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
Four years ago.....

- April 2008: 1st CC Stakeholder Meetings
- June 2008: DFG Climate Workshops
- <insert child>
- December 2008-09: CAS
- September 2009: CC Stakeholder Meeting
- Dec 2009-Nov 2010: Thematic work groups
- February 2010: S. CA Stakeholders
- Feb-April 2010: CAT-Biodiv (BioCAT)
- Sept-Nov 2010: Workgroup products!
- <insert child>
- June 2010: Climate Associate position
Celebrate our Success!

- Climate change magazine

- Gold award for excellence in government communications
  - State Information Officers Council’s 2010 competition
Celebrate our Success!

- Climate Change magazine

- **Downscaling workshop**
  - “Bridging the Gap: Downscaling Climate Models to Inform Management Actions”
  - 75 in-person/50 online participants
  - Archived on web
  - Next steps/Science panel
Statistical Downscaling for the State of California

Mike Dettinger & Dan Cayan
US Geological Survey, La Jolla, CA

CDFG/USGS/USFWS Downscaling Workshop,
CSU Sacramento, Nov 3, 2010

Climate change and biodiversity:
implications for Bay Area conservation

California State Univ., Nov 3, 2010

- Bay Area climate: historical patterns and future changes
- Climate impacts on Bay Area vegetation
- Climate heterogeneity and biodiversity
- Management in the face of change

A framework for assessing adaptation strategies for plants threatened by climate, land use, and altered fire regimes

Alexandra Syphard¹, Helen Regan², Janet Franklin³, Rebecca Swab²,
Paul Zedler⁴

¹ Conservation Biology Institute
² U.C. Riverside
³ Arizona State University
⁴ University Wisconsin - Madison

Applying Downscaled Data
To Large-Scale Wildlife Corridor Planning

Healy Hamilton
Center for Applied Biodiversity Informatics
California Academy of Sciences
Celebrate our Success!

- Climate Change magazine
- Downscaling workshop

- Collaborative climate change research
  - Vulnerability assessments
  - Ocean Acidification
  - DFG Research reports
Celebrate our Success!

- National/regional coordination and collaboration

- National Fish, Wildlife, and Plants Climate Adaptation Strategy
- Southwest Climate Science Center
- LCCs: California, Desert, North Pacific, Great Basin
- National Climate Assessment
- Western Association of Fish and Wildlife Agencies (WAFWA)
- Association of Fish and Wildlife Agencies (AFWA)
Adaptation in Action:

DFG Climate Science Program highlights

- Website overhaul
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 groundwork 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...
Adaptation in Action:

*DFG Climate Science Program highlights*

- Website overhaul
- Vulnerability Assessment Resource Center
http://www.dfg.ca.gov/Climate_and_Energy/Vulnerability_Assessments/
Adaptation in Action:

*DFG Climate Science Program highlights*

- Website overhaul
- Vulnerability Assessment Resource Center
- *Climate change adaptation case studies*
Unity, Integration, and Action: Climate Change Adaptation Case Studies

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 assaily 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 scales planning efforts such as the Natural Communities Conservation Planning (NCCP) program are important models for conservation, restoration, and acquisitions efforts.

The Natural Community Conservation Planning Program

The Natural Community Conservation Planning Program (NCCP) takes a broad-based ecosystems approach to planning for the protection and enhancement 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 areas of conservation biology, including representation, connectivity, 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
Adaptation in Action:

DFG Climate Science Program highlights

- 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
1607 13th Street, Suite 202, Sacramento, CA 95811
(916) 324-5198; 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.

Methods

• Assess 156 rare plant species in California based on CCF factors:
  1. Predicted exposure to climate change
     • Use Climate Wizard data and Maxent to create climate models
  2. Climate change sensitivity
     • Direct exposure to climate change
       a. Land conversion
       b. Development
     • Species specific factors
       a. Dispersal ability
       b. Habitat restrictions
  3. Documented response to climate change
     • All emissions scenario
     • Predicted for the year 2080

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 results: highly vulnerable
• Prefers winterly moist grasslands and is dependent on a seasonal flood regime.
• Predicted climate change exposure is 2.2–2.4 ºC for half of the B. orcuttii occurrences and 2.5–2.7 ºC for the other half of the B. orcuttii occurrences (Figure 2).
• Anthropogenic barriers: Development and construction are major threats to the majority of its range 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.

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/CALCC (primary funding)
• NaturalServe (Bruce Young, Anne Frances)
• DFG (Rosanne Blizman, Todd Kester-Wolf)
• UC Davis (Robert Hjemsley, Susan Harrison, Jim Thorne, Nick Jensen, Robin Thorpe)
• California Native Plant Society (Aaron Sins)
Adaptation in Action:

DFG Climate Science Program highlights

- 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
# Climate Change Vulnerability Species Scores

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

## California Bird Species of Special Concern

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Habitat Suitability</th>
<th>Confidence</th>
<th>Food Availability</th>
<th>Extreme Weather</th>
<th>Confidence</th>
<th>Habitat Specialization</th>
<th>Confidence</th>
<th>Physiological Tolerances</th>
<th>Migratory Status</th>
<th>Dispersal Ability</th>
<th>Dispersal Ability</th>
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</thead>
<tbody>
<tr>
<td>Albert’s Tern</td>
<td>Palaearcticus melanocephalus</td>
<td>1</td>
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<td>1</td>
<td>1</td>
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<td>2</td>
<td>1</td>
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<tr>
<td>Alameda Song Sparrow</td>
<td>Melospiza melodia pudicula</td>
<td>3</td>
<td>1</td>
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<td>0</td>
<td>3</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Alaska Mew Gull</td>
<td>Lirina ferruginea</td>
<td>2</td>
<td>0.5</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0.5</td>
<td>2</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Atlantic Piping Plover</td>
<td>L. houstouni</td>
<td>2</td>
<td>0.5</td>
<td>1</td>
<td>0.5</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
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</tr>
<tr>
<td>Allen’s Hummingbird</td>
<td>Selasphorus semilimbata</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0.5</td>
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<tr>
<td>American Avocet</td>
<td>Recurvirostra avosetta</td>
<td>2</td>
<td>0.5</td>
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<td>0</td>
<td>1</td>
<td>0.5</td>
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DFG Climate Science Program highlights

- 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
  - *Climate change effects on inland fishes, mammals, and herps*
- DFG’s Going Green initiative
GOING GREEN
California Department of Fish and Game
Adaptation in Action:

*DFG Climate Science Program highlights*

- Website overhaul

- Vulnerability Assessment Resource Center

- Climate change adaptation case studies

- Climate Change Vulnerability Assessments

- DFG’s Going Green initiative

- **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
Manage Endemic and Other Priority Species Populations
SWAP, vulnerability assessments

State-wide System of Marine and Terrestrial Conservation Areas
ACE-II, Essential Habitat Connectivity Plan, land acquisition, NCCP

Creating and Maintaining Climate Change Partnerships
DFG Stakeholders, WAFWA, AFWA, LCCs, BAECCC

Integrate Climate Change into DFG Functions
CEQA, Land acquisition policy, Going Green

Manage for Enhanced Ecosystem Function
South Bay Salt Pond restoration, BDCP
Eyes on the Prize:
*DFG’s Goals for 2012*

- Maintaining and increasing partnerships
- State Wildlife Action Plan revision
- Climate Training Course
SWAP Update: Objectives

- Create a collective vision
- Incorporate cc impacts & adaptation strategies
- Update species at risk, vulnerable spp, & SGCN
- Conservation actions consistent with other agencies
SWAP Update: Key Changes

- Use of Ecoregional Boundaries
- Climate Change Adaptation Focus
- New Analytical Tools (ACE, CEHC)
- Broader Treatment of Marine & Enforcement
- Measurable Goals and Actions
- Companion Plans
SWAP Update- Next Steps

- DFG internal teams by ecoregions identified
- Open Standards Process: Defenders of Wildlife
- March: “Train the Trainers” workshop
- March: Meeting with CA Tribes
- April-Aug: Ecoregional assessments with partners
- September: Draft state wide assessment
- September: Public outreach (15)
- 2013: Final draft & companion plans
DFG Climate Training Course

- **Training course structure**
  - Monthly speakers
  - Required readings
  - Forum participation
  - Final project
## DFG Climate Course: Outcomes

<table>
<thead>
<tr>
<th>Opportunity for True Institutional Change</th>
<th>Opportunity to Foster Teamwork</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Provides a foundation of climate change knowledge for ALL staff</td>
<td></td>
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<td>- Provide tools and resources to empower staff</td>
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<tr>
<td>- Promotes general knowledge of evolving responsibilities for staff</td>
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<td>- In-house science/technical course that promotes networking across branches/regions</td>
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<tr>
<td>- Promotes networking with other partners</td>
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<tr>
<td>- Displays to senior leadership interest from staff in climate change</td>
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</tbody>
</table>
Collaborative Work Groups

1. Climate training network
2. SWAP revision science panel
3. Climate change menu
1. DFG Climate Training Course

Partner input on design & content

- Identify speakers
- Finalize content
- Identify key readings
- Design effective and engaging forum
- Design range of final project
- Promote networking with partners
1.1 Climate Training Network

- Climate change 101
  - Projections
  - Downscaling
- Climate change impact to fish and wildlife
  - Ecosystem impacts
  - Impacts in California
- Climate change communication
  - Communicating climate change to the public
2. SWAP Revision Climate Workgroup

- Stakeholder input
- Network of climate expertise to support revision
- Provide resources for ecoregional teams
- Participate directly with ecoregional teams
3. Climate Change Menu
Get it while you can-local supplies limited!

- Food is a compelling subject
- State wide-economic component
- All partners have a connection
- Opportunity to collaborate on a joint cc adaptation message
- Focus on shared objectives & collaborative actions
Sign up!
DFG Climate Change website: http://www.dfg.ca.gov/Climate_and_Energy/Climate_CHANGE/
Email: climatechange@dfg.ca.gov