Contents

Executive Summary

In 2000, Congress enacted the State Wildlife Grants Program to support state programs that broadly benefit wildlife and habitats but particularly "species of greatest conservation need." As a requirement for receiving funding under this program, state wildlife agencies were to have submitted a Wildlife Action Plan (comprehensive wildlife conservation strategy) to the U.S. Fish and Wildlife Service in 2005. The California Department of Fish and Game (Fish and Game), working in partnership with the Wildlife Health Center, University of California, Davis, directed the development of this report, *California Wildlife: Conservation Challenges*, the state's Wildlife Action Plan, and associated Web publications.

California Wildlife: Conservation Challenges is directed at answering three primary questions:

- What are the species and habitats of greatest conservation need?
- What are the major stressors affecting California's native wildlife and habitats?
- What are the actions needed to restore and conserve California's wildlife, thereby reducing the likelihood that more species will approach the condition of threatened or endangered?

California's Natural Diversity

California is the wildlife state. Its diverse topography and climate have given rise to a remarkable diversity of habitats and a correspondingly diverse array of both plant and

animal species. California has more species than any other state in the United States and also has the greatest number of endemic species—species that occur nowhere else in the world (CDFG 2003). Wildlife provides significant economic benefits to the state through recreation, tourism, and commercial harvest. Many of the places where wildlife thrives are often the same as those valued for recreation and other human activities. By learning what threatens the state's wildlife and the steps that can be taken to reduce those threats, California's residents have the opportunity to become more active stewards of this precious resource, ensuring that the Golden State remains the wildlife state for generations to come.

Species at Risk

One of the elements of developing a wildlife action plan is to identify and compile information on species of wildlife, including low and declining populations, that are indicative of the diversity and health of the state's wildlife. Fish and Game has chosen to use the Special Animals List, which it maintains and updates within the California Natural Diversity Database (CNDDB). This list is also referred to as the list of "species at risk" or "special status species," and it includes vertebrates and invertebrates. The special status species are diverse, and they inhabit the varied ecosystems across the state. Many of the special status species have been identified as **species of special concern*** due to their low or declining numbers.

Included in the associated Web publication of this report is the Wildlife Species Matrix consisting of all wildlife **taxa** (species and subspecies) on the California Department of Fish and Game's Special Animals List. This special status species list includes 140 birds, 127 mammals, 102 fishes, 43 reptiles, 40 amphibians, and 365 invertebrates. Of these, 13 birds, 69 mammals, 19 reptiles, 22 amphibians, 46 fish, and 312 invertebrates are endemic to the state; these taxa are indicated in the matrix with an asterisk.

Threats to Wildlife Diversity in California

The regional chapters describe the problems and threats that may adversely affect wildlife and their habitats (see map facing page 1 for regional divisions). These threats are termed "stressors." In each region of the state, there are multiple stressors to wildlife and habitats, operating alone and in combination. A number of these stressors are common to the entire state or to several different regions. The scope and effects of the most widespread stressors are briefly described on the facing page. More in-depth discussion of these stressors and their roles in each region can be found in the regional chapters.

* Terms in boldface are defined in the glossary.

Major Wildlife Stressors Identified by Region

Mojave Desert

- Multiple uses conflicting with wildlife on public lands
- Growth and development
- Groundwater overdrafting and loss of riparian habitat
- Inappropriate off-road vehicle use
- Excessive livestock grazing
- Excessive burro and horse grazing
- Invasive plants
- Military land management conflicts
- Mining operations

Colorado Desert

- Water management conflicts and water transfer impacts
- Inappropriate off-road vehicle use
- Loss and degradation of dune habitats
  - Disruption of sand transport processes
  - Invasive plant species
  - Inappropriate off-road vehicle use
- Growth and development
- Invasive species

South Coast

- Growth and development
- Water management conflicts and degradation of aquatic ecosystems
- Invasive species
- Altered fire regimes
- Recreational pressures

Central Coast

- Growth and development
- Intensive agriculture
- Excessive livestock grazing
- Water management conflicts and degradation of aquatic ecosystems
- Recreational pressures
- Invasive species

North Coast–Klamath

- Water management conflicts
- Instream gravel mining
- Forest management conflicts
- Altered fire regimes
- Agriculture and urban development
- Excessive livestock grazing
- Invasive species

Modoc Plateau

- Excessive livestock grazing
- Excessive feral horse grazing
- Altered fire regimes
- Western juniper expansion
- Invasive plants
- Forest management conflicts
- Water management conflicts and degradation of aquatic ecosystems

Sierra Nevada and Cascades

Stressors affecting upland habitats

- Growth and land development
- Forest management conflicts
- Altered fire regimes
- Excessive livestock grazing
- Invasive plants
- Recreational pressures
- Climate change

Stressors affecting aquatic and riparian habitats

- Water diversions and dams
- Watershed fragmentation and fish barriers
- Hydropower project operations
- Excessive livestock grazing
- Water diversion from the Owens Valley
- Introduced non-native fish

Central Valley and Bay-Delta

- Growth and development (including urban, residential, and agricultural)
- Water management conflicts and reduced water for wildlife
- Water pollution
- Invasive species
- Climate change

Marine Region

- Overfishing
- Degradation of marine habitat
- Invasive species
- Pollution
- Human disturbance

Growth and development, water management conflicts, **invasive** species, and climate change each have major consequences for species, **ecosystems**, and **habitats** in every region of the state.

A number of other stressors also recur in multiple regions. Excessive livestock grazing, either in sensitive habitats or grazing of too many animals or for too long a grazing period, significantly affects wildlife habitats in the Mojave Desert, Central Coast, North Coast–Klamath, Modoc Plateau, and Sierra Nevada and Cascades regions. Forest management conflicts represent a major stressor in the North Coast–Klamath, Modoc Plateau, and Sierra Nevada and Cascades regions. Altered **fire regimes** were identified as major stressors in the South Coast, North Coast–Klamath, Modoc Plateau, and Sierra Nevada and Cascades regions. Pollution and urban or agricultural runoff were identified as major stressors in the South Coast, Central Coast, Central Valley and Bay-Delta, and Marine regions. Recreational pressures and human disturbance are issues in the Mojave Desert, Colorado Desert, South Coast, Central Coast, Sierra Nevada and Cascades, and Marine regions.

The stressors that affect wildlife, and the conservation actions needed to address them and restore and conserve ecosystems and wildlife populations, were analyzed in each region of the state. While some stressors are significant in only a few regions, others are pervasive across the state. Similarly, some conservation actions are important for a few regions, while other conservation actions are needed throughout the state or are more appropriately implemented through a statewide program. This chapter describes recommended statewide conservation actions.

Recommended Statewide Conservation Actions

Conservation actions were considered for each region, based on the stressors and circumstances in each. Statewide conservation actions are those actions that are important across most or all regions. The following are recommended statewide conservation actions:

a. The state should develop policies and incentives to facilitate better integration of wildlife conservation considerations into local and regional planning and land-use decision-making.

b. Permitting agencies, county planners, and land management agencies should work to ensure that infrastructure development projects are designed and sited to avoid harmful effects on sensitive species and habitats.

c. The state should develop policies and incentives to better integrate wildlife conservation into state and regional transportation planning. Wildlife considerations need to be incorporated early in the transportation planning process.

d. State and federal agencies should work with cities and counties to secure sensitive habitats and key habitat linkages.

e. State and local agencies should allocate sufficient water for ecosystem uses and wildlife needs when planning for and meeting regional water supply needs.

f. Federal, state, and local agencies should provide greater resources and coordinate efforts to control existing occurrences of invasive species and to prevent new introductions.

g. Federal, state, and local agencies and nongovernmental conservation organizations, working with private landowners and public land managers, should expand efforts to restore and conserve riparian communities.

h. Federal, state, and local agencies and nongovernmental organizations, working with private landowners, should expand efforts to implement agricultural and rangeland management practices that are compatible with wildlife and habitat conservation.

i. In their conservation planning and ecosystem restoration work, state and federal wildlife agencies and land managers should consider the most current projections regarding the effects of global warming.

j. Both state and federal governments should give greater priority to wildlife and natural resources conservation education.

k. The state should strengthen its capacity to implement conservation actions and to assist local agencies and landowners with planning and implementation of wildlife and habitat restoration and conservation efforts.

Recommended Region-Specific Conservation Actions

Implementing the statewide conservation actions and the region-specific conservation actions is necessary to restore and conserve ecosystems and wildlife populations. **For fuller discussion of recommended region-specific conservation actions, see Section 4 in each of the regional chapters.**

Mojave Desert Region

a. Improve stewardship on federally managed lands to protect wildlife diversity.

b. Stabilize groundwater levels and recharge depleted sub-basins of the Mojave River Basin, restoring groundwater to levels that support riparian habitat.

c. Stabilize groundwater levels and secure wet habitats in the Amargosa River Basin. This action will help protect the endangered Amargosa vole and the Amargosa pupfish, among other species.

d. Provide maximum federal and state protection for remaining riparian, spring, seep, and wetland habitats, and restore degraded riparian, spring, seep, and wetland areas.

e. The Bureau of Land Management should improve, and, upon approval, implement the West Mojave Plan with conservation measures to address all special status species and to maintain wildlife diversity.

f. Reduce off-road vehicle damage to wildlife habitats.

g. Federal, state, and local agencies should provide greater resources and coordinate efforts to eradicate or control existing occurrences of invasive species and to prevent new introductions.

h. Fully implement the recovery plans for the Mojave tui chub, Amargosa vole, and Inyo California towhee.

i. Fish and Game, BLM, and the three military bases that support the Mohave ground squirrel should develop a collaborative conservation and recovery strategy for the Mohave ground squirrel so that federal listing is not necessary.

Colorado Desert Region

a. Federal, state, and local agencies, along with nongovernmental conservation organizations, should work together to reach agreement upon and fund a restoration plan for the Salton Sea.

b. Federal and state wildlife agencies should work to ensure that environmental impacts resulting from water transfers (both those permitted under the Quantification Settlement Agreement [QSA] and any future transfers) are mitigated and that the related habitat conservation plans are fully implemented.

c. Federal and state wildlife agencies, water management agencies, and nongovernmental conservation organizations should develop and invest in restoration and protection efforts for the Salton Sea, the Colorado River delta, and other regional wildlife habitats.

d. Wildlife agency staff developing the Imperial Valley Habitat Conservation Plan, working with Imperial County planners and nongovernmental conservation organizations, should identify and protect critical avian habitats in southern Imperial County.

e. The Bureau of Land Management, working with state and federal wildlife agencies and nongovernmental conservation organizations, should protect and restore biologically significant habitats in the Algodones Dunes.

f. State and federal agencies and nongovernmental partners should collaborate to develop a comprehensive Southern California Outdoor Recreation Program (for the South Coast and Colorado Desert regions) to provide recreational opportunities and access that do not conflict with wildlife habitat needs. Areas for intensive recreational access and off-road vehicle use should be developed on the least-sensitive public lands in order to direct pressures away from sensitive habitats.

g. Federal, state, and local agencies and nongovernmental conservation organizations should work to protect and restore biologically significant habitats in the Coachella Valley.

h. Nongovernmental conservation organizations should continue to work to protect important wildlife habitat areas.

i. Permitting agencies, county and local planners, and land management agencies should work to ensure that infrastructure development projects are designed and sited to avoid harmful effects on sensitive species and habitats.

j. Federal, state, and local agencies should work with nongovernmental organizations to provide greater resources to eradicate or control and to limit introductions of invasive species in the region.

South Coast Region

a. Wildlife agencies and local governments should work to improve the development and implementation of regional Natural Community Conservation Plans (NCCPs), which is the primary process to conserve habitat and species in the region's rapidly urbanizing areas.

b. Wildlife agencies should establish regional goals for species and habitat protection and work with city, county, and state agency land-use planning processes to accomplish those goals.

c. Federal, state, local agencies, and private conservancies should safeguard and build upon Camp Pendleton's contribution to the regional network of conservation lands. Similarly, protect habitats on lands adjacent to the Marine Corps Air Station Miramar.

d. To address regional habitat fragmentation, federal, state, and local agencies, along with nongovernmental conservation organizations, should support the protection of the priority wildlands linkages identified by the South Coast Missing Linkages project.

e. Federal, state, and local agencies, along with nongovernmental conservation organizations, should protect and restore the best remaining examples of coastal wetlands that provide important wildlife habitat.

f. Public agencies and nongovernmental conservation organizations should invest in efforts to protect and restore the best remaining regional examples of ecologically intact river systems.

g. Federal, state, and local agencies should provide greater resources and coordinate efforts to eradicate or control existing occurrences of invasive species and to prevent new introductions.

h. Federal, state, and local public agencies should sufficiently protect sensitive species and important wildlife habitats on their lands and should be adequately funded and staffed to do so.

i. Federal and state agencies and nongovernmental partners should collaborate to institute appropriate fire management policies and practices to restore the ecological integrity of the region's ecosystems while minimizing loss of property and life.

j. The state should coordinate the development of a model ordinance and building codes for new or expanding communities in fire-adapted landscapes to make those communities more fire compatible and reduce the state's liability for fire suppression.

k. State and federal wildlife agencies, the U.S. Forest Service, state and county parks, BLM, and nongovernmental partners should collaborate to develop a comprehensive Southern California Outdoor Recreation Program to provide recreational opportunities and access that do not conflict with wildlife habitat needs.

Central Coast Region

a. Wildlife agencies should establish regional goals for species and habitat protection and work with city, county, and state agency land-use planning processes to accomplish those goals.

b. Federal, state, and local agencies, along with nongovernmental organizations, should work with private landowners and land managers to implement agricultural and rangeland management practices that are compatible with wildlife and habitat conservation.

c. Federal, state, and local agencies, along with nongovernmental organizations, should work with private landowners to both continue and develop programs that help keep grazing-land uses profitable.

d. Federal, state, and local agencies, along with nongovernmental conservation organizations, should work to protect large, relatively unfragmented habitat areas, wildlife corridors, and underprotected ecological community types.

e. Federal, state, and local public agencies should sufficiently protect sensitive species and important wildlife habitats on their lands.

f. Federal, state, and local agencies should work to restore fish passage in aquatic systems important for anadromous and wide-ranging fish populations.

g. State and local agencies should allocate sufficient water for ecosystem uses when planning for and meeting regional water supply needs. Providing adequate water for wildlife and instream uses is particularly important in systems that support sensitive species or important habitat areas.

h. State and federal agencies should work to protect and restore biologically significant regional river systems.

i. Federal, state, and local agencies should provide greater resources and coordinate efforts to control existing occurrences of invasive species and prevent new introductions.

North Coast–Klamath Region

a. For regional river systems where insufficient or altered flow regimes limit populations of salmon, steelhead, and other sensitive aquatic species, federal and state agencies and other stakeholders should work to increase instream flows and to replicate natural seasonal flow regimes.

b. Federal, state, and local agencies and private landowners should work to restore fish passage in aquatic systems important for anadromous and wide-ranging fish populations.

c. Through the Federal Energy Regulatory Commission (FERC) relicensing process, the state should pursue changes in operations of hydropower projects to provide more water for aquatic species and ecosystems and require that flows be managed to approximate natural flow regime.

d. Fish and Game should continue fisheries restoration and watershed assessment efforts.

e. Fish and Game should work to complete and implement recovery strategies and plans for listed species and develop and implement statewide or regionwide recovery plans to benefit multiple species.

f. Where historical or active gravel mining has had substantial effects on river systems that are important for sensitive aquatic species, federal, state, and local agencies should continue

monitoring and restoration efforts to minimize the negative effects of mining. Active mining operations should employ the most ecologically sensitive practices possible.

g. Public forest lands should be managed to maintain healthy ecosystems and wildlife diversity. State and federal forest and wildlife managers should work cooperatively to develop a vision for future forest conditions.

h. On public lands, post-fire and post-harvest treatments and forest management should be designed to achieve the principles listed in Action g, above.

i. Federal and state agencies should work to understand the natural fire regimes of different ecosystems and how the ecological role of wildfire can be replicated with prescribed fire and other forest management practices.

j. State and federal forest and wildlife managers should work cooperatively with private landowners and timber companies to develop timber-harvest cumulative-impact standards for watersheds in the North Coast–Klamath Region to protect ecosystem health and wildlife habitat.

k. State and federal agencies should work with private forestry operators and landowners to implement forest management practices that are compatible with wildlife and habitat conservation.

l. The state should coordinate the development of a model ordinance and building codes for new or expanding communities in fire-adapted landscapes to make those communities more fire compatible and reduce the state's liability for fire suppression.

m. Federal, state, and local agencies and nongovernmental organizations should work with regional landowners to develop and implement agricultural and rangeland management practices that are compatible with wildlife and habitat conservation.

n. Federal, state, and local agencies should provide greater resources and coordinate efforts to eradicate or control existing occurrences of invasive species and to prevent new introductions.

o. Federal, state, and local agencies, nongovernmental conservation organizations, and private landowners should protect and restore underprotected and sensitive habitat types such as riparian forests and coastal dunes.

Modoc Plateau Region

a. Federal land management agencies should more effectively manage forest, shrub, aspen, meadow, and riparian habitat to enhance ecosystems and conditions for wildlife.

b. Federal land management agencies should implement modifications to grazing management on public lands that are conducive to recovery of key habitats for restoring and conserving wildlife.

c. The Bureau of Land Management should update the Resource Management Plans (RMPs) to include provisions to restore and conserve wildlife diversity.

d. Feral horse numbers should be maintained at levels that meet the constraints imposed by law, and funds should be provided for BLM and the Forest Service to meet the standards in place for the protection of meadows and riparian areas.

e. The Cooperative Sagebrush Steppe Restoration Initiative and the National Resource Conservation Service (NRCS) should design juniper-removal projects to benefit wildlife diversity and ecosystem health.

f. Public forest lands should be managed to maintain healthy ecosystems and wildlife diversity, including thinning to restore diverse habitats and reduce the risk of catastrophic wildfire. State and federal forest managers and wildlife agencies should work cooperatively to develop a vision for the future forest condition.

g. Regarding forest management conservation actions, see Conservation Actions d, e, f, and g in Chapter 13, Sierra Nevada and Cascades Region.

h. Land management and wildlife agencies and conservation nongovernmental organizations should develop an aquatic multispecies conservation plan for the Pit River watershed.

Sierra Nevada and Cascades Region

a. The state should provide scientific and planning assistance and financial incentives to local governments to develop and implement regional multispecies conservation plans for all of the rapidly developing areas of the Sierra Nevada and Cascades.

b. The Sierra Nevada Conservancy should develop a program, closely coordinated with federal, state, and local wildlife conservation planning efforts, that prioritizes areas for acquisition and easements based on the needs of wildlife.

c. In areas where substantial development is projected, the state and federal land management and wildlife agencies should identify and protect from development those critical wildlife migration or dispersal corridors that cross ownership boundaries and county jurisdictions.

d. Public forest lands should be managed to maintain healthy ecosystems and wildlife diversity, including thinning to restore diverse habitats and reduce the risk of catastrophic

wildfire. State and federal forest managers and wildlife agencies should work cooperatively to develop a vision for the future forest condition.

e. On public lands, post-fire and post-harvest treatments and forest management should be designed to achieve the principles listed in Action d.

f. State and federal forest managers and state and federal wildlife managers should cooperatively develop timber-harvest cumulative-impact standards for each watershed or group of adjacent watersheds of the Sierra, Cascades, and Modoc regions to protect aquatic ecosystems and conserve wildlife habitat.

g. The California Resources Agency should coordinate the development of a model ordinance and building codes for new or expanding communities in fire-adapted landscapes to make those communities more fire compatible and reduce the state's liability for fire suppression.

h. Federal, state, and local agencies and fire-safe councils should work cooperatively to expand the use of prescribed fire and natural-burn programs.

i. State and federal wildlife agencies and federal land managers should jointly develop and implement grazing strategies for the Sierra Nevada and Cascades Region to reduce or eliminate livestock grazing on sensitive habitats to restore the condition of meadow, riparian, aspen, and aquatic habitats.

j. Federal, state, and local agencies should provide greater resources and coordinate efforts to eradicate or control existing occurrences of invasive species and to prevent new introductions.

k. In their conservation planning and ecosystem restoration work, state and federal wildlife agencies and land managers should consider the most current projections regarding the effects of global warming.

l. Fish and Game should be allocated the resources to monitor and enforce the distribution of sensitive fish and other aquatic species populations and to engage effectively in water-rights decision processes, water diversion issues, land-management planning, and conservation planning actions to restore and enhance aquatic systems.

m. Through the Federal Energy Regulatory Commission relicensing process, the state should pursue changes in operations of hydropower projects that will provide more water for wildlife, mandate that water flows be managed as close to natural flow regimes as possible, and ensure that the new license agreements provide the best possible conditions for ecosystems and wildlife.

n. The state, Inyo County, and the city of Los Angeles should fully implement the Lower Owens River Project (LORP), restoring riparian and aquatic habitat along 62 miles of the lower Owens River.

o. The city of Los Angeles should reach long-term agreement with Inyo County and the state to use shallow flooding to control dust on the Owens Lake lakebed.

p. Fish and Game should establish trout-free sub-basins and lakes across the high Sierra and Cascades to restore amphibians and other native species while concurrently improving trout fisheries in other lakes.

q. Fish and Game and the U.S. Fish and Wildlife Service should seek an agreement with the Los Angeles Department of Water and Power (LADWP) to establish Owens pupfish and Owens tui chub in springs and creeks of the Owens Valley on LADWP lands as part of a strategy to recover these two endangered fish and ensure their long-term survival.

Central Valley and Bay-Delta Region

a. The California Resources Agency, Fish and Game, the U.S. Fish and Wildlife Service, public land managing agencies, and local governments need to develop multicounty regional habitat conservation and restoration plans.

b. While numerous private landowners are leaders in conservation, Fish and Game, the U.S. Fish and Wildlife Service, the USDA Natural Resources Conservation Service, and local resource conservation districts need to improve conservation and restoration on private lands by assisting private landowners.

c. Public land managers need to continue improving wildlife habitat for a variety of species on public lands.

d. Public agencies and private organizations need to work with the San Francisco Bay Joint Venture to protect and restore tidal habitats and baylands in San Francisco Bay.

e. Public agencies and private organizations need to collaboratively protect and restore habitat connectivity along major rivers in the Central Valley.

f. Public agencies and private organizations need to collaboratively protect and restore upland linkages among protected areas in the San Joaquin Valley.

g. Public agencies and private organizations need to collaboratively protect and restore lowland linkages in San Francisco Bay.

h. Public agencies and private organizations need to collaboratively protect upland linkages and reduce the risk of habitat isolation in the eastern and northern San Francisco Bay area.

i. Water management agencies need to secure dependable and adequate amounts and quality of water for wildlife.

j. Water management agencies need to reestablish and maintain more natural river flows, flooding patterns, water temperatures, and salinity conditions to support wildlife species and habitats.

k. Water management agencies need to restore gravel supply in sediment-starved rivers downstream of reservoirs to maintain functional riverine habitats.

l. Public agencies and private organizations should protect, restore, and improve water-dependent habitats (including wetland, riparian, and estuarine) throughout the region. Design of these actions should factor in the likely effects of accelerated climate change.

m. Water management agencies, state and federal wildlife agencies, and other public agencies and private organizations need to collaboratively improve fish passage by removing or modifying barriers to upstream habitat.

n. To support healthy aquatic ecosystems, public agencies and private organizations, in collaboration with the California Bay-Delta Authority, need to improve and maintain water quality in the major river systems of this region.

o. Regional water quality boards, in collaboration with other public agencies and private organizations, need to improve and maintain water quality in streams and tidal waters of San Francisco Bay.

p. Fish and Game should expand funding and coordinate efforts to prevent the establishment of invasive species and to reduce the damage caused by established invasive species.

q. State and federal agencies should expand law enforcement funding and staffing and coordinate efforts to enforce regulations to prevent the degradation of rivers and streams and to detect, prevent and take actions to protect water quality.

Marine Region

a. The state should fully implement the Marine Life Management Act to ensure that marine fisheries and the marine ecosystem are managed sustainably.

b. The state should move forward in implementing the Marine Life Protection Act by establishing a network of marine protected areas.

c. The state should secure Tidelands Revenues for implementation of the California Ocean Protection Act.

d. The state should increase efforts to restore coastal watersheds.

e. The state should adopt a "no net loss" policy for critical marine habitat.

f. The federal and state resource agencies should expand efforts to eradicate introduced predators from all seabird colonies.

g. The state should systematically review and monitor the distribution and abundance of nonharvested marine fish and invertebrates.

h. Federal and state resource agencies and institutions should foster and facilitate interstate collaborative research on marine species whose ranges cross jurisdictional boundaries.

Monitoring and Adaptive Management

Natural communities, ecosystems, species population dynamics, and the effects of stressors on the environment are inherently complex. Wildlife and resource managers often are called upon to implement conservation strategies or actions based upon limited scientific information and despite considerable uncertainties. Adaptive management is a key element of implementing effective conservation programs. Adaptive management combines data from monitoring species and natural systems with new information from management and targeted studies to continually assess the effectiveness of, and adjust and improve, conservation actions.

Some conservation actions recommended in this Wildlife Action Plan may be assessed adequately simply by monitoring a few environmental variables. At the other extreme, a regional multispecies conservation effort requires a major long-term comprehensive monitoring program. Chapter 5 summarizes current monitoring programs and addresses the steps and considerations needed to design a monitoring program in an adaptive management context. Chapter 5 also provides a process for establishing the monitoring program for each recommended conservation action.

Strengthening California's Conservation Capabilities

California needs to strengthen its wildlife resource assessment and conservation planning capabilities. The state also needs to dedicate greater and more reliable funding for wildlife conservation. These three conservation elements are addressed in Chapter 6.

Development of the Wildlife Action Plan

Project staff conducted regional reviews, organized scoping meetings and workshops, gathered digital data sets and prepared GIS maps, compiled information regarding over 800 species at risk and prepared associated range maps, and surveyed wildlife research and monitoring efforts throughout the state. Based on this work, the project staff prepared this report and its affiliated Web publications (available on the Web at http://www.dfg.ca.gov/habitats/wdp/index.html).