation Prioritization

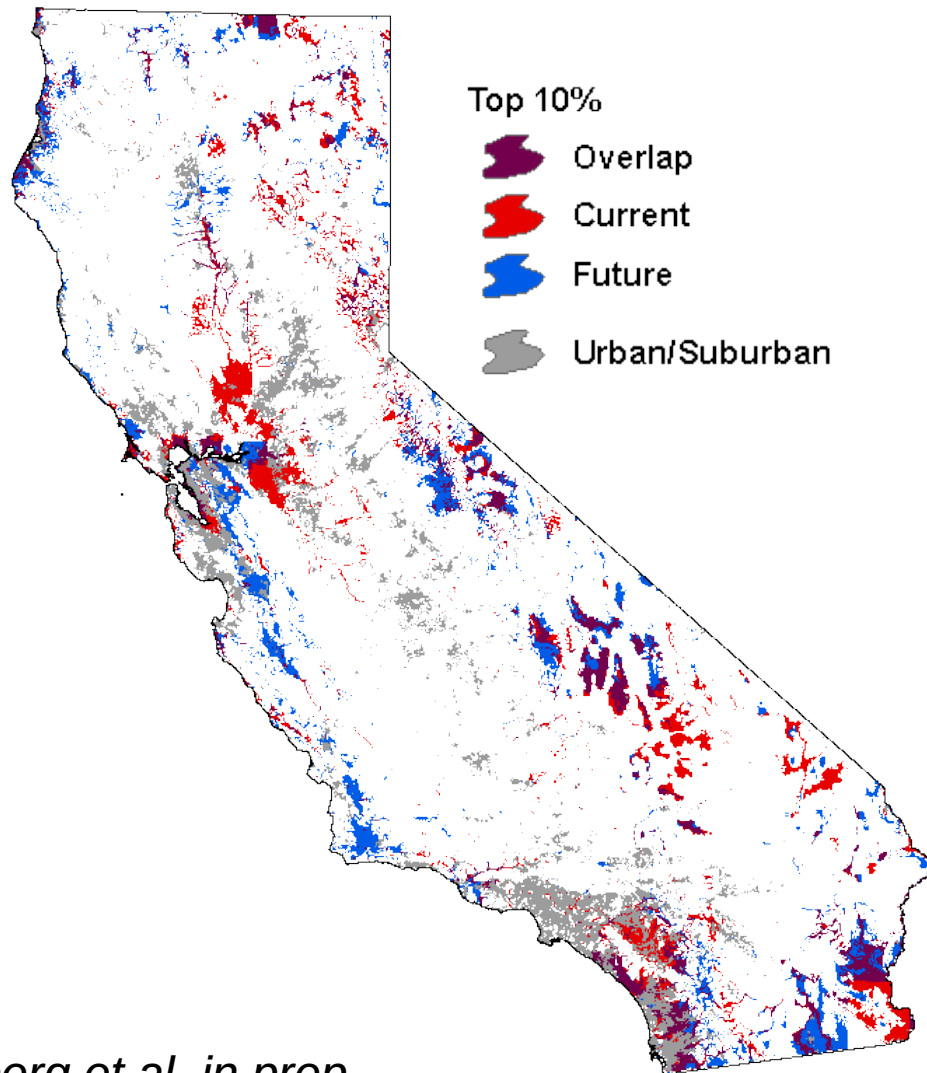
- Zonation (Moilanen and Kujala)
 - Multi-species spatial conservation planning software
 - Hierarchical prioritization of landscape (vs. targets)
 - Species “core area” algorithm retains high value areas for each species
 - Can incorporate uncertainty



Climate change may alter conservation priorities



Small overlap between current and future highest priorities

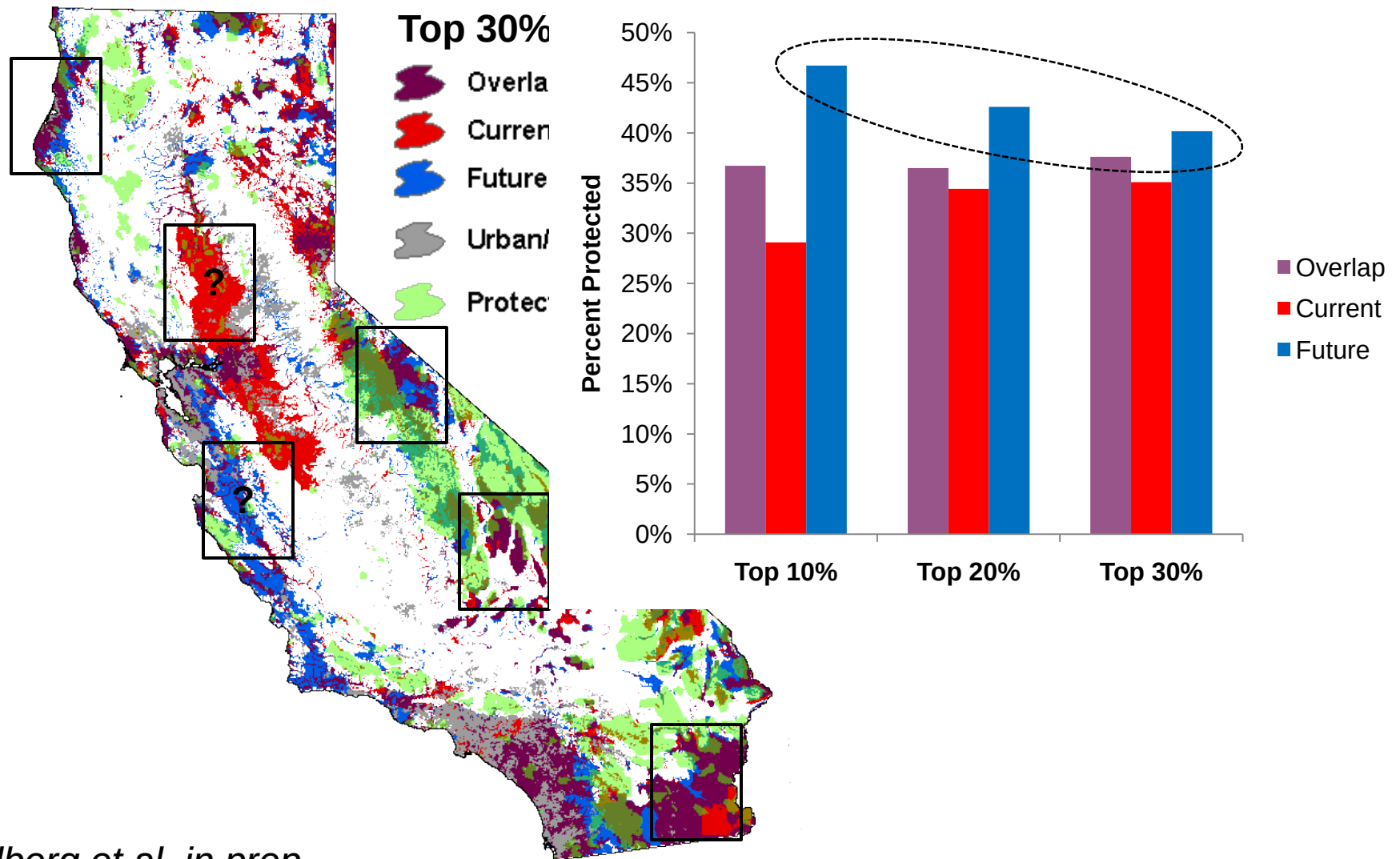


Top 10%



32% Overlap

Future conservation priorities better protected



Tidal Marsh Bird Population and Habitat Assessment for SF Bay Under Future Climate Change Conditions

- How will tidal marsh bird populations respond to changing climate?
- For marsh-endemic species, assume habitat availability and suitability is limiting factor
- Vegetation composition and structure determines habitat suitability (Spautz et al. 2006, Stralberg et al. in press)
- Sea level rise (and salinity change) will determine future habitat availability and suitability



Black Rail



Clapper Rail

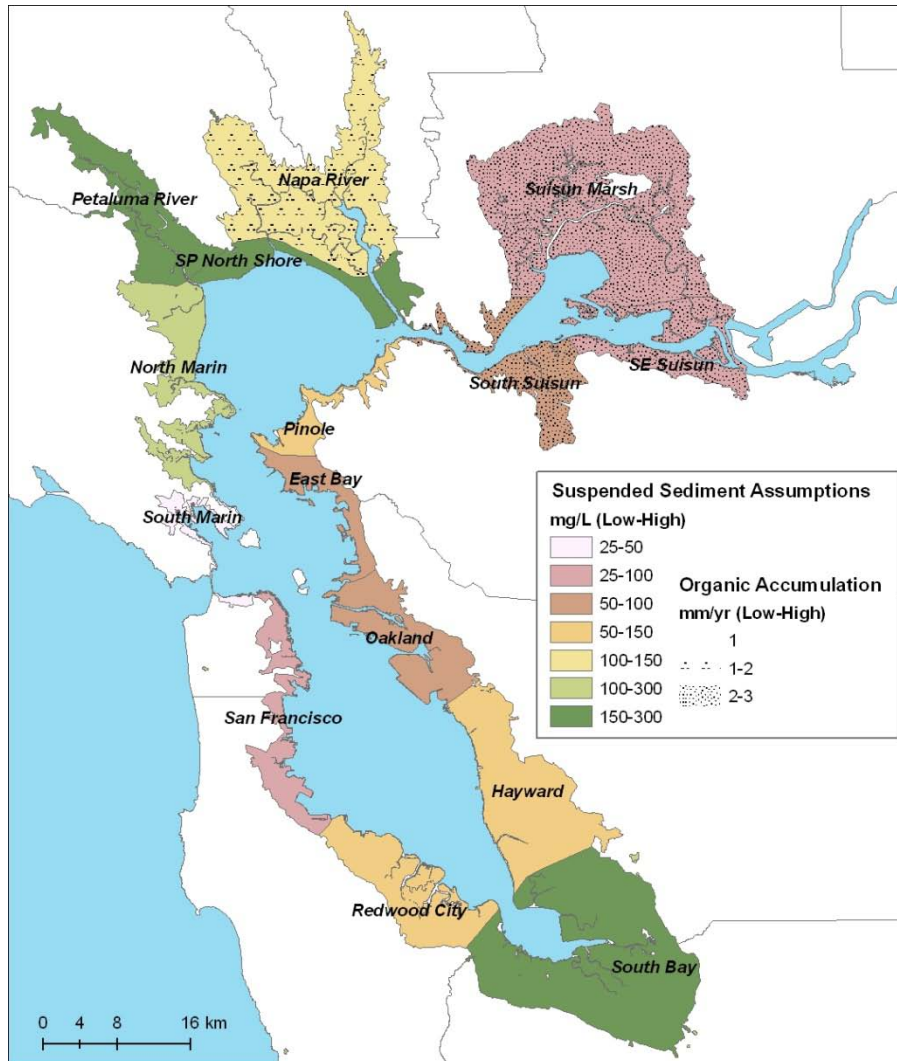


Common Yellowthroat

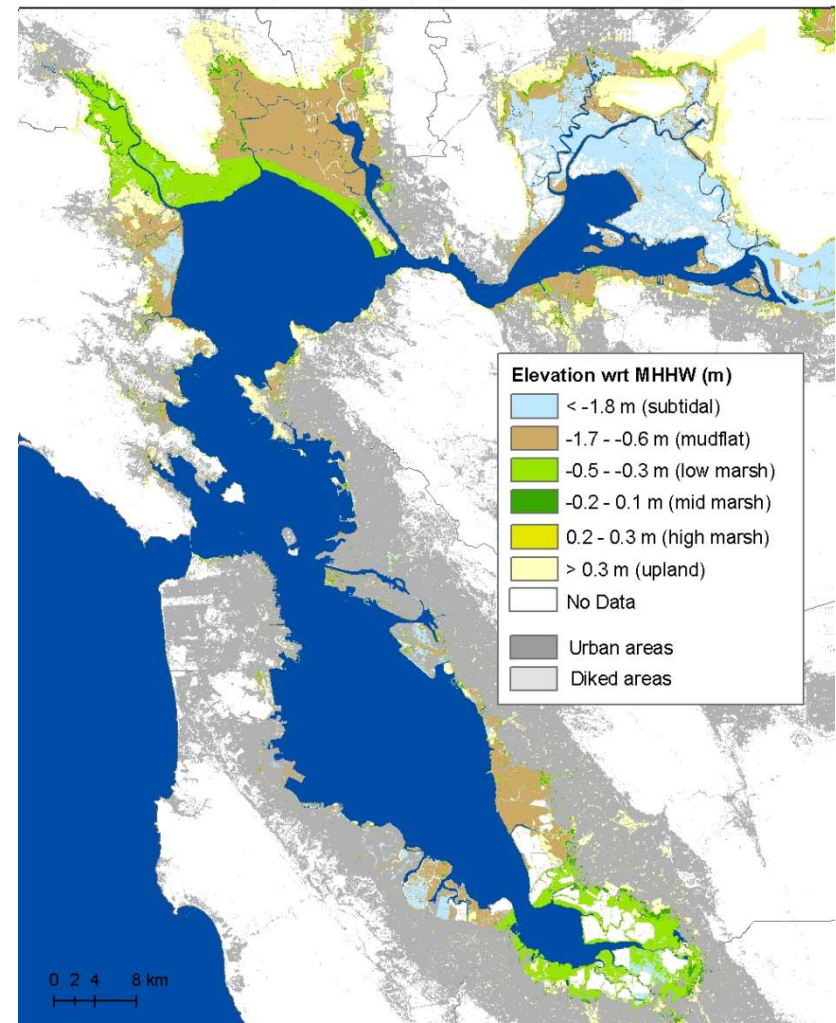


Song Sparrow

Elevation Change – Combined Scenarios

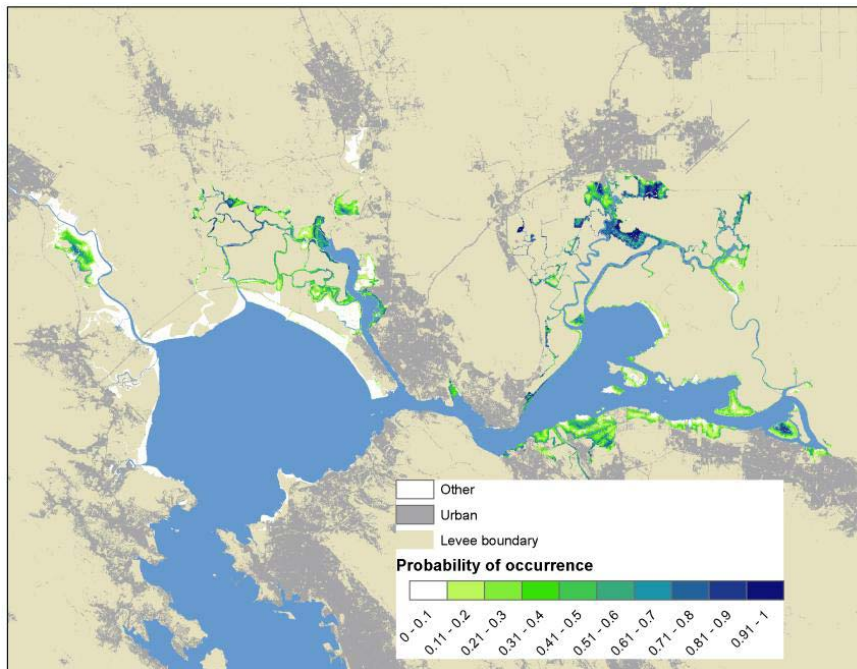


Year 100 - Low Sediment, Low Organic, High SLR (1.65 m/century)

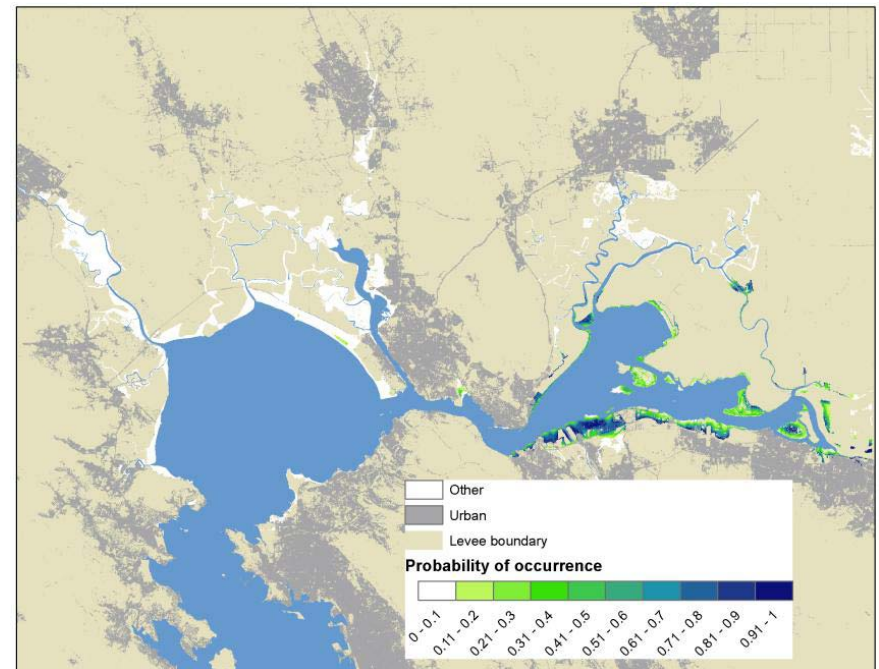


Projecting changes in vegetation composition with sea level rise

Present distribution

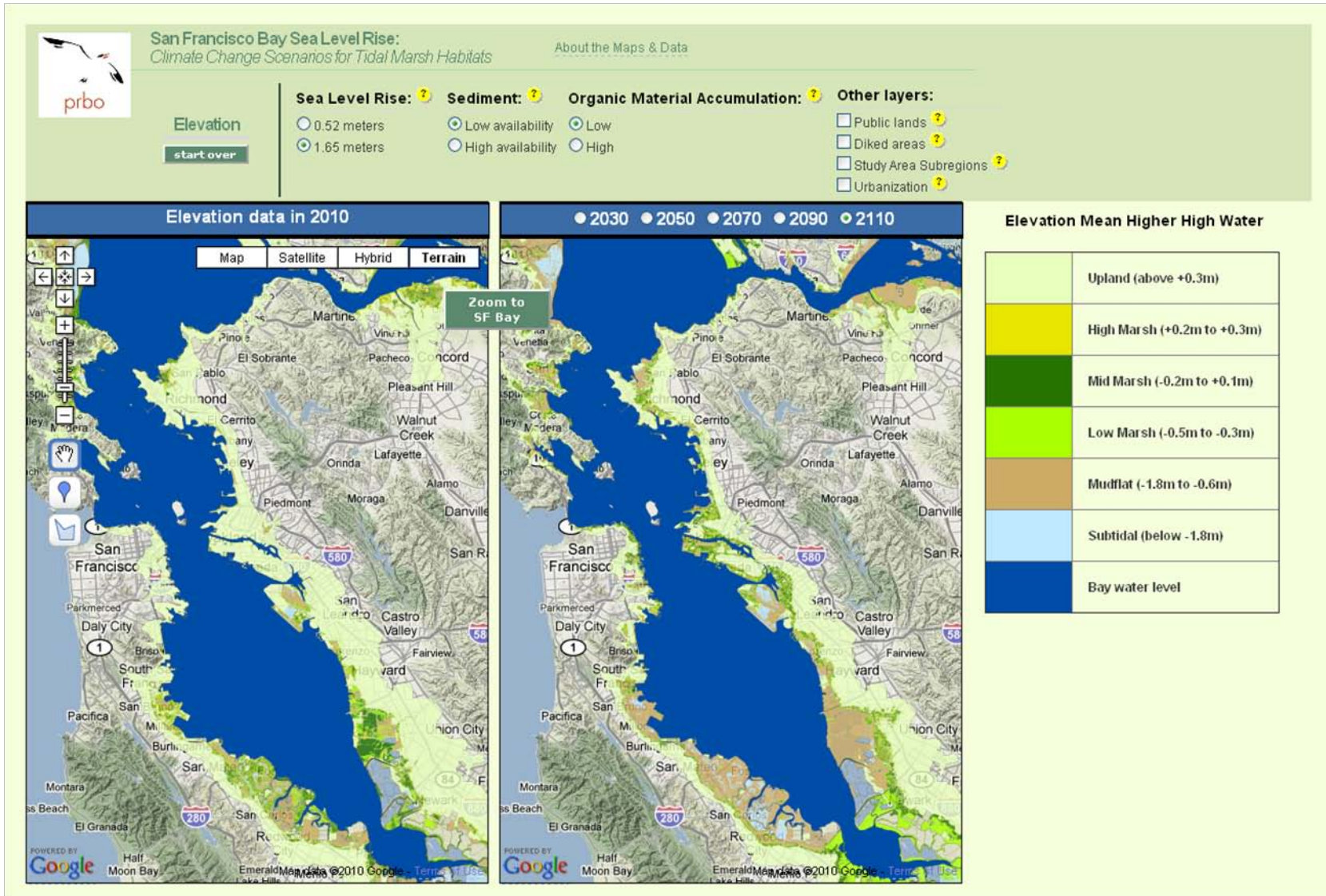


Distribution in 2100



Schoenoplectus americanus (Bulrush)

Web Mapping Tool Preview



Acknowledgments

www.prbo.org/cadc

Funding: California Landscape Conservation Cooperative, San Francisco Foundation, California Coastal Conservancy, National Science Foundation, Anonymous PRBO donors, Faucett Family Foundation, US Department of Defense Legacy Resource Management Program

Collaborators: John Callaway (SFU); Lisa Schile & Maggi Kelly (UC Berkeley); Tom Parker & Ellen Herbert (SFSU); Mark Snyder (UCSC)

Technical Assistance: Justin Vandever (PWA)

Conservation Input: Coastal Conservancy, SF Bay Joint Venture, Central Valley Joint Venture, BCDC, USFWS, Sonoma Land Trust, Sonoma Open Space District, Sonoran Joint Venture

Scientific Input: Dave Schoellhamer (USGS), Neil Ganju (USGS), Stuart Siegel (WWR), Bruce Jaffe (USGS)

Elevation Data: Noah Knowles (USGS), FEMA, Joel Dudas (DWR), Stuart Siegel (WWR), Sonoma County

