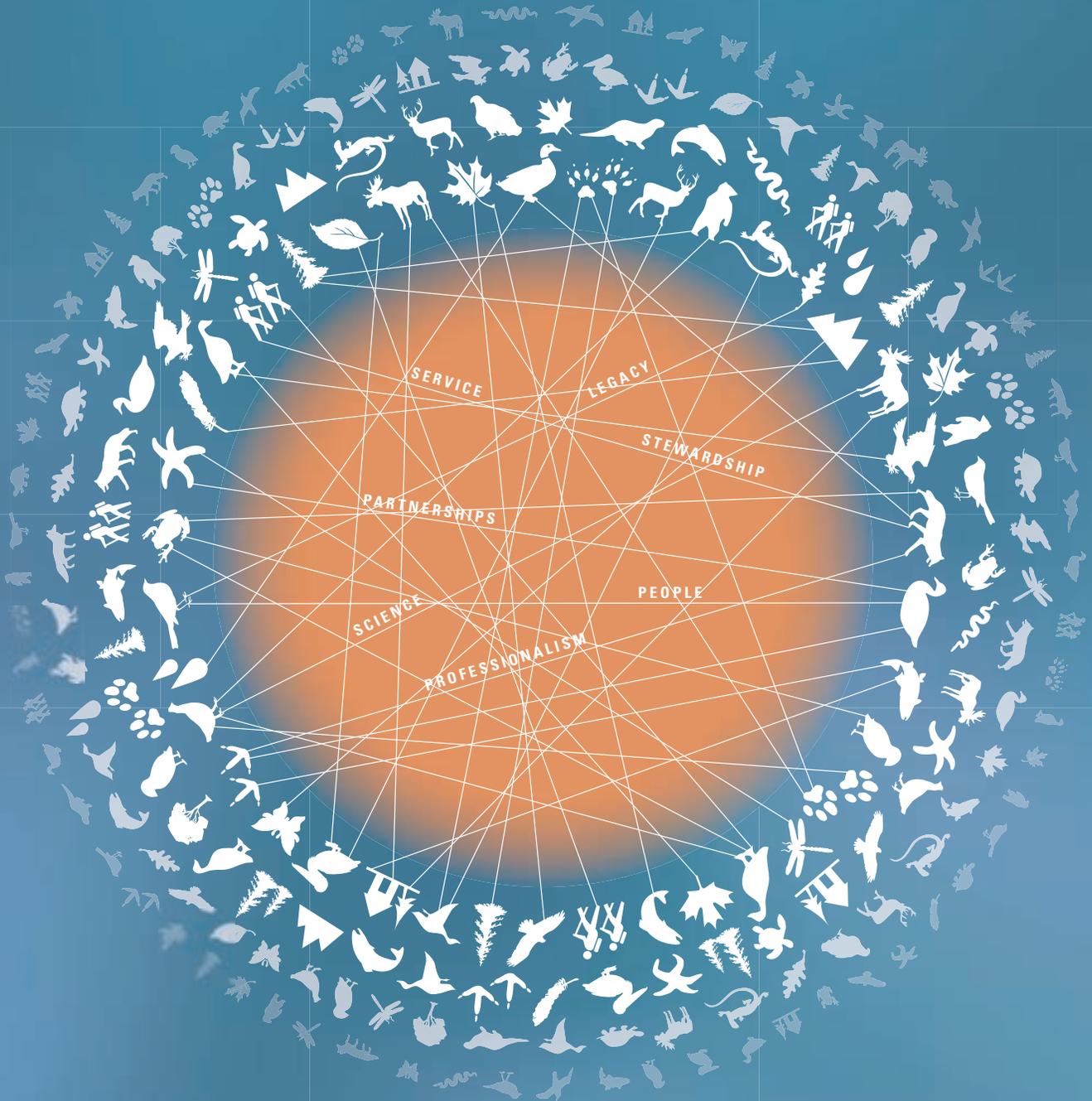


U.S. Fish & Wildlife Service

# Conservation in Transition

*Leading Change in the 21st Century*



*We must embrace and lead change, not just within ourselves and our organization, but across the entire conservation community.*

## Foreword

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American fish and wildlife conservation took root and flourished during the 20th century, organizing around component pieces of the ecological landscape—land, water, coast, ocean, forest, range, fish and wildlife. Conservation professions and organizations emerged from these demarcations and have served well in facing issues that are largely local and confined within jurisdictional boundaries. But as the human enterprise has grown from local to regional and now global scales, conservation challenges such as poorly planned development, habitat fragmentation, pollution and water scarcity have also increased. The complexity and scale of today's conservation problems are challenging the existing organizational and professional frameworks within which the conservation community operates.

Now, climate change is accelerating the need for change in our conservation professions and organizations. Coordination can no longer be our goal; we must recognize the need for working beyond our boundaries and accept interdependency as an organizing principle. We must embrace and lead change, not just within ourselves and our organization, but across the entire conservation community. As we approach a governmental transition, the U.S. Fish and Wildlife Service is positioned to be a catalyst for a new and promising era of conservation.

Dealing with changing climate requires willingness and ability to think about and approach conservation in new ways. Our “marketplace” is now global. Our conservation target—once as simple as protecting and managing parts and pieces—is now as complex as sustaining systems and functions, species and populations at global scales. We must understand climate change as an overarching challenge that requires us to reconsider every aspect of organizational and program operations and performance. We cannot face this challenge by simply repeating the conservation successes of the past. We must rapidly develop the capacity to envision and deliver conservation across connected networks of habitats, based on scientific understanding and predictions of species' needs. We know what needs to be done, and we know it will be difficult. The key ingredient is leadership with a vision that is equal to the challenges of the 21st century. 🦋



FRANK PETERS

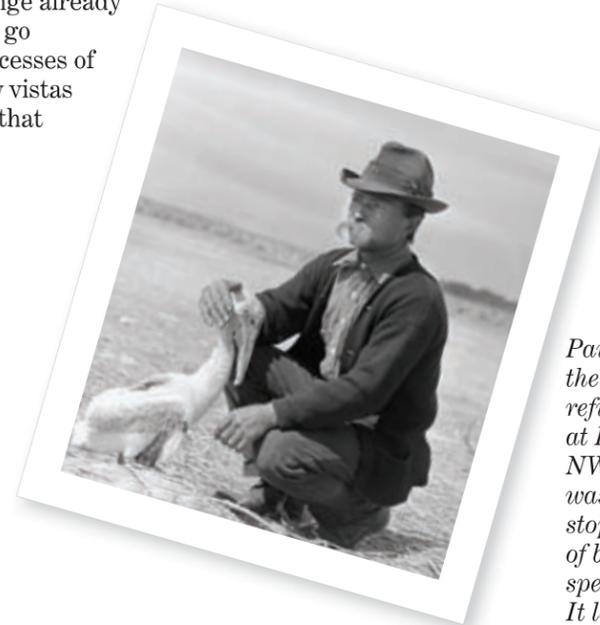
JANE FELLICCIOTTO

## Introduction

As an agency, the U.S. Fish and Wildlife Service traces its origins to a point nearly two decades before the closing of the American Frontier. In 1871, with the establishment of the U.S. Commission on Fish and Fisheries, the idea of fish and wildlife conservation as a right and proper federal government endeavor found its first public expression. That idea framed our beginning, and from the beginning there was change.

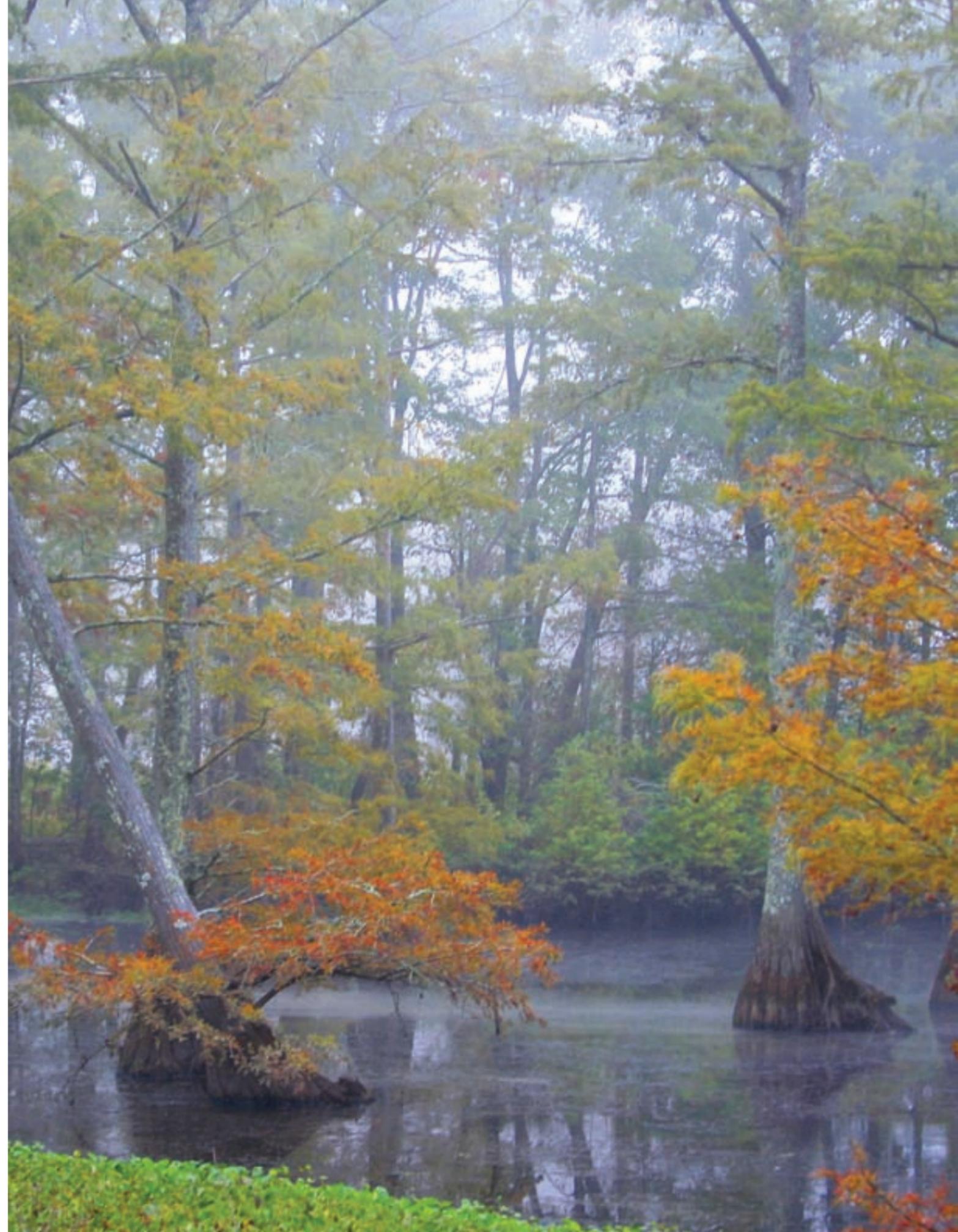
At the dawn of the 20th century, leaders solidified the notion of conservation as a fundamental public service, providing a powerful vision of public trust that would guide development of the nation's private, state, tribal and federal conservation infrastructure. Soon thereafter, in the midst of the first global conflict, we would enter into a treaty with Great Britain for the conservation of migratory birds. And later, from the social, economic and ecological turmoil of the Dust Bowl and the Great Depression, other visionary commitments would emerge: secure funding to build state capacities and reestablish depleted populations of wildlife; a collaborative system to regulate the hunting of migratory waterfowl on continental scales; a system of national wildlife refuges; the Endangered Species Act; and many others. Alongside our state and other conservation partners — notably hunters, anglers, birders and citizen conservationists — we have proudly met the 20th century's conservation challenges. Our charge now is to move beyond our past success and find new and innovative ways to deal with climate change and other emerging challenges in the 21st century.

In the following pages, we present a future vision that is mindful of the past. We examine the forces and trends that even now are shaping 21st century conservation in ways very different from that of the previous century. We continue with a broad analysis of the implications to the future Service and the growing realization that the change before us is, in many respects, change without precedent. We conclude with an assessment of the transformational change that will be needed by the Service — change already underway — to go beyond the successes of our past to new vistas of opportunity that lie ahead. 🐦



*Paul Kroegel (left), the nation's first refuge manager, at Pelican Island NWR. The refuge was designed to stop the killing of birds at a specific location. It led to the idea of building a network of habitat (such as bottomland hardwood forest, pictured right, at Noxubee National Wildlife Refuge in Mississippi) to protect migrating birds on a continental scale. Climate change will require an even grander vision.*

FRANK PETERS



*Like the resource it seeks to protect, wildlife conservation must be dynamic, changing as conditions change, seeking always to become more effective.* Rachel Carson

Sixty years ago, Rachel Carson wrote those words in the fifth pamphlet of her “Conservation in Action” series, but they now seem almost prophetic. Carson, a former Fish and Wildlife Service employee, is known for her epic *Silent Spring*, which awakened the world to the dangers of indiscriminate pesticide use. The conservation challenges of the 21st century, however, represent a force of change potentially more far-reaching and consequential than any previously encountered.

Today the Service and conservation community at large face issues of scale, pace and complexity unheard of in Carson’s time. When *Silent Spring* was published in 1962, the world’s human population was slightly more than 3 billion. As of September 2008, it is estimated to be about 7 billion people and is expected to reach nearly 9 billion by the year 2042. As the number of people has increased—along with rapid industrialization and development—resource management challenges such as habitat fragmentation, contamination, pollution, invasive species, disease and threats to water quality and quantity have grown as well. In particular, accelerated energy development—from both conventional and renewable sources in the United States—is interrelated with the above challenges and the larger impacts of climate change.

Accelerated climate change is magnifying impacts on water and land resources, agriculture and biological diversity (see sidebar page 5). We know from the experiences and observations of Service biologists that the effects of climate change are neither isolated nor limited to a small number of vulnerable species and habitats; they are ubiquitous across the U.S. landscape and they are growing.

Climate change impacts are already urgent in Alaska; they are increasingly evident along our coastlines, in the arid West, and in the shifting ecologies of migration, pollination and invasion; and the threat of ever greater impacts looms large. For example, as temperatures rise, the mountain pine beetle is expanding its western U.S. range into higher latitudes and elevations—areas once too cold to support it. The beetle is killing pine trees, making forests more susceptible to wildfires, and creating the potential to fundamentally and rapidly shift ecosystem function and structure.

Success at individual project sites will not be sufficient in an era of climate change. Therefore, the overarching aim of the Service will be success at the landscape scale, achieved by leveraging our conservation capacity with that of states and the conservation community at large and attaining biological outcomes larger than those we could attain ourselves.

### Emerging Trends

Peter Drucker, perhaps the most widely read and widely quoted management theorist of the 20th century, emphasized the idea of “the future that has already happened.” Emerging trends and forces already in motion are shaping the conservation landscape of the 21st century. If we can identify these, as Drucker suggests, we can prepare now for the challenges that lie ahead.

During the 20th century the unstated but prevailing conservation theory was the idea that the nation’s natural resources could be secured by government-driven protection, restoration and management. The future, however, points toward solutions that reflect an integrated response by a more networked conservation community. The 21st century will demand:

- A shift from managing individual resource components to sustaining species, populations, communities and systems;
- An emphasis on science linking work at project sites to achievement on broader scales, including landscapes, major ecoregions and entire species ranges;
- Increased use of predictive models and specific measurable biological outcomes;
- Increased emphasis on biological accountability and inter-organizational collaboration;
- Increased emphasis on transparency (public knowledge of government actions), public participation and engagement.

Already universities are training young scientists in these approaches. Tomorrow’s workforce will be trained in systems thinking; socially conditioned to networking; and resistant to compartmentalized hierarchical structures. The future points to a workforce predisposed to a conservation business model markedly different from today’s.

Similarly, our concept of partnerships must change. Collaboration among agencies and organizations has been a hallmark of late-20th century conservation, but more as a forum for coordination than an engine to build capacity. Partnerships in the 21st century must be driven by measurable resource outcomes rather than mutual interests. We must all recognize—whether federal, state, tribal, industry or NGO—that our conservation responsibility vastly exceeds our individual organizational footprints across the landscape. Looking at this from the Fish and Wildlife Service perspective, we cannot hope to fulfill our trust responsibilities without help from states, tribes, private landowners and other partners. This requires not just greater cooperation and collaboration, but recognition that we are interdependent organizations.

The future is already happening. Our challenge as an agency is to respond decisively to these forces of change, develop a vision for our conservation work in the 21st century, and build the capacity to move it forward. ♣

### Coping with Climate

As climate changes, the abundance and distribution of wildlife and fish will also change. Some species will adapt to an abruptly warming world but many will not. Species that migrate long distances and those whose geographic ranges are limited, for instance, may not be able to adjust to the changes caused by rising temperatures. Barriers to migration (natural and human-caused), increased competition for habitat and the lack of suitable or available food could make things difficult for species moving to new locations.

Challenges posed by a changing climate might include:

- Increased frequency of extreme weather events;
- Changes in the timing, location, and intensity of wildfires;
- Altered hydrology in rivers and wetlands;
- Changes in rain and snowfall patterns;
- Changes in access to water resources;
- Rising sea levels at the Service’s 166 coastal refuges.

Nowhere are the effects of climate change more evident than in the Arctic ecosystems. In the Service’s Alaska Region, observations of Arctic changes include diminishing sea ice, coastal erosion, shrinking glaciers, thawing permafrost, wetland drainage, altered stream hydrology and earlier “green-up” of Arctic vegetation. Increased temperatures in the Arctic have also contributed to the earlier onset of snow melt and the lengthening of the melting season, resulting in decreased total ice cover at summer’s end. Such changes have profound implications for many Arctic species, such as those that led to our 2008 decision to list the polar bear as a threatened species.

*A polar bear near the Beaufort Sea Coastline of Alaska.*



Though other regions likely will not be confronted with climate change impacts on the same scale or pace as the Arctic, climatic changes in the Lower 48 States will amplify current management challenges such as habitat fragmentation, invasive species and water scarcity. This will require an emphasis on large areas with interconnected and ecologically functional habitats capable of sustaining many species—landscapes—rather than single species or isolated or remnant habitats. The Service’s challenge will be to translate climate projections into transparent predictions of how wildlife populations and habitats will change in response. ♣

*Climate change will amplify existing resource management challenges, requiring an emphasis on large areas with interconnected and ecologically functional habitats capable of sustaining many species—landscapes—rather than single species or isolated or remnant habitats.*

## Conservation in Transition Vision for the Future

The Service's response to the changing conservation landscape is grounded in a clear realization that 21st century challenges cannot be met by repeating and amplifying the 20th century successes. We are proud of our achievements and draw inspiration from them, but that must not keep us from embracing change that will enable future success.

We cannot determine what we want to be, however, without first understanding who we are and why we exist as an agency. Our vision statement, conservation principles and priorities define our identity and are guideposts for our future vision:

### Our Vision

We will continue to be a leader and trusted partner in fish and wildlife conservation, known for our scientific excellence, stewardship of lands and natural resources, dedicated professionals and commitment to public service.

### Our Conservation Principles

*Science.* Our work is grounded in thorough, objective science.

*Stewardship.* Our ethic is to conserve natural resources for future generations.

*Service.* It is our privilege to serve the American people.

*Professionalism.* We hold ourselves to the highest ethical standards, strive for excellence and respect others.

*Partnerships.* We emphasize creative, innovative partnerships.

*People.* Our employees are our most valued asset.

*Legacy.* We ensure the future of natural resource conservation by connecting people with nature.

*We must become  
the change  
we want to see.*

**Mahatma Gandhi**

### Our Priorities

*National Wildlife Refuge System:*  
Conserving our Lands and Resources

*Landscape Conservation:*  
Working with Others

*Migratory Birds:* Conservation and Management

*Threatened and Endangered Species:*  
Showing Recovery Success and Preventing Extinction.

*Aquatic Species:* National Fish Habitat Action Plan and Trust Species

*Connecting People with Nature:*  
Ensuring the Future of Conservation

Our vision, principles and priorities (see priority summaries page 8) drive our conservation work, what we aspire to accomplish with states and other partners, and how we accomplish it. They are a compass for navigating change now and in the years ahead and focusing our efforts on what really matters. Ultimately, our performance is measured in the beat of wings on an autumn morning, the promise of a rising native trout, and in the great opportunity represented in abundant, diverse and healthy populations of fish, wildlife and plants. These things have never been more important, and perhaps, never more fragile and threatened.

### Beyond Our Boundaries

In some respects, that which is changing most significantly about conservation is its boundaries. Conservation is expanding beyond individual project and site-specific borders to larger landscapes. It is pushing against the boundaries of other disciplines. It is shoving aside the idea that protection, restoration and management are ends unto themselves and carrying with it the idea that each is a means to a larger outcome—landscapes capable of sustaining abundant, diverse and healthy populations of fish, wildlife and plants.

Sustaining populations at landscape scales requires understanding of the diverse and complex biological systems and processes upon which they depend. As we face a changing climate system, it requires capacity to understand and predict how those systems and processes will change and how those changes will affect the abundance, distribution and health of species and populations. These complexities, in turn, will define how we work as an agency and with partners. Fortunately, there has emerged from the field level of the Service a strategic approach for landscape conservation that is suited to this challenge. Termed “Strategic Habitat Conservation” or SHC, it is an adaptive resource management framework composed of five key elements: biological planning, conservation design, conservation delivery, decision-based monitoring and assumption-driven research. While methods may vary, SHC begins and ends with measurable biological objectives (e.g., sustainable populations or specific habitat outcomes, such as water quality measurements, that would support a sustainable population) for a species or group of species. These objectives are met by applying models and conservation biology principles to ecological conditions on the landscape.

SHC is a response to changes affecting not only the Service but the conservation community at large. It allows the Service to deal with issues of scale and accountability and effectively address priorities and challenges such as climate change. In line with this thinking, the Service is redefining its approach to partnerships by promoting relationships that allow a region's private, state and federal conservation infrastructure to operate as a system rather than as independent entities. As the federal agency most directly responsible for fish and wildlife conservation, we will be a catalyst for the efforts of the larger conservation community.

The trends transforming partnerships and conservation in general have revealed a major shift in the manner in which the Service and the wildlife community at large engages the public, and the implication is this: landscape conservation is both a science endeavor and a social endeavor. Increased demands for transparency and public participation will require at least three things: First, a science-based narrative describing the current and projected ability of a landscape to support ecologically viable populations of fish, wildlife and their habitats; second, a social narrative defining public expectations regarding fish and wildlife and the area of habitat needed; and third, a strategy for purposeful action. Conservation professionals will be responsible for providing the public with transparent, science-based assessments and predictions of the consequences of action and inaction. From this, the public can participate in landscape-specific planning and help put those plans into action on the ground.

*Strategic Habitat Conservation is a response to changes affecting not only the Service but the conservation community at large.*

Efforts to see beyond our own boundaries must occur not only within the Service and with our partners but also across federal government. Under the current administrative structure, agencies are not well coordinated in achieving common resource goals. In the current and future era of climate change, our ability to conserve the nation's fish and wildlife will be diminished if agencies continue to develop and pursue resource objectives in relative isolation. We propose that the Service and state wildlife agencies (with science and technical support of the U.S. Geological Survey) share responsibility for developing spatially explicit landscape designs for wildlife adaptation.

Habitat management agencies (e.g., Forest Service, Bureau of Land Management, Natural Resources Conservation Service, Farm Service Administration, Department of Defense, Bureau of Reclamation and Bureau of Indian Affairs) will be responsible within the context of their specific missions for treating these designs as an important guide for management decisions and commitment of resources. This calls for a new operational construct for agency collaboration through the collective integration of common goals for wildlife conservation, and the directed efforts of the respective agencies to achieve these goals. <img alt="arrow" data-bbox="875 418 885 432"/> >> continued on page 10



*The Service is redefining its approach to partnerships by promoting relationships that allow a region's private, state and federal conservation infrastructure to operate as a system rather than as independent entities.*



Mattamuskeet NWR, North Carolina

LYN ADAMS, SR.

*Refuges are living case studies for resource management challenges.*

### Priority: National Wildlife Refuge System

*Conserving Our Lands and Resources*

Created in 1903, the National Wildlife Refuge System is the world’s most extensive network of public lands devoted to the conservation of wildlife habitat and wildlife species. Spanning more than 96 million acres on 548 national wildlife refuges and 37 wetland management districts, the Refuge System is home to at least 700 species of birds, 220 mammals and nearly 280 threatened or endangered species.

Refuges are key starting points for the Service’s landscape conservation efforts and living case studies for resource management challenges involving habitat fragmentation, urbanization, invasive species, disease, parasites and water management—all of which are magnified by climate change. Protection of key habitats within the Refuge System remains one of the Service’s highest priorities and one of the most important means of implementing landscape conservation. Using the Strategic Habitat Conservation framework, the Refuge System is working on a new policy for strategic growth to address high priority conservation needs, like the impacts of climate change on fish and wildlife populations and habitats.

Because sea level rise is a projected impact of climate change, the Service is currently examining related affects on our 166 coastal national wildlife refuges. Using predictive models, refuge managers will be able to understand what will happen as the ocean level rises, how fresh water marshes will give way to salt water, and then slip below the ocean’s surface. Knowing this information in advance will help refuge managers make long-term planning decisions and implement strategic actions to help fish and wildlife species adapt.



ALISON WHITLOCK / USFWS

*Partnerships are critical to the landscape conservation process.*

### Priority: Landscape Conservation

*Working With Others*

The concept of landscape conservation is not new. For decades, the Service’s National Wildlife Refuge System has been built around intuitive concepts of the relationship of birds to their habitats. While much of the nation was in the midst of a drought in the 1930s, the Service and other conservation partners had the vision to acquire and conserve wetlands in the Prairie Pothole Region, a delicate ecosystem rich in plant and aquatic life that supports globally significant populations of breeding waterfowl. More recently, increased population and development, as well as technological advancements that allow scientists and managers to analyze change at landscape scales are pushing landscape conservation to the forefront of the fish and wildlife profession.

What is new are the Service’s efforts to establish a commonly understood and practiced approach to landscape conservation—one that is adaptive, science-driven and focused on explicit and measurable biological outcomes. In the Lower Mississippi Valley, for example, Service biologists—working with the U.S. Geological Survey, state wildlife agencies and other partners—discovered that by conserving the right habitat in the right places they could increase the benefit to wildlife populations across the valley. They found that when small tracts where conservation had been achieved were mapped they hit only 3 percent of the core habitat needed by waterfowl and forest breeding birds. When the partners focused on core habitat and connected it using the same level of conservation resources, they captured 54 percent of the core habitat needed for those species. That’s what landscape conservation is all about.



Bald Eagle

THOMAS G. BARNES

### Priority: Migratory Birds

*Conservation and Management*

Migrating birds are more adaptive than other suites of species because they can move long distance in search of food and mates. But, because of the distance traveled, they are more difficult to study and understand. This means researchers and conservationists need to cover more ground—sometimes an entire hemisphere. Some migrating species are highly specialized to particular food sources like a hummingbird that times its northerly migration to meet flowering plants along the way. Other birds, like the albatross that breed on remote islands, require ground nesting areas protected from the sea and predators.

It’s not hard to imagine that a warming climate may cause plants to flower earlier causing the hummingbird to miss its connection with the sugar-filled nectar. Sea-level rise could over come the low-lying islands in the South Pacific that serve as breeding colonies for albatross.

As the Service works with its migratory bird partners at home and abroad, it will continue to use the Strategic Habitat Conservation framework to identify and conserve those breeding areas in the north and wintering areas to the south that migrating birds require during their epic annual journeys. As the Service seeks to understand the causes of bird population declines and the added complication of climate change, it will follow the integrated process of monitoring populations, understanding the dynamics of why bird numbers change, and strategically designing and implementing conservation programs to address these changes.



*Connecting people with nature also helps connect them to the Service’s conservation mission.*

### Priority: Connecting People with Nature

*Ensuring the Future of Conservation*

Americans’ declining interaction with the outdoors—particularly children growing up in a digital age who prefer virtual reality to natural reality—is a substantial challenge to our conservation mission. In response to this trend, the Service has joined a national movement to expand opportunities for people to get outside and become involved with the natural world. Our challenge is not simply reconnecting people with nature; it is growing a national constituency for conservation. Adapting the wide-ranging elements of landscape planning will have limited effect without strong public support and participation and an American public committed to the sustained future of the natural world—particularly in a changing climate.

From providing programs that educate and inspire children to engaging a new generation of citizen scientists who will help us collect and interpret data to understand species’ response to climate change, our land base and our employees are helping people of every age to get outdoors.

By connecting people with nature today we are promoting healthy lifestyles and improving the chances that future generations will have an affinity for nature and a concern for its conservation. Learn more at <[www.fws.gov/letsgooutside](http://www.fws.gov/letsgooutside)>.



American Pika

N.J. STUART

*Some species, such as the American Pika, are already surviving at the limits of their ecological tolerance.*

### Priority: Threatened and Endangered Species

*Achieving Recovery and Preventing Extinction*

Under the Endangered Species Act, identifying species population and habitat conservation goals and mapping a plan to deliver those goals has been the heart of candidate conservation and listed species recovery planning. Conservation of threatened and endangered species will pose a particular challenge under climate change.

Species unable to adapt to the new, rapidly changing conditions will be less successful. Because endangered and threatened species are already surviving at the limits of their ecological tolerance, the added stress of changing climate creates the potential for mass species extinctions.

The Intergovernmental Panel on Climate Change estimates (with medium confidence) that approximately 20–30 percent of species assessed so far are likely to be at increased risk of extinction if global average global temperatures rise more than 1.5–2.5°C (relative to 1980–1999). If the increase exceeds about 3.5°C, model projections suggest significant extinctions (40–70 percent of species assessed) around the globe.

As climate change expands the scale and complexity of the challenges facing candidate and listed species, landscape conservation offers the conservation community a way to identify, prioritize and improve recovery efforts while remaining responsive to changing threats and new scientific information.



Brook Trout

ERIC ENGBRETSON

*Water management is crucial for sustainable habitats that support plants and animals.*

### Priority: Aquatic Species

*National Fish Habitat Action Plan and Trust Species*

Aquatic resources are declining at alarming rates due to habitat loss, contaminants, invasive species, overexploitation and most recently, diseases—all of which are exacerbated by climate change. Of about 800 native freshwater fish species in the United States, 37 percent are in need of conservation action. As fish habitats decline, so do the numerous values they provide for natural resources, human health and a sound economy.

There is little doubt that water quality and quantity may be the most important conservation issues of the 21st century. As our population and water use increase, so do the competing needs of our cities, agricultural areas and wildlife. Because water connects all forms of life, conserving it requires a landscape-level approach based on action, cooperation and sound science.

In a changing climate, effective water management will be of even greater importance in sustaining habitats that support plants and animals. The National Fish Habitat Action Plan uses federal, state and privately-raised funds to build regional partnerships that target financial and technical resources where they can do the most good. The plan uses an integrated landscape approach, linking upland, aquatic and marine systems and determining the condition of the nation’s waters by classifying them based on published landscape classification systems and support for landscape-level fisheries projects.

*Vision without action is a dream.  
Action without vision is simply  
passing the time. Action with vision is  
making a positive difference.* Joel Barker

The Fish and Wildlife Service has a reputation for getting things done, which springs from our collective commitment to service and the individual dedication of thousands of conservation professionals. Nearly a year ago, our agency embarked to develop a strategic plan to guide its climate change work and chart a course of action. The strategy focuses on adaptation (the management actions we take to reduce the impacts of climate change on fish, wildlife, plants and their habitats), mitigation (human intervention to reduce the sources or enhance the sinks of greenhouse gases) and education. In the year ahead we will move quickly to identify knowledge gaps and expand our work with partners to effectively anticipate and address climate change. These steps grow from and build upon our decisions to implement the SHC framework for landscape conservation, and support our transition strategy and our climate change strategic and action plans now being developed. No amount of vision and planning, however, can succeed without the capacity to equip our employees with necessary skills, technologies, funding and leadership support to achieve our conservation mission.

*Armed with the capacities outlined in this document, the Service will support development of renewable energy sources while avoiding population-level effects on fish and wildlife resources.*

Mirroring elements of the SHC framework, we have identified key investments to support this vision. We will build additional core capacity in biological planning and conservation design to identify landscapes, habitats and species that are most vulnerable to climate change, define clear conservation objectives, and focus our management actions most effectively. We will work with partners to target our conservation delivery to accomplish these objectives, focusing on building connectivity to support population-level adaptations to changing climate. We will establish and implement new monitoring programs and refine existing ones in order to implement adaptive management and test and improve our conservation hypotheses.

### **Biological Planning and Conservation Design**

Through the actions described above, we will identify clear objectives and acquire valuable information and design strategies necessary to meet them. This will include determining priority species,



DIEGO VAJRES

formulating population objectives for those species, assessing species' status and trends and associated limiting factors, and developing models to help explain and predict the changing relationships between species and their habitats.

Implementing this vision requires expertise from many disciplines: conservation biologists to prescribe a genetically viable population objective; ecologists to define the population-habitat relationships and limiting factors; modelers to help inter-relate all these variables; GIS specialists to identify potential sites for protection or management; land-use planners to input zoning and land ownership data; field biologists to ground-truth assumptions and outcomes; and climate change experts to predict large-scale ecological changes that will drive habitat conditions and population response.

This vision requires understanding the relationship between project-scale actions and larger landscape-scale objectives; shifting focus from outputs such as stream miles restored, or migration barriers removed, to explicit outcomes such as sustainable populations; and emphasizing the predicted impacts of climate change. To achieve the latter, we will need capacity to model and predict fish and wildlife population responses to direct changes in temperature and precipitation, and to indirect changes resulting from human activities in response to a changing climate. We will need improved and increased research and monitoring to test assumptions about ecosystem changes that have no precedent.

To build these capacities and drive these changes, we envision an initial investment to establish a network of Landscape Conservation Cooperatives. These cooperatives will house shared expertise and capacity among Service programs and between partners from

other federal agencies, states, tribes, universities, businesses and private citizens. The Service will act not as owner or operator of these cooperatives, but as a catalyst and participant. We will offer opportunity for co-location with existing Service facilities and equal eagerness to co-locate Service employees and assets at partner facilities. In some cases, employees and assets of many partners will be networked between remote locations using technology. Our vision is not one of buildings and bricks-and-mortar; but rather, it is one of building capacity to define and pursue conservation at broader scales. Because our collective need for these capacities and technologies far outweighs our individual abilities to invest in them, a collaborative approach is essential to success.

### **Conservation Delivery**

Climate change and other emerging natural resources threats demand immediate response. As we stimulate and build new capacities through mechanisms like Landscape Conservation Cooperatives, there are many actions that can be taken now. We propose bolstering existing delivery capacities to leverage habitat protection, restoration, enhancement and management activities to begin addressing the most pressing and obvious effects of changing climate and to identify and begin experimenting with adaptation options. In addition, we will take steps to lead by example in reducing our carbon footprint, and to provide education on the causes and effects of a changing climate to fish and wildlife resources. Specific measures include:

- Developing objectives to assess, measure and deliver landscape connectivity through land acquisition, easements, fish passage and cooperative habitat restoration with private landowners;

*Climate change and other emerging natural resources threats demand immediate response.*

■ Acquiring priority refuge and hatchery water rights needed to meet objectives for climate-vulnerable species. Water management will be a key factor in helping waterbirds and aquatic species respond to changes in precipitation. Availability of sufficient water to operate the Service's fish hatcheries and wildlife refuges is fundamental to mission success, and we will identify and build strategies for particularly vulnerable facilities;

■ Implementing conservation plans for priority species. The Service works extensively with partners to write and implement conservation plans that prescribe specific action items, timelines and responsible parties;

■ Intensifying assessment of population status and trends, reducing disturbance, mitigating development-related impacts and adaptively managing for optimal sustainable populations of ice-dependent species as Arctic sea ice diminishes;

■ Reducing the Service's carbon footprint by restructuring our vehicle fleet, emphasizing energy conservation and managing employee travel;

■ Extending our engagement in international climate negotiations and treaties, and in international conservation supporting species adaptations; and

■ Implementing a comprehensive communications plan to support the Service's Strategic Approach to Climate Change at all levels of the Service.

### **Conservation Research and Monitoring**

To maximize efficiency, new Service research and monitoring efforts will be integrated with partners such as the U.S. Geological Survey, state wildlife agencies

and key conservation organizations, which will:

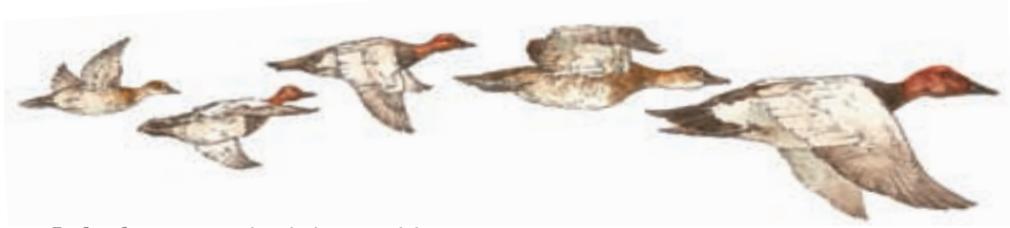
■ Monitor how changes in temperatures and precipitation alter existing ecosystems and species-habitat relationships. This includes expanding our partnership in the National Phenology Network and our efforts to connect people with nature by engaging a new generation of citizen scientists who will help us collect and interpret data to understand species' response to a changing climate;

■ Conduct applied research to test assumptions in peer-reviewed fish and wildlife models. Historical climate, population and habitat conditions are not necessarily indicative of future conditions. Assumptions will have to be refined in order for models to predict outcomes accurately, and management actions will have to be adapted to the revised scenarios in order to yield predicted results; and

■ Evaluate the response of populations to management actions. Resource managers will have to quickly assess the population response to their actions and adjust management techniques and strategies to achieve desired outcomes. For example, as we take specific actions to manage climate-vulnerable species such as polar bear, we will need to quickly assess their effect and adapt management strategies as conditions change.

## Conservation in Transition

### *Moving Forward*



Viewed collectively, the conservation challenges of the 21st century seem staggering. But our history is one of overcoming adversity through the power of innovation, diligence and a strong sense of purpose.

Dr. Ira Gabrielson, the first Director of the Fish and Wildlife Service, exemplified these traits. In the midst of the Depression and Dust Bowl, Gabrielson oversaw a nearly fourfold expansion of the Refuge System — from 63 refuges when he took over as Director to 210 by the time he retired. In 1939, he helped create the Patuxent Research Refuge — the only wildlife refuge dedicated to research; and in 1943, Gabrielson wrote *Wildlife Refuges*, the definitive book on the Refuge System. In the book, he wrote, “The conservation battle cannot be a short, sharp engagement, but must be grim, tenacious warfare — the sort that makes single gains and then consolidates these gains until renewed strength and a good opportunity make another advance possible.”

Today, the Service continues to make “single gains” but often falls short in consolidating them. We now see that broad-scale challenges like climate change threaten to diminish these advances if we are not mindful in building the type of capacities called for in this document. The kind of change we envision is never easy, and it will not take place quickly or without sacrifice. But we must realize we are not only working for those who place their trust in us today; we are working for our children and future generations who someday will inherit the job of protecting our natural resources.

Indeed, conservation is in transition. But change presents an opportunity for leadership to build on the great traditions of our past and help shape our future legacy. This is why the women and men of the Fish and Wildlife Service have chosen a career of public service — to deal with issues of consequence and make a difference for our nation. Together with our partners, and with the support of visionary leaders, we can face the challenges of our time and change the future for the better. ♡

*We do not inherit the Earth  
from our ancestors;  
we borrow it from our children.*

#### Origin Uncertain

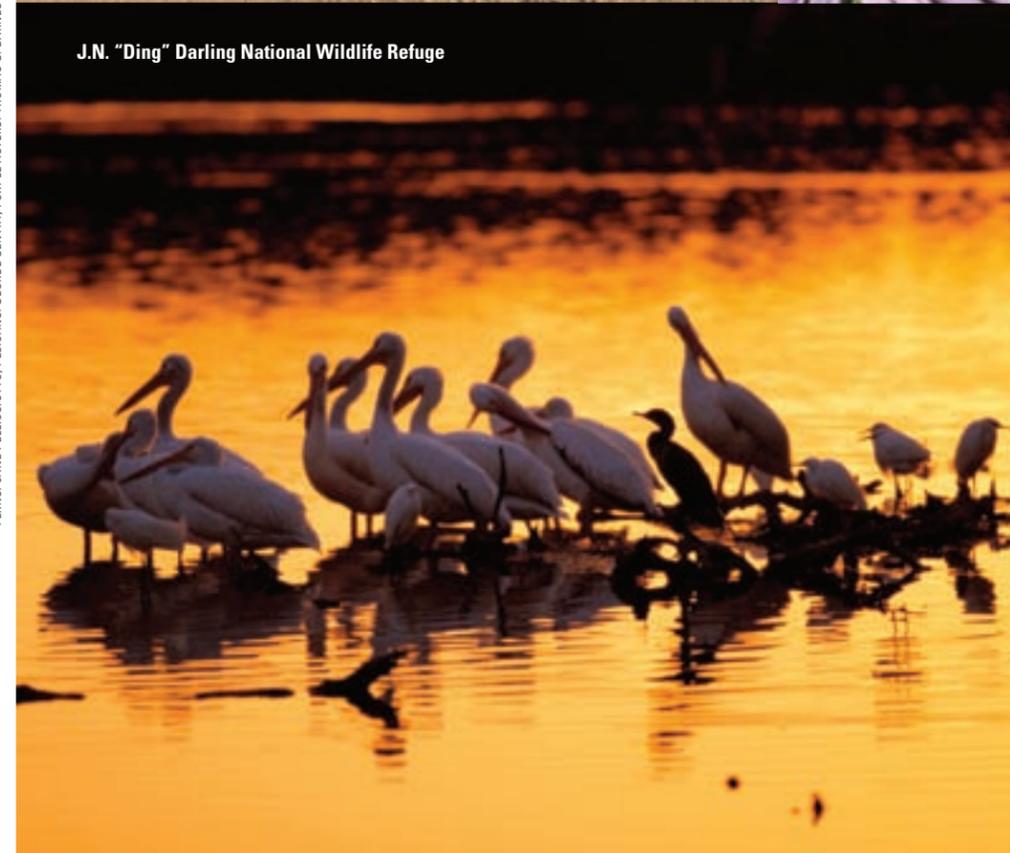
CANVASBACK DUCKS ILLUSTRATION: TIM KNEPP; CACTI: USEWS; ELK: GLEN SMART



Cabeza Prieta National Wildlife Refuge



National Elk Refuge



J.N. “Ding” Darling National Wildlife Refuge

FERNS: JANE PELLUCIOTTO; PELICANS: GEORGE GENTRY; PURPLE ASTERS: THOMAS G. BARNES



**The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect and enhance fish, wildlife, plants and their habitats for the continuing benefit of the American people.**

**We are both a leader and trusted partner in fish and wildlife conservation, known for our scientific excellence, stewardship of lands and natural resources, dedicated professionals and commitment to public service. For more information on our work and the people who make it happen, visit [www.fws.gov](http://www.fws.gov).**

