

## Conclusion

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An Adaptive Conservation Strategy facilitates “learning by doing” and “learning by sharing information,” both of which are science-based. Adaptive management at the site-specific level constitutes “learning by doing.” The development of species, habitat, or ecosystem Adaptive Conservation Plans (ACPs) constitute “learning by sharing information.” The goals of an Adaptive Conservation Plan tend to be general and overarching (for example “promote self-sustaining, functioning riparian ecosystems”)—yet they can only be achieved through a multitude of individual on-the-ground projects that are monitored, assessed, and evaluated at the site-specific project level. An Adaptive Conservation Strategy constitutes a very large feedback loop between site-specific projects and many conservation practitioners with similar interests. Findings from individual projects inform ACPs, while recommendations contained in the ACPs inform management plans that guide the stewardship of natural areas.



Red-breasted Sapsucker Photo by Eric Preston.

The crucial components of a successful Adaptive Conservation Strategy (ACS) are collaboration, team work at the project level, keeping data current, information sharing, effective communication, flexibility (from all sides, including funders), and a results-oriented applied focus in monitoring, research, and management. The ACS has, to date, been based on the use of birds as indicators. Continuing research is needed to evaluate and refine our understanding of which bird species are the most accurate indicators of which elements of ecosystem integrity. It is fair to ask, however, whether the ACS process might also be applied in the field using other taxa as indicators (for example, bats or invertebrates). This is an area ripe for future investigation.

Natural resource management is an unpredictable process.

For this very reason, conservation scientists have an unswerving belief in the power of objective scientific measurement to provide one of the best means for guiding conservation action. Yet managers are often overwhelmed by immediate problems: everything from controversies among conflicting user-groups to exotic species that threaten years of restoration investment to mysterious new plant and animal pathogens. It can be easy, at times, for managers to overlook the important role of science in achieving long-term conservation goals—whether through science partnerships or through participation in research themselves. For their part, conservation scientists must constantly make an effort to reach out to land and ocean managers to ensure that the results of monitoring and research efforts will be relevant and useful in addressing key resource management issues. Both conservation scientists and natural resource managers ultimately serve the same mission: facilitating and advancing successful, cost-effective conservation of our precious natural heritage. An Adaptive Conservation Strategy provides a win-win approach for achieving this mission.

## **Appendix I. Adaptive Conservation Strategy Partners**

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### Non-governmental Organizations

American Farmland Trust  
 American Bird Conservancy  
 Cache Creek Conservancy  
 California Association of Winegrape Growers  
 California Audubon  
 California Cattleman's Association  
 California Coastal Conservancy  
 California Farm Bureau Federation  
 California Native Grass Association  
 California Native Plant Society  
 California Oak Foundation  
 California Waterfowl Association  
 Center for Ecoliteracy  
 Central Valley Bird Club  
 David and Lucile Packard Foundation  
 Ducks Unlimited  
 Environmental Defense?  
 Friends Of Corte Madera Creek  
 Gateway to Lake Isabella Wetlands Project  
 Institute for Bird Populations  
 Island Conservation Ecology Group  
 Mountains Conservancy Trust  
 Mono Lake Committee  
 National Audubon Society  
 National Fish and Wildlife Foundation  
 Natural Resources Defense Council  
 North Bay Riparian Station  
 Sacramento River Discovery Center  
 Sacramento River Partners  
 San Francisco Bay Bird Observatory  
 Santa Cruz Bird Club  
 Santa Monica Mountains Conservancy  
 School Environmental Education Docents (SEED)  
 Scripps Research Institute  
 Sequoia Riverlands Trust  
 Solano Farmlands and Open Space Foundation

Southern Sierra Research Station  
 The Bay Institute Center For Ecoliteracy  
 The Nature Conservancy  
 Trust for Public Lands/  
 Wildlands Project  
 Wildlife Conservation Board  
 Wildlife Conservation Society  
 Youth Conservation Corps

### Private Organizations

California North Coast Grape Growers Association  
 California Association of Winegrape Growers  
 California Prune Growers  
 Certified Rangeland Managers  
 California Rice Commission  
 Ecosystem Sciences  
 Hansen Biological Consulting  
 Hedgerow Farms  
 H.T. Harvey & Associates  
 Jones and Stokes Inc.  
 McBain and Trush Associates  
 Napa Valley Vintners Association  
 Prunuske Chatham Inc.  
 Registered Professional Foresters  
 Sea Ranch  
 Sonoma County Vintners Association  
 Sonoma Grape Growers  
 Wetland Concepts  
 Wine Institute

### University Organizations

California State University-Chico  
 Cornell University - Department of Ecology and Evolutionary Biology  
 Integrated Hardwood Range Management Program, University of California (UC)  
 Hastings Natural History Reservation, UC

Berkeley  
 International Center for the Environment,  
 UC Davis  
 San Francisco State University, Center for  
 Tropical Research  
 UC Cooperative Extension (UC-Berkeley,  
 UC-Davis).  
 UC Davis  
 UC White Mountain Research Station –  
 Eastern Sierra Institute for Collaborative  
 Education

City Governments

City of Chico  
 City of Los Angeles Department of Water  
 and Power  
 City of Santa Cruz

County Organizations

Bonnelli Park  
 William Heise Park  
 East Bay Regional Parks  
 Environmental Education Council of Marin  
 Marin County Resource Conservation  
 District  
 Marin County Storm water Pollution  
 Prevention Program (MCSTOPP)  
 Marin Municipal Water District  
 Mono County  
 Napa County Planning Board  
 Santa Cruz County Parks  
 Solano County Farmlands and Open Space  
 Foundation  
 Sonoma County Agricultural Preservation  
 and Open Space District  
 Topanga Conservation District

State of California Organizations

Ano Nuevo State Park  
 Bolsa Chica Ecological Preserve  
 California Department of Fish and Game  
 California Department of Forestry and Fire  
 Protection

California Department of Water Resources  
 California Department of State Parks and  
 Reserves  
 California State Water Resources Control  
 Board  
 Caswell State Park  
 Chino Hills State Park  
 Crystal Cove State Park  
 Daley Ranch  
 Grasslands Water District  
 Gray Lodge Wildlife Area  
 Grizzly Island Wildlife Area  
 Los Banos Wildlife Area  
 McGinty Mountain  
 Mendota Wildlife Area  
 Mono Lake Tufa State Reserve  
 Woodson Bridge State Ecological Reserve  
 Resource Conservation Districts  
 State Lands Commission  
 State Park System in California  
 Upper Butte Basin Wildlife Area  
 Wildlife Conservation Board  
 Yolo Bypass Wildlife Area

Other State Organizations

Oregon Department of Fish and Wildlife  
 Washington Department of Fish and  
 Wildlife

Federal Organizations

Alcatraz Island  
 Boardman Naval Weapons Testing  
 Facility  
 Bureau of Land Management  
 Bureau of Reclamation  
 California Coastal National Monument  
 Camp Pendleton  
 Channel Islands National Marine  
 Sanctuary (NMS)  
 Channel Islands National Park  
 Cordell Banks NMS  
 Department of Defense  
 Don Edwards San Francisco Bay NWR  
 Farallones National Wildlife Refuge

Golden Gate National Recreation Area  
 Gulf of the Farallones NMS  
 Kern National Wildlife Refuge (NWR)  
 Marine Corps Mountain Warfare Training  
 Center  
 Monterey Bay NMS  
 Point Reyes National Seashore  
 National Park Service  
 Natural Resource Conservation Service  
 Naval Air Station, Alameda (closed)  
 NOAA Fisheries (formerly National Marine  
 Fisheries Service)  
 NOAA National Marine Sanctuaries  
 Partners for Wildlife Program  
 Point Mugu (Navy)  
 Redwoods National Park  
 Sacramento NWR Complex  
 Salinas River NWR  
 San Clemente Island  
 San Francisco Bay NWR Complex  
 San Luis NWR Complex  
 Seal Beach NWR  
 Stone Lakes NWR  
 Sweetwater NWR  
 USDA Forest Service  
 US Fish and Wildlife Service  
 US Geological Survey  
 US Navy  
 US Shorebird Conservation Plan  
 Vandenberg Air Force Base

Museums

California Academy of Science  
 LA County Natural History Museum  
 Museum of Vertebrate Zoology, UC  
 Berkeley  
 San Diego Natural History Museum  
 San Bernardino County Natural History  
 Museum

Canada Department of Fisheries and  
 Oceans  
 Canadian Wildlife Service  
 CISESE (Mexico)  
 North American Waterbird Conservation  
 Plan  
 North American Waterfowl Management  
 Plan  
 Partners In Flight

Consortia

Bay-Delta Science Consortium  
 California Cooperative Oceanic Fisheries  
 Investigations (CalCOFI)  
 California Oak Mortality Task Force  
 Central Valley Habitat Joint Venture  
 Cosumnes River Project  
 Intermountain West Joint Venture  
 Pacific Coast Joint Venture  
 Riparian Habitat Joint Venture  
 San Francisco Bay Joint Venture  
 Sonoran Joint Venture  
 South Bay Salt Pond Restoration Project  
 (San Francisco Bay)  
 U.S. Shorebird Conservation Plan  
 Western Hemisphere Shorebird Reserve  
 Network

International Organizations

## **Appendix 2. List of Adaptive Conservation Plans Applicable to California**

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The following plans were developed to guide habitat conservation, under the auspices of three of the four continental bird conservation plans (as of May 2003).

### Partners in Flight

*Coastal Shrub and Chaparral Bird Conservation Plan*

*Coniferous Forest Bird Conservation Plan*

*Desert Bird Conservation Plan (in process)*

*Grassland Bird Conservation Plan*

*Oak Woodland Bird Conservation Plan*

*Riparian Bird Conservation Plan*

*Sagebrush Bird Conservation Plan (in process)*

*Sierra Nevada Bird Conservation Plan*

### U.S. Shorebird Conservation Plan

*Southern Pacific Shorebird Conservation Plan*

### North American Waterbird Conservation Plan

*California Current Marine Bird Adaptive Conservation Plan (in process)*

(PRBO has also participated in the development of the *Conservation Strategy for Landbirds in the Columbia Plateau of Eastern Oregon and Washington.*)

NOTE: All plans are available for download as PDF files at [www.prbo.org](http://www.prbo.org), link “conservation planning.”

## **Appendix 3. How to Create an Adaptive Conservation Plan**

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An Adaptive Conservation Strategy (Fig. 1) can be conceptualized as a giant feedback loop between two separate iterative cycles: (1) the site-specific adaptive management cycle, where monitoring data are collected and adaptive conservation plan recommendations are implemented, and (2) the plan cycle, which develops Adaptive Conservation Plans (ACPs) that cover a region containing many site-specific projects and their associated data (as distinguished from site-specific management plans).

While adaptive management is a decades-old concept, the Adaptive Conservation Plan has been developed and refined over the past dozen years or more. This Appendix addresses the detailed steps that have been successfully used to collaboratively develop ACPs based on results from adaptively managed conservation projects. (Note: see chapter 1 for references cited here.)

**The steps in developing an Adaptive Conservation Plan are:**

- a. **Synthesize findings** from multiple adaptively managed projects.
- b. **Develop a written/on-line Adaptive Conservation Plan** focused on the ecosystem or habitat of interest. The plan incorporates findings from step a, as well as peer-reviewed literature, gray literature, and expert opinion. Conservation plans advance recommendations to guide resource management and policy.
- c. **Disseminate and incorporate plan recommendations** into resource management and/or policy by partnering with or conducting outreach to appropriate audiences and sites.
- d. **Iteratively reassess and revise** both site-specific resource management plans/practices and Adaptive Conservation Plans.

The philosophy underlying the Adaptive Conservation Planning process is that in the realm of natural resource management, where action is almost always necessary with imperfect knowledge, it makes sense to maximize and make use of what we do know and build from there. Therefore, the Adaptive Conservation Planning process begins by assessing the “state-of-the-science” knowledge concerning birds and their habitats. Planning is also a successful process for partnering between scientists and land or ocean managers—both governmental and private—to develop conservation goals, monitor actions in support of those goals, and evaluate progress in meeting them.

### **Step a: Synthesize findings from multiple adaptively managed projects.**

The ACP process begins with an exercise designed to collect, synthesize, and articulate the current state of scientific knowledge concerning the conservation of a given species, habitat type, or ecosystem. By definition, this process includes the participation of as many as possible of the key management agencies and researchers with expertise and experience in the topic of interest.

- Recruit key experts to participate in development of relevant information on a species, habitat, conservation issue, or threat. Through their experience and knowledge of the gray literature, experts capture much of the knowledge from projects that have been adaptively managed (that is, they have access to the data collected at the project level.) Analyze and interpret data to inform project management and share in the ACP.

For example, Bird Conservation Plans developed by California Partners in Flight use a suite of focal species created by identifying focal habitats, and then selecting those species associated with important habitat elements or ecosystem attributes, as well as those species with special conservation needs. Thus, a suite of species was chosen whose requirements define different spatial attributes, habitat characteristics, and management regimes representative of a healthy system. This process resulted in a diverse list of focal species for each habitat that includes both common and uncommon or rare species.

Partners participate in developing focal species accounts, derived from both scientific and gray literature, which differ from other species accounts (such as *The Birds of North America* series) in that they focus on species-specific conservation priorities<sup>10</sup>. When employing focal species accounts, include detailed information on species' ecological requirements. Also emphasize key conservation concerns (such as declining populations); identification of stresses and related threats (such as habitat fragmentation contributing to increased predation or parasitism, resulting in low nest success); and management, monitoring, research, policy, and education priorities. For a description of the use of focal species in Conservation Planning, see Chase and Geupel (in press)<sup>5</sup>.

- Collaborate and include a wide range of participants. In addition to thoroughness, inclusiveness also facilitates “buy-in” to the plan and engenders support for ongoing action to implement and test recommendations. Peer review of the process also occurs when participants review one another’s work products.
- Fundraise for the costs of plan participation in order to foster participation from a wide range of collaborators. (This practice has allowed PRBO to contract with various partners in the development of species accounts and the plan itself.)
- Seek to submit the completed plan for peer review. For example, a review of the Riparian Bird Conservation Plan was published in *Western Birds* in 2001, which validated the value of the plan in tightening the link between science and “on-the-ground” management, and which called for greater transparency in showing assumptions upon which management recommendations are based to aid in generating hypotheses for testing through adaptive management<sup>10</sup>.

### **Step b: Develop a Written/On-line Adaptive Conservation Plan**

This step results in a written product: the Adaptive Conservation Plan (abbreviated ACP; some plans are called bird conservation plans or BCPs). The plan includes both analysis and synthesis of information developed for focal species and other issues in Step I. A key facet of Adaptive Conservation Planning, however, is that the plan is available online and is updated regularly, incorporating the latest data, new findings and, at times, new analyses. Thus ACPs are dynamic “living” documents, reflecting the reality of the systems they seek to conserve.

- Subsequent to completion of the species accounts and other background information, hold a meeting of all participants in the ACP process to synthesize information, incorporate expert opinion, and conduct peer review.
- Develop a set of shared conservation priorities or goals. These priorities may include specific objectives for bird species, populations, or habitats as well as an emphasis on recommended land or ocean management practices to address identified stresses and threats.
- Identify assumptions and gaps in current understanding. Assumptions serve as hypotheses that can then be tested through implementation “on-the-ground” (at the project level). In this way, ACPs provide decision-makers and conservation initiatives with biological assumptions (models) in a timely manner, and these can be tested with ongoing monitoring<sup>9</sup>.
- Designate a lead author whose job it is to further synthesize the data and information compiled in steps 1 and 2.
- Develop conservation recommendations for land or ocean managers that are designed to improve habitat conditions for wildlife, with an emphasis on current and novel information.

### **Step c. Disseminate and Incorporate Plan Recommendations**

This step is crucial to the ACP’s function as a means of “sharing learning.” ACPs contain a wide variety of useful, often hands-on management, monitoring, and research recommendations that will benefit not only birds but also many other wildlife species. Despite the fact that these plans are available online, it takes time and a certain overcoming of inertia to ensure their adoption and widespread use by resource management agencies. ACP conservation recommendations can also improve the delivery of conservation through funding programs, both private and public (see Chapter 1, “Programmatic/Policy Applications of ACPs”).

- Ensure adequate funding for both ACP plan printing and creation of CDs. Share these with key individuals and organizations. Above all, ensure access to the plan online!
- At the project level, the intent is that land or ocean managers seek to implement conservation and management recommendations from applicable ACPs.
- Collaborate with appropriate participants in the ACP development process to craft an outreach strategy appropriate to each resource management agency. For example, a key goal should be to incorporate ACP recommendations into resource management plans—as they are created or updated—at the local, state and federal levels. This may most effectively be accomplished through personal presentations and question & answer sessions. Presentations should seek to highlight information in the ACPs of most relevance to the agency/staff in question.
- Summarize, synthesize, and communicate scientific assessments and conservation recommendations to management agencies, conservation funders, local policy makers, local resource conservation advocates, and the public. This can be accomplished through a variety of means: sharing the ACP itself, media coverage, list-serves, etc.

- Work to improve conservation funding programs by ensuring that appropriate ACP recommendations are incorporated into program funding criteria.
- Work to improve conservation policies and laws by sharing appropriate ACP recommendations with lawmakers and their staff.
- Consider the goal of strengthening the citizen constituency for conservation and management of critical wildlife habitats by communicating conservation science priorities to the public.

#### **Step d: Iteratively reassess and revise ACPs and site-specific management plans**

Step d constitutes the feedback loop in the ACP process. As such, its purpose is to incorporate new or updated information and data into existing ACPs. Such data may take the form of expanded geographic coverage, greater understanding of a particular species or stress, or information concerning bird response to specific plan recommendations that have been implemented in the field. This step ensures that the ACP will remain a living document. The long-term emphasis is on revising conservation recommendations to ensure their efficacy and applicability.

- Track and incorporate new data available as a result of wildlife monitoring at the project level.
- Pool data in a central location to facilitate analysis.
- Analyze data (on bird species occurrence, reproduction, diversity, abundance, and survival) contributed from many sources.
- Revise plan recommendations and assumptions, as needed, based on results.
- Add focal species as necessary. For plans developed using a subset of focal bird species to define overall ecological requirements, the focal species list should (1) be directly linked to the defined conservation objectives and (2) include species that make good indicators for monitoring the results of management action.

#### **Appendix 4 References**

Please consult the references cited for Chapter I.

## Appendix 4. Case Study Interview Questions

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### PRBO Conservation Science: “Developing and Implementing an Adaptive Conservation Strategy”

#### Case Study Questions for Partners

1. Please provide your full name, title, address and telephone number, and a few salient facts about your position within your current agency and PRBO (for example, what is your role; how long have you been in this position; how did you begin working with PRBO?).
2. Could you tell me in your own words why you initially were interested in working with PRBO and what you believe have been the benefits to conservation?
3. Have any management changes occurred or management plans been developed as a direct or indirect result of PRBO monitoring data and management recommendations? Why or why not?
4. Would you be willing to provide a quote or two about your agency’s relationship with PRBO and the value of that relationship to conservation?
5. In your mind, what are some of the incentives/advantages to other organizations (government and non-governmental) to work with PRBO? What are some of the disincentives/disadvantages?
6. If PRBO wanted to create incentives to encourage agency feedback concerning how bird data and management recommendations are used or incorporated into official resource management planning or policy documents, what would you recommend?
7. If you could choose one area in which PRBO or your agency’s relationship with PRBO could improve, what would it be?
8. Anything else to add?

## Appendix 5. Glossary of Terms and Acronyms

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**ACP** – Adaptive Conservation Plan, a species, habitat, or ecosystem conservation plan, which pools data from many projects to develop conservation recommendations for practitioners at both the project and program levels. One of the two elements of an Adaptive Conservation Strategy (sometimes titled “Bird Conservation Plan.”)

**ACS** – Adaptive Conservation Strategy; a conservation approach that consists of Adaptive Management at the site-specific level and, in addition, Adaptive Conservation Plans that provide a systematic means of synthesizing data, sharing learning, and influencing policy

**adaptive management** – a decades-old method of natural resource management that integrates design, management, and monitoring to systematically test assumptions in order to adapt and learn.

**agency** – a government organization or department at the local, state, or federal level with jurisdiction over natural resources (such as the USDA Forest Service or the California Department of Fish and Game).

**BLM** – U.S. Bureau of Land Management

**CalPIF** – California Partners In Flight

**conservation management** – any natural resource management undertaken for the purpose of conserving biodiversity, wildlife, landscapes, natural processes, ecosystems, or habitats. Conservation management is thus distinguished from, but often intertwined with, other types of natural resource management, such as commodity production or recreation management.

**conservation scientist** – a scientist trained to conduct monitoring or research of relevance to practitioners.

**focal species** – a group of species selected to represent the range of ecological ? within an ecosystem.

**FWS** – U.S. Fish and Wildlife Service

**manager** – one who manages natural resource projects or programs for conservation purposes; steward.

**NABCI** – North American Bird Conservation Initiative

**NRCS** – Natural Resources Conservation Service

**partner** – any organization or individual working as part of a team with one or more others in pursuit of common conservation objectives; partners usually bring some level of their own project support to an endeavor.

**PIF** – Partners In Flight

**PRBO** – PRBO Conservation Science (originally established as Point Reyes Bird Observatory)

**practitioner** – manager; conservation scientist.

**science organization** – an organization whose mission is to use the scientific method to produce data and recommendations that will further natural resource conservation

**team** – a set of individuals with complementary expertise, often from various organizations, working collaboratively and interdependently toward specific conservation goals.

**USFS** – USDA Forest Service