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STATE WILDLIFE ACTION PLANS: SHAPING NATIONAL FISH & WILDLIFE CONSERVATION

ASSOCIATION OF FISH AND WILDLIFE AGENCIES

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www.wildlifeactionplans.org

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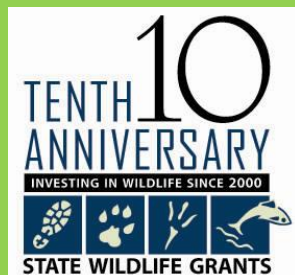
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Executive Summary

State Wildlife Action Plans—A Significant Achievement for Wildlife Conservation

In 2001, Congress charged each state and territory with developing a statewide Comprehensive Wildlife Conservation Strategy (State Wildlife Action Plan) in order to strategically invest federal funds provided through the Wildlife Conservation and Restoration Program and the State Wildlife Grants Program. The goal of State Wildlife Action Plans is to conserve fish and wildlife and their vital habitats proactively before they become more rare and costly to restore.

By October 2005, all states and territories completed their Wildlife Action Plans and submitted them to the National Advisory and Acceptance Team for review. Each plan was ultimately approved by the Director of the US Fish and Wildlife Service. This was an historic accomplishment for our national conservation community. Collectively, the plans identified more than 12,000 species of greatest conservation need, their habitats, key threats, and the actions needed to conserve wildlife.

State Wildlife Action Plans used the best scientific information available and involved thousands of the nation's experts on fish and wildlife conservation. States drew on the expertise of federal, state, and local agencies, as well as private conservation organizations and citizens including farmers, ranchers, and business owners. Viewed as a whole, these plans lay out what is needed to prevent future endangered species listings and to keep common species common. The plans provide the constructs for a national program for conserving the nation's fish and wildlife.

Identifying Conservation Challenges and Actions

Individual plans identified conservation challenges, needed actions and opportunities at the state level. The purpose of this report is to identify common priorities that can be used to guide national conservation work. An independent consultant gathered information—now distilled into this report—via several methods: a survey of state fish and wildlife agencies, a review of the State Wildlife Action Plans, and discussions with state Wildlife Diversity Program Managers and State Wildlife Action Plan Coordinators to determine common priorities contained within State Wildlife Action Plans.

This report identifies the following as the top 10 national challenges to conserving the nation's at-risk fish and wildlife:

- **Habitat loss due to residential, commercial, and industrial development**
- **Habitat loss from ecosystem modifications, such as fire suppression**
- **Impaired water quality**
- **Habitat conversion for agriculture, aquaculture, forestry, and mining**
- **Data gaps**
- **Introduction and spread of invasive species**
- **Collection and illegal harvest**
- **Human intrusion and disturbance**
- **Climate change impacts on fish, wildlife, and their habitats**
- **Insufficient conservation funding and capacity**

Insufficient funding and capacity for conservation work is a near universal barrier that is inhibiting full implementation of State Wildlife Action Plans. In addition, the lack of comprehensive baseline information makes it difficult for agencies to assess the status and trends of species and habitats, and to carry out adaptive management.

In addition to defining conservation challenges, State Wildlife Action Plans identified conservation actions needed to conserve species of greatest conservation need. These actions are being implemented on a state-by-state basis, but added efficiency and effectiveness could result with improved coordination at regional and national levels. State Wildlife Action Plans identified the following management and protection practices as priorities by the states:

- **Provide private landowners with technical assistance and incentives to voluntarily conserve species and their habitats.**
- **Disseminate information from State Wildlife Action Plans to land-use planners and other decision-makers at the local, state, and national levels, and provide expert advice on how to integrate the plans into new and existing programs.**
- **Prevent the introduction of new invasive, non-native species and track and control existing ones.**
- **Use partnerships that result in collaborative, stakeholder-based approaches to solving problems associated with fish, wildlife, and their habitats.**
- **Develop effective education and outreach programs that reconnect people with the natural world and engage them in active conservation of fish, wildlife, and their habitats.**

By building on the foundation of the State Wildlife Action Plans, the potential exists to bring wildlife conservation more effectively into the national arena with decision-making processes that fully support the implementation of wildlife management across the country. This report identifies the need for national analysis, outlines the top 10 threats to wildlife that are common across the states, and provides recommendations for specific actions to address each of those threats in an effort to help make comprehensive fish and wildlife conservation a national reality.

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Many Plans, Many Partners: Clear, Common Targets

The impetus for historic State Wildlife Action Plans had its origins in the Fish and Wildlife Conservation Act passed by Congress in 1980. The Act authorized but never appropriated funding to states to help them develop and implement plans focused on nongame species conservation. After a decade of inaction, the Association of Fish and Wildlife Agencies launched the Teaming With Wildlife Initiative in the early 1990's. The purpose of the coalition was to advocate for funding to the states and expand an existing state-federal-private partnership to conserve the full array of fish and wildlife. The initiative included the formation of the Teaming With Wildlife Coalition that currently includes more than 6,300 organizations and businesses representing millions of birdwatchers, hunters, anglers, hikers, campers and other conservationists who support the goal of restoring and conserving our nation's fish and wildlife resources.

For more than two decades, the coalition has tirelessly championed the cause for dedicated federal funding to keep fish and wildlife from becoming endangered. The coalition's work led to the passage of the Wildlife Conservation and Restoration Program and the State Wildlife Grants Program in 2000. As a requirement of these programs, Congress charged each state and territory with developing a "comprehensive wildlife conservation strategy,"—also known as a State Wildlife Action Plan—that evaluated fish and wildlife conservation needs and threats and outlined necessary action steps.

The development of Wildlife Action Plans in every state and territory was an enormous undertaking and an historic accomplishment. Funding for the planning process became available through the Wildlife Conservation and Restoration Program and State and Tribal Wildlife Grants Program in 2001; prior to this funding, most states lacked the resources needed to do comprehensive planning for at-risk fish and wildlife. The planning process was an unparalleled success that brought together thousands of public and private participants. The result was that for the first time in conservation history, the nation had coast-to-coast coverage of fish and wildlife conservation planning.

A key strength of the plans was that each could be designed to take into account the specific needs of a state. Although Congress laid out eight required elements (Table 1), states were given discretion to address the elements in a manner that met individual state needs. For example, states were allowed to develop their own criteria for the designation of species of greatest conservation need and key habitats. Although state fish and wildlife agencies took the lead in developing State Wildlife Action Plans, implementation of the plans requires broad collaboration with partners.

Table 1. Eight elements required by Congress to be included in State Wildlife Action Plans.

- (1) Information on the distribution and abundance of species of wildlife, including low and declining populations as the state fish and wildlife agency deems appropriate, that are indicative of the diversity and health of the state's wildlife; and,
- (2) Descriptions of extent and condition of habitats and community types essential to conservation of species identified in (1); and,
- (3) Descriptions of problems which may adversely affect species identified in (1) or their habitats, and priority research and survey efforts needed to identify factors which may assist in restoration and improved conservation of these species and habitats; and,
- (4) Descriptions of conservation actions proposed to conserve the identified species and habitats and priorities for implementing such actions; and,
- (5) Proposed plans for monitoring species identified in (1) and their habitats, for monitoring the effectiveness of the conservation actions proposed in (4), and for adapting these conservation actions to respond appropriately to new information or changing conditions; and,
- (6) Descriptions of procedures to review the plan at intervals not to exceed ten years; and,
- (7) Plans for coordinating the development, implementation, review, and revision of the plan with federal, state, and local agencies and Indian tribes that manage significant land and water areas within the state or administer programs that significantly affect the conservation of identified species and habitats.
- (8) Broad public participation is an essential element of developing and implementing these plans, the projects that are carried out while these plans are developed, and the species of greatest conservation need.

Before State Wildlife Action Plans were developed, each state had a patchwork of plans to guide certain aspects of wildlife conservation. **Wildlife Action Plans have become a unifying force to help states more clearly define key species, habitats, threats, and actions needed, improving the efficiency and effectiveness of conservation work.** Although there are still many other species and habitat plans—and indeed, a need for them—these plans informed State Wildlife Action Plans and now share a common implementation focus with them.

This project examined the plans from a national perspective to help inform the larger fish and wildlife conservation community of key priorities to at-risk species. This report identifies the need for national analysis, outlines the top 10 threats to wildlife that are common across the states, and provides recommendations for specific actions to address each of those threats in an effort to help make comprehensive fish and wildlife conservation a national reality. This report focused on the following questions:

- What key issues are shared by states and which of these issues and challenges can be better addressed via coordination at a regional or national scale?
- How can coordination be improved and resources leveraged to address these issues at a landscape scale?
- What are the shared conservation actions that can address these issues and challenges?

Putting the Pieces Together

Collecting and Analyzing Information from 56 Wildlife Action Plans

This report distills the voluminous expertise and data from 56 State Wildlife Action Plans to define a set of top challenges facing wildlife conservation and determine what opportunities exist to most effectively address them. These are presented at the broadest level to provide a nationwide overview.

Throughout the report, examples of success stories from various states and regions provide concrete examples of strategies that could be replicated in other states and help shape a national fish and wildlife conservation program.

Each state or territory took a different approach to creating its Wildlife Action Plan, and the strategic program plans and conservation designs that emerged are diverse. As a result, knitting the 56 very different plan approaches together in a meaningful way posed a daunting challenge. In 2006, an independent consultant gathered information—now distilled into this report—via several methods: a survey of state fish and wildlife agencies, a review of the State Wildlife Action Plans, and consultation with state agency staff to identify top priorities contained within their respective plans.

Identifying Common, Recurring Themes

Although every state had distinct, local challenges, the overall, underlying conservation problems were similar. Certain groups of species such as anadromous fish, freshwater mussels, grassland-associated birds, bats, amphibians, and reptiles are more at-risk than other groups. In addition, certain habitat types such as coastal beach systems, virgin forests, native grasslands, caves, etc. are also more vulnerable than other habitat types. For many species like invertebrates, there is a lack of sufficient status information to even determine their level of risk. Top threats were strikingly similar regionally and nationwide and reflected the pressures of the growing human footprint on our nation's lands and waters. Most impressive were the similarities amongst states in addressing these seemingly overwhelming challenges.

Each State Wildlife Action Plan presented a clear vision and the strategies that need to be implemented to reverse the decline of species. There was, however, also an overriding recognition that the task at hand required a broader momentum: that an expanded “fellowship of doers,” as Teddy Roosevelt coined it—or new alliances and partnerships with a wider group of partners and land-users alike—was needed to loft a comprehensive conservation program.

This common vision permeates the rest of this document and calls for actions from many individuals and partners, coordinated with and through state fish and wildlife agencies as clearinghouses. In order to maintain our nation's wildlife heritage, the needs of wildlife must be woven into the very fabric of our land use planning and decision-making. Recognition and understanding that fish and wildlife are critical puzzle pieces and indicators of the health of our land and water systems, and therefore human health, should be foremost on our nation's agenda for a stronger, more viable ecology, economy, and national legacy.

Key Habitat and Wildlife Concepts

The United States harbors a remarkable diversity of natural communities and land cover types, from Arctic tundra in Alaska to subtropical forest in the Florida Keys, and from the lush temperate rainforests of the Pacific Northwest to the inhospitable salt flats of Death Valley and the Great Basin. Across this vast and varied land, certain natural communities—including riverine habitats, coastal bays, estuaries, native grasslands, wetlands, caves, springs, and cool temperate and unfragmented forests—have been identified by multiple State Wildlife Action Plans as having particular importance to wildlife species. Many of these habitats areas are currently experiencing pressure from stresses and threats discussed in the National Challenges, Targets, and Action Opportunities section of this report.

Each of the State Wildlife Action Plans also includes a list of “Species of Greatest Conservation Need”—wildlife species that are currently of highest conservation priority in that state. Each state followed a rigorous process to compile the most current and best available data on these species. Across the country, states utilized ongoing regional and national collaborative efforts, such as key bird conservation programs like the North American Bird Conservation Initiative, Partners in Flight, Joint Ventures, and the North American Waterfowl Plan. Similar broad-scale plans and programs were used for other taxa, like Partners for Amphibian and Reptile Conservation for herpetofauna. Numerous working groups and expert committees were employed for mammals, like the Northeast and Southeast Bat Working Groups. American Fisheries Society's fish and freshwater mussel expertise and lists were used, as well as the National Marine Fisheries Service and Coastal Fisheries Commissions. Lists of species were compiled using data from state natural heritage programs and NatureServe, Partners in Flight, the Xerces Society, the World Conservation Union, and from other sources.

National Challenges, Targets, and Action Opportunities

Investing Now for American Wildlife and Natural Resources

State Wildlife Action Plans not only identify challenges to declining fish and wildlife, but also serve as a report card on the health of our nation's ecosystems. During the last century there have been unprecedented changes to our forests, prairies, deserts, wetlands, and ocean habitats. These impacts have had a deleterious effect on fish and wildlife and also on the ecosystem services upon which society depends. Action is needed now to invest in conserving remaining fish and wildlife habitats and in on-the-ground restoration work that can mitigate past damage. By investing now, we can not only prevent future endangered species listings, but also ensure that other public benefits such as clean water and air can be assured for the benefit of future generations.

Although regulatory programs play an important role in wildlife conservation, State Wildlife Action Plans emphasize voluntary approaches that are incentivized. Implementing voluntary conservation actions that prevent future species from becoming endangered is more cost effective, less controversial, and can result in less economic hardship.

Key Challenges to Wildlife and Opportunities for Action and Partnerships

Each State Wildlife Action Plan lays out key challenges and actions needed to conserve fish and wildlife. One of the strengths of the plans is that each reflects the ecological, economic, and social setting of its respective state. A conservation action that is appropriate in California may not be practical in South Carolina. Nonetheless, the plans presented many key challenges and conservation actions that are similar across regions and the nation. The following sections identify these common key themes and opportunities for action to address them.

1) Habitat Loss due to Residential, Commercial, and Industrial Development

The expanding human population and its footprint on the land and water alter the natural habitats of many once-common wildlife species.

Success Story: Assisting Private Landowners to Conserve Vital Wildlife Habitat in Pennsylvania

Working with private landowners to protect the Commonwealth's wildlife is a priority in Pennsylvania's Wildlife Action Plan. **Private property comprises more than 85% of the Commonwealth's land area, so focusing attention on these habitats can provide far-reaching and long-term conservation benefits.** Through State Wildlife Grants and other funding sources, the Pennsylvania Game Commission and Pennsylvania Fish and Boat Commission are providing technical assistance to private landowners to make their properties more attractive for fish and wildlife of conservation concern. Thus far, biologists have helped more than 380 landowners develop habitat management plans for more than 71,000 acres of prime private property. **Working with landowners to establish permanent conservation easements is another important approach to protecting critical habitats.** Private lands programs such as these help to slow the state's ongoing decline in habitat quality and loss of wildlife habitat, benefiting wildlife before recovery becomes more difficult and costly.

Success Story: Conserving Wildlife Habitat for Virginia's Great Dismal Swamp

Virginia's Wildlife Action Plan identifies habitat loss, fragmentation, and degradation caused by human development as the most serious threats to wildlife in the state. **Using State Wildlife Grants and other funding, the Virginia Department of Game and Inland Fisheries purchased 3,800 acres in southeastern Virginia to create the Cavalier Wildlife Management Area.** This continues public and private efforts to safeguard the Great Dismal Swamp, which once covered more than 3,600 square miles. The area provides habitat for more than a hundred different neotropical migratory bird species and many other wildlife species. Plantings of Atlantic White Cedar and Long-leaf Pine at Cavalier would expand these important habitats for many species found only in this part of Virginia. **As Virginia's communities grow, this effort will help the state fulfill its responsibility to conserve wildlife and the places they live for future generations.**

As our population and standard of living have increased, so has our impact on fish, wildlife, and their habitats. Our footprint for housing and commercial development has resulted in the loss of millions of acres of native habitat, impacting countless species. Not all wildlife has been affected equally. Some species like White-tailed Deer and Canada Geese have adapted well to most urban environments and have proliferated. Others that require specialized or large blocks of habitat like Salt Creek Tiger Beetles or Piping Plovers have not fared as well.

In addition to loss of habitat from home and business construction, hundreds of thousands of acres of habitat have been lost to road construction. Roads directly impact wildlife through collisions and habitat loss and fragmentation. Although development is critical to our nation's economic security, growth that does not take into account impacts to fish and wildlife health or the value of the "life support system" of our natural resources not only threatens wildlife, but also human health and welfare for generations to come.

Despite the challenges that land development pose, there are many solutions that can help fish and wildlife fare better in an increasingly urbanized world. Following are conservation actions that have been proposed to deal with current or future development impacts to fish and wildlife.

Opportunities for Action:

- **Increase and Improve Land Protection.** Most State Wildlife Action Plans identified land protection as a priority action to protect remaining habitats and natural areas. Land protection tools may include fee title acquisition, conservation easements, and leases with private landowners. Land protection should be strategic and optimize the leveraging of state, federal, local, and private resources.
- **Integrate State Wildlife Action Plans into Land Use Planning.** State Wildlife Action Plans are a valuable source of information that should be used by local, state, and federal planning entities to inform land use decisions. Data on species and habitats, as well as maps showing priority conservation areas, can be used to help planners with site development that reduces impacts on priority wildlife and habitat.
- **Increase State Fish and Wildlife Agency Capacity.** State fish and wildlife agencies suffer from a lack of staff to collaborate at an interagency level to share technical expertise and consult on issues that impact fish and wildlife. Accurate and timely information is often needed on the status, condition, and location of key wildlife and habitats, but high demands for staff time restrict the opportunity for interagency collaboration.
- **Increase Private Landowner Technical Service and Incentives.** Land protection alone cannot conserve all remaining habitats and natural areas. In some places the public does not support permanent protection of habitat or critical tracts may not even be for sale. By providing private landowners with technical advice and incentives for stewardship and conservation of priority wildlife and habitats, the conservation footprint can be expanded greatly. In addition to technical assistance, conservation of private lands can be incentivized by providing cost-share, stewardship payments, tax incentives, carbon sequestration credits, or recognition through awards.
- **Integrate State Wildlife Action Plans into Land Management Plans and Policies.** State Wildlife Action Plans drew information from other planning documents and contain a wealth of information that can be incorporated into new and existing land management plans and policies.
- **Increased Outreach.** The public sometimes lacks an awareness and understanding of the impacts of land development on fish and wildlife conservation. Outreach needs to be targeted for the public and decision-makers to improve their understanding of these impacts and solutions that are available to minimize effects to fish and wildlife.
- **National Tracking and Reporting of Habitat Conversion.** There is a need for a clearinghouse to facilitate the collection, reporting, and sharing of data on land use and conversion of key habitats at regional and national scales. Without such a system, managers lack the information needed for planning and assessing trends.

2) Habitat Loss from Modification of Ecological Processes

Many natural processes, such as natural water flow and fire, have been altered or disrupted, impacting at-risk plants, fish, and wildlife.

Success Story: Restoring a Rich Coastal Estuary in Oregon

Estuaries, where freshwater rivers meet the salty ocean, are a priority habitat in the Oregon Wildlife Action Plan. **In a landmark project to restore a slough to its natural state, concrete dikes were removed from Alsea Bay to restore natural processes that create and maintain estuarine habitats.** For the first time in 40 years, tidal waters from the estuary of Alsea Bay reached what was once—and will be again—marshland habitat. Priority species in the area include Bald Eagles, Band-tailed Pigeons, California Brown Pelicans, Caspian Terns, Shorebirds, Chum Salmon, Coho Salmon, and Winter Steelhead. Restoring important wetland habitat for wildlife means cleaner waters overall, benefiting people as well.

Success Story: Restoring Access to Ozark Fish Habitat in Missouri

Priority objectives in Missouri's Wildlife Action Plan include improving water quality and stream habitat and removing environmental threats. Low water crossings in the Niangua River basin impede movement of fish between bridges, including the federally threatened Niangua Darter and other fish, mussels, and crayfish of the Ozarks. **In 2006, two low water crossings in the Little Niangua River were replaced with clear-span bridges, recovering access to 14.4 miles of stream habitat for Niangua darters.** Subsequent monitoring revealed that Niangua Darter numbers increased.

Success Story: Restoring Fire-Dependent Ecosystems in Florida

Florida's Wildlife Action Plan identifies prescribed burns as a priority because **the decrease in natural fires imperils many plants and animals that depend on periodic fires for their reproduction, growth, and survival.** Florida's Wildlife Legacy Initiative helps land managers meet prescribed burning goals by supporting two fire-based efforts. The Upland Ecosystem Restoration Project conducted prescribed burns on more than 10,000 acres of private land, and the Lake Wales Ridge Prescribed Fire Strike Team conducted prescribed burns on 17,600 acres on 24 natural areas. This proactive approach to conservation helps Florida prevent catastrophic wildfires that threaten habitat as well as homes and helps fulfill its responsibility to pass on these vital natural places to future generations.

Changes to natural ecological processes have had important consequences for biological diversity. Two examples-- the alteration of waterways and fire suppression-- have taken a great toll on fish and wildlife.

Impoundments have altered natural hydrologic cycles, changed the temperature and chemistry of water, significantly altered the natural flow of river systems, and usually present significant obstacles to the passage of migratory fish species. Excessive withdrawals of groundwater can reduce or even eliminate stream flows, directly affecting aquatic life as well as species dependent on subterranean habitats, such as caves.

Fire has also been an important force in shaping prairies, savannas, and other native grasslands, as well as barrens and shrub communities. Suppressing fire has led to the invasion of fire-intolerant woody plants such as Eastern Red Cedar and Buckthorn in these natural communities. Fire suppression has also led to a decline of Long-leaf Pine forests. Additionally, planned fires reduce fuel loads of accumulated, dead plant materials, thereby decreasing the likelihood of catastrophic wildfires, which have the potential to severely impact both human communities and natural ecosystems.

Many State Wildlife Action Plans recommend some form of fire management activities as part of an integrated strategy for managing and restoring fire-dependent habitats. The reduction of fuel loads through prescribed burning, brush removal, and other forms of fire management also has the additional benefit of helping to protect houses and buildings that are located in highly flammable ecosystems. Many state agencies and nongovernmental groups are actively engaged in restoring and managing natural landscapes, while at the same time minimizing the risk of catastrophic wildfire. Alliances and partnerships can assist these organizations with needed funding, in-kind donations, and volunteer hours.

Opportunities for Action:

- **Remove/bypass Dams and Manage Discharge.** The removal of obsolete dams or the installation of fish-bypass structures can help restore migration routes and improve habitat. Improved management of discharges from dams can improve water quality and better simulate historical flow patterns.
- **Integrate State Wildlife Action Plans into Water and Land Management Plans and Policies.** State Wildlife Action Plans recommend conservation actions that not only conserve at-risk species and their habitats but also promote sustainable land stewardship. Application of these practices in other plans and policies will improve the environmental condition, benefitting people and wildlife.
- **Acquire In-stream Flows to Maintain Key Wildlife Habitat.** It's often a challenge to balance the needs of fish and wildlife conservation with other societal needs such as drinking water supplies, irrigation, and flood control. The long-term sustainability of some fish and wildlife will only be achieved if a portion of stream flows can be protected or allocated for these purposes.
- **Re-establish Natural Fire Regimes.** Build the necessary capacity to reinstitute fire to restore and maintain fire-dependent wildlife habitats including native grasslands, woodlands, and pine savannas.
- **Expand Existing and Initiate New Incentive Programs for Private Landowners.** Collaborate with partner agencies and organizations, such as the Natural Resources Conservation Service, U.S. Fish and Wildlife Service, U.S. Forest Service, Bureau of Land Management, and the National Park Service, to promote prescribed fires and other Best Management Practices in historically fire-maintained habitats. Community, land use, and conservation groups can adopt key targets and specific state or regional projects that restore key wildlife habitats, as identified in State Wildlife Action Plans.
- **Develop educational materials and outreach programs.** Inform the public about the importance of ecosystem remediation actions, such as dam removal and prescribed burning, that are essential to restore ecosystem functions.

3) Impaired Water Quality

Key aquatic habitats are degraded or lost because of many forms of pollution.

Success Story: Restoring Polluted Aquatic Habitat in Tennessee

Restoring aquatic habitat to benefit fish and wildlife is an important goal in Tennessee's Wildlife Action Plan. **Refuse from underground mines that were abandoned 100 years ago made Panther Branch so polluted and acidic that virtually nothing could live in the water.** With State Wildlife Grant funds, the Tennessee Wildlife Resources Agency partnered with the Tennessee Department of Environment and Conservation to restore Panther Branch. **They removed the mine refuse, restructured the stream channel, built a drainage system to reduce the water's acidity, and constructed artificial wetlands to remove any dissolved metals.** Completed in the spring of 2007, Panther Branch will soon re-colonize with aquatic wildlife. Maintaining clean and healthy waters benefits both wildlife and people.

Success Story: Conserving the Aquatic Diversity of Alabama's Paint Rock River

The Paint Rock River basin is one of the most biologically diverse watersheds in North America and a high priority area in Alabama's Wildlife Action Plan. **More than 30 fish, mussel, and snail species of greatest conservation need historically or currently inhabit the basin.** With support from the Landowner Incentive Program and other federal funds, the Alabama Division of Wildlife and Freshwater Fisheries and the Nature Conservancy are working together to proactively restore stream habitat in the basin. This partnership is making major strides and has already restructured some of the stream bank and replanted native vegetation. **Restoring the Paint Rock means cleaner water that benefits people as well as the river's more than 150 species of native fish, mussels, and snails.**

State Wildlife Action Plans describe the importance of many different aquatic systems, from estuaries to headwater streams and from lakes and ponds to coastal oceanic waters. Plans in every region of the country identify riverine and riparian habitats as areas of concern.

Impaired water quality of aquatic systems is identified by *every* state as one of the most significant threats to wildlife populations and habitats. Agricultural, forestry, household and urban waste, industrial effluent, and airborne pollutants combine to seriously degrade overall surface and groundwater quality and other key aquatic wildlife habitats. This significantly impacts fish and invertebrate abundance, life cycles, and distribution. Particularly vulnerable are fish and wildlife in the Southeast where 34 percent of North American fish and 90 percent of native mussel species are at-risk.

Our nation's aging infrastructure means that many of the systems originally intended to control pollution such as sewers, landfills, and storm drains can instead leach large amounts of contaminants into surface water and groundwater. Thermal pollution from storm water runoff and industrial effluent, as well as airborne pollutants, also can alter aquatic environments.

Additionally, agricultural effluents carry nutrients, harmful chemicals, and other pollutants that cause siltation, sedimentation, and eutrophication, degrading key rivers, like the Mississippi River, as well as smaller rivers, streams, and wetlands. This, in turn, affects the diversity of aquatic species, especially fish and mussels. Contamination of waterways and wetlands through non-point source pollution has deliberating impacts throughout the food chain.

Opportunities for Action:

Some aquatic species are particularly vulnerable to impaired water quality and may be negatively impacted in waters that meet pollution standards for humans. State Wildlife Action Plans recommend a diverse and comprehensive mix of strategies for dealing with water pollution in aquatic systems.

- **Share Data from State Wildlife Action Plans with Water Quality Regulatory Agencies.** The incorporation of data on fish and wildlife into planning, program, and regulatory decisions can help safeguard public drinking supplies, recreation, and at-risk fish and wildlife. The development of new incentives and support for regulatory programs can help reduce both point and non-point source pollution.
- **Provide Technical Support.** Provide assistance to soil and water conservation districts, state technical committees, U.S. Department of Agriculture staff, watershed coordinators, and other groups and individuals to direct conservation funding (e.g., Farm Bill Conservation Title) so that it is targeted and meets the dual objectives of conserving fish and wildlife habitat and improving water quality and quantity.
- **Integrate State Wildlife Action Plans into Watershed Plans.** Wildlife agencies should share data and concerns about water quality and quantity issues affecting wildlife with agencies and groups that do watershed planning.
- **Apply and Expand “On-the-ground” Techniques.** Non-point source pollution should be addressed through collaboration with partner agencies. Techniques that can be employed include riparian plantings, wetland restoration, natural stream bank stabilization, and the planting of rain gardens or bioretention facilities to retard erosion and filter excess nutrients and other pollutants from entering aquatic systems. There is a critical need in many areas to help target federal funding (e.g., the Farm Bill Conservation Title) towards sites that have the most benefits for at-risk species.
- **Develop Focused Education and Outreach.** Step up efforts to inform the public of the impacts of everyday activities—such as household water use—on water availability for wildlife. Supporting and participating in such programs would be an important step towards improving water quality for both humans and wildlife.
- **Highlight and Support Community Watershed Organizations.** Fish and wildlife conservation can be advanced by supporting groups that work on preventing water pollution in watersheds and water bodies, particularly if these groups can help implement actions identified as priorities in the State Wildlife Action Plans. This can be accomplished by supporting efforts by community watershed organizations and other groups to clean up polluted waterways, restore natural stream channel morphology, and improve habitat for fish, waterfowl, and other wildlife, as recommended in State Wildlife Action Plans.
- **Provide Information about Pollution Prevention Activities.** Like humans, many species of fish and wildlife require good water quality. Sharing information about the need to prevent pollution would have positive effects on at-risk fish and wildlife and the public.

To counter the threat of pollution, it will be critical to convince partners and stakeholders to support and adopt: 1) State Wildlife Action Plans and 2) other regional and national efforts to improve water quality using key wildlife/habitat targets (i.e., National Fish Habitat Initiative, Southeast Aquatic Resource Partnership, Eastern Brook Trout Joint Venture, Western Native Trout Initiative, Midwest Driftless Area Restoration Effort, Mattanuska-Susdna Basin Salmon Conservation Partnership Initiative, and other key regional efforts).

4) Habitat Conversion for Agriculture, Aquaculture, Forestry, and Mining

Past and current use or conversion of land and aquatic systems for agriculture, aquaculture, timber, and mining has had a major impact on landscapes and fish and wildlife resources.

Success Story: Sustainably Managing Kachemak Bay Clams in Alaska

Obtaining better information in order to make smart management decisions is a priority in Alaska's Wildlife Action Plan. Kachemak Bay is one of the most productive, diverse, and intensively used estuaries in Alaska. **The hardshell clam fishery is Alaska's largest and is important to many family traditions, but the lack of sufficient information makes it difficult to ensure sustainable use.** Through research, Alaskan biologists have learned more about where and how clams grow. **With this information, wildlife managers are better able to monitor the health of these populations and ensure good conservation of Alaska's hardshell clam resource for the enjoyment and benefit of future generations.**

Success Story: Collaborating for Tricolored Blackbird Conservation on California Farms

California is home to 99 percent of the world's population of Tricolored Blackbirds, a species of greatest conservation need cited in California's Wildlife Action Plan. The Tricolored Blackbird population has dropped drastically in the last 60 years, along with the decline of native wetlands in California's Central Valley. **In the absence of these wetlands, the birds commonly nest in silage fields, ditches, and other areas around dairy farms. This is a serious risk when fields are ready for harvest and young birds cannot yet fly. An alliance of 16 partners has come together to conserve habitat and restore Tricolored Blackbird populations without listing the species as threatened or endangered.** This diverse partnership includes the California Department of Fish and Game, Audubon California, California Farm Bureau, California Cattlemen's Association, Pacific Gas & Electric Company, and the University of California. This voluntary and proactive effort would conserve the Tricolored Blackbird and may avoid another costly endangered species listing.

Success Story: Managing Diverse Bird Communities in Louisiana

Improving multi-species habitat management practices is a high priority in Louisiana's Wildlife Action Plan. **The Louisiana Division of Wildlife and Fisheries is conducting a 10-year bird study to evaluate the impacts of natural area designations and forestry practices on birds in the Sherburne Wildlife Management Area.** More than 30 resident and migratory bird species of greatest conservation need inhabit this bottomland hardwood forest area. Information gathered will complement other research efforts on bird reproduction and survival. **This proactive effort would help Louisiana implement forest management practices that maximize the habitat quality for resident and migratory birds while still allowing a sustainable timber harvest.**

Our economic prosperity has been driven by our abundant natural resources. Large-scale clearing of the land helped build an economy that supports a high standard of living. Although many species of fish and wildlife have persisted or even thrived in an altered landscape, many others have been extirpated or driven to the brink of extinction. In order for fish and wildlife to live in an altered landscape, it is necessary to find a balance between resource extraction and the need to maintain natural habitats. Also needed are best management practices and restoration techniques that meet the needs of at-risk and more common species of fish and wildlife, as well as the landscapes to sustain them.

Opportunities for Action:

Given the absolutely critical importance of agriculture to human well-being, the State Wildlife Action Plans wisely focus on strategies to ensure that wildlife and agriculture can sustainably co-exist. For example, states in the Central Flyway Region recommend flooding agricultural fields during migration season for ducks and other waterfowl, providing stopover habitat for these species. Other recommendations include increasing the amount of hedgerow and field edge habitat, which provides shelter for native pollinators, upland game birds, and predators of agricultural pests. Substantial funding for conservation work on agricultural lands is available through sources such as the U.S. Department of Agriculture Natural Resources Conservation Service and the U.S. Fish and Wildlife Service, as well as forestry stewardship through the U.S. Forest Service. However, additional financial and in-kind resources are greatly needed, particularly to help focus these existing resources on the landscapes most in need of conservation attention.

- **Direct Existing Conservation Spending to State Wildlife Action Plan Implementation.** There are a myriad of federal, state, and local programs that are intended to conserve wildlife in working landscapes. The conservation title of the Farm Bill alone includes billions in authorized funding. State Wildlife Action Plans can help ensure these funds are used effectively and serve the interests of species of greatest conservation need.
- **Provide Technical Assistance to Private Landowners and Businesses.** Many species of wildlife occur on working lands. To successfully conserve at-risk fish and wildlife, it is important that technical and financial assistance be provided to owners and operators of agricultural and forest lands, mineral extraction sites, aquaculture sites, etc.
- **Develop New Programs that Deliver Financial Incentives to Private Landowners.** Since existing programs to private landowners did not take into consideration the needs of all fish and wildlife species, there is a need to develop new or retrofit existing programs that can best meet the needs of declining species. These programs should be developed in collaboration with agencies and the private sector so that they are biologically sound and practical.
- **Support a Sustainable and Compatible Natural Resource-Based Private Sector.** Sustainable fish and wildlife populations are important to the public and private sector. Wildlife plays a large role in supporting the \$730 billion active outdoor recreation industry. Furthermore, if the goal of reducing endangered species listings is accomplished, then costs associated with species recovery can be avoided and regulatory certainty achieved. As the value of ecosystem services becomes better defined, new opportunities to link at-risk species conservation and economic prosperity should be pursued.

5) Data Gaps

Insufficient scientific information hinders effective fish, wildlife, and habitat conservation.

Success Story: Conserving Native Tree Snails in the Mariana Islands

Conserving native island wildlife, such as tree snails, is an important conservation priority in the Wildlife Action Plan of the Northern Mariana Islands. Humped Tree Snails were abundant on the island of Sarigan in 1992. Sarigan has been negatively impacted from feral goats and pigs consuming understory vegetation, threatening forest regeneration. In response, all feral animals were removed in the late 1990s and the forest has since begun to recover. **The conservation strategy prioritized determining whether healthy Humped Tree Snail populations still exist. A State Wildlife Grants-funded expedition in 2006 revealed that native forests on Sarigan support the healthiest tree snail populations known in the Mariana Islands.** Humped Tree Snails were found in the highest densities known for the species. In addition, seven new species of ground-dwelling snails were discovered on Sarigan, making a diverse array of 22 snail species. With the island of Sarigan rapidly recovering from the effects of feral animal browsing, it is imperative that conservation measures be taken to prevent the introduction of snail predators, such as non-native flatworms. Such efforts will conserve Sarigan's diverse wildlife and vital natural areas for future generations.

Success Story: Finding Biologically Diverse Caves in West Virginia

Conservation of caves and their wildlife are priorities in West Virginia's Wildlife Action Plan. In addition to conducting regular bat and woodrat monitoring, the West Virginia Division of Natural Resources worked with the Karst Waters Institute to survey the wildlife living in West Virginia's caves. More than 80 different species of cave invertebrates were documented in 282 caves. In addition, 29 new cave species have been discovered so far. Caves in Greenbrier and Pocahontas Counties host particularly rich wildlife diversity. This effort culminated with the publication of *The Invertebrate Cave Fauna of West Virginia*, second edition. Maintaining diverse, healthy wildlife populations means cleaner and healthier natural places overall, benefiting people as well as wildlife.

It is hard to believe that in the 21st century we should know so little about the majority of the animal species with which we share our world. Yet, this is unfortunately the case. For most of the thousands of wildlife species in the United States, we simply do not have even the most basic information about population status or trends. Most of these taxa are invertebrate species, for which we lack even the most fundamental information about basic ecology, key habitat requirements, and geographic distribution. These data gaps pose real problems for state wildlife biologists who are entrusted with ensuring the well-being of the wildlife species in each state.

Although there has been considerable scientific research and study of wildlife in the United States, much of this work has focused on a few groups of organisms that are popular or charismatic, such as big game species and migratory birds. The State Wildlife Action Plans represent a commitment by state wildlife agencies to consider all species of wildlife in the states and to focus more broadly on many other species, especially those that are declining or are indicators of natural community health. In order to ensure the continued viability of these species of conservation need, state wildlife biologists will need a basic understanding of their ecology, distribution, population status, and habitat requirements. Without such knowledge, it is likely that human activities will inadvertently harm these species by, for example, allowing commercial or residential development to occur in areas that provide key nesting or foraging habitat for a particular species. Such inadvertent actions have the potential to cause irrevocable harm to a species before the effects are even detected or understood.

Two key types of missing information are cited by *every* state Wildlife Action Plan. The first is basic information on wildlife populations, including data on overall abundance, population trends, number of occurrences, and geographic distribution. Such data are at present available for only a few groups of organisms—some big game species, endangered species, and breeding birds being the best known examples. For the vast majority of fish and wildlife species, including most small mammals, reptiles, amphibians, fishes, and invertebrates, we currently lack this information. This statement is even true for many of the species that have already been listed under state and federal endangered species statutes!

The second type of missing information relates to the ecological interactions between fish, wildlife, and their biological and physical surroundings. These data gaps include information about basic ecology and life history, key habitat parameters, associated vegetative communities, and the distribution of these parameters and communities across the broader landscape. Such basic ecological attributes are poorly understood—or not known at all—for the vast majority of our wildlife species, again including many threatened and endangered species.

Fortunately, state wildlife agencies are not alone in tackling these substantial gaps in our scientific understanding. Assistance is available from many federal and state partner agencies, such as the U.S. Geological Survey Cooperative Research Units, which are charged with addressing the science research and monitoring needs of state fish and wildlife agencies. Partner universities and organizations can help collect data on species of interest, even through citizen science programs, such as Project Feeder Watch at the Cornell Lab of Ornithology and the National Audubon Society's Christmas Bird Count.

The State Wildlife Action Plans outline a diversity of approaches to help meet these challenges and plug the numerous data gaps. One key recurring strategy common to all states is to conduct targeted scientific studies (including surveys, inventories, and research) that will help to fill in key knowledge gaps regarding particular species or groups of species of conservation need. In many states, State Wildlife Grant funds have been (and continue to be) strategically applied to meet key information needs through exactly this kind of directed scientific research.

Another common key strategy of State Wildlife Action Plans is to develop and implement monitoring programs for key species of conservation need. Long-term monitoring can be used to detect degradation or improvement in natural systems, identify new or emerging conditions that signal the need for management actions or further investigative research, provide feedback critical to evaluating the effectiveness of specific management actions, validate research results and models, and promote increased public understanding of wildlife. At the same time, monitoring programs can be expensive and resource-intensive to implement, so states will need to continue to be judicious in selecting monitoring targets that will help them meet multiple management objectives.

Taken together, these strategies represent a sound approach for beginning to address the substantial data gaps that exist for fish and wildlife species and their key habitats in the United States.

Review of the 56 Wildlife Action Plans indicates more similarities than differences when it comes to data gaps. Basic science and data needs are not isolated to a particular state, region, taxonomic group, or ecosystem type. Rather, they reflect the limited information that is currently available for the vast number of fish and wildlife species that occur within the United States.

Opportunities for Action:

- **Improve Understanding of Species and Habitats of Greatest Conservation Need.** Too little is known about the status, distribution, and life history of many at-risk species of fish and wildlife. Significant new resources are needed to conduct inventories and surveys and do natural history research.
- **Develop and Implement Long-term Monitoring Programs.** The key to successful adaptive management is having a robust monitoring program to feed the adaptive management cycle. There needs to be improved coordination and resources to develop and implement a monitoring framework that can be used to inform managers at local, regional, and national scales.
- **Develop Centralized Data Management Systems for Tracking Data.** Information about species and habitats are contained within hundreds of databases that are not integrated. Centralized databases would facilitate data-sharing and help managers disseminate results of scientific research projects.

Partnership Opportunities for Addressing Data Gaps:

- National and regional scientific agencies (e.g., U.S. Geological Survey and the National Science Foundation) **can address the science and data gaps** identified in the State Wildlife Action Plans. The U.S. Geological Survey Cooperative Research Units are available to assist states in identifying and meeting data needs for wildlife management. These units are charged with addressing the science research and monitoring needs of state fish and wildlife agencies. The Natural Resource Monitoring Partnership is emerging as another vehicle to identify ongoing monitoring activities and monitoring protocols.
- States can **partner with multiple sectors**, such as universities, research institutions, museums, non-profits, and the private sector for assistance and collaboration with basic research, assessment, and monitoring of key wildlife species and habitats.
- Foundations, granting agencies, and organizations can **provide additional funding and grant opportunities to support basic scientific research** on wildlife species of greatest conservation need, particularly in cases where that research can be shown to directly facilitate the management and conservation of these species.
- States, in collaboration with federal agencies and private foundations, can **support the development and maintenance of shared data and information systems and networks** to acquire and share knowledge concerning our nation's wildlife resources (distribution, abundance, habitat requirements, life history, etc.) together with information concerning monitoring projects, protocols, and findings.
- Public and private research institutions and universities can **use State Wildlife Action Plans as guides to research needs** and as tools for establishing collaborative partnerships to conduct priority scientific research on wildlife species of greatest conservation need.

The Natural Resource Monitoring Partnership

The NRMP is an open and inclusive process committed to the goal of improving monitoring efforts in order to support effective evaluation and decision-making, which encourages participation by organizations and individuals committed to that goal. NRMP also develops practical resources that can help the resource management community develop and improve monitoring efforts to support more effective evaluation and decision-making.

These resources—hosted by the National Biological Information Infrastructure—are the **Monitoring Protocol Library** and the **Monitoring Locator**. The Library is an Internet-accessible, searchable database that provides information on monitoring protocols and resource assessment methodologies organized to facilitate reference and use. This is not a database of monitoring data or results, but rather a database of protocols, developed and maintained by users, under the management of an archivist/librarian.

The Locator is an Internet-based, GIS application that allows users to identify what natural resource monitoring is being conducted within a particular area (e.g., state, county, Canadian province, or other selected geographic area). Users of this system will have search tools to find out about ongoing and historic monitoring according to the scales, targets, and objectives that are of interest to them.

6) Invasive and Non-Native Species

Native wildlife and habitats can't compete with invasive species.

Success Story: Restoring Montane Forests on the Hawaiian Islands

Hawaii's Wildlife Action Plan identifies the restoration and protection of native dry forests as a priority goal. Invasions of non-native weeds pose major threats to forests because they lead to more frequent and intense wildfires that can eventually destroy the forest. Without protection and management, these habitats remain vulnerable. **This project is restoring three forest habitats that support hundreds of native threatened and endangered plants and animals. Restoration includes fencing imperiled habitat, restoring native plants, and removing feral pigs and sheep that destroy habitat.** Areas that benefit include 5,000 acres near Mauna Kea Forest Reserve, the 3,800-acre Puu waawaa Forest Bird Sanctuary, and more than 40,000 acres of public and private land in the Leeward Haleakala Watershed. **These proactive efforts begin a long-term recovery effort that will conserve wildlife and vital natural areas for future generations.**

Success Story: Removing Invasive Trees in Grassland, Wetland, and Riparian Habitats in North Dakota

Restoring habitat is a key priority in the North Dakota Wildlife Action Plan. Russian Olive is a non-native tree known for invading riparian areas, grasslands, and wetlands, where it crowds out cottonwoods and willows and reduces the number of grassland-dependent birds, including eight species of greatest conservation need. **To enhance habitat for these and other wildlife species, and to restore riparian and grassland habitat to a more natural state, the North Dakota Game and Fish Department is removing Russian Olive and other unwanted woody vegetation from key wildlife management areas.** Such proactive efforts will benefit the birds and other wildlife that depend upon these areas, conserving them before they become rare and more costly to protect.

Success Story: Holding the Line on Invasive Mussels in Oregon

The Oregon Wildlife Action Plan identifies invasive species as a key issue of concern. **Today, Oregon is attempting to hold the line against destructive Quagga Mussels that are spreading across the country.** States infested with invasive mussels spend millions of dollars each year to keep water systems unclogged and ecosystems balanced. Experts believe if quaggas enter Oregon, it will be by boat or houseboat, so the Marine Board, the Oregon Department of Fish and Wildlife, invasive species groups, and others are mobilizing resources to protect Oregon's freshwaters from what would be a costly management effort. Workshops, boat washing demonstrations, and media events are being used to spread the word. **Recently, monitoring efforts paid off with the early detection and quarantine of a quagga-infested boat.** Prevention, early detection, and swift action would help protect native fish and wildlife from invasive species before more costly measures are needed.

Ecosystems throughout the world have been modified or disturbed by the introduction of exotic organisms, often with unexpected and detrimental results. In the United States, invasive and non-native species threaten wildlife species through predation, resource competition, disease transmission, and displacement of habitat. Analysis of Federal Register data on threats to 958 species listed as endangered or threatened in the United States from June 1991 to September 1996 revealed that invasive species were implicated in the decline of 42% of the species (see Stein and Flack, eds. 1996. *America's Least Wanted: Alien Species Invasions of U.S. Ecosystems*. The Nature Conservancy, Arlington, Virginia). State Wildlife Action Plans point out how little is known about the impacts of invasive species on the broader array of wildlife. Invertebrates remain a major concern, as little data are available for the vast majority of this large taxonomic group.

Invasive exotic aquatic plants and animals enter lakes, streams, and rivers through commercial transport, ballast water discharges, aquaculture, boating, landscaping, water transport, private aquarium releases, and bait handling. Negative effects include alterations in nutrient cycling pathways, decreased habitat value of infested waters, decreased water quality, altered community structure, and threats to endangered species. Disturbance of salt marshes through activities such as road construction or dredge spoil exacerbates the proliferation of invasive plants like Common Reed and Purple Loosestrife, which in turn reduces habitat quality for a number of native wildlife species. Other invasive exotic plants may decrease plant species diversity, produce allelopathic chemicals that retard native species, modify disturbance regimes, and significantly modify the species composition and structure of vegetation. Invasive species may further inhibit forest regeneration and degrade wildlife habitat.

Every State Wildlife Action Plan identifies invasive or non-native species as a significant problem for wildlife and their habitats and suggests strategies for the management, control, or eradication of these problem species.

Regional Comparison of Invasive Species Threats

Invasive species seriously impact every major ecosystem type in the **Northeast**. Among the many invasive plants and animals threatening native wildlife and key habitat are Zebra Mussels, Asiatic freshwater clams, Hemlock Woolly Adelgids, Beech Scales, *Phragmites*, Purple Loosestrife, Japanese Knotweed, Gypsy Moths, Japanese Longhorn Beetles, and Mute Swans.

Examples of invasive plant species in the **Southeast** include Cogon Grass, Kudzu, Fescue, *Phragmites* and Hydrilla, all of which threaten important areas for native wildlife.

In the **Midwest**, exotic plants and aquatic nuisance species, including Asian Carp, Zebra Mussels, Reed Canary Grass, *Phragmites*, Purple Loosestrife, and the Emerald Ash Borer Beetle are especially problematic.

Invasive non-native and alien species (both plant and animal) are threats to native species and habitat composition throughout the **West**, where invasive species such as Cheatgrass and other noxious weeds have the potential to permanently change range communities and fire regimes.

Partners Working to Combat Invasive Species

Important partners in the fight against invasive species include the National Invasive Species Council, Weed Management Districts, and local non-profit citizens groups, such as land trusts. Regional efforts attempt to track the introduction and spread of certain invasive species, increase public awareness, and promote eradication efforts. However, effective clearinghouses and more intensive landscape/watershed scale efforts are needed around the country to combat this serious threat. Several federal clearinghouses and tracking programs, such as the U.S. Department of Agriculture's National Invasive Species Information Center and PestTracker for agricultural pests, the U.S. Geological Survey's Non-indigenous Aquatic Species repository, and the Invasive Species Information Node of the National Biological Information Infrastructure offer opportunities for improved regional and national coordination of invasive species management efforts. Individual State Wildlife Action Plans contain much information about invasive species and describe specific strategies for their control or management. In general, funding is often a critical need in invasive species management, as are in-kind donations of goods (chemical products for invasive vegetation control) and services (volunteer labor for invasive plant removal).

Opportunities for Action:

- **Develop and Implement Early Detection and Tracking Methods for Invasive Species and Diseases.**

Improved detection and management programs and protocols are needed to reduce or prevent impacts to key wildlife and habitats. Multi-state and partner efforts, such as the Mid-Atlantic Exotic Pest Council, Invasive Plant Atlas of New England in the East, and Weed Management Districts in the West, provide a coordinated approach in assessing, mapping, monitoring, and evaluating the impact of invasive species on key fish, wildlife, and their habitats.

- **Develop Landscape or Watershed-Level Action Plans to Control Exotic Species.** The complete elimination of non-native species is often not practical, but management on a landscape basis that includes public and private land should be pursued. In addition, research into new methods for treating invasive species should be pursued when existing methods are less than effective. The individual Great Lakes and other watersheds (e.g., Chesapeake Bay, Lake Champlain, Gulf of Mexico, etc.) have already developed regional, watershed-level management plans, particularly to address aquatic nuisance species and include Canada as a partner where appropriate.

- **Increase Public Awareness of Problems.** One of the keys to controlling invasive species is to increase public awareness about their destructive capability and to change behavior to avoid introduction and transport.

- **Develop Demonstration Areas and Encourage the Use of Native Species.** Public lands (federal, state, and local) and private conservation lands can serve as demonstration sites for invasive species and natural area management. Managed sites can be used for passive education for the public, training places for conservation practitioners, and research study sites. When possible, public land managers should strive to manage their lands to support the maximum number of native species.

- **Improve and Support Policies and Regulation that Prevent Invasive Introduction.** There is a need to review and amend if necessary the “approval process” for the introduction of new non-native species. Technical assistance and information should be provided to the U.S. Department of Agriculture for proposed introductions of plants and insects.

7) Collection and Illegal Harvesting

Unsustainable fish and wildlife collection impacts vulnerable fish and wildlife populations.

Success Story: Restoring Alabama's Gopher Tortoises

Gopher Tortoise restoration is a high-priority conservation action in Alabama's Wildlife Action Plan due to the tortoise's importance to so many other species and their perilously low numbers. Gopher Tortoise burrows are used by more than 300 other species, including some rare amphibians and reptiles in Alabama. **Many local populations of Gopher Tortoises were decimated or lost entirely during the 20th century due to habitat modification and human collection. The Alabama Department of Conservation has begun a pilot project to reestablish Gopher Tortoises on the 1,500-acre Wehle Tract owned by the Forever Wild Land Trust.** This project would also determine the best methods for future reintroductions, so the most cost-effective and efficient efforts can be undertaken to conserve this reptile for future generations.

Success Story: Restoring Native Fish to the District of Columbia's Waters

Restoring healthy populations of priority fish and wildlife to their natural habitats is an important goal in the District of Columbia's Wildlife Action Plan. **The American Shad is a freshwater fish species of greatest conservation need, as its population has severely declined due to overfishing and pollution of its habitat. In Spring 2007, the DC Fisheries and Wildlife Division hatched approximately one million American Shad and stocked them in the Anacostia River, a priority habitat in the Wildlife Action Plan.** Also, approximately 70,000 Hickory Shad and 300,000 Blueback Herring, both species of greatest conservation need, were stocked in Rock Creek. Maintaining robust populations of native wildlife in the DC's rivers means cleaner and healthier waters overall, ultimately benefiting people as well.

Illegal collection and harvest of wildlife and plants was cited as an issue in more than half the states and in every region. Collection and illegal harvest are problems for a variety of wildlife species, especially those that are rare or experiencing population declines from other causes.

Illegal collection of wildlife species, especially rare reptiles and amphibians, is cited as occurring in every **Northeastern** state. These animals are then sold on the black market and even include endangered species like Bog Turtles and Timber Rattlesnakes. Overharvesting of declining fish and invertebrate wildlife species, such as Horseshoe Crabs or freshwater mussels, was listed as an issue in all regions, particularly in the **Southeast**, as is the use of non-native species for stocking or bait, as noted in the **Southeast and Midwest**. By-catch, such as sea turtles and marine mammals, from commercial fishing in the **Southeast and West** is an additional concern specifically noted in all regions. The plans recommend a variety of programs and strategies to address these threats, including the establishment of permits and harvest monitoring systems, as well as increased regulatory protections for target species.

Opportunities for Action:

- **Establish Permits and Harvest Monitoring Systems.** Increased enforcement of existing laws and/or new laws may be needed to reduce or eliminate the impact of overharvest and collection.
- **Develop Techniques and/or Model Enforcement Standards.** New management techniques like sea turtle excluder devices are needed to reduce impacts to species. New developments, including information on their efficacy, should be shared regionally and nationally.

8) Human Intrusion and Disturbance

Incompatible outdoor recreational activities disturb sensitive fish, wildlife, and their habitats.

Success Story: Educating Ecotourists and Conserving Migrating Shorebirds in New Jersey

Protecting, recovering, and enhancing habitat for rare wildlife are important priorities in New Jersey's Wildlife Action Plan. Thousands of migrating shorebirds stop in Delaware Bay to double their body weight on the way to Arctic nesting grounds. Endangered Red Knots and other migratory shorebirds feed on the eggs from the Western Hemisphere's highest concentration of spawning horseshoe crabs. But, as crab populations have declined from overharvest, the birds are increasingly at risk. New Jersey has actively monitored shorebirds, identified causes of decline, and is committed to the recovery of shorebird populations on Delaware Bay. Efforts include protecting important feeding beaches. **Since 2003, shorebird stewards have been present at viewing areas and all critical shorebird beaches to educate visitors and protect feeding and resting shorebirds from disturbance by beach walkers and unleashed dogs.** By simultaneously protecting shorebirds and educating the public, New Jersey is efficiently helping to conserve migrant shorebird populations before they become rare and costly to protect.

Success Story: Providing Island Sanctuaries to Vulnerable Nesting Seabirds in South Carolina

Seabirds are a high priority group in South Carolina's Wildlife Action Plan due to declines in their populations throughout the state. Seabirds often lay eggs in shallow scrapes or rough nests directly on the ground, and can easily be crushed underfoot. Human presence makes adults abandon their nests, leaving eggs to sun damage or predation by gulls. In 2006, South Carolina designated three barrier islands as sanctuaries—Bird Key Stono, Crab Bank, and Deveaux Bank Islands—where public access is limited. The island closures have increased nesting for Black Skimmers, Brown Pelicans, Royal Terns, and Sandwich Terns. South Carolina's proactive conservation efforts are helping to conserve these species before they become more rare and costly to protect.

A host of human outdoor recreational activities can directly disturb wildlife and key habitats. In particular, off-road vehicle use has been identified as a threat to sensitive wildlife species and their habitats in most regions. Incompatible recreation on beaches and shorelines has contributed to the decline of many beach species, including colonial waterbirds, Piping Plover and rare the Tiger Beetle in the **Northeast** and **Midwest**, as well as sea turtles, marine mammals, and shorebirds along the **Southeast** Atlantic coast.

Caves in all regions of the country support a wealth of rare and unusual species, including bats and highly endemic cave invertebrates, that are limited to a single cave, and disturbance to these sensitive habitats can easily lead to extinction. Other key habitats that are especially vulnerable to human disturbance include vernal pools, springs, dunes, montane tundra, and rock outcroppings.

Outdoor recreational activities are a large part of Western lure and, when compatible, offer ways to reconnect Americans with the great outdoors. However, **Western** states identified negative habitat impacts from a wide range of outdoor activities conducted incompatibly or in excess, such as camping, skiing, hiking, snowmobiling, and jet skiing. **Midwestern** states also cite harmful impacts from excessive or inappropriate mountain biking and horseback riding in sensitive areas.

Opportunities for Action:

- **Develop and Support Outreach and Education Efforts.** Human disturbance to at-risk fish and wildlife often results from ignorance about the impacts of human activity. Increased efforts to inform recreational users of potential adverse impacts to wildlife species could reduce impacts and lead to increased awareness and appreciation of sensitive fish and wildlife.
- **Establish Regulatory Approaches.** To minimize the potential for human interference with wildlife, it may be necessary to impose regulations. For example, to reduce disturbance to whales by whale-watching vessels, it is often necessary to put viewing distance restrictions in place. Likewise, the movement of off-road vehicles sometimes needs to be restricted to avoid damage to sensitive habitats.

9) Climate Change Impacts on Fish, Wildlife, and their Habitats

Fish, wildlife, and their habitats will be placed in further jeopardy by climate change.

Success Story: New Mexico has established the Climate Change Advisory Group

New Mexico established the Climate Change Advisory Group, which published policy recommendations to help meet greenhouse gas emission goals by 2020 and has implemented many programs to promote clean energy and reduce greenhouse gas emissions. Among these initiatives are 1) state memberships in the Chicago Climate Exchange, which requires members to reduce greenhouse gas emissions annually or buy credits from those that reduce more than required, 2) increased funding for public school facilities to help build green public schools across the state, 3) use of tax credits for renewable energy factories and to promote green offices and homes, 4) adoption of the State Clean Car Program, which would dramatically reduce the greenhouse gas emissions of new cars and trucks sold in New Mexico, 5) establishment of the Energy Innovation Fund to develop new technologies for clean energy, and 6) partnerships with Arizona and California to reduce greenhouse emissions through western and national incentives, such as regional inventories and registries.

Climate change may pose the most formidable challenge for species and habitats that are already at-risk. Many state fish and wildlife agencies already lack capacity and other resources to conserve fish and wildlife, and climate change will exacerbate these challenges.

Opportunities for Action:

- **Conduct Vulnerability Assessments.** The impacts of climate change will vary by species and habitats. Vulnerability assessments would help managers forecast impacts and direct resources at species and habitats that are most vulnerable to climate change.
- **Employ Landscape-Level Conservation Strategies.** To effectively manage species under a changing climate, a new emphasis on landscape-scale conservation is needed. Collaboration across state borders will be necessary in order to monitor impacts and to establish connectivity to facilitate movement of species as species ranges shift and habitats change.
- **Develop and Implement Mitigation and Adaptation Strategies.** Natural habitats have the capacity to absorb carbon and mitigate the impacts of climate change, making them valuable for resiliency. Reforestation, wetland restoration, etc. can help reduce the amount of carbon in the atmosphere while at the same time conserving at-risk species.
- **Develop and Implement Adaptation Strategies.** As the climate changes, there will be impacts on habitats due to sea level rise, more extreme droughts, and flood events, etc. New strategies need to be designed and implemented to help wildlife make the transition to new and changing habitats. Increasing connectivity through corridors is one way that managers may help wildlife adapt.
- **Secure Dedicated Funding from Greenhouse Gas Regulation to Natural Resources Adaptation.** Conservation of fish and wildlife and their habitats under a changing climate will require substantial new funding for planning, monitoring, and implementation of climate change mitigation and adaptation strategies. If there is a revenue source associated with greenhouse gas regulation, then a portion of the proceeds should be invested in fish and wildlife conservation.

10) Insufficient Funding and Capacity

Lack of capacity and funding hinders conservation stewardship.

Success Story: The Rio Grande Initiative

Colorado's Wildlife Action Plan identifies the Rio Grande River as important habitat for the endangered southwestern Willow Flycatcher and for rare fish such as the Rio Grande Cutthroat Trout and Rio Grande Chub. As Colorado grows, this valuable habitat and open space is under pressure from the subdivision of farms and ranches into vacation properties. **Through a proactive State Wildlife Grant of just \$16,000, the Colorado Division of Wildlife helped the Rio Grande Headwaters Land Trust complete a strategic mapping project, which later attracted \$7.4 million in state lottery funds, the largest award to a private conservation organization.** The plan, developed through the Rio Grande Initiative, includes information that will help focus the habitat conservation efforts of more than 25 partners, including federal, state and local agencies, county governments, and conservation organizations. Ultimately, the Rio Grande Headwaters Trust aims to protect 27,000 acres, or nearly half of the large parcels of private lands in the river corridor, conserving the wildlife and natural places that are so important to our family traditions.

Success Story: Working with Citizen Scientists for Wildlife in Ohio

Ohio's Wildlife Action Plan involves numerous partners, including Ohio citizens. The Ohio Division of Wildlife sponsors volunteer-based statewide survey efforts through the Frog and Toad Calling Survey, Breeding Bird Survey, Long-term Butterfly Monitoring Program, Winter Bird Survey, Salamander Monitoring Program, Wetland Breeding Bird Survey, and the Ohio Spider Survey. **These endeavors engage hundreds of wildlife enthusiasts in meaningful data collection to provide seasonal, annual, and long-term changes in wildlife populations, in response to both natural processes and human-caused habitat modifications.** Ohio's citizen scientists help the Division identify vulnerable species and observe declines before species become imperiled. They also document species-rich habitats to target for conservation. These collaborative efforts will help conserve Ohio's wildlife and vital natural areas for future generations.

The lack of reliable funding and inadequate capacity were identified as barriers to full implementation of State Wildlife Action Plans. The lack of capacity at the state level is due in large part to a longstanding funding disparity in fish and wildlife conservation. For many state fish and wildlife agencies, about 90% of the funding is available for about 10% of the species-- the ones that are hunted and fished. This funding disparity exists because federal excise taxes and license fees provide dedicated permanent funding for game management, whereas no similar revenue is in place for nongame species. An expanded excise tax has been discussed but not implemented.

The current funding model is not sustainable as the numbers of hunters and anglers continue to decline. This comes at a time when Americans are becoming increasingly more removed from direct contact with natural ecosystems and wildlife. Technological advances like the Internet have facilitated the isolation of society from the outdoors. There is a paramount need to reconnect Americans with the natural world for their quality of life, health, and recognition of the need to conserve the full array of species, including the ones most at-risk. If society does not recognize its dependence on its natural resources and the irreplaceable value of its natural heritage, then the impending funding crisis will likely not be avoided.

Opportunities for Action:

- **Provide Information.** Elected officials and the public need to understand that the funding model for fish and wildlife conservation is not sustainable. The 6,300 member Teaming With Wildlife Coalition is one way that awareness is being raised.
- **Utilize and Enhance Outreach and Education Programs.** State wildlife agencies can effectively convey conservation challenges to citizens. Education programs should emphasize that private citizens can get directly involved with wildlife conservation and become catalysts for change in their own communities.
- **Promote and Develop Regional and National Collaborations.** Working at landscape scales can result in increased effectiveness and efficiency. By combining resources and knowledge across state lines, key data gaps and information needs can be addressed, allowing each state to benefit and accomplish improved conservation.
- **Strengthen and expand conservation partnerships.** To successfully achieve the goals set forth in the State Wildlife Action Plans, partnerships need to continue and be expanded. Each state's Wildlife Action Plan Coordinator can serve as a catalyst for bringing each state's fish and wildlife conservation community together to improve focus and spur collaboration.

Partnership Opportunities for Implementing Action

Success Story: Partnering to Restore Sand Prairies and Prevent Wildlife from Becoming Endangered in Missouri

Sand prairies are the rarest natural community in southeast Missouri, and conserving them is a regional priority in Missouri's Wildlife Action Plan. Sand prairies support imperiled plants like Snoutbean, Sand Hickory, Hall's Bulrush, and Jointweed. Species include Dusty Hognose Snake, Illinois Chorus Frog, Bobwhite Quail, Eastern Meadowlark, native bees, and sand cicadas. **A new habitat initiative has brought together a diverse partnership**, including the U.S. Fish and Wildlife Service, Natural Resources Conservation Service, three universities, Charleston Baptist Association, Missouri Botanical Garden, and the Missouri Departments of Conservation and Natural Resources. This new habitat effort and diverse partnership will help restore habitat for rare and declining species, preventing the need to list them as endangered.

Success Story: Bringing Back Arizona's Bald Eagles

Bald Eagles occur on lands managed by different agencies and Native American tribes, requiring cooperation among many groups to ensure the species' survival—a key priority in Arizona's Wildlife Action Plan. **The Arizona Game and Fish Department chairs the Southwestern Bald Eagle Management Committee, a collaborative group of 23 agencies, Native American Tribes, and private organizations that monitor the population to help guide management actions.** Through the Arizona Bald Eagle Nestwatch Program, nest watchers monitor eagles, observe their behavior, educate the public, and help protect eagles during their breeding season. These two efforts help biologists and decision-makers conserve bald eagles for future generations while maintaining compatible recreational and educational opportunities for the public.

Success Story: Restoring Zuni Bluehead Suckers in New Mexico

New Mexico's Wildlife Action Plan identifies conservation actions for recovery of the Zuni Bluehead Sucker. Found in only 10% of its historic range, this fish species is state endangered in New Mexico and a federal endangered species candidate. **In partnership with the tribal Zuni Fish and Wildlife Department and others, the New Mexico Department of Game and Fish launched projects to improve habitat for the Zuni Bluehead Sucker and to remove predatory non-native Green Sunfish and crayfish.** Additionally, the Department and the Nature Conservancy have purchased habitat for the species, protecting nearly its entire occupied range for the long term. Conserving the Zuni Bluehead Sucker and its habitat means cleaner water, benefiting people as well.

Success Story: Connecticut's Grassland Habitat Conservation Initiative

An important aspect of Connecticut's Wildlife Action Plan aims to conserve rapidly-disappearing grassland habitat. Connecticut's grasslands provide nesting and breeding habitat for 80 bird species, including 13 on the state's endangered species list. Other species include Meadow Jumping Mouse, Smooth Green Snake, and the threatened Violet Dart Moth. **The Grassland Habitat Conservation Initiative brings together a range of groups in support of proactive conservation including the Connecticut Farmland Trust, Audubon groups, academic institutions, municipal organizations, and many state and federal agencies.** Their work ranges from land acquisition, land banking, and management incentives to partnerships that help grassland conservationists work together. These wide-ranging and collaborative efforts will help conserve wildlife species and the grassland habitat upon which they depend for future generations.

Individuals, organizations, and government agencies at every level can help to achieve the major conservation goals set forth in the State Wildlife Action Plans. The State Wildlife Action Plan Coordinator in each state is able to provide further information about any of these actions. For a current list of plan coordinators, visit www.wildlifeactionplans.org. Following are some examples of how various partners can implement actions from the State Wildlife Action Plans.

- For the U.S. Fish and Wildlife Service, incorporate the priority species and habitats from the State Wildlife Action Plans into the Comprehensive Conservation Plan and Comprehensive Conservation Planning Process for each refuge in the National Wildlife Refuge System. Conduct inventories on each refuge for species and habitat types identified as priorities in the State Wildlife Action Plans.
- For the U.S. Department of Agriculture Forest Service, adopt the species and habitats identified in the State Wildlife Action Plans as targets. Incorporate these targets into the forest plan for each national forest. Conduct inventories on each national forest for species and habitat types identified as priorities in the State Wildlife Action Plans.
- For the U.S. Department of Agriculture, Natural Resources Conservation Service, state conservationists and technical committees should consider giving extra points for cost-share to projects that involve species and habitats identified in the State Wildlife Action Plans.
- For the Bureau of Land Management (BLM), adopt the species and habitats identified in the State Wildlife Action Plans as targets. Incorporate these targets into the resource management plans for specific BLM management units. Conduct inventories on each management unit for species and habitat types identified as priorities in the State Wildlife Action Plans.
- For the National Park Service, incorporate priority species and habitats from the State Wildlife Action Plans into the general master plan for each park. Conduct inventories in each park for species and habitat types that have been identified as priorities in the State Wildlife Action Plans.
- For the U.S. Department of Defense, incorporate priority species and habitats from the State Wildlife Action Plans into the integrated natural resource management plan for each facility.
- For the U.S. Environmental Protection Agency, consider integrating the State Wildlife Action Plan targets with the goals and objectives of the National Estuary Program partnerships. Consider giving priority for point and non-point source control funding to projects that involve species and habitats identified in the State Wildlife Action Plans.
- For the U.S. Geological Survey and other federal research offices, consider new programs and projects to help fill key data gaps identified in the State Wildlife Action Plans at the multi-state level.
- For state environmental regulatory departments, consider focusing activities to improve water quality in specific watersheds or water bodies that have been identified in the State Wildlife Action Plans.
- For state departments of transportation, incorporate information about species and habitats identified in State Wildlife Action Plans into the planning process for new road developments and for maintenance projects on existing roads.

- For state development or land use planning departments, incorporate information about species and habitats identified in State Wildlife Action Plans into land use plans.
- For county and city development offices, consider impacts on species and habitats identified in the State Wildlife Action Plans when evaluating new development proposals.
- For non-profit land trusts and other land protection groups, make the habitat areas identified in the State Wildlife Action Plans a priority for land protection efforts.
- For private organizations that manage or restore properties for wildlife, adopt recommendations for habitat management or restoration contained in the State Wildlife Action Plans.
- For non-profit wildlife conservation groups, work to generate enthusiasm and support among the general public and key decision-makers regarding the Wildlife Action Plan recommendations. Help to raise funds for specific conservation projects identified as high priorities in State Wildlife Action Plans. If resources permit, initiate habitat management projects in specific areas identified in State Wildlife Action Plans.
- For scientific researchers, consider conducting research projects on species and habitats that are identified in the State Wildlife Action Plans. Work with State Wildlife Action Plan Coordinators to ensure that the results of research projects will be useful for management.
- For concerned citizens, make financial contributions to local organizations that are working to implement State Wildlife Action Plans. Consider volunteering with local habitat restoration projects.

Conclusions

Although each of the State Wildlife Action Plans was developed through an independent process, there are nonetheless clear, common themes that emerge from reviewing the information contained in the individual plans. A wide array of anthropogenic threats, including water pollution; habitat loss via development, agriculture, natural resource extraction, and human intrusion; ecosystem modifications like fire suppression; illegal collection and overharvest; and introduction and spread of invasive species, etc.—threaten wildlife across the nation. In addition, there is much that we do not know about the vast majority of non-game wildlife species, and these data gaps impede the development of more detailed conservation strategies. Likewise, a lack of funding and other resources threatens to impede implementation of State Wildlife Action Plan recommendations. Experience shows that conservation actions only become more expensive as populations of species decline and important habitat areas are lost.

Key habitat areas that have high value to wildlife and are currently experiencing significant threats in multiple states include riverine habitats; fire-dependent habitats like native grasslands, savannas, barrens, and shrublands; vulnerable coastal systems; and cool temperate forests. Similarly, certain wildlife species or groups have been identified as conservation priorities across broad sections of the country. These are by no means the only species deserving of conservation attention, but identifying these species is a first step towards implementing broader regional or continental-scale conservation measures for these and other taxa.

Fortunately, there are steps that can be taken to address these threats and conservation priorities. Detailed information about necessary actions is already clearly outlined in the State Wildlife Action Plans. The most commonly identified strategies in the plans include land and water management, restoration, and protection. The further need to build strong and diverse partnerships and alliances and outreach to promote a conservation ethic and stewardship were other key components mentioned in every plan. Filling critical data gaps and disseminating information in State Wildlife Action Plans to decision-makers, land users, stakeholders, and the general public are key to making this happen.

These strategies represent the best thinking by state wildlife biologists and their many partners regarding the approaches that are needed for conservation of key wildlife species. As appropriate and accurate as these strategies may be, they cannot be implemented without the necessary resources. State fish and wildlife agencies currently lack sufficient funding and capacity to undertake more than a fraction of the activities described in the plans. Long-term, dedicated financial support and a more conservation-conscious citizenry are clearly needed to achieve the vision for wildlife outlined in the State Wildlife Action Plans. Fulfilling the recommendations of the plans, as well as cooperating regionally on conservation strategies, will help make comprehensive fish and wildlife conservation a national reality.