



Climate Change and California's Wildlife Action Plan

Workshop Summary and Next Steps

June 13, 2008

Sacramento, CA

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Climate Change and California’s Wildlife Action Plan**

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Workshop: Scope and Purpose

California has an incredibly diverse landscape which is highly sensitive to changing trends in temperature and precipitation. A number of ecological changes have already occurred in California over the past century in concert with an increase in average temperature and changes in precipitation patterns. Further global temperature increases are expected to continue to have a wide range of impacts on California's natural resources and ecosystems.

The Department of Fish and Game (DFG) recognizes the need to be forward thinking with respect to climate change impacts on ecosystems. The DFG is committed to reducing the effects of climate change on the state's natural resources and taking action designed to mitigate these impacts and help species adapt to a changing landscape. A workshop was held in June 2008 to help the DFG begin to develop a climate change adaptation strategy for fish and wildlife that is embedded within the framework of California's Wildlife Action Plan (Action Plan).

Integrating climate change into the Action Plan is one facet of the DFG's climate change activities and this workshop was one of the first steps in initiating a discussion between staff and stakeholders. This workshop was part of a two-day event that included a seminar co-hosted by the California Energy Commission that brought together researchers with the most up to date climate change science specific to California and the practitioners within DFG who are working to implement the Action Plan. The second day, the DFG convened a small group of stakeholders and DFG staff to begin discussing how the DFG can build on existing efforts to implement the Action Plan while incorporating a climate change context into the process.

There were two main purposes to having this workshop.

1. Initiate a discussion among select DFG staff and stakeholders to solicit preliminary recommendations/ideas for how to integrate a climate change context into the Action Plan.
2. Use the ideas and recommendations generated by the group to inform the Resource Agency's effort to create a California Adaptation Strategy (CAS). The CAS will synthesize the most up-to-date information on expected climate change impacts to California for policy-makers and resource managers, provide strategies to promote resiliency to these impacts and develop implementation plans for short and long term actions.

All regions and branches of the DFG were represented at the workshop along with more than 30 NGO, state, and federal partners. Break out groups were formed based on the bioregions identified in the Action Plan and participants brainstormed on a series of questions. Specifically, each break out group was tasked with identifying those stressors, research needs, and a desired conservation response/plan for each region. Additional follow up will be required and this is only the beginning of a much longer process that will eventually be opened up to a larger group of participants.

Specific Questions

The workshop participants in the breakout groups focused on one Action Plan bioregion. They structured their discussion around two main topic areas:

Topic 1: Quantifying expected impacts caused by climate change

Within each bioregion stressors have been identified by the Action plan along with recommended regional and statewide actions to address these threats. Workshop participants reviewed this list of stressors and discussed how climate change might act synergistically to exacerbate the impact of these stressors. With these thoughts in mind, participants then looked through the Action Plan recommendations for the bioregion and the list of statewide recommended actions and identified the top 3-4 key recommendations that should be a primary focus when considering the potential risks posed by climate change.

Once they had identified their 3-4 priority recommendations, participants brainstormed the following:

- Potential/expected consequences climate change may pose to species and habitats in this bioregion and how that might inhibit the DFG's ability to implement conservation measures as currently stated in the recommendations.
- How should the agency go about assessing vulnerability and risk?
- What key concerns or issues related to climate change need to be incorporated into the language of the recommendation?
- What are some of the key research questions we will need to ask to address the impacts climate change may pose?
- Are there other climate change related impacts that are not addressed in any of the recommendations identified in the plan?

Topic 2: Estimating consequences of particular climate change impacts.

For each of the 3-4 key recommendations, participants brainstormed the level (high, medium, and low) of multiple cross-sectoral impacts (economic, social, cultural, and legal) associated with implementing the specific recommendation. Responses were qualitative and were intended to help identify areas where climate change may pose additional challenges. For example, establishing corridors may be a priority but could have economic challenges associated because of limited resources.

Workshop Outcomes

A great deal of information was collected as a result of the breakout sessions and there were many similarities among bioregions on priorities. Each group identified the major stressors from the action plan that climate change will likely exacerbate. Surprisingly, there was almost complete consensus across regions of which stressors the DFG should pay particular attention to in light of climate change. For each bioregion 3-4 priority areas were identified and ideas were recorded for how DFG might go about assessing vulnerability and risk. In addition, a substantial list of key research needs/questions that can be applied at both the bioregion and statewide scale were collected. The qualitative judgments (high-medium-low impact) on costs/challenges that climate change might pose was difficult to grasp but the groups came up with some very insightful “red flags” to consider as DFG rethinks the challenges to implementing recommended actions. Specific responses for each bioregion are detailed in the working group summaries section of this report.

There were common themes among all regions that provide a statewide perspective useful to the CAS effort. Almost all of the working groups identified similar stressors and priorities when considering potential climate change impacts to the region. In addition, each group came up with ideas for how to assess **vulnerability and risk**. Many of the suggestions will provide valuable guidance as an adaptation plan is crafted. The break out groups also identified key **research questions** related to climate change for each bioregion. Many of the research questions were site specific but others were broader in context and addressed state wide research needs and challenges.

Stressors:

Existing stressors likely to be exacerbated by climate change

1. Invasive species
2. Growth and development
 - Energy development
 - Conflicts over land protection and land use planning
 - Fragmentation
 - Corridors/connectivity
 - Agriculture and range expansion
3. Water and hydrology
 - Availability/quality
 - Diversions
 - Management conflicts
 - Temperature changes
 - Sea level rise (result of climate change)
 - Pollution and sediments
 - Fish populations passage issues
4. Ecosystem change
 - Vegetation structure/community changes
5. Fire regime changes

Assessing Vulnerability and Risk

- Establish baseline conditions:
 - Review existing information
 - Modeling to project climate change scenarios
 - Set goals using modeling results (acquisition, restorations, etc)
 - Monitor
 - Predictive/risk modeling. Run population viability analysis on protected land to identify priority areas. Follow up with monitoring.
 - Monitoring sustainability of existing water use and water quality. (Need to establish a baseline) Already in the process of climate change-now is not the baseline.
 - Identify focal species that might be indicators for climate change
 - Assess existing levels of connectivity, fragmentation, and habitat conversion.
 - Evaluate how exotics move and adapt to new locations in consequence to predicted weather changes, susceptibility to fire, etc.
- Evaluate mandates, tools, approaches, options for making decisions, public perception of activities, and outreach.
 - Engage with planning agencies on proactive measures
- More frequent and adaptive planning required.

Key Research Questions/Data Needs

Monitoring

- Establish framework for comprehensive research program combining predictive modeling and monitoring of focal species to assess changes in the ecological resources and assesses viability.
- Long term monitoring to evaluate changes in focal species
- Develop regional climate change scenarios for California relevant to the resources DFG manages.
 - Include micro-region weather data collection protocols and coordinate with other scientists at regional level to ensure repeatability and data integration.
- Need central data bank that synthesizes data for land managers. Could be in the form of 'response plans' for different scenarios. Need to easily transform data into regulatory schemes and on the ground management plans.
- Use predictive models to focus on which species are most likely to be at risk (sensitivity, likely habitat shifts, etc)
- Population studies
- Demographic studies
- Species tolerance
- Future conditions
- ID what already doing and how to modify; ID gaps on data for fish, wildlife + plants.

Connectivity

- Identify critical connections/corridors taking into account changes due to climate change. (Model change in precipitation and temperature).
 - Linkages should include heterogeneity (soil, vegetation type, elevation, latitudinal).
 - More potential to accommodate changes with more habitat variability.
 - Consideration of multiple types of corridors.
- ID places for things to move on and around DFG lands – what might wind up on Federal land?

Changes to Community Composition

- Can we predict community composition changes?
- Emphasize increasing the heterogeneity around protected areas.

Invasive Species

- Predicted response of invasive species. Need better predictive modeling and integration of climate change scenarios into invasive species management.

Water

- Distribution/longevity of surface water for wildlife
- Can we predict changes in composition and structure from precipitation and flow changes for riparian communities?

Fire

- Need data to predict likelihood of fire and model potential habitat change due to climate change where catastrophic events are possible to convert one habitat type to another.

Policy

- Re-evaluate DFG policies for population management
- Need regulatory research to see what adjustments may need to be made to address climate change. What holes exist in regulatory schemes- need to make sure climate change included in regulations.
- The term “adequate” needs to be defined-current definition may not be the case in 20 years. What will be considered sustainable?
- Wetlands habitat, focus on specific mechanisms to achieve → i.e. CEQA docs, stream alteration permit treatment on climate change

Key Strategies

- Collaboration and Cooperation: Work with federal and other management agencies, and private landowners to more effectively manage habitat and species.
- Resource Assessment and establishing a baseline
 - Use modeling to predict changes
 - Ecological
 - For acquisition priorities
- Growth and development of the human landscape
 - Protection of large, relatively unfragmented habitat areas and corridors

- Look at different ownership collectively, comprehensively, and on landscape scale across ownership boundaries
- Invasive species
- Water management conflicts
 - Allocation of surface water
- Protect sensitive species and habitats
 - Develop multi county regional restoration plans
 - Assist private landowners when possible
 - Improve habitat on private land

Examples of short and long term projects for select bioregions

Colorado Desert Region

1. Climate change accelerated increases in water demands resulting in increased salinity and degradation of aquatic habitats. Monitor changes in water availability (Colorado River, Salton Sea, and natural springs), salinity, and degradation (e.g. invasive species like tamarisk, burros) at a landscape level as it may impact focal sensitive species (e.g. bighorn sheep, desert pupfish, breeding/wintering migratory birds).
2. Establish a long-term monitoring framework of focal species and habitats (to be determined through scoping and conceptual modeling) to assess changes in ecological resources from stressors (e.g. development and recreational activity, invasive species) that may be accelerated by GCC. Develop predictive models of species distributions to examine changes over time.
3. Establish micro region weather data.

Sierra Nevada

1. Study fire and fuels treatment in riparian areas. Evaluate what treatments (including no treatment scenario) are effective in reducing fire frequency (to historic levels) and intensity. Incorporate (modeling) potential tree and vegetation composition changes (as affected by climate change).
2. Model changes in perennial streams affected by changes in snow pack and water availability to inform watershed management, water storage and releases, land acquisition, buffer sizes, and prioritize species management.
3. Establish long-term monitoring stations along gradients in the Sierra Nevadas to monitor changes in vegetation and wildlife community compositions to inform decisions and refine models over time.
4. Develop a habitat corridor analysis specifically for Sierra Nevada to determine likely "pinch points" in movement and relocation of wildlife in response to climate change.

5. Conduct risk assessments for invasions of non-native species into the Sierras and scenarios for eradication or management to minimize impacts of climate change on native species.

South Coast

1. Research (and disseminate) if there are already basic assumptions regarding CC specific to each bioregion.
2. Conduct baseline inventory of habitats and species, for future trend studies.
3. Evaluate existing conserved lands or lands available for conservation (still in habitat) within the coastal zone (coastal wetlands, maritime succulent scrub, coastal dunes, coastal bluff scrub), develop conservation strategy and pursue acquisitions or zoning changes that will increase core areas and buffers to mitigate potential effects of CC.
4. Evaluate known wildlife corridors with CC in mind, considering projected weather patterns, slopes, aspects, elevations –make recommendations for conservation/ acquisition of new and expanded linkages. Consider the role pollinators play and general seed disbursement by wildlife to better ensure an effective future corridor.
5. Evaluate existing fuel management zones at the wildland/urban interface (WUI) for effectiveness in recent 2003-2007 wildfires in southern Calif. – make recommendations as to whether more be installed or not. If installation of fuel management zones is proposed, conduct assessment of habitat loss and determine mitigation that will, hopefully, withstand future CC alterations to regional habitats.

Long-term projects/activities to address concerns:

1. Establish a seed bank of species known only to the South Coast area, collect representative samples of these narrow endemic species and those likely to be needing reintroduction or genetic augmentation if CC alterations cause breaks in current wildlife movement or type conversion. Consider collecting in habitat types that are already inadequately conserved or those that may be first to become altered by CC.
2. Partner with federal, state, local and NGO's in an acquisition strategy that includes potential (predicted) CC alterations on the landscape.

Identify strategies to promote resiliency or adaptation to identified impacts:

1. Re-assess areas in regional planning efforts to include wider buffers, wider corridors and transitional habitat that may be more resilient to changes due to CC.
2. Expand criteria for NCCP's, acquisition planning, wildlife corridors to include potential for CC. Utilize a habitat-based model for conserving percentages of

representative habitat types rather than a hard-line “preserve” based on development footprints and local jurisdictional boundaries.

3. Evaluate “species of concern” and candidate lists for various taxonomic groups, determine those species needing conservation or enhancement measures now, and implement those recommendations. These species may already be feeling the effects of CC, and hence may be declining faster than anticipated. Contingency planning, captive breeding or other mechanisms may need to be initiated if the goal is to manage and maintain sustainable populations of all species even with a worse-case CC scenario.

Next Steps

- Solicit participant input and comments on workshop outcomes. Please return comments to Amber Pairis by **December 31, 2008**
- Use workshop outcomes to inform the California Adaptation Strategy (CAS) effort coordinated by the Resource Agency.
 - DFG and State Parks are taking the lead to coordinate the Biodiversity working group and will use this information to feed into that process.
 - An initial draft of the Biodiversity sector draft report will be available for comment mid November and a public meeting is planned for **December 5** from 1-3 at the Resources Building auditorium.
- Reconvene stakeholder group (date TBD) and additional partners to discuss:
 - Regional workshops to continue to build on efforts to integrate climate change into the Action Plan.
 - Workshop/meeting to discuss shared priorities and where we might work together to start implementing projects on the ground.
 - The CAS effort and how to coordinate work of the Biodiversity sector to compliment DFG’s department wide efforts.
 - Update on other activities/efforts DFG is taking to address climate change.

Important Dates

December 5, 2008: CAS Biodiversity Sector public meeting 1-3 Resources Building auditorium

December 31, 2008: Return comments on this report to apairis@dfg.ca.gov