

Conservation Actions for a Changing Climate: State Fish and Wildlife Agencies' Perspective



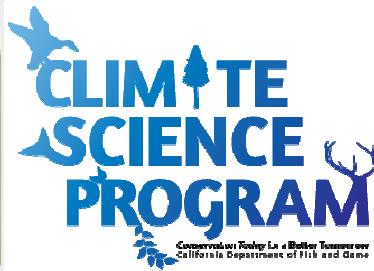
Photo courtesy of Meredith Osborne California Department of Fish and Game

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Special thanks to:



State Fish and Wildlife Agency Response to Climate Change

Collectively, state fish and wildlife agencies are taking many steps towards minimizing the negative effects of climate change on fish, wildlife, and habitats across the country. While their specific activities may vary, many agencies are pursuing a variety of climate adaptation efforts that generally include adaptation strategy development, revising and updating State Wildlife Action Plans for climate change, vulnerability assessments, and other climate-related research such as downscaling climate models for regional use. However, not all of the efforts to respond to climate change will require new approaches, new research, or new tools. Many existing conservation efforts will go a long way towards building resiliency in natural systems and help agencies to plan for and minimize the impacts of climate change on natural resources now and in the future, and in some cases may be the most important steps we can take. The purpose of this document is to provide some guidance and examples for demonstrating the importance of existing conservation activities as part of an approach to safeguard wildlife and habitats in a changing climate.

State fish and wildlife agencies have a long legacy of effectively managing natural resources, often in the face of great uncertainty. Many state fish and wildlife agencies have already begun to re-examine existing programs and projects and address the threats associated with climate change with appropriate responses. By working collaboratively and communicating about how current management actions can be adjusted and updated to include climate change, state fish and wildlife agencies will be able to demonstrate that the steps being taken today are playing a role in effectively addressing the challenges presented by climate change now and in the future. Better communication and outreach regarding the links between current conservation actions and climate adaptation and/or mitigation responses will help build confidence with the public, policymakers, and partners that state fish and wildlife agencies have the expertise and management skills to move forward with actions to address climate challenges.

Importance and Difficulty in Communicating about Climate Change

From the perspective of state fish and wildlife agencies the importance of communicating about climate change and the need to respond cannot be understated. First, by describing the challenges posed by climate change to the resources stakeholders care about, agencies can raise awareness about the conservation and management challenges facing fish and wildlife and help justify the need for resources, policy level support, and collaborative actions. And secondly, describing the steps being taken to address these issues will demonstrate that state fish and wildlife agencies are actively working on solutions to conserve the resources that so many people value.

Communication about activities and actions related to climate change requires both careful thought and delivery, especially when it comes to the fish, wildlife, and habitats about which so many people are passionate. When talking with the public about these issues, state fish and wildlife agencies are often faced with the challenge of reaching a wide variety of audiences with different backgrounds, levels of expertise, and different levels of openness to information about climate change and climate change adaptation. Additionally, climate change science itself can be inherently difficult to present. Not only is it associated with a number of uncertainties, but many of the projected climate change impacts can sound especially negative and disheartening. In addition, long-range models that are used to project impacts can result in apathy and a sense of

decreased urgency. The fact that many of the projected impacts are decades into the future can sometimes create difficulties in weighing the current value of a conservation action with future changes to the habitat condition. These barriers may at times seem insurmountable, but fortunately there are ways in which state fish and wildlife agencies can discuss climate change adaptation as a feasible and practicable exercise that is palatable to the public, policymakers, and the public.

Opportunities for Positively Communicating State Agency Efforts

One way state fish and wildlife agencies can consider presenting their climate change response activities, is to discuss existing projects in the context of their climate co-benefits or actions. These climate co-benefits can be described as those that will help state fish and wildlife agencies to anticipate and/or minimize potential negative impacts from a changing climate. For example, many current state agency projects are focused on managing for enhanced ecosystem function, which is a core tenet of conservation biology and recognized as a valuable management practice in the present. However, the on-the-ground actions associated with managing for enhanced ecosystem function will also increase the resiliency of ecosystems in the face of future climatic changes, ensuring that fish, wildlife, and habitats are better equipped to respond to climate change and that the important ecosystem services they provide are preserved.

Another opportunity for positive messaging includes those projects in which state fish and wildlife agencies attempt to reduce existing stressors to a species or habitat. For example, removing or preventing the establishment of invasive species will not only alleviate current stress on native habitat, but will support the integrity and function of the ecosystem overall and help that system buffer future impacts associated with climate change. State fish and wildlife agencies efforts to manage for endemic and priority species provide an important opportunity to showcase how management actions are incorporating climate change science. Evaluating and modifying management actions and building in adaptive management strategies will allow for appropriate adjustments to be made to help stabilize target populations in the future.

And finally, describing climate adaptation activities in the context of a risk management approach can be another way to emphasize the importance of investing in an appropriate climate response. At its most basic, the impacts of climate change can be considered as future threats to the success of our conservation objectives, or to the security of capitol assets,— such as roads and hatcheries. It is pragmatic and sound management practice to fully evaluate future climate risks when designing new projects or developing management plans in order to ensure the value of our investments over the long term.

Table I provides a sampling of examples regarding current management practices that are on track to build resiliency and preparedness for future climate change impacts on fish, wildlife, and habitats.

TABLE I: How Existing Conservation Actions Support Climate Adaptation

EXISTING ACTIVITY	HOW IT HELPS PREPARE FOR CLIMATE CHANGE	EXAMPLES OF INTEGRATING CLIMATE CHANGE CONSIDERATIONS
<i>Conservation Action: Acquisition</i>	<i>Conservation Action: Acquisition</i>	<i>Conservation Action: Acquisition</i>
Buying land for habitat conservation, species management, habitat connectivity	Buying and managing lands for enhanced ecosystem function will increase the resiliency of ecosystems in the face of future climatic changes and help to establish stable populations of imperiled species.	Incorporating concepts of corridors for species future range expansion, and focusing on landscape scale connectivity
<i>Conservation Action: Habitat and Species Restoration and Management</i>	<i>Conservation Action: Habitat and Species Restoration and Management</i>	<i>Conservation Action: Habitat and Species Restoration and Management</i>
Restore endangered species	Stable populations will be better able to withstand additional climate stressors.	Factor in future likely conditions as they affect habitat and physiology of species or their habitats
Manage seasons for game species	Stable populations will be better able to withstand additional climate stressors.	Consider issues of fish and wildlife health and changing population levels due to projected changes in temperature and precipitation (i.e. less snow, early spring melt, decrease in duration of ice cover over winter, etc)
Control invasive species	Controlling invasive species supports the integrity and function of the ecosystem overall and helps buffer against future impacts associated with climate change	Increase early detection rapid response as a higher priority
Riparian restoration	Creates more resiliency for extreme flood events, and help buffer higher water temperatures.	Increase as a priority, increase the size of buffers, ensure buffers are vegetated or forested (where appropriate), Consider securing protection for cold water seeps and springs.
Restoring Floodplain function and connectivity	Helps to mitigate impacts of extreme flood events and create buffering for low summer flows.	Integrate projections of future flows due to climate change.
<i>Conservation Action: Planning</i>		<i>Conservation Action: Planning</i>
Develop habitat conservation plans		Include climate change as part of future conditions.
Develop species management plans		Include information about species vulnerability to climate change and possible habitat shifts.

State Fish and Wildlife Agency Case Studies

State fish and wildlife agencies are already invested in many projects and programs that are helping to prepare for climate change. By putting together examples or case studies, agencies can use their stories to help communicate how existing programs and projects are helping to

protect agency investments and prepare for climate change. A central theme here is that adapting to climate change does not necessarily mean launching big new programs; it means making sure there is good data, resources and tools to enable an informed response to protect and conserve natural resource investments. The goal would then be to strategically design and prioritize existing conservation activities to increase chances for success in an uncertain future.

Below are several examples of how states are retooling themselves to think about how conservation actions taken now can be designed to plan for or minimize the impacts of climate change in the future. In addition, the California Department of Fish and Game has put together a website of **climate change case studies** that highlight existing activities related to managing for ecosystem function, working collaboratively with partners across large landscapes, managing for priority species populations, and integrating climate change into department functions that can serve as a resource for other state fish and wildlife agencies. More information at http://www.dfg.ca.gov/Climate_and_Energy/Climate_Change/Case_Studies/

California:

By linking existing funding mechanisms to projects that have climate co-benefits, the California Department of Fish and Game (DFG) is helping to focus limited resources towards conservation actions with climate considerations. For example, DFG's **land acquisition proposals** have been modified to include direct considerations of climate change. Specifically all proposals must address the potential of an area under consideration to help facilitate adaptation of species, habitats and communities to climate change. The result is a more thorough evaluation of proposed projects that clearly articulate how a proposed acquisition might facilitate adaptation to climate change to benefit conservation of fish, wildlife, and/or habitats.

Terrestrial and Marine Connectivity: The creation of a well connected sustainable system of terrestrial and marine conservation areas has been under development for many years throughout California; however, a changing climate adds additional impetus to accelerate these efforts. The success of a state-wide system of conservation areas will in part be driven by how species adapt or adjust to their surroundings and will require ongoing research and monitoring. To this end, the DFG recently completed Phase II of DFG's Areas of Conservation Emphasis (ACE-II) mapping and modeling tool that includes layers of information on biodiversity, endemism, stressors and threats (including sea level rise predictions), protected status of lands, and connectivity and corridor information that can be overlaid to contribute to setting terrestrial conservation priorities statewide. In addition, the DFG completed a collaborative process to create a state-wide system of marine reserves. Efforts are now under way to promote marine biodiversity maintenance and adaptation through adaptive management and monitoring activities, specifically efforts to establish baseline data for data-poor target species. The ACE mapping and modeling tool and establishment of marine reserves will directly support climate change adaptation planning efforts by building on and contributing to efforts to identify a network of sustainable, well connected conservation areas within California's borders, an effort long underway in the state.

Florida:

The Florida Fish and Wildlife Conservation Commission (FWC) has partnered with Defenders of Wildlife (Defenders) to develop new strategies to integrate climate change adaptation into many levels of conservation planning within the agency. Utilizing funding provided through a State Wildlife Grant, the Defenders project aims to integrate climate change adaptation planning into

the State Wildlife Action Plan (SWAP) as well as other agency planning processes. The project has two major components. The first objective is to draft a high-level climate change adaptation guidance document that synthesizes available climate change information and develops adaptation strategies. The guidance document will inventory FWC's information on climate change impacts and vulnerability of priority species and habitats, identify existing informational gaps, and make recommendations for future research and technical product development. Defenders will provide recommendations on how to integrate climate change impacts and vulnerability into a decision-making process that can be applied across agency efforts, including the SWAP. The second and more 'on the ground' component of the effort is to develop three pilot projects, occurring on differing levels of FWC's management planning, that actually integrate the guidance from the adaptation document into specific adaptation actions implemented in the field. The pilots will target planning at the species specific level, at the habitat level, and at the management area level. The aim of these pilots is to capitalize on existing planning processes as a vehicle for implementing climate change adaptation strategies in order to showcase the benefits (and lessons learned) of implementing these strategies in concert with existing species management.

Hawaii:

The Hawaii Department of Land and Natural Resources Division of Forestry and Wildlife is making great strides in thinking about how to integrate climate change into their existing conservation activities in order to address a new suite of current and future challenges associated with climate change. For example, habitat restoration activities have been an important part of the Department's conservation efforts but now with emerging threats associated with climate change they are starting to target and increase dry and mesic forest habitat restoration to mitigate impacts of mosquito-borne diseases as they move into higher elevation with warming trends. Restoration of these forests will also help offset loss of habitat associated with sea level rise, since existing seabird habitat protection efforts on offshore islets is being expanded to include increased protection for larger main island habitats. In addition, existing fire suppression efforts are being re-thought and new management goals are being expanded to include fire management planning for larger areas as fire regimes change.

Kentucky:

The Kentucky Department of Fish and Wildlife Resources (KDFWR) has completed a stand-alone Action Plan to Respond to Climate Change in Kentucky. Kentucky's climate change strategy is one of resilience, not resistance. Instead of resisting the impacts of climate change by reacting to model-driven predictions, KDFWR has adopted strategies of increasing resilience through direct actions which will increase the probability that species and habitats of conservation concern will adapt to impacts of climate change throughout Kentucky. A project-level example of the implementation of this plan is a project in the Licking River watershed designed to increase fish and mussel passage in a high priority aquatic conservation area. KDFWR replaced a low-water ford in a top tier mussel conservation area to restore the original flow of an important watershed, and facilitate passage for dozens of mussel and fish species of greatest conservation need, including several federally endangered species. Kentucky has 20 federally listed mussel species and 46 mussel species of greatest conservation need. By increasing fish and mussel passage in high priority areas, KDFWR aims to mitigate future

threats, including climate change. Conserving and restoring functioning ecosystems in Kentucky will facilitate fish and wildlife adaptation to climate change stressors.

Massachusetts:

BioMap2 identifies critical land protection and stewardship priorities to help conserve the biodiversity of Massachusetts over the long term. Habitat loss and fragmentation are well understood as significant threats to biodiversity; in recent years, understanding of climate change and its potential to dramatically affect biodiversity has increased substantially. In addition to habitat loss, fragmentation, and climate change, ecosystems and organisms are threatened by invasive species, pollution, and altered ecosystem processes. *BioMap2* is designed to inform strategic land protection to enhance overall ecological resistance and resilience, critical components of biodiversity conservation in the face of these perils.

A variety of emerging strategies, collectively termed Climate Change Adaptation, are designed to help ecosystems and populations cope with the adverse impacts of climate change. *BioMap2* incorporates a suite of these strategies to promote resistance and resilience of plant and animal populations and ecosystems, and to assist anticipated transformations caused by climate change and other stressors. *BioMap2* uses the following strategies to impart resistance and resilience to species habitats, natural communities, and ecosystems.

- Prioritizes habitats, natural communities, and ecosystems of sufficient size
- Selects habitats, natural communities, and ecosystems that support ecological processes
- Builds connectivity into habitats and ecosystems
- Represents a diversity of species, natural communities, ecosystems, and ecological settings

Michigan:

Michigan's climate is changing and wildlife management in Michigan is changing as well. Michigan Department of Natural Resources (MI DNR) is currently assessing vulnerability of public trust species both game and Species of Greatest Conservation Need (SGCN). These vulnerability assessments will inform revisions of both game and SGCN conservation plans. In addition to climate specific considerations, MI DNR is also looking at integrating climate projections into existing research efforts. For example, Snowshoe hare are important recreationally and ecologically in Michigan and hare populations have been declining as the quality of both snowfall and habitat has been deteriorating. A recent collaborative study with MSU, the Sault Ste Marie Tribe, and the MI DNR is seeking to tease apart the causes of that decline. In addition, many managers have already begun changing how they manage resources based on local knowledge of the climate and their resources. For example, during recent mild winters, early spring mowing has been shifting to winter, when impacts to nesting birds and reptiles could better be avoided.

Utah:

The Utah Division of Wildlife Resources (UDWR) is leveraging ongoing conservation activities into climate change adaptation. Maintaining and restoring wildlife habitats have long been an integral component of UDWR's conservation efforts. UDWR is a major partner in the Utah Watershed Restoration Initiative, which is a partner-based, habitat-focused initiative that should

increase ecosystem resilience and resistance to climate change. UDWR managers believe that actively and aggressively reducing habitat degradation and fragmentation will help wildlife withstand or adapt to current and future climate change impacts. For example, UDWR is focusing habitat restoration efforts on large-scale projects in sagebrush-steppe, riparian, and aspen habitats. Since 2005, this partnership has restored 778,000 acres at a cost of \$76 million. Activities have included invasive weed (e.g., cheatgrass, Russian olive, tamarisk, and knapweed) management, removal of encroaching conifers, grazing management improvements, and projects that improve stream channel sinuosity and stream connectivity.

Washington:

The Washington Department of Fish and Wildlife recognizes that much of the agency's existing and ongoing conservation work will help in creating greater resiliency to projected impacts from climate change. For example, stream and coastal habitat restoration activities are intended largely to restore natural fluvial processes and reconnect floodplains, create new water storage and attenuate the effects of extreme flood or storm events, all of which will help to buffer these systems to projected climate impacts. Part of our challenge now is to integrate future climatic conditions into the selection and design of these restoration activities in order that they will provide maximum benefit as the climate changes. This challenge includes both a science component, to identify spatially explicit changes in sea level and hydrology and how those changes will affect species we manage, as well as policy changes to ensure climate considerations are built into our prioritization and design processes. A vulnerability assessment project is also underway to assess which characteristics of coastal and freshwater habitats make them more sensitive to climate change impacts, and which are likely to be more resilient, and may potentially serve as refugia for cold water dependent salmonids. The policy and management component includes efforts to integrate climate considerations into technical assistance, guidance and funding that supports restoration. A comprehensive guidance document for practitioners on [stream habitat restoration](#) was recently completed, and now includes a chapter on climate change. The agency also manages a grant program to fund nearshore restoration, and is exploring specific criteria related to climate and sea level rise in the proposal. For more information see http://wdfw.wa.gov/conservation/climate_change/.

Demonstrating Leadership and Innovation on Climate Challenges

Collectively state fish and wildlife agencies are taking many steps towards minimizing the negative effects of climate change on fish, wildlife, and habitats, and ensuring that agency investments will continue to provide value over time. The purpose of this document is to provide some examples of programs underway in several states that highlight the climate co-benefits of current management actions. Through targeted outreach and communication to the public, partners, and policymakers, state fish and wildlife agencies will be better positioned to articulate and demonstrate how the actions they are taking now will better prepare the state for the present and future challenges presented by climate change. Using messaging and outreach tools which clearly articulate the links between conservation management and preparing for climate change, state fish and wildlife agencies have the opportunity to turn what could be interpreted as a no win situation into one where they are demonstrating great leadership and innovation. In addition, more effective communication not only builds confidence in state fish and wildlife agencies actions but should help attract the support and resources necessary to fulfill their stewardship responsibilities.