



# State Wildlife Action Plan Strategies Workshop

## March 7, 2012

Amber Pairis and Whitney Albright  
Climate Science and Renewable Energy Branch



# Climate Science Program

## *Unity-Integration-Action*

### Unity

Creating and  
maintaining vital  
partnerships &  
collaborative  
efforts

### Integration

Integrating climate  
change into DFG  
programs and  
policies

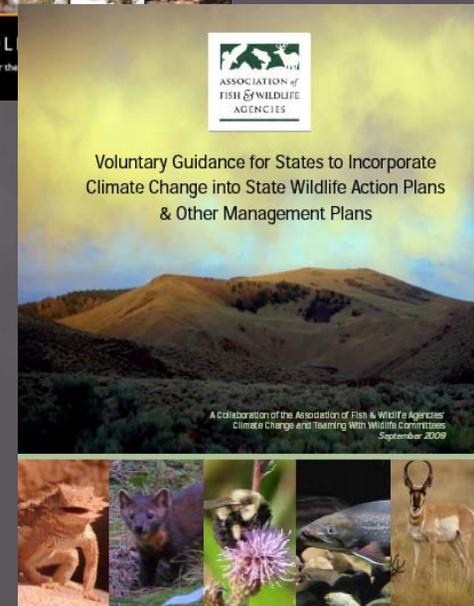
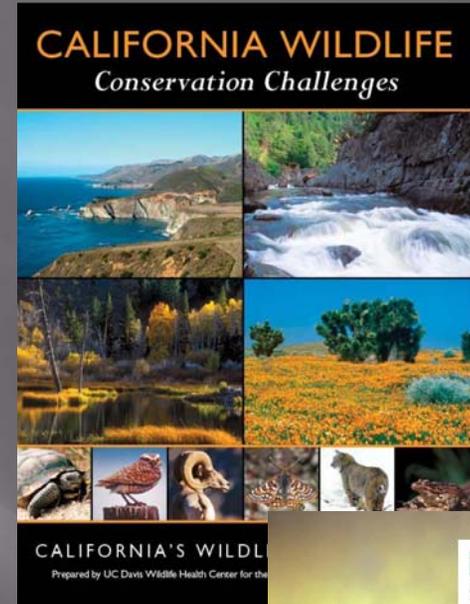
### Action

Products and  
projects that are  
meeting our  
conservation  
objectives



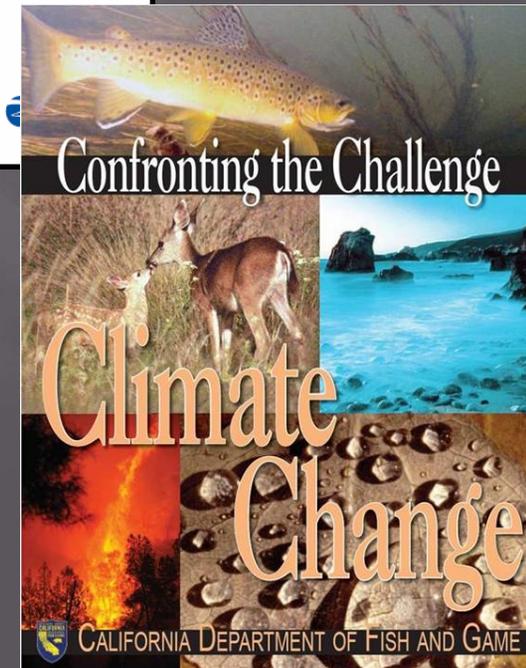
# Climate Change & SWAP

- Climate included in first version
- AWFA
  - Guidance document
- WAFWA
  - multisector approach
- National Fish, Wildlife, and Plants, Climate Adaptation Strategy
- SW CSC and LCC's: California, Desert, Great Basin, North Pacific



# Climate Change & SWAP

- ▣ April 2008: 1st Climate Change Stakeholder Meetings
- ▣ June 2008: DFG Climate Workshops/SWAP
- ▣ December 2008-09: CA CAS
- ▣ September 2009: CC Stakeholder Meeting-thematic working groups
- ▣ February 2012: DFG CC Stakeholders Meeting



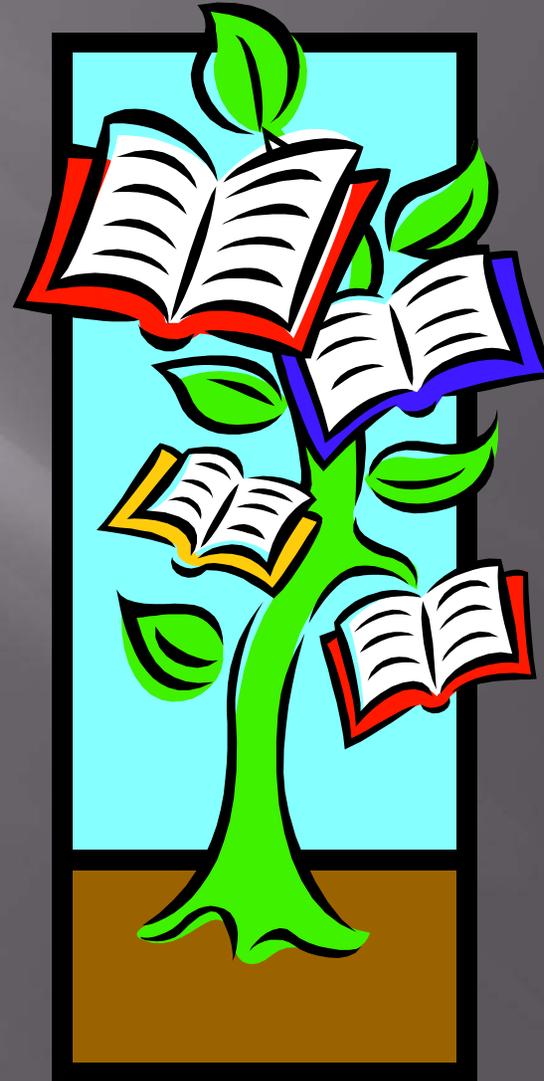
# SWAP Revision Climate Workgroup



- ▣ Stakeholder input
- ▣ Network of climate expertise to support revision
- ▣ Provide resources for ecoregional teams
- ▣ Participate directly with ecoregional teams

# Building Internal Capacity

- ▣ DFG Climate Course
  - Climate training network (e.g. Downscaling workshop)
- ▣ Climate Roundtable/DFG Bikes! discussion forums
- ▣ DFG Staff Spotlights



# DFG Climate Tools and Resources

- ▣ **Website overhaul**

Unity-Integration-Action: DFG's Approach to Confronting Climate Change - Mozilla Firefox

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- [DFG Going Green](#)
- [Climate Change Case Studies](#)
- [Vulnerability Assessment Tools](#)
- [Western Association of Fish and Wildlife Agencies](#)
- [Director's Bulletins](#)
- [Legislation and Policy](#)

Climate Science and Renewable Energy Branch  
 1416 9th Street  
 Sacramento, CA 95814  
[climatechange@dfg.ca.gov](mailto:climatechange@dfg.ca.gov)

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## Unity-Integration-Action: DFG's Approach to Confronting Climate Change

In keeping with its mission, DFG is committed to minimizing to the maximum extent practical, negative effects of climate change on the state's fish, wildlife, and habitats through the development of adaptation and mitigation measures, policies, and practices that provide clear benefits to terrestrial and marine ecosystems and recognize the uncertainty associated with future climatic states. Through an approach that embodies the theme Unity-Integration-Action, DFG is laying the ground work for a proactive, adaptive, and collaborative approach to safeguarding California's fish, wildlife, and habitats for years to come. DFG staff and leadership recognize that emerging climate change science brings uncertainty and are committed to addressing this uncertainty through the use of a variety of planning tools and strategic initiatives. We also recognize the importance of developing and maintaining partnerships to more effectively address the broad scope of climate change issues. By working together and taking actions today we can better anticipate the effects of future climate change and fulfill our responsibility to conserve fish, wildlife and the places they live for future generations to enjoy.



- **Save the Date!** – Public meeting on the draft National Fish, Wildlife, and Plants Climate Adaptation Strategy  
 January 31, 2012, 9:00 a.m. - 12:00 p.m., at Sacramento State University, Modoc Hall, Sacramento, CA
- **Save the Date!** – DFG Climate Change Stakeholder meeting  
 February 21, 2012, 10:00 a.m. - 12:00 p.m., at the Natural Resources Building Auditorium, 1416 9th St., Sacramento, CA
- 📄 [DFG Climate Stakeholder Agenda Feb21](#)
- 📄 [Unity, Integration, and Action: DFG's Vision for Confronting Climate Change in California](#)
- 📄 DFG's Role: [Climate Change, Confronting the Challenge \(Outdoor California article\)](#)  
*This special climate change issue of DFG's Outdoor California magazine received a gold award in the State Information Officers Council's 2010 statewide competition for excellence in government communications.*
- [DFG's Internal Climate Change Task Force](#)

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# DFG Climate Tools and Resources

- ▣ Website overhaul
- ▣ **Vulnerability Assessment Resource Center**

Climate Change Vulnerability Assessment Resource Center - Mozilla Firefox

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Home -> [Climate and Energy](#) -> **Vulnerability Assessments**

## Climate Change Vulnerability Assessment Resource Center

The materials presented on these web pages are meant to serve as a resource for those interested in learning more about climate change vulnerability assessment efforts, specifically those related to fish, wildlife, and habitats.

### What is a Vulnerability Assessment?

Vulnerability assessments are a key element to successful climate change adaptation as they reveal what systems, species, populations, entities, etc. are most vulnerable to expected climatic changes, often depending on factors such as exposure, sensitivity, and adaptive capacity. With the increased recognition of the utility of vulnerability assessments, efforts to conduct these assessments are becoming more and more common; as these reports become available, we will continue to update this website. If you are aware of natural resource vulnerability assessments specific to fish, wildlife, and habitats or those specific to California that are not currently on our list, please let us know by sending an email to [climatechange@dfg.ca.gov](mailto:climatechange@dfg.ca.gov).

### Climate Change Vulnerability Assessment Tools for Fish, Wildlife, and Habitats

- > [Tools / Resources for conducting a vulnerability assessment](#)
- > [Vulnerability assessments in California](#)
- > [Vulnerability assessments in other U.S. states](#)
- > [National/Regional vulnerability assessments](#)
- > [International vulnerability assessments](#)

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Sacramento, CA 95814  
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# DFG Climate Tools and Resources

- ▣ Website overhaul
- ▣ Vulnerability Assessment Resource Center
- ▣ **Climate change adaptation case studies**

# Unity, Integration, and Action: Climate Change Adaptation Case Studies



California Department of Fish and Game  
August 2011

## Objective 3: State-wide System of Conservation Areas

An important objective of the Department's climate change adaptation planning efforts is the need to maintain and create where needed a network of terrestrial and marine reserves (conservation areas) that builds on existing conservation investments. Proactive planning efforts that identify, improve, and connect conservation areas will help maintain and increase ecological integrity and provide habitat and refuge areas to help species persist in a changing environment. A periodic reexamination of this kind of conservation area network will be needed, and modifications made, as more is learned about the full impacts of climate change and species migration/movement in response to these changes.

California has a legacy of proactive conservation planning and any future efforts to create or connect habitat areas to help species respond and persist in a changing climate will easily build on existing conservation investments. For example, the current reevaluation and redesign of the system of Marine Protected Areas (MPAs) mandated by the Marine Life Protection Act (MLPA) and other terrestrial landscape scale planning efforts such as the Natural Communities Conservation Planning (NCCP) program are important models for conservation, restoration, and acquisition efforts.



### *The Natural Community Conservation Planning Program*

[The Natural Community Conservation Planning program](#) (NCCP) takes a broad-based ecosystem approach to planning for the protection and perpetuation of biological diversity. The NCCP program is one of the few programs in existence that is designed to facilitate the adaptation of wildlife to climate change. These plans build ecological resilience by creating landscape-scale interconnected reserve networks that are based on the major tenets of conservation biology, including representativeness, multiplicity, and redundancy of large habitat blocks and natural communities. NCCP reserve networks typically occupy hundreds of thousands of acres across the entire range of environmental gradients in a planning area, and because of this and their high level of connectivity, NCCP reserve systems readily provide for the natural movement of individual organisms, and species and habitat distributional shifts, in response to climate change. In addition, where possible, NCCP reserves and linkages also provide interconnections to large blocks of federal and other publicly-owned lands to help ensure that species and habitats on public lands have access to the broadest range of ecological gradients over which to adapt. NCCPs also require protection and restoration of key ecological processes which

# DFG Climate Tools and Resources

- ▣ Website overhaul
- ▣ Vulnerability Assessment Resource Center
- ▣ Climate change adaptation case studies
- ▣ **Climate change vulnerability assessments**
  - Rare plant vulnerability assessment (CA LCC)



# Climate Change Vulnerability Index

Brian Anacker, Krystal Leidholm, Melanie Gogol-Prokurat, Steve Schoenig  
California Department of Fish and Game, Biogeographic Data Branch  
1807 13<sup>th</sup> Street, Suite 202, Sacramento, CA 95811  
(916) 324-5198; [sschoenig@dfg.ca.gov](mailto:sschoenig@dfg.ca.gov); <http://www.dfg.ca.gov/biogeodata>



## Introduction

- Climate change impacts on biodiversity need to be addressed in resource management decisions and included in revisions of key planning documents.
- The *climate change vulnerability index* (CCVI) was developed to assess potential impacts of climate change to individual species based on their life history characteristics and distributions.
- The output will guide monitoring, management, and conservation plans for sensitive plant and animal species.

## Objectives

- Evaluate climate change assessment methodology.
- Assess 156 rare plant species using the climate change index.
- Create future plant species distribution models and maps to aid in the assessment of vulnerability.
- Make management recommendations.



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## Methods

- Assess 156 rare plant species in California based on CCVI factors:
  - Predicted exposure to climate change
    - Use Climate Wizard data and Maxent to create climate models
  - Climate change sensitivity
    - Indirect exposure to climate change
      - Land conversion
      - Development
    - Species specific factors
      - Dispersal ability
      - Habitat restrictions
  - Documented response to climate change
    - A2 emissions scenario
    - Predicted for the year 2080



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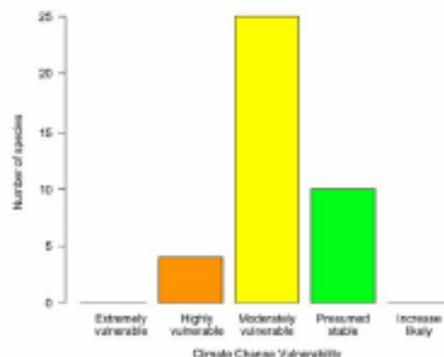
## Preliminary Results

- We have assessed 50 species to date (Figure 1).
- Most species fall into the moderately vulnerable to climate change category, followed by presumed stable, and highly vulnerable.
- Overall, climate models indicate a decrease in climate suitability for most of the species we have assessed to date.



## Species Vulnerability

Figure 1. Climate change vulnerability index (CCVI) results for 50 species assessed to date



## Example: *Brodiaea orcuttii*

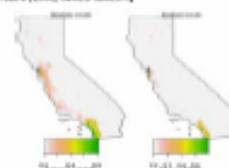
### Preliminary result: highly vulnerable

- Prefers vernal moist grasslands and is dependent on a seasonal flood regime.
- Predicted climate change exposure is + 2.2-2.4 C for half of the *B. orcuttii* occurrences and + 2.5-2.7 C for the other half of the *B. orcuttii* occurrences (Figure 2).
- Anthropogenic barriers: Development and construction are major threats; the majority of its range is surrounded by high density urban interface.
- Renewable energy production within the species range also threatens the species, decreasing its ability to shift range and, therefore, increasing its susceptibility to climate change.



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Figure 2. Maxent predicted historical (1951, 2080) and future (2080) climate suitability



## Ongoing work

- Consulting expert opinions to improve scoring accuracy of ranks for species with little or no life history data.
- Critiquing distribution models and their sensitivity to climate variables.
- Continuing research and climate vulnerability assessment for the remaining 100 rare and endemic plant species.

## Collaborators

- US Fish and Wildlife Service/LCC (Primary funding)
- NatureServe (Bruce Young, Anne Frances)
- DFG (Roxanne Bittman, Todd Keeler-Wolf)
- UC Davis (Robert Hamans, Susan Hamson, Jim Thorne, Nick Jensen, Robin Thorpe)
- California Native Plant Society (Aaron Sims)

# DFG Climate Tools and Resources

- ▣ Website overhaul
- ▣ Vulnerability Assessment Resource Center
- ▣ Climate change adaptation case studies
- ▣ **Climate change vulnerability assessments**
  - Rare plant vulnerability assessment with CA LCC
  - Bird species of special concern vulnerability assessment with PRBO Conservation Science



# California Bird Species of Special Concern

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## Climate Change Vulnerability Species Scores

To download this report select your preferred format next to "copy table to:" below

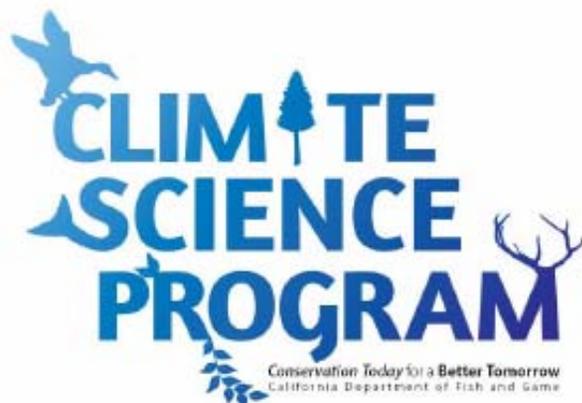
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CommonName	ScientificName	Habitat Suitability	Confidence	Food Availability	Confidence	Extreme Weather	Confidence	Habitat Specialization	Confidence	Physiological Tolerances	Confidence	Migratory Status	Confidence	Dispersal Ability	Confidence
Abert's towhee	Pipilo aberti	1	0.5	1	0	3	1	1	1	2	1	1	1	3	1
Alameda song sparrow	Melospiza melodia pusillula	3	1	1	0	3	0.5	3	1	1	0.5	1	1	3	1
Alaska marbled godwit	Limosa fedoa beringia	2	0.5	2	0	1	0.5	2	1	1	0.5	2	1	1	1
Aleutian cackling goose	Branta h. leucopareia	2	0.5	1	0.5	1	1	2	1	1	0.5	2	1	1	1
Allen's hummingbird	Selasphorus sasin	2	1	1	0	1	1	1	1	1	0.5	3	1	1	1
American avocet	Recurvirostra americana	2	0.5	1	0.5	1	0.5	2	1	1	0.5	2	1	1	1

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  - Rare plant vulnerability assessment with CA LCC
  - Bird species of special concern vulnerability assessment with PRBO
  - *Climate change effects on inland fishes, mammals, and herps*
- ▣ Collaborative climate change research
  - DFG Research reports



Climate Change Adaptation Research for Fish, Wildlife, and Plants  
in California  
California Department of Fish and Game  
February 6, 2012

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California DFG Climate Change Research Needs  
February 2012

Below is a list of general research needs related to the DFG's climate change adaptation activities and priorities. For more detailed information, please visit the "DFG climate change related research" document on our website at [http://www.dfg.ca.gov/Climate\\_and\\_Energy/Climate\\_Change/Activities/](http://www.dfg.ca.gov/Climate_and_Energy/Climate_Change/Activities/).

**Ecosystem Resilience, Restoration, and Adaptation:** Decision support tools to help determine when and where to implement adaptation/restoration activities and the best approaches to take. Additionally, tools are needed that guide assimilation of information from climate change research (e.g. projected changes in species and community composition) into various planning applications.

- Methodology/guidelines for assimilating knowledge gained from vulnerability assessments into management plans and adaptation planning
- Assessment of the economic and cultural value of ecosystem services in California and how they may be impacted/threatened by climate change

**Baseline data/Mapping:** Baseline data is needed as a foundational benchmark to measure changes due to climate change. This information is also necessary for many projection modeling exercises.

- State-wide vegetation maps (underway but in need of additional funding)
- High resolution California species range maps (underway but in need of additional funding)
- State-wide habitat maps

**Disturbances/Stressors:** Effects of climate change on disturbance agents (e.g. fire, flooding, droughts, insects, invasive species, etc.), the interactions between them, and the resulting impacts to ecosystem function, resilience, and ecosystem services.

- Impacts of increased risk of more frequent and intense wildfire on sensitive species and resulting ecosystem conversions
- Research on the impacts of increased risk of repeated drought/flooding cycles on water quality, quantity, and availability, to minimize conflicts between people and wildlife
- Predictive modeling and integration of climate change scenarios into invasive species management to support early detection/rapid response

**Connectivity:** Information regarding climate change impacts to habitat connectivity and corridor use by wildlife is needed for integration into land use planning and management.

- Additional finer-scale corridor analyses that build off the state-wide Essential Habitat Connectivity Plan and can be utilized in the context of future public land acquisitions and investments

**Sea-level rise/Ocean acidification:** Research on the impacts of ocean acidification and sea-level rise on marine ecosystems/species, commercial fishing, inundation and increased salinity of wetlands, and contamination of freshwater resources is needed to support coastal vulnerability assessments and the development of appropriate adaptation strategies.

**Monitoring:** Monitoring changes in ecosystems and key focal species populations over time in association with climate change will be necessary for effective adaptive management.

- Assessment of species tolerances and abilities to adjust or adapt to short term and long term habitat changes caused by climate change



# DFG Climate Tools and Resources

- ▣ Website overhaul
- ▣ Vulnerability Assessment Resource Center
- ▣ Climate change adaptation case studies
- ▣ Climate Change Vulnerability Assessments
- ▣ Collaborative climate change research
- ▣ **DFG's climate change vision**
  - Implementing the 2009 CA Climate Adaptation Strategy

EXECUTIVE SUMMARY

# 2009 CALIFORNIA CLIMATE ADAPTATION STRATEGY

A Report to the Governor of the State of California  
in Response to Executive Order S-13-2008



## Unity, Integration, and Action:

### DFG's Vision for Confronting Climate Change in California



California Department of Fish and Game  
September 2011

# Climate Change & SWAP: Recap

- ▣ **Partner/collaborative resources**
- ▣ **Building internal capacity**
- ▣ **Tools and resources currently available**
- ▣ **Continued support to help you accomplish this task!**



# CLIMATE SCIENCE PROGRAM

*Conservation Today* for a **Better Tomorrow**  
California Department of Fish and Game