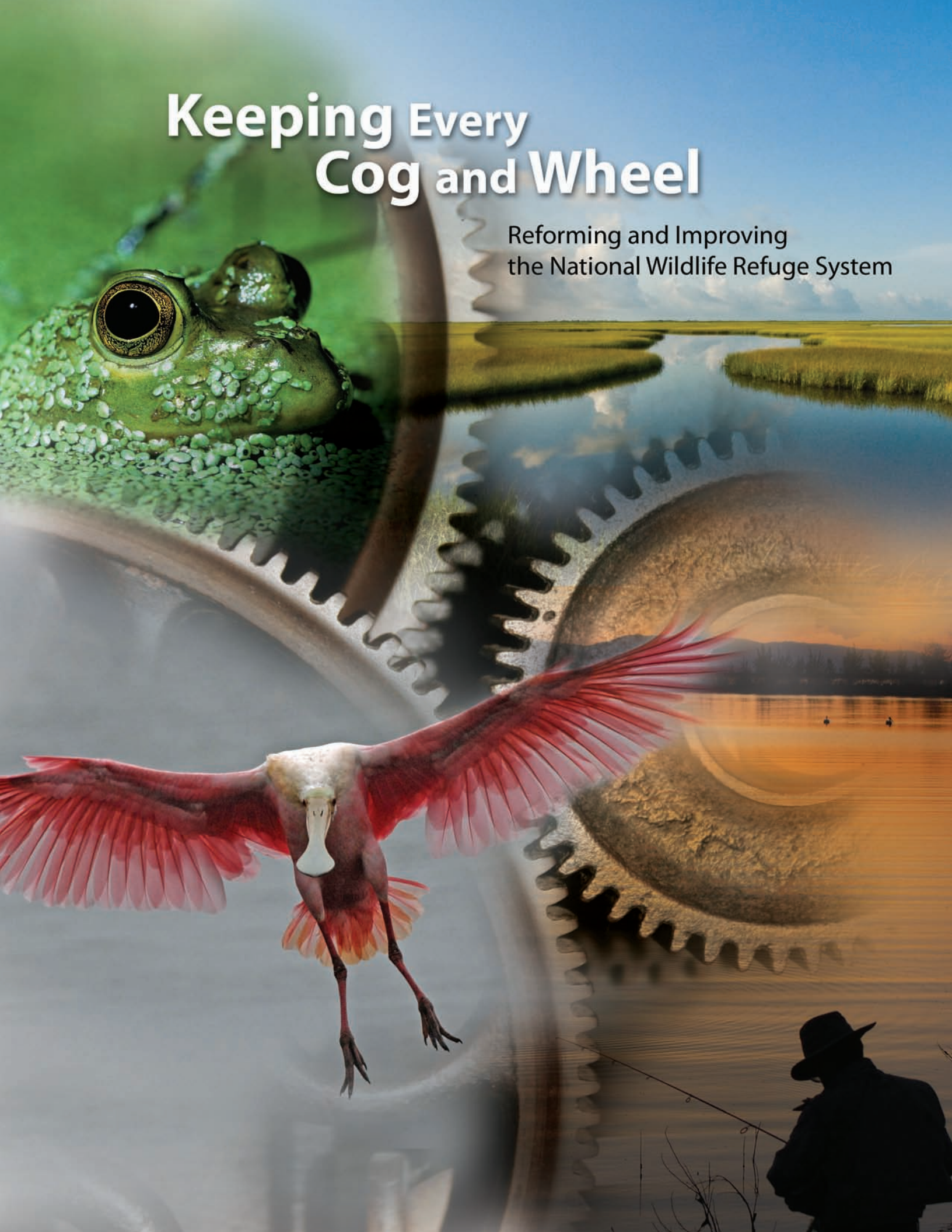

# Keeping Every Cog and Wheel

## Reforming and Improving the National Wildlife Refuge System

*This report is dedicated to all those land managers, biologists and administrators who — in the face of great adversity — have the courage, passion, and vision to clutch tightly to every last cog and wheel.*


## Acknowledgements

The authors gratefully acknowledge the contributions made by leaders from the U.S. Fish and Wildlife Service, U.S. Geological Survey and key congressional staff for their expertise and cooperation during the development of this report.


## Summary of the process

The undersigned organizations, which together represent millions of Americans, have a long-standing dedication to the health of America's land, wildlife and the National Wildlife Refuge System, one of America's crowning conservation achievements. It is with this commitment to cause that the organizations first convened in fall 2007 with the goal of providing an independent assessment of the management of the refuge system, with particular attention toward current and future challenges and opportunities. For the next year, wildlife and policy experts from these organizations met regularly with academic and professional leaders in the disciplines of wildlife and habitat management and refuge administration. This report is the result of that endeavor, and we hope its recommendations will help to reform and strengthen America's only system of lands dedicated to wildlife conservation, the National Wildlife Refuge System.

**The Aldo Leopold Foundation, American Bird Conservancy, Defenders of Wildlife, National Audubon Society, National Wildlife Federation, National Wildlife Refuge Association, Trust for Public Land, The Wilderness Society**


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Cogs © Alicia Higgins

# Keeping Every Cog and Wheel

Reforming and Improving the National Wildlife Refuge System

2008

*"If the land mechanism as a whole is good, then every part is good, whether we understand it or not. If the biota in the course of aeons, has built something we like but do not understand, then who but a fool would discard seemingly useless parts? To keep every cog and wheel is the first precaution of intelligent tinkering."*

*~Aldo Leopold, from The Round River — A Parable*

# FOREWORD

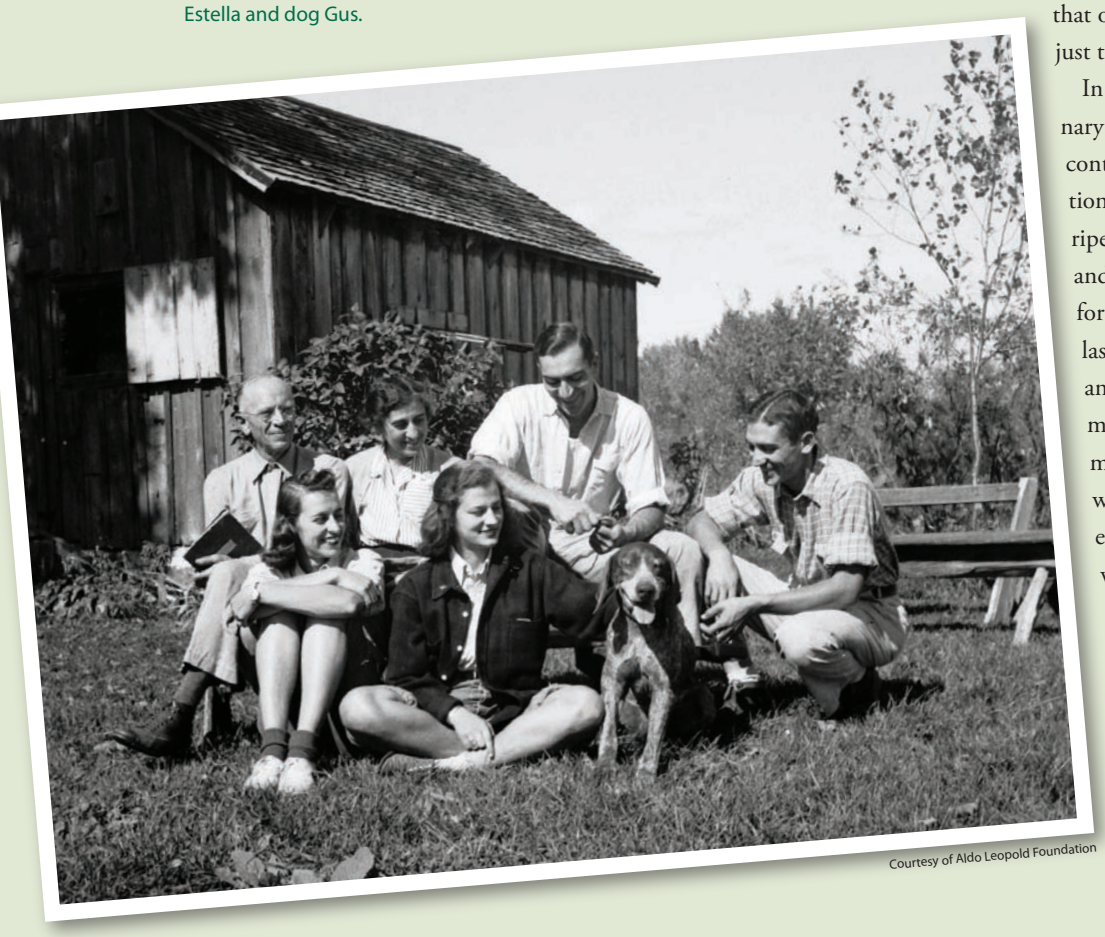
**To keep every cog and wheel…"** as my father, Aldo Leopold once noted, "is the first precaution of intelligent tinkering." He added that "the biotic clock may continue ticking if we cease throwing away its parts." These metaphors capture the core of conservation; that maintaining each part — each wildlife refuge — is essential for the continued health and existence of the whole. As we contemplate the future of wildlife and wild places, we would do well to remember that each remaining habitat is essential; each biological facet is undeniably and inextricably woven.

Ed Pembleton

Above: Nina Leopold Bradley. Below: Leopold family at the Shack (back row) Aldo, Estella, Luna, Starker (front row) Nina, Estella and dog Gus.

The National Wildlife Refuge System, nearly 100 million natural acres dedicated first and foremost to wildlife management and protection, seems the very embodiment of this holistic vision. National wildlife refuges help the nation conserve its essential natural parts and provide opportunity to help wildlife adapt to climate change and other environmental challenges. Our wildlife refuges should serve as an early warning system, where biologists can monitor and understand the status of diverse habitats and hone their management, safeguarding all the parts necessary for maintaining healthy fish, wildlife and plants.

My brother, Starker, at the request of the secretary of the interior in 1968, Stewart Udall, prepared the now-famous "Leopold Report" on the National Wildlife Refuge System. It rightly called upon refuges to embrace the entire spectrum of native wildlife and the restoration of natural ecosystems, with an emphasis on system-wide management as the logical response to mounting ecological concerns. Starker's report helped to elevate refuges to the forefront of conservation in America and to shape the principles the refuge system still subscribes to today. His words still ring true, as we face both familiar and emerging threats to wildlife and ecosystem health. We are tasked with the challenge of understanding and learning from the past so we can better imagine and shape our collective future. *Keeping Every Cog and Wheel: Reforming and Improving the National Wildlife Refuge System* outlines the tools and policies that our dedicated refuge stewards need to do just that.



Courtesy of Aldo Leopold Foundation

In the past, powerful politicians and ordinary American citizens have both made great contributions to the protection and restoration of ecological systems. The time is now ripe to renew that oft-forgotten commitment and think seriously about adopting visionary, forward-thinking policies that will leave a lasting conservation legacy. The choices we, and our government, make at this defining moment will have lasting consequence. I, like my father before me, hope that we have the wisdom to choose to adopt a stronger land ethic; to sensibly cling to "…every cog and wheel."

*By Nina Leopold Bradley*
*December 2008*

Black Brant by Ron LeValley | Birch Bay NWR, Washington

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# EXECUTIVE SUMMARY

This report, the product of more than a year's worth of research, discussion and deliberation, offers an objective assessment of the state of the National Wildlife Refuge System, describes the most pressing challenges and opportunities facing the system, and makes recommendations rooted not only in what ideally *should* be done, but also in the practicality of what *can* be done. It is our hope that these recommendations will help reform, strengthen and guide the refuge system well into its second century.

Perhaps never before in its long history has the National Wildlife Refuge System had the level of public and congressional attention it enjoys today. People all across America realize and appreciate the unparalleled value that national wildlife refuges have for plants and animals, hunters, anglers, wildlife watchers and other visitors, and local economies. Congress has taken note; the House of Representatives' Wildlife Refuge Caucus now boasts more than 145 members who have each pledged their commitment to ensuring a thriving and adequately funded refuge system.

Addressing the many challenges and taking advantage of the many opportunities now before the refuge system will require us to take the following actions:

## Adopt a new vision for the future

To make certain that the refuge system is prepared to navigate the complex challenges facing it now and in the future, the Obama administration should forge a modernized national vision for the next century of wildlife conservation in America. The vision should reflect the sound provisions of the National Wildlife Refuge System Improvement Act and support a partner-based, landscape-level approach that emphasizes habitat connectivity and the reduction of threats to wildlife and habitat.

## Make a renewed commitment to funding

The Obama administration should seek significantly increased funding from Congress to ensure the vitality of the National Wildlife Refuge System and its crucial role in protecting America's natural lands, waters and wildlife.

## Plan for 21st century conservation

In light of the U.S. Fish and Wildlife Service's (FWS) mission to protect and recover wildlife and a congressional mandate to strategically plan for land acquisitions, FWS must develop a national habitat protection plan. The plan should emphasize connecting and buffering habitats through strategic land acquisitions or easements, protecting imperiled ecosystems and species underserved by existing conservation areas, and working to secure adequate water quantity and quality for conservation purposes.

## Respond to climate change

FWS should use the refuge system to advance deeper understanding of the impacts of climate change and as a key element in developing a national climate change adaptation strategy necessary to safeguard the nation's fish, wildlife and plants. FWS should manage the refuge system to respond to climate change by emphasizing the elimination of species dispersal barriers, the reduction of non-climate stressors, aggressive land acquisition strategies and employing adaptive management principles grounded in science-based inventory and monitoring.

## Encourage a return to nature

Today's children and adults are more disconnected with the natural world than ever before. Facing a future where a majority of citizens may not understand or particularly care about wildlife or the natural environment, wildlife refuges are uniquely positioned to combat this troubling societal trend by cultivating interest in wildlife conservation and the natural world. The refuge system should prioritize community involvement, including outreach to underserved minorities, to cultivate new and diverse constituencies supportive of wildlife and land conservation.

## Renew and practice science-based management

Unique in having a legislative mandate to monitor the status and trends of fish, plants and wildlife populations, the refuge system should serve as a model for holistic, science-based monitoring and the development of adaptive management responses. A renewed scientific capacity within FWS is needed before the agency can utilize national wildlife refuges as field laboratories and outdoor classrooms where environmental changes are detected and adaptive management responses are tested, honed and shared.

## Address water quantity and quality concerns

Climate change and increasing human demand are threatening needed water supplies for conservation purposes. FWS must be a stronger advocate for fish, wildlife and plants in the adjudication and allocation of water rights and the protection of natural hydrological systems. FWS must develop a water policy for the refuge system that standardizes protocols for water assessments, helps refuge manag-

ers secure and defend water rights, and considers water quality and quantity as a factor in all future land and water acquisitions.

## Rein in invasive species

Nearly all refuge managers across the United States agree that non-native, invasive species are the single greatest threat to wildlife and habitat on refuges. With several million refuge acres now impacted by invasive plants and animals, FWS should establish an invasive species initiative that expands the use of strategic control methods and qualified personnel, educates visitors and neighboring landowners, and works to prevent the establishment of new populations of invasive species on refuges.

## Recognize and protect refuge wilderness lands

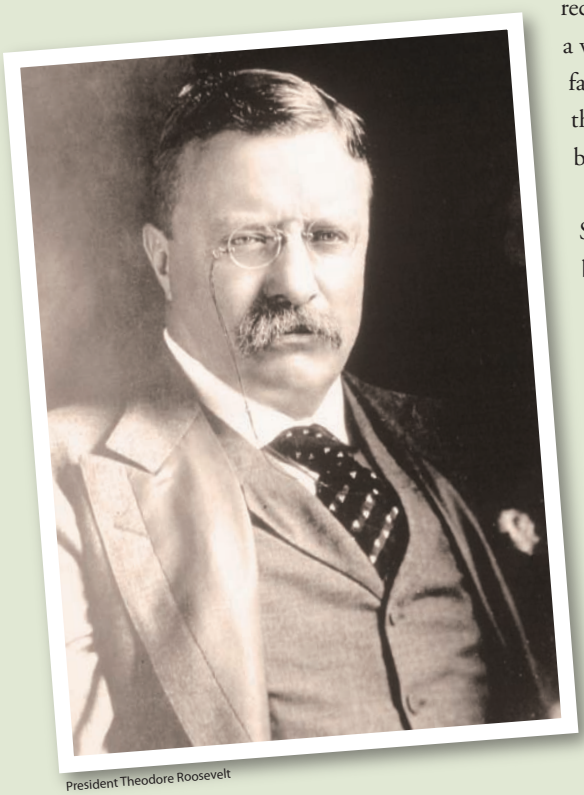
While all national wildlife refuges are undoubtedly special places within America's landscape mosaic, occasionally a refuge will have such a wild and untouched quality that an extra level of protection and recognition is warranted: wilderness. With more than 55 million acres of potential wilderness within refuge boundaries, refuge managers must be given the training and guidance necessary to conduct meaningful wilderness reviews as part of the comprehensive conservation planning process. A revised wilderness policy is needed to educate and guide refuge managers on appropriate monitoring and management of existing wilderness areas.

## Improve the management and oversight of mineral extraction

The development of privately-owned subsurface minerals, including oil and natural gas, is having adverse or even devastating impacts on many national wildlife refuges. FWS must take immediate action to overhaul extractive operations on refuges. New regulations should be promulgated that establish a detailed and precautionary approach to the approval and subsequent management of mineral activities.

# INTRODUCTION

**Just over a century ago**, a squat but oddly elegant bird stood on the verge of losing its final safe haven on the eastern shore of Florida. Instead, it altered the future of the American landscape by drawing a visionary president into an unprecedented compact with wildlife. For the National Wildlife Refuge System, it all began with the brown pelican and a tiny mangrove island in Indian River Lagoon. These unassuming birds ignited a budding consciousness in a handful of thoughtful people — a recognition that their exquisite plumage ruffling in an ocean breeze carried a value that at least matched the price the birds' feathers could fetch in the fashion industry. And so, in 1903, President Theodore Roosevelt set aside the nation's first national wildlife refuge, Pelican Island, as a preserve and breeding ground for these inspiring birds.



President Theodore Roosevelt

Unique among federal land systems, the National Wildlife Refuge System was created with the recognition that certain special areas should be reserved for wildlife — not only for its own sake but also to provide enjoyment for all Americans. Today, more than 547 wildlife refuges and thousands of prairie wetlands totaling nearly 100 million acres have been established across all U.S. states and territories. They provide essential habitat for migratory birds and other wildlife, a safe haven for endangered species, protection for imperiled ecosystems, and recreational opportunities such as hunting, fishing, wildlife watching and environmental education for nearly 40 million annual visitors. Make no mistake: the National Wildlife Refuge System, managed by the U.S. Fish and Wildlife Service (FWS), is the nation's premier system of lands dedicated to wildlife management and land conservation. But unfortunately, all is not well.

It's no secret that plants and animals around the globe face a litany of serious threats. Driven by the economic growth of a global population rapidly approaching 6.8 billion people, these threats include climate change, competition with invasive species and habitat loss and fragmentation due to fences, highways and other infrastructure, and intensive agriculture. Fortunately, the National Wildlife Refuge System exists expressly to protect American wildlife from these threats and to ensure its sustainability in perpetuity.

Created to protect beleaguered animals from unsustainable market hunting in the early 20th century, many of the nation's first refuges served as sanctuaries that offered relief for heavily hunted birds such as egrets, herons and pelicans. New threats emerged in the 1930s, as protracted drought in the Great Plains, combined with rapidly declining waterfowl populations, led to the establishment of a land acquisition and management program focused on conserving migratory ducks and geese. In the decades following, more than 200 wildlife refuges were established specifically to aid migratory birds, especially waterfowl. In the 1960s and 1970s, agriculture intensified, toxic and persistent pesticides were widely cast, and huge swaths of habitat were altered or lost, contributing to the growing ranks of imperiled plant and animal species. With passage of the Endangered Species Act of 1973, the refuge system made yet another transition in its history. Since then, more than 60 wildlife refuges have been established specifically to protect and recover endangered species such as Florida manatees, Columbian white-tailed deer and isolated populations of desert-dwelling fish.

## 1 Acknowledging the Past, Envisioning the Future

Despite the past century of relative success, the National Wildlife Refuge System and other natural areas throughout North America face a future full of difficult challenges. Climate change, the steady march of invasive species and rapidly intensifying competition for clean, fresh water top a growing list. To maintain some semblance of ecosystem integrity, to help North American plants and animals survive in the face of these mounting threats, and to frame the actions necessary to ensure a prosperous future, a purposeful vision for the desired future condition of the refuge system must be articulated. The vision should build upon the work begun in *Fulfilling the Promise*, the 1999 FWS report for implementing the landmark National Wildlife Refuge System Improvement Act of 1997 (Refuge Improvement Act). The vision should acknowledge the daunting challenges while recognizing and embracing the many opportunities that show success is still possible, such as an ever-growing conservation ethic among the public, countless potential partnerships, unprecedented congressional support and a staff comprised of the most dedicated wildlife management professionals in the business.

The refuge system has been responsive to crises since its inception and, with a nod to its important and historic past, a vision for the future should unite all agency actions toward a common purpose and address the most serious challenge now facing people and wildlife: rapid climate change. The vision should recognize that the refuge system is uniquely positioned to shepherd American wildlife through the dynamic, uncertain times ahead. As our only federal lands dedicated primarily to wildlife conservation, our refuges represent the greatest hope that American wildlife can enjoy a prosperous future. The Obama administration should leave its mark on the future of wildlife conservation in America, much as President Roosevelt did over a century ago, by championing a more vibrant and verdant America, alive with healthy wildlife, lands and air.

Bison by Reid Squyres | National Elk Refuge, Wyoming | Courtesy of NWRA

## Elements of the Vision

In an era with many interests competing for limited dollars, acres, water and natural resources, the refuge system can only retain its relevance in the future by fostering creative partnerships to maximize its conservation impact. But coordinating with other agencies or adjacent landowners is not enough, closer cooperation among FWS regions and divisions is needed. FWS regions now function semi-autonomously, with unnecessary redundancy and little standardization or information sharing. While FWS has long recognized the need for a nationally coordinated approach involving partnerships and prioritization schemes, as articulated in *Fulfilling the Promise*, it has made little progress in moving coherently toward this goal. The new FWS director should promote the integration of programs and establish more opportunities for sharing information between regions. In other words, systematize the system.

With a commitment to better integration of programs, the refuge system can begin to fulfill its stated intention of shifting toward landscape-level planning and adaptive management to conserve America's wildlife. This needed change reflects ongoing shifts in the practice of conservation science — from relatively narrow fields such as forestry, weed science or fisheries management, to today's emphasis on an interdisciplinary, interagency approach of managing, restoring and connecting wildlife populations, watersheds and even entire ecosystems. This progressive approach to conservation, which is already happening in some regions, can only be implemented with an increased national emphasis on partnerships and intra- and inter-agency cooperation. The future of conservation in America depends on it.

The vision should also reflect the sound provisions of the Refuge Improvement Act, which recognized that in order to conserve America's wildlife and habitats in perpetuity, it would be necessary to maintain the "biological integrity, diversity, and environmental health of the System," "plan and direct the continued growth of the System…to contribute to the conservation of the ecosystems of the United States," guarantee "adequate water quantity and water quality," and permit only "wildlife-dependent" recreational uses that are compatible with the purpose of the refuge and the mission of the refuge system. In recent years, however, many of these provisions have been neglected or worse, are under direct assault. It is time for a new administration to acknowledge the visionary quality of these provisions and work aggressively to promote their implementation.

Articulating a vision for the future of the refuge system is the logical first step, but the Department of the Interior (DOI) must create a broader habitat protection plan to implement that vision. Of course, any strategy to safeguard America's natural history cannot, and should not, focus solely on the refuge system. Although national wildlife refuges can form the backbone, they should be part of a wider effort across the landscape to protect, restore and connect wildlife habitat. Further, as many national wildlife refuges, waterfowl production areas and other protected areas now exist as relatively small, isolated oases amid vast areas inhospitable to wildlife, strategic growth of the refuge system will necessarily play a central role in any national or international strategy. It is essential to build upon widely accepted, but often neglected, themes in *Fulfilling the Promise* and the guiding principles of the Refuge Improvement Act to modernize a national vision and implementation strategy for the next century of American wildlife conservation.

### RECOMMENDED ACTIONS

- **The Obama administration should build upon widely accepted principles in Fulfilling the Promise, the 1999 report on implementing the Refuge Improvement Act, and modernize a national vision and implementation strategy for the next century of wildlife conservation in America.**
- **The vision should reflect the sound provisions of the Refuge Improvement Act and the administration must work aggressively to promote implementation of that vision.**
- **The Obama administration should support a science-based, landscape approach to conservation, which can only be implemented with an increased emphasis on partnerships and intra- and inter-agency cooperation.**
- **The FWS director should "systematize the system" by promoting the integration of FWS programs and establishing more opportunities for sharing information among regions.**

Abandoned truck near the U.S.- Mexico border | Cabeza Prieta NWR | FWS

## Help Wanted: Law Enforcement Personnel

The presence of uniformed officers is undeniably essential to protect wildlife, habitat, visitors and refuge employees. However, the vast majority of refuges lack any on-site law enforcement presence. To patrol and safeguard more than 580 wildlife refuges and wetland management districts, spanning nearly 100 million acres, the National Wildlife Refuge System employs only approximately 180 full-time officers. In 2005, the International Association of Chiefs of Police scrutinized this dire situation and highlighted the urgent need for 845 full-time officers to adequately respond to commercial-scale drug production and trafficking, homicides, vandalism, assaults and "traditional" resource crimes such as poaching and illegal wetland drainage.

## 2 Renewing the Commitment to Funding

The single greatest service that could be provided to America's wildlife, wildlife refuges and enduring natural heritage would be a commitment to funding the National Wildlife Refuge System at a level commensurate with its disproportionately beneficial mark on the American landscape.

Persistent inadequate budgets have rapidly ballooned the operations and maintenance backlog to $3.5 billion and required downsizing plans for a dramatic 20 percent reduction of the workforce, or more than 600 career employees. With over 300 jobs so far eliminated, these dramatic reductions are burdening dedicated but overworked staff tasked with meeting the increasingly challenging conservation mission of the refuge system. Refuge visitors often show up to find roads and visitor centers closed, viewing platforms and hiking trails in disrepair, and habitat restoration and school education programs eliminated. Non-native, invasive plants have degraded millions of acres and crime is on the rise as only 180 full-time law enforcement officers are now doing what should be shared by more than 800.


Crystal River NWR, Florida | by Noah Kahn

A comprehensive analysis in 2008 by the Cooperative Alliance for Refuge Enhancement (CARE), a national coalition of 22 wildlife, sporting, conservation and scientific organizations representing more than 14 million people, found that the refuge system needs a minimum of $765 million in annual funding — about $7.65 an acre — to properly administer its nearly 100 million acres, educational nature programs, habitat restoration projects and much more. Annual funding at this level is still conservative, as it would not begin to dent the crushing backlog of mission-critical projects and staffing needs.

### RECOMMENDED ACTIONS

- **The Obama administration should announce a budget initiative that puts the National Wildlife Refuge System on track toward achieving a funding level of $765 million.**

## 3 Planning for 21st Century Conservation

While the nation has amassed impressive holdings that benefit wildlife, including national wildlife refuges, national parks, national forests, wildernesses and other areas, current human population and development trends threaten to overwhelm the value these lands now hold for wildlife and ecosystem integrity. Many of America's natural areas exist as parcels surrounded by land or water unsuitable for most wildlife; an arrangement that does not benefit the whole of biodiversity or the maintenance of landscape-level processes. However, with a soaring population and relatively unplanned growth in many areas, the need for a forward thinking strategy to conserve America's wildlife resources and habitats is more urgent than ever. In addition, with the effects of climate change bearing down on already stressed plant and wildlife populations, the administration should prioritize the development of an interconnected system of wildlife conservation lands while working to reduce dispersal barriers.

Recognizing these threats, the visionary Refuge Improvement Act called on DOI to orchestrate "the continued growth of the System in a manner that is best designed to accomplish the mission of the System [and] to contribute to the conservation of the ecosystems of the United States." Unfortunately, FWS has yet to systematically or proactively prioritize needed land acquisitions to preserve the spectacular biodiversity found in this country. A recent report based on an independent assessment[1] gave FWS a failing grade in this metric, calling it "ineffective" at strategically growing the refuge system. The report cited the troubling decline in land acquisitions in recent years and observed that FWS has sharply decreased the amount of acquisition funding it requests from Congress. Other observations included that land ultimately purchased often "does not match the priorities identified by the refuge system's Land Acquisition Priority System." Finally, the report criticized the land appraisal process, stating it "cannot be relied upon to produce timely or accurate appraisals, [which] causes available land deals to be lost."

**with a soaring population** and relatively unplanned growth in many areas, the need for a **forward thinking strategy** to conserve America's wildlife resources and habitats is **more urgent than ever.**

### Reforming the Land Appraisal Process

Since the land-appraisal responsibilities were removed from the various DOI agencies in 2003 and re-established at the department level, rising costs and bureaucratic inefficiencies have cost FWS many promising land acquisition opportunities. The move was made under the promise of greater efficiency and accountability, but has resulted only in lengthy delays and a near doubling in cost. Today, if a landowner wishes to sell property to an interested refuge, they can now expect to wait from between nine and 18 months before a final appraisal is completed. FWS must first send its request to DOI's Appraisal Services Directorate (ASD), which in turn contracts out all appraisals to a restricted number of contractors. Many factors have resulted in higher overall cost since the transfer of the appraisal function to DOI, including the self-imposed limitation on the number of bidding contractors that drives prices up and the higher average salaries of ASD employees. Further, final appraisals have an expiration date or "date of value" of one year. So after much bureaucratic paperwork and needless delay, FWS typically has only a short time to organize funding and make an offer to the landowner before the appraisal expires. Clearly, this is a broken system in need of commonsense reform.

The secretary of the interior should restore the appraisal function to the agency level for improved efficiency, cost savings and response time, while establishing accountability provisions that ensure appraisal activities are fair, equitable and conducted in the public interest. Employees at the agency level are more connected with the resource base and more in touch with the lands they are working to protect and the mission they are striving to uphold. FWS should be given the discretion to determine whether their own government appraisers or private contractors can most efficiently do the job.

### Land Protection Funding

The Obama administration should facilitate land protection efforts by strongly supporting the two primary sources of acquisition dollars, the Land and Water Conservation Fund (LWCF) and the Migratory Bird Hunting and Conservation Stamp (Migratory Bird Stamp, also known as the Duck Stamp). In recent years, the LWCF, which is congressionally authorized to receive $900 million annually from Outer Continental Shelf royalties and other sources as a trade-off for offshore oil and natural gas development, has largely been starved of funds. The LWCF is of critical importance to preserving the nation's wildlife and scenic areas and has funded the purchase of all or a major part of some of the nation's most beloved public lands, such

Snow Geese by Erich Decker-Hoppen | Bosque del Apache NWR, New Mexico | Courtesy of NWRA

as the Pelican Island, Don Edwards San Francisco Bay, and Balcones Canyonlands national wildlife refuges. The administration must ensure that similar irreplaceable treasures are saved from permanent loss and that LWCF dollars are fully appropriated and spent on the conservation purposes they were intended for.

The federal Migratory Bird Stamp, the purchase of which is required to hunt waterfowl, has a long and successful history of land protection in America. For more than 70 years, the Migratory Bird Stamp has arguably been the most important citizen conservation tool available, as sales revenues have directly protected more than 5.2 million acres of wetlands, grasslands and other habitats. Holding steady at $15 for more than 15 years, the stamp has long been a bargain and the administration should support the recently proposed price increase to $25. At current sales volume, an additional $16 million could be raised each year for conservation. There is also unprecedented opportunity to market the Migratory Bird Stamp to nonhunters, as the ranks of wildlife watchers and other outdoor enthusiasts swell with each passing year.

With land prices steadily climbing, now is the time to permanently protect important lands and waters and be aggressive with strategic acquisition. Strong and vocal support for both the LWCF and the Migratory Bird Stamp will be critical if the administration is to implement a strategic growth plan to conserve America's magnificent, but imperiled, flora and fauna.

## Habitat Protection Plan

In light of the FWS mission to conserve wildlife and a congressional mandate to strategically plan for land acquisitions, FWS must develop a national habitat protection plan.

The habitat protection plan should be prepared in accord with the provisions found in the Refuge Improvement Act, which emphasizes conservation at multiple scales to increase habitat connectivity, ecological resilience, redundancy and ecosystem functions. The plan should incorporate consideration of climate change, projected population growth and land-use patterns, water availability and habitat connectivity. It should also prioritize linking areas of existing habitat, providing buffer lands to protect core habitats, protecting imperiled ecosystems currently under-protected or underrepresented such as native prairie or oak savannah, and securing adequate water quantity and quality. The FWS habitat protection plan should complement efforts of other federal land management agencies, state wildlife action plans and science-based conservation plans of relevant non-governmental organizations (NGO). Finally, the FWS emphasis on migratory species such as birds, fish and marine mammals requires that the agency develop its habitat protection plan in close coordination with foreign governments and NGOs, especially with Canada, Mexico and central and South America.

A vital component of the habitat protection plan is the strategic acquisition of land and water that confers the maximum ecological benefit. Given the widely recognized benefits of designated wilderness areas to wildlife and ecosystem functions, lands that would likely qualify as wilderness, or those that would increase the integrity or resilience of existing wilderness, should be carefully considered for acquisition. In addition, land acquisition plans should also consider strategically located parcels in need of restoration. Several refuges, including Lower Rio Grande Valley NWR in Texas, have successfully employed this strategy to restore agricultural lands to habitat where wildlife can once again thrive.

Land acquisitions may be in the traditional form of obtaining fee-title ownership or through conservation, grassland or wetland

Development completely encircles Philadelphia's John Heinz NWR, preventing natural animal movement and introducing invasive species and sources of pollution. | FWS

easements, but the overall land acquisition strategy must be cooperatively developed, implemented and strive to restore, protect, connect and buffer wildlife habitats. It is virtually certain that FWS managers will continue to face familiar issues and proposed projects, such as highway modifications, utility corridors and mineral exploration, but increasingly are facing new issues such as wind turbine development on easement lands. Such emerging issues should be addressed, to the extent possible, with a standardized, precautionary approach and always with strict adherence to the strong standards of FWS compatibility policy.

The Partners for Fish and Wildlife Program, the Division of Bird Habitat Conservation's Joint Ventures program, and the Habitat and Population Evaluation Teams (HAPET) all offer useful models from which to build a broader plan that encompasses not just particular suites of species, but biodiversity writ large. A fledgling FWS initiative called *Strategic Habitat Conservation* is conceptually similar to these approaches but includes greater emphasis on working toward common, scientifically defensible goals and using adaptive management based on coordinated biological modeling and monitoring. Regardless of the model ultimately chosen, the Obama administration should make a clear institutional and financial commitment to landscape-level conservation and provide the staff and training necessary to usher in a progressive, 21st century approach to conservation.

With a strategic, landscape-level habitat protection plan in hand and a commitment from the administration to funding priority land acquisitions, FWS should look toward the refuge system's comprehensive conservation plan (CCP) process as the means for implementation and public participation. Unfortunately, with declining planning budgets, reduced staff levels in recent years, and a lack of national direction, many refuge CCPs do not adequately address important issues such as climate change, wilderness reviews or strategic growth. Similarly, some compatibility determinations, which are often conducted during the CCP process to evaluate the appropriateness of various refuge uses, have lacked the necessary scientific rigor and freedom from political influence. The administration should make a strong commitment to using the best available scientific literature when preparing compatibility determinations. Finally, the looming deadline to complete all CCPs by 2012 means that refuge managers and planners are scrambling to assemble CCPs in time, often having to sacrifice quality and substance because they are severely short-staffed and under-funded. The FWS director must support a restoration of the planning budget and make clear the importance of developing meaningful CCPs and defensible compatibility determinations for every refuge.

## RECOMMENDED ACTIONS:

- **With the effects of climate change, border fencing, unplanned sprawl and other environmental challenges bearing down upon already stressed plant and wildlife populations, the administration should prioritize the creation of an interconnected system of wildlife conservation lands by working to reduce dispersal barriers and restore habitat linkages.**
- **FWS should prepare a habitat protection plan in the context of climate change, projected population growth and land-use patterns, water availability and habitat connectivity. It should focus on restoring, protecting, connecting and buffering habitats through strategic acquisitions or easements, protecting particularly imperiled ecosystems and species now under-protected by existing conservation areas, and securing adequate water quantity and quality for wildlife purposes.**
- **The secretary of the interior should restore the land-appraisal function to the agency level for improved efficiency, cost savings and response time, while establishing accountability provisions that ensure appraisal activities are fair, equitable and conducted in the public interest. FWS should be given the discretion to determine whether government appraisers or private contractors can most efficiently do the job.**
- **Due to steep declines in land acquisition appropriations and requests under the previous administration, strategic expansion of the refuge system has not kept pace with needs. The new administration should seek to acquire high-priority refuge properties. In addition, strong and vocal support for both the LWCF and the Migratory Bird Hunting and Conservation Stamp will be critical if the administration is to successfully implement plans to conserve America's irreplaceable wild plants and animals.**
- **The FWS director must support restoration of the refuge system's planning budget and make clear the importance of developing CCPs that substantively consider strategic responses to all significant problems, including climate change, which will affect refuge resources.**

## 4 Responding to Climate Change

Through the ages the Earth has experienced natural climatic variability. But today, climate change accelerated by human activity is occurring too rapidly for many species to keep up. Reports from the Intergovernmental Panel on Climate Change and the U.S. Climate Change Science Program confirm that climate change is already causing serious damage and disruptions to wildlife and ecosystems, including loss of important habitat in polar and high-mountain ecosystems, acidification of the oceans, increased drought, warming of rivers and other waters, increased threat from invasive species and more frequent catastrophic fires. These impacts threaten the natural systems that provide communities with drinking water, flood protection, food, medicine, timber, recreational opportunities, scenic beauty, jobs and numerous other services.

Because these intensifying changes seriously threaten American wildlife and habitats, they strike at the very core of the FWS mission. Fortunately, the current dilemma presents not only difficult challenges but also great opportunity. The refuge system should be a leading laboratory for understanding the impacts of climate change and in developing the tools necessary to maintain the nation's fish, wildlife and plants. Regrettably, FWS has only scratched the surface in planning for climate change and is currently mired in relative inaction with neither the operational capacity nor the technical capability to properly address the challenge. To remedy this, a large infusion of federal funding is needed to restore FWS's scientific capacity and to develop strategies, even in the face of considerable uncertainty, that address the impacts of climate change and implement science-based management responses.

Of all the federal land agencies, FWS is perhaps best positioned to adapt to changing land uses and climatic conditions. The refuge system enjoys broad public support, has great flexibility in acquiring and restoring select habitats, is nested within an agency that wields the essential tools for conserving wildlife across jurisdictional boundaries, and has a long history of active management that may become increasingly necessary. Of course, a balance should be sought between intensive manipulation of the land and passive, hands-off management, as is often practiced in designated wilderness. The Leopold Report supported such a balance in 1968, when it concluded that "Naturalism in management is to be considered a virtue."

### A National Strategy

The country needs a cohesive national strategy for maintaining plants, fish, wildlife and habitat in the face of climate change. The current absence of a national strategy, however, should not delay thoughtful action at the regional or field level. It is imperative for land and wildlife managers to begin biological monitoring and conservation planning at various scales to address the foreseeable impacts.

Sockeye Salmon | FWS

A national strategy should acknowledge that management for static conservation targets or of isolated land units has become impractical and unsustainable. A century ago, the concept of wildlife refuges serving as islands of safe haven was considered to be a viable conservation strategy, as most plants and animals still had the opportunity to move across the landscape. Today, however, more than 4 million miles of roads and massive infrastructure supporting over 300 million people has significantly fragmented and degraded America's once wild lands.

Now more than ever, enhancing habitat connectivity between wildlife refuges and other natural areas is essential to expanding the nation's overall conservation footprint. Reducing non-climate stressors to wildlife, such as communication tower guy wires and lights that kill millions of migratory birds or highway and border wall projects that fragment populations, must also play a key role in building resilience within climate-stressed populations. Further, given the global nature and impacts of climate change and the highly migratory behavior of many species, such as shorebirds, marine mammals and anadromous fish, it is also essential that the national strategy consider global changes and work collaboratively to protect migratory species when outside of the United States.

## Refuge Adaptation Planning

Preferably tiered from a broader national strategy, the refuge system needs a consistent, thoughtful response to climate change. Climate change is already adversely affecting many regions, and with impacts predicted to worsen in coming years, effective planning must begin now. Acting soon will help avoid irreversible losses and save money in the long term.

Each refuge's CCP should serve as the vehicle for downscaling national climate strategies to the refuge level. It is through the CCP process that refuges should address many of the needed climate-change-related actions, such as gathering inventory and monitoring data, restoring habitat, eliminating incompatible uses, forming cooperative partnerships and conducting public outreach. FWS should also commit to working with partners, including states and other federal agencies, to eliminate and prevent barriers to species dispersal by protecting or restoring habitat linkages.

As part of a comprehensive approach to climate-change planning, it is appropriate that CCPs also include detailed plans for reducing existing or projected non-climate stressors to wildlife, such as mineral extraction, unnecessary roads, livestock grazing or pollution. By reducing other pressures, it is widely believed that wildlife will be better able to cope with climate-related stressors, such as rising temperatures, drought and changes in plant communities or sea level. Unfortunately, the vast majority of CCPs finalized to date have failed to consider or plan for climate change.

## Inventory and Monitoring

Many well respected scientists, land managers, conservationists and recent reports[2] have stressed the urgent need for more accurate, unbiased and comprehensive information to inform climate change adaptation policies and management strategies. This call can no longer be ignored, nor action further delayed. Collecting baseline inventory data and conducting monitoring on most wildlife refuges will prove essential in: identifying conservation targets; detecting climate-related system changes; identifying the most vulnerable species and habitats; evaluating scale-specific choices of management and policy responses to various climate scenarios; developing objective criteria for prioritizing and decision-making; and developing, implementing and evaluating plans using adaptive management principles.[3] The refuge system's wildlife adaptation plan should be grounded in science-based inventory and monitoring protocols so adaptive management and land acquisition decisions may be informed to the fullest extent possible.

## Training and Research Partnerships

The collection and dissemination of climate change information will necessarily involve partnerships among FWS regions, programs and with the U.S. Geological Survey (USGS), as well as other federal and state agencies, tribes, universities and non-governmental organizations. To expedite long overdue interagency cooperation at the landscape level, FWS should create a platform for ongoing professional-level training workshops that involves relevant decision-makers, landowners, managers and researchers. These trainings should be regional and include consideration of resource vulnerability, impacts and management responses necessary to promote the adaptation of species and natural habitats. Workshops at the regional level serve to connect land managers with their local universities and research community, a critical first step toward developing meaningful research partnerships. Absent this effort, land managers will continue to struggle without useful data, predictive models, decision-support tools or actions to tackle complex management and conservation-design problems.

The fledgling and underfunded National Climate Change and Wildlife Science Center, housed within USGS, was recently established to address many of these challenges. Still in its formative stages, the science center intends to provide land managers with information on the effects of climate change and to assist federal agencies in developing adaptive fish and wildlife management strategies. Scientific capacity should be increased within FWS so the agency can effectively collaborate with USGS scientists to identify knowledge gaps, conduct appropriate trainings and facilitate the integration of applied research into land-management decisions.

## Education

An increasingly important aspect to address with regard to climate change is the education of neighboring landowners and the visiting public, especially children. Many refuges are located near population centers, providing a great opportunity to increase public awareness of the challenges faced by wildlife in a changing environment. Workshops, brochures and kiosks could be developed that provide information about the effects of climate change on refuges, such as sea level rise, the proliferation of invasive species and altered precipitation patterns. In addition, FWS should boost outreach efforts to private landowners and encourage them to adopt practices demonstrated to be useful in building resiliency or otherwise adapting to climate change. Refuges are often surrounded by private land, which harbors at least one population of more than half of all imperiled species and two-thirds of federally threatened or endangered species.[4] Coupled with the well-documented need for plants and wildlife to move across landscapes in response to climate change, restoration of private land to suitable habitat will prove vital to the larger conservation effort. Of course, these goals can only be achieved after initial education and training for refuge system staff at all levels.

**RECOMMENDED ACTIONS:**

- The National Wildlife Refuge System should be a leading laboratory for understanding the impacts of climate change and a key partner in developing the national climate change strategy necessary to safeguard the nation's fish, wildlife andplants. The refuge system should respond to climate change by emphasizing the elimination of species dispersal barriers and restoration of habitat linkages, the reduction of non-climate stressors, aggressive land acquisition strategies, and the employment of adaptive management principles based on scientific inventory and monitoring.
- Create regional Climate Advisory Teams of expert scientists to assist in completing CCPs, prioritizing conservation actions and making Endangered Species Act implementation decisions in accordance with the best available science on climate-change impacts.
- A large infusion of federal funding is needed to increase FWS's scientific capacity and develop a wildlife adaptation plan that addresses the impacts of climate change and implements management responses.
- FWS should create a platform for ongoing regional training workshops that involve relevant decision-makers, landowners, managers and researchers. FWS should work in close collaboration with USGS scientists to identify knowledge gaps, conduct appropriate trainings and to facilitate the integration of scientific research into land-management decisions.
- The refuge system should boost outreach efforts to visitors and neighboring landowners and encourage them to adopt land-use practices that increase species and habitat resilience. Of course, these goals can only be achieved after refuge system staff at all levels has received standardized education and training.

## 5 Returning People to Nature

Today's children and adults are more disconnected from the natural world than ever before. This development is linked not only to problematic societal trends such as rising obesity, juvenile diabetes, loneliness, attention disorders and depression, but also, according to numerous studies, to a rapidly declining environmental literacy in America.[5] These studies reveal the trend away from broad environmental literacy by illustrating, for example, that 130 million Americans believe that hydropower is our top energy source, when it only accounts for 10 percent of the total. But the trend is also evident in smaller, less conspicuous ways. One of the refuge system's top leaders recently lamented that, contrary to the youth of bygone eras, "today's kids can identify more celebrities than songbirds." Perhaps FWS itself best summed up the problem in its publication, *Fulfilling the Promise*: "The American people cannot appreciate or support what they do not know exists or do not understand."

Fortunately, the refuge system is uniquely positioned to help combat this growing trend of environmental detachment or "nature deficit disorder." With nearly 40 million visitors annually and a refuge within an hour's drive of nearly every major American city, wildlife refuges should be able to host even more visitors, including school groups and families. But with more than 35 percent of the nation's refuges completely unstaffed and many others with inadequate levels of visitor-services staff, the refuge system is missing a golden opportunity to educate and encourage a conservation ethic among the

Tree planting by Noah Kahn | Presquile NWR, Virginia

Birders © FWS

populace, especially young people. Regardless of very real budget and staffing limitations, wildlife refuges should emphasize community involvement to the extent possible, not only to help combat troubling social trends but also to cultivate future conservationists.

Demographics are changing rapidly in the United States. Ethnic groups that have historically been the minorities, especially people of Hispanic origin, are projected to become the majority in some regions. A general population movement toward the south and coasts, where many wildlife refuges are located is also underway. In most areas, the opportunity to engage minorities has never been greater, as there is extensive overlap among states with significant minority populations and a large number of wildlife refuges, such as Hawaii, California, Arizona, Texas, Florida and North Carolina. Linking wildlife education or bird watching with community events or school programs is a great way to make the necessary connections. Engaging diverse constituencies, including underserved minorities, is essential to building a broader base of public support to guarantee that wildlife, natural areas and the wilderness experience all remain relevant in the midst of profound shifts in U.S. demographics.

The effort to recruit and cultivate new constituencies to the refuge system is an important one. It may involve the additional training or empowerment of refuge support groups, or "Friends" that can serve as ambassadors to carry messages deeper into local communities and schools. Other existing efforts to boost community involvement should be further supported, such as the various programs promoted by the refuge system's Division of Visitor Services. One especially promising initiative, the FWS Birding Team, is working to attract and provide a positive experience for the large and growing constituency of birders. Recruitment of wildlife watchers not only showcases refuges in a positive way, but also generates significant revenue for local economies. In 2006, visitors to refuges generated more than $1.7 billion in annual sales to local economies, which employed more than 27,000 U.S. workers.[6]

Additionally, to promote visitation and awareness, FWS should standardize its regional and individual refuge Web sites to streamline operations and attract and educate birders and other potential visitors. Currently, regional and refuge Web sites look dramatically different and provide widely varying levels of content. This problem was highlighted recently in an independent evaluation that concluded FWS could do "a substantially better job at orienting visitors by improving its websites and making sure website content is updated and consistent." Web sites should also be used to communicate any significant monitoring or research occurring on refuges and to relay the effects of a changing climate on refuge resources.

To accomplish education and outreach goals in the most cost-effective manner, additional financial resources should be dedicated to appropriate visitor infrastructure, such as consistently branded FWS welcome signs, eBird (an online bird sighting program) kiosks, observation platforms, interpretive panels and up-to-date bird and wildlife checklists and other brochures — none of which require on-site staff presence. These types of projects offer partnership opportunities that often attracts funding and labor through refuge Friends groups, Scouts and other community organizations. These items can each be funded through the underutilized but important Visitor Facilities Enhancement (VFE) account in the FWS budget. VFE funding stretches federal dollars farther than they would otherwise go, in that once instructive material or infrastructure is developed, visitors can create memorable, educational experiences without necessarily needing omnipresent staff. Certainly, however, the visitor experience will always be richer with on-site interpretive personnel. Coupled with greater emphasis on the VFE account, the number of visitor services staff should be increased to further encourage volunteer opportunities through community outreach and partnerships. A commitment to increasing visitor services staff results in multiplied benefits, since volunteers already perform 20 percent of the work on national wildlife refuges, and increasing staff levels leverages the refuge system's capacity to host even more volunteers.

**RECOMMENDED ACTIONS:**

- **Support the various programs of the Division of Visitor Services, such as the FWS Birding Team, which works to attract a large and growing constituency of wildlife watchers. To offer a unified appearance and message and provide for a better visitor experience overall, FWS should standardize its regional and individual refuge Web sites, which currently vary widely in format and content.**
- **National wildlife refuges are uniquely positioned to educate the public about wildlife and habitat conservation. The Obama administration should develop and implement an environmental education strategy for refuges that prioritizes the engagement of all potential constituencies, including underserved minorities. Developing a broader base of public support will guarantee that wildlife refuges remain relevant in the midst of profound demographic shifts in the United States.**
- **Increase the number of visitor services personnel to restore lost volunteer opportunities and partnerships and to educate visitors on the importance of refuges and the challenges they face.**
- **Prioritize the development of appropriate visitor-related infrastructure — consistently branded welcome signs, eBird kiosks, observation platforms, interpretive panels, and up-to-date bird and wildlife checklists and other brochures — none of which require on-site staff presence.**
- **The Obama administration should request increased funding from Congress for the VFE account.**

## 6 Recognizing the Need for Scientific Research

In the spirit of Aldo Leopold's teachings, the National Wildlife Refuge System should be a model for science-based wildlife management and ethical land stewardship. The refuge system should also function as an early detection system for broader environmental changes. Wildlife refuges are capable of serving as field laboratories where environmental changes are detected and management responses are tested, honed and shared. FWS has the land base and the experience necessary to lead other resource agencies, and even other countries, in the development of mechanisms to monitor and respond to profound environmental changes now underway, including global climate change. Successfully helping wildlife and habitats adapt to major ecological changes will depend in large part on specific knowledge of environmental changes, how those changes are affecting species and habitats of interest, and what, if anything, can or should be done in response. FWS should be a leading partner in an effort to establish national standards for inventory and monitoring protocols in conjunction with federal and state agencies.

The refuge system is unique in having a legislative mandate to provide a platform for monitoring the status and trends of fish, wildlife and plant populations, yet FWS has generally failed to develop a national strategy to effectively implement or prioritize this directive. It is unacceptable that the world's premier wildlife conservation system does not have a comprehensive catalogue of the plants and animals found within its boundaries, let alone wildlife population trends or impacts of environmental stressors. Without baseline biological inventories and robust monitoring programs for factors such as sea level, soil moisture and aquifer levels, refuges will be utterly unable to detect environmental or population changes, and therefore unable to develop appropriate, timely responses. Further, monitoring efforts should also pay close attention to important non-trust species, such as pollinators and amphibians, to better understand the root causes and effects of broad environmental changes.

Tree frog by C. Dennis McKelroy | San Bernard NWR, Texas | Courtesy of NWRA

A 2004 FWS report, *Baseline Inventory Data Recommendations for National Wildlife Refuges*, provided useful guidance and standards on the collection and maintenance of baseline biological information. Although the report was effectively shelved in recent years, its recommendations remain sound. FWS should adopt these recommendations as official policy and redistribute copies of the report to all regions and field

Dew covered butterfly by Carol Wolfe | Seney NWR, Michigan | Courtesy of NWRA

stations. To reduce costs associated with comprehensive inventories of refuge biota, FWS should develop a system for rapid assessments, using "strike team" surveyors to develop a snapshot of abundance and distribution data in only a few weeks. The refuge system has already made use of this approach for fighting invasive species and wildfire. Given that less than half of wildlife refuges employ even a single biologist — a crippling problem for an agency whose express purpose is wildlife conservation — this strategy is the most practical way to gather baseline data within a reasonable timeframe and budget.

Other, more creative ways of gathering standardized data exist, such as deploying citizen scientists with handheld GPS devices to catalogue invasive species infestations, or eBird kiosks, where visitors can input their wildlife sightings in a format useful to research biologists. Of course, inventory data are only useful when followed by regular and coordinated monitoring; therefore FWS should standardize monitoring procedures throughout its regions and the refuge system and in conjunction with USGS and other federal and state agencies, so information can be shared and compared.

Recognizing that complex environmental changes are underway and expected to continue, FWS must stimulate dialogue between land managers and academics so that researchers are investigating and applying knowledge to practical, real-world problems. In addition, available science must be packaged and distributed to land managers in usable form, such as a decision-support system, given constraints on time and breadth of expertise. Currently, many land managers are unable to incorporate large-scale research or climate models into their land-use plans or decision-making simply because the scale is not relevant. Moving forward, it will be increasingly important to design relevant research questions, and FWS should not only collaborate on research with USGS, but also increase its own scientific capacity.

It will be important to restore capability within FWS to conduct research and carry out other science functions. FWS is the key federal agency with responsibility for conservation of migratory and imperiled wildlife. However, in 1993 all FWS research and science programs were transferred, first to the National Biological Survey and then to its successor, the Biological Resources Division, within USGS. While this transfer has provided some benefits for agencies within the Department of the Interior, including FWS, it has left the nation's leader in wildlife conservation without the scientists and funding it needs to effectively interact with USGS and augment its efforts. Strong scientific capability within FWS is necessary for efficient and effective biological planning and wildlife conservation.

## RECOMMENDED ACTIONS:

- **FWS has the land base and the experience necessary to lead other resource agencies, and even other nations, in the development of mechanisms to monitor and respond to profound environmental changes, including global climate change. The refuge system should be a model for science-based monitoring and the creation of adaptive wildlife and habitat management responses.**
- **FWS should be a leading partner to establish national standards for inventory and monitoring protocols in conjunction with other agencies. FWS should adopt the recommendations in Baseline Inventory Data Recommendations for National Wildlife Refuges as official policy. In addition to monitoring "trust" species, particular attention should be paid to indicator species such as pollinators and amphibians, assessing water usage, and important climate-related variables.**
- **FWS should develop a system for deploying rapid biological assessments on refuges, which utilize a "strike team" approach where survey teams develop a snapshot of abundance and distribution data in only a few weeks.**
- **Stimulating open dialogue between researchers and land managers is essential so that researchers are investigating and applying knowledge to practical, real-world problems. While FWS should continue to collaborate with the U.S. Geological Survey, scientific capacity within FWS should be restored.**

## 7 Solving Water Woes

In *The State of the Nation's Ecosystems 2008*, a monumental effort to catalogue the condition of America's natural resources, the Heinz Center reports that contaminants such as DDT, PCBs and mercury were found in virtually all of the nation's streams. Nitrogen, too, is a growing problem as homeowners and farmers have increased use of nitrogen fertilizers in the last 60 years. Excess nitrogen often ends up in rivers that discharge into coastal waters, causing widespread low- or no-oxygen zones harmful or fatal to marine life. Further, the acreage of coastal wetlands on the Atlantic and Gulf coasts has decreased significantly, as have freshwater wetlands (not including ponds) throughout the United States. Moreover, with a burgeoning U.S. population of more than 300 million, there is little reason to believe these trends will reverse course.

Ruddy duck by Sharon Cummings | J. Clark Salyer NWR, North Dakota | Courtesy of NWRA

Relative to other ecosystems, freshwater systems are taking the brunt of the punishment. NatureServe, which compiles a national network of biological inventories, reports that 37 percent of native freshwater aquatic animals — more than in any other habitat type — are classified as "at-risk," meaning they are at elevated risk of extinction. Plants are not faring any better, as about 62 percent of the freshwater plant communities in wetland and riparian areas are "at risk," Compared to other federal land management agencies, FWS typically manages areas that are wetter, lower in elevation and higher in biodiversity; often freshwater wetlands or coastal marshes. The importance of natural areas such as wildlife refuges cannot be overstated. Refuges provide innumerable environmental benefits well beyond the obvious ones for wildlife. Refuges filter groundwater and rainwater before it flows downstream to municipal water supplies and, in many areas, reduce flooding by capturing excess rainwater and attenuating coastal storm surges. The dense vegetation on many wildlife refuges absorbs pollution and sequesters atmospheric carbon. However, often these biologically rich habitats overlap closely with areas selected for human development or agriculture and are placed at great risk.

Unfortunately, with increasing water demands from urban development and agriculture, many refuges are struggling to secure enough water to meet their conservation targets. In enacting the Refuge Improvement Act, Congress showed foresight in addressing the emerging water crisis on wildlife refuges, a crisis now exacerbated by climate change and intense regional droughts. Congress was unequivocal when it stated in the Refuge Improvement Act that "adequate water quantity and water quality" must be maintained to "fulfill the mission of the system and the purposes of each refuge."

FWS has long recognized that water availability is one of the most challenging problems facing the refuge system. As stated in *Fulfilling the Promise*: "The Service needs to be a strong advocate for fish, wildlife, and plants in the adjudication and allocation of water rights and the protection of natural hydrological systems. A comprehensive assessment of the availability of water supply, projected water needs, and status of existing and needed water rights should be completed for

Great blue heron with largemouth bass by Mark B Bartosik | San Bernard NWR, Texas | Courtesy of NWRA

each refuge." Although more than 150 assessments have been completed, many are outdated and there is little evidence that they were performed in a standardized or thorough manner. Unfortunately, a decade has now elapsed with the refuge system making little progress toward the comprehensive goals outlined in *Fulfilling the Promise*.

FWS must develop a refuge system water policy that standardizes protocol for water assessments and helps land managers obtain and defend water rights on wildlife refuges. In the face of increasing human demand, droughts, floods and altered timing and volume of water flows, FWS needs to anticipate and appropriately plan for future water challenges. As part of this planning effort, FWS should secure hydrologists and equipment and foster the institutional commitment necessary to thoroughly catalogue existing water use along with current and projected needs. Currently, some FWS regions have no dedicated hydrologists or water monitoring programs. With such limited capacity, it is not surprising that many wildlife refuges, particularly in the East, have not documented current water usage or projected future needs. Documentation will be absolutely critical if refuge water rights are legally challenged as water supplies dwindle. Thorough documentation of usage is essential not only to defend existing rights, but also to assert what refuges actually need. Some of the necessary inventory and monitoring can be done in conjunction with partners, but all data needs to be standardized and accessible in a centralized database.

Consideration of water quality and quantity should be a component of all future land and water acquisitions. Priority should be given to parcels with high-quality habitat that also have senior water rights, where possible. It would also be prudent to identify overlap between willing sellers of water rights and areas where FWS has identified a need for additional water. Of course, an inventory and monitoring of related factors will be necessary first. DOI should encourage and provide guidance to all its land managers to work with neighboring landowners and upstream users on various water measures, including water conservation techniques and the improvement of water quality through, for example, the reduction of contaminants or sediment inputs. In some isolated cases, wildlife refuges themselves adversely impact water quality by releasing large volumes of nutrient-laden waters from freshwater impoundments into larger water bodies. For FWS to achieve its goal of managing refuges within a landscape-level context, it should develop habitat management strategies and population targets that minimize pollution of local watersheds.

## Disappearing Prairie Wreaks Habitat Havoc

The wetlands at Hailstone National Wildlife Refuge are surrounded by rolling hills of shortgrass prairie and Montana's famed "big sky." This remaining bit of native grassland, a largely lost ecosystem, is essential for prairie wildlife now squeezed to the brink. But Hailstone is surrounded by mostly wheat fields, which regularly lie fallow and don't hold rainwater as the deep roots of prairie grasses once did. With a landscape now dominated by agriculture, water percolating through the soil carries salts and selenium along the water table and deposits toxic concentrations of these minerals into the low-lying refuge wetlands. As a result, birds and other animals are literally dying at Hailstone, with similar tales now playing out across the United States.

Salt encrusted green-winged teal, FWS | Hailstone NWR, Montana

**RECOMMENDED ACTIONS:**

- **Climate change and increasing human demand are threatening water supplies for needed conservation purposes. FWS needs to be a stronger advocate for fish, wildlife and plants in the adjudication and allocation of water rights and the protection of natural hydrological systems.**
- **FWS must develop a national water policy for the refuge system that standardizes protocol for water assessments and helps land managers secure and defend water rights on wildlife refuges. To fend off future challenges, professional hydrologists should be hired by each region to assess the availability of water supply, status of existing and needed water rights and projected water needs for each refuge.**
- **Consideration of water quality and quantity should be a component of all future land and water acquisitions.**
- **The DOI should encourage and provide guidance to its land managers to work with neighboring landowners and upstream users on various water measures, including water conservation techniques and the improvement of water quality through the reduction of contaminant or sediment inputs.**

## 8 Reining in Invasive Species

After direct habitat loss, invasive species are believed to be the second leading cause of species decline in the U.S. Refuge managers across the country almost unanimously agree that non-native, invasive species are the top threat to wildlife and habitat on refuges. According to FWS, 2.4 million acres of refuge lands are now overrun with invasive plants, while more than 4,400 invasive animal populations run amok on millions more acres. In fiscal year 2006, the last year in which a comprehensive assessment of needs was assembled, the refuge system was buried in a $360 million backlog of critical invasives control projects. Of course, the problem is much larger than the refuge system. Invasive insects, such as emerald ash borers and Asian longhorned beetles, have killed tens of millions of trees in recent years, costing billions in control costs and damages. A broader approach is needed. America's lax national importation laws and inadequate regulation must be overhauled to provide this ultimate solution, but FWS must quickly intensify its commitment to dealing with the problem at the refuge level. FWS should establish an invasive species initiative designed to prevent the establishment of new populations of invasive species and begin the process of reducing the impacts of existing populations.

The refuge system has little or no spatially explicit data regarding the distribution or intensity of invasive species infestations on most refuges. Even so, the use of Invasive Species Strike Teams, which utilize the principle of "early detection and rapid response" to quickly assess and eradicate new infestations, can be effective if properly staffed, coordinated and funded. But with only five small and scattered strike teams, invasive species continue to expand virtually unchecked. The strike teams are not centrally coordinated and there is little direction or restriction on how allocated resources may be used. For the strike-team model to realize its potential, FWS should hire more professional botanists and invasive animal specialists at the regional or refuge-complex level, acknowledging the fact that invasive species management is a professional specialty akin to fighting wildfire or removing toxic contaminants. These specialists

Girl captures non-native carp, by Sheri Melanso | Bosque del Apache NWR, New Mexico | Courtesy of NWRA

Orange hawkweed by Steve Hillebrand, FWS | Alaska Maritime NWR, Alaska

could orchestrate the field activities of strike teams, with direction from a national coordinator. The national effort must be strategic, as simply peppering the refuge system with more dollars and people cannot solve this pressing problem. FWS should also consider utilizing the strike team approach on islands, as results on islands are often immediate, long-lasting and showcase eradication efforts to the public in a positive light.

A key component of battling invasive species is prevention; therefore, the education of refuge visitors, neighboring landowners and area policymakers is important. Visitor centers should have educational displays that discuss the harmful and very costly effects of invasive species and encourage people to landscape with native plants. Partnerships with area native plant societies are another way to reach the local community. The Volunteers and Invasives Program has been successful to date in both outreach efforts and combating on-the-ground infestations, with competitive grants awarded to invasive-species-control projects that directly involve volunteers or refuge Friends groups. But the program currently has two major shortcomings: It receives a maximum of only $1 million annually, and annual congressional funding is not mandatory, meaning the refuge system cannot rely on guaranteed dollars each year. To effectively plan ongoing and future control projects, FWS should move the Volunteers and Invasives Program into the base budget and increase funding for it.

## RECOMMENDED ACTIONS:

- **FWS should establish an invasive-species initiative designed to prevent the establishment of new populations of invasive species and begin the process of reducing the impacts of existing populations.**
- **FWS should expand the use of Invasive Species Strike Teams as a method to quickly assess and eradicate new infestations. Currently, the strike teams are grossly under-staffed, under-funded and under-coordinated. Professional botanists and invasive animal specialists are needed.**
- **To more effectively plan ongoing and future control projects, FWS should move the Volunteers and Invasives Program into the base budget and increase funding for it.**
- **Refuge visitor centers should have educational displays that discuss the harmful and very costly effects of invasive species and encourage people to take actions that benefit native plants and wildlife.**

## 9 Providing a Wilderness Experience

*"A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise."* — Aldo Leopold

Aldo Leopold and his dog Gus | Courtesy of Aldo Leopold Foundation

National wildlife refuges are rare and special places within America's landscape mosaic. Occasionally, however, a place will have such meaning, such untouched and wild quality, that an extra level of protection is warranted. These are America's wilderness areas, congressionally designated areas often found within national wildlife refuges, national parks, national forests and other lands. The Wilderness Act of 1964 eloquently articulated the unique essence of wilderness areas, stating that "wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain."

Roughly 21 million acres on 63 national wildlife refuges are designated as wilderness. Another 21 refuges contain proposed wilderness areas, while the refuge system possesses an additional 57 million acres of potential wilderness that should be evaluated during the development of comprehensive conservation plans. Despite this potential, nearly 15 years have passed since new wilderness areas have been designated in the refuge system.

Refuge wilderness areas provide many ecological, recreational and educational benefits. Millions of birds and large mammals such as moose, elk and bears use wilderness areas as undisturbed breeding and foraging grounds. Wilderness allows for undisturbed natural life cycles to be played out for thousands of plant and animal species. In

addition, wilderness areas protect watersheds and provide primitive and unconfined recreation for those who love the outdoors but find ever-fewer wild places to explore. Equally important, wilderness areas provide educators and researchers with a natural laboratory to observe and learn about wildlife and intact ecosystems. Moving forward, these serene areas will provide crucial respite for wildlife struggling to deal with the many perils of climate change.

The thorough evaluation of potential wilderness should occur during the CCP process, but wilderness reviews are falling well short of anything representing substantive consideration. FWS should complete its Wilderness Review Handbook for land managers. This handbook, when coupled with wilderness review training, finally will enable refuge managers to conduct meaningful wilderness reviews.

In November 2008, the Bush administration released a new wilderness stewardship policy for the National Wildlife Refuge System. This long overdue step should have provided a foundation for integrating the sound provisions of the Wilderness Act of 1964 and the Refuge Improvement Act, but, unfortunately, the policy has serious deficiencies. It fails to consider one of the most pressing issues of our time, climate change, and exempts all national wildlife refuges in Alaska from conducting wilderness reviews. In addition, the final policy was released suddenly after sitting idle since 2001 — without any opportunity for public comment — a serious problem given the document's shortcomings.

**RECOMMENDED ACTIONS:**

- **FWS should complete the Wilderness Review Handbook for its refuge managers. Coupled with wilderness review training, this handbook will enable managers to properly conduct meaningful wilderness reviews as part of the comprehensive conservation planning process required for every national wildlife refuge.**
- **The Bush administration's recently released wilderness policy, which falls far short of providing adequate stewardship guidance, should be revised to reflect emerging threats such as climate change, released for public input, and, after further revision in response to public comments, finalized and implemented. The policy is needed to educate and guide land managers on monitoring and managing wilderness areas.**
- **The administration should support the adoption of pending national wildlife refuge wilderness proposals.**

## 10 Improving Management and Oversight of Mineral Extraction

Although the federal government owns almost all of the surface acreage in the refuge system, in some cases subsurface mineral rights are owned by private parties, creating a split estate. There is inherent tension between the property rights associated with these minerals and the mandate to manage national wildlife refuges for the primary purpose of wildlife conservation. The proper balance between these competing interests remains largely undefined. This tension is exacerbated by FWS's failure to promulgate detailed regulations governing private mineral estates, despite the fact that the National Park Service (NPS) and U.S. Forest Service have developed regulations for the lands they administer. As a result, FWS oversight of private mineral estates within wildlife refuges is often ineffective and inconsistent, varying widely among regions and individual refuges.

Oiled Grebe | FWS

In 2002, the last year for which data were available, more than 25 percent of all national wildlife refuges had oil and natural gas activities, including over 1,800 active wells and 2,600 inactive wells scattered across 155 wildlife refuges. Anecdotal evidence indicates that mineral extraction on refuges has increased markedly in recent

years, tracking the rising global demand for oil and gas. As with most oil and gas activities, these operations frequently result not only in significant wildlife disturbance but also in oil spills, leaking pipelines, abandoned infrastructure and equipment such as leaking oil drums, toxic chemical gas leaks, fires, spread of invasive species, severe erosion, wildlife exposure to open reserve pits, reduced or eliminated public access and wildlife mortality. Many refuges experience similar impacts from mining operations.

Open oil pits, such as this one, resemble water and frequently kill wildlife. | FWS

In response to congressional concern over this mounting destruction of refuge resources, the Government Accountability Office (GAO) undertook a detailed study of private oil and gas estates on refuges, concluding in 2003 that management and oversight of oil and gas operations was inadequate and making specific recommendations to address numerous problems. For example, the GAO found that FWS had very little knowledge regarding the extent of oil and gas development occurring on refuges. Further, FWS had not assessed the cumulative environmental impact of these activities. A follow-up assessment by GAO in 2007 found that FWS and DOI had made little or no progress in most areas and matter-of-factly observed that "more action is needed." A year later, FWS has still not created a database to collect basic information on oil and gas activities and their effect on refuge wildlife or habitat. Instead of undertaking diligent efforts to address these gaps in knowledge, FWS instead has essentially decided not to regulate any nonfederal oil and gas operations on refuge system lands.

## A Model for Regulation

The shortcomings of the FWS regulatory regime are sharply underscored by NPS's comprehensive and substantive oversight of the same activities. Promulgated in 1979, NPS's rules establish a detailed and precautionary approach to the approval and subsequent management of nonfederal mineral operations on NPS lands. At the core of this program is the requirement that oil and gas operators submit a detailed plan of operations, with precise information concerning the location, extent and duration of proposed activities and associated infrastructure; the affected environment and anticipated environmental consequences; technologically achievable alternatives to the proposed operations; measures to protect surface and subsurface waters and many other standards. NPS also retains the authority to reject inadequate or incomplete plans of operations. Additionally, NPS regulations require specific authorization for any use of water within its lands, establish substantive reclamation requirements and operating standards, mandate registration of oil and gas related commercial vehicles with the agency, require guaranteed performance bonds, provide for specific damage clauses, and allow public participation and comment on a proposed plan of operations.

With adverse and sometimes devastating impacts from private mineral development occurring with alarming regularity, FWS must take immediate action to overhaul the management of mineral activities on national wildlife refuges. Improving the management of oil and gas activities will require FWS to address two overarching needs: promulgating new regulations to include mandatory permitting and seeking the funding necessary to support adherence to these regulations.

## New FWS Regulations and Funding

FWS must be given the statutory authority to establish a standardized permitting and fee collection system for the refuge system. Currently, there are no mandatory permitting requirements or any fees collected for mineral extraction on refuges, except in Louisiana and Texas. Here, federal law permits upfront fees to be collected and used

for completing damage assessments of affected oil and gas sites, mitigating or restoring damaged resources, and monitoring and studying recovery of damaged resources. However, these up-front damage fees are only for *new* oil and gas activities and do not alleviate the substantial costs associated with the day-to-day management of oil and gas, nor do they pay for cleanup of thousands of existing sites on refuges. It also does not apply to other mineral extraction activities such as mining, which has similarly adverse environmental impacts.

First, fees should be collected upfront in all states for foreseeable damages from any new mineral activities. This will allow FWS to quickly begin restoration, mitigation and monitoring of these sites soon after damage occurs, which will help avert more costly and potentially devastating impacts to natural resources. Second, a separate fund should be established for cleanup and restoration of refuge sites damaged by extraction activities. Wells and associated infrastructure typically change ownership many times, often leaving the last — and usually the smallest — operator unable to fund a multi-million dollar cleanup and restoration. New operators would pay into this fund upon initiating extraction activities. The fund would be used by FWS for current and future cleanup and restoration costs. Third, additional federal funding should be established for routine management of existing activities to allow refuge personnel to work with mineral operators, contractors and any other affected agencies to identify resource issues relevant to the proposed operation; identify environmental planning and compliance requirements; determine affected local, state and federal agencies; and discuss permitting requirements, mitigation strategies and safety protocols.

Even with improved or clarified policies and practices, the management of mineral activities will continue to suffer under current staffing levels. Just to reach parity with NPS, which employs 13 people to manage 700 wells in 12 national parks, FWS would need about 82 people to oversee the 4,400 total wells on 155 wildlife refuges. A recent internal assessment conducted by a team of refuge managers in cooperation with NPS determined a minimum need for 45 full-time positions; however, the refuge system employs merely five permanent staff to administer mineral extraction activities across the nation. FWS should annually request additional dollars for this important activity. With additional funding and staff, a Mineral Resources Team should be established to provide technical expertise to refuge managers to better inform management decisions regarding mineral resources on wildlife refuges.

Finally, the use of particularly environmentally damaging practices, such as open-reserve-fluid pits, should be banned on national wildlife refuges. Reserve pits are essentially open-air pits that contain diesel fuel, oils, detergents and other chemicals harmful to humans and wildlife. Animals, often birds, are contaminated or killed after mistaking these pits for water bodies. This is especially true in areas of the United States where water resources are scarce. Closed-loop technology exists to capture drilling fluids and solids, which can then be trucked off site and disposed of in an environmentally safe manner.

## RECOMMENDED ACTIONS:

- **With adverse or even devastating impacts from private mineral development occurring with alarming regularity, FWS must take immediate action to overhaul the management of mineral activities on national wildlife refuges. New regulations should be promulgated that establish a detailed and precautionary approach to the approval and subsequent management of mineral activities on refuges.**
- **Upfront fees should be collected in all states for foreseeable damages from any new mineral activities. This will allow FWS to quickly begin restoration, mitigation and monitoring of these sites to avert more costly and potentially devastating impacts to refuge resources.**
- **A separate fund should be established for cleanup and restoration of refuge sites damaged by extraction activities. New operators would pay into this fund upon initiating mineral activities. The fund should be used by FWS for current and future cleanup and restoration costs.**
- **A recent assessment conducted by refuge managers in cooperation with NPS determined a need for 45 full-time positions; however, the refuge system employs merely five permanent staff to administer mineral activities across the nation. The secretary of the interior should annually request additional dollars to address this urgent need.**
- **The use of particularly environmentally damaging practices, such as open reserve fluid pits, which often trap and kill wildlife, should be banned on national wildlife refuges.**

Bald eagle by Ted Steinke | Bear River Migratory Bird Refuge, Utah | Courtesy of NWRA

## CONCLUSION

There is perhaps no greater symbol of the significance and success of the National Wildlife Refuge System than the bald eagle. The U.S. Fish and Wildlife Service was able to remove our national icon from the endangered species list in 2007, a conservation victory due in part to the protected habitats on our nation's wildlife refuges.

By sheltering the bald eagle from extinction, we have secured an opportunity for ourselves and our children to be awed and inspired when we see a bird with a 7-foot wingspan gracefully skim the water, grasp a fish in its talons and head into the forest canopy with this meal for its young. The value of these moments, which happen every hour of every day on 548 national wildlife refuges, is priceless.

But the continued survival of sensitive species such as the bald eagle and the future health of all wild species depend on a consistent and intelligent approach to habitat conservation and restoration. With American wildlife now forced to run a veritable gauntlet of threats such as climate change, invasive species, habitat loss and fragmentation just to survive, our nation must redouble its efforts to protect its biological heritage. How poor the American natural experience would be in a world without eagles flying free, salmon spawning, wolves howling or dense clouds of waterfowl lifting in unison from a prairie lake. National wildlife refuges not only provide safe haven for these charismatic species and thousands more, but also return billions of dollars to local economies, purify the nation's water and air, and offer unique opportunities for recreation, education and research.

This assessment of the state of the National Wildlife Refuge System offers a vision for seizing upon its many opportunities while responding thoughtfully to its most pressing challenges. It should inspire each of us to vigorously uphold the core values and standards articulated in the Refuge Improvement Act. Reform of governmental programs is never easy and there are seldom quick fixes, but we believe the commonsense recommendations presented herein can and should be embraced by the Obama administration, the dedicated professionals of FWS and anyone concerned with the future of wildlife conservation in America. In doing so, we will collectively guide the National Wildlife Refuge System closer to the fulfillment of its conservation mission and ensure that bald eagles and all other species will thrive for the enjoyment of future generations, for whom we hold these lands and its wild creatures in trust.

# ENDNOTES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6 *Banking on Nature 2006: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation.* Division of Economics, U.S. Fish and Wildlife Service. 2007.