

NATIONAL *fish, wildlife & plants*
CLIMATE ADAPTATION STRATEGY

highlights





Climate change is already affecting the natural world and the communities and economies that **depend** on it.

These impacts are expected to increase as the climate system continues to change.

Many ecosystems and species are at risk.

Living systems provide jobs, food, clean water, storm protection, health **benefits** and many other important ecosystem services that **support** people, communities, and economies across the nation every day.

To sustain these valuable resources and services, we must begin **now** to help fish, wildlife, plants, and ecosystems **adapt** to a changing climate.

www.wildlifeadaptationstrategy.gov

PHOTO CREDITS

COVER: CHILDREN IN WOODS, STEVE HILLEBRAND.
HORSE-EYE JACKS, NATIONAL OCEANIC AND ATMOSPHERIC
ADMINISTRATION. PAINTED HILLS, JANE PELLICCIOTTO.
PELICAN, GEORGE ANDREJKO/ARIZONA GAME AND FISH DEPARTMENT
INDIAN PAINTBRUSH, TIMOTHY K HAMILTON.
ELK, KENTUCKY DEPARTMENT OF FISH & WILDLIFE RESOURCES



A Call to Action

OUR CLIMATE IS CHANGING, and these changes are impacting species and habitats across America. Flowers are blooming earlier and animals like voles and chipmunks are moving to new ranges. Geese are not migrating as far south and ducks are migrating later in the fall, to the dismay of waterfowl hunters. Oyster larvae are failing to survive off the coast of Washington State, threatening the shellfish industry. Fish stocks along the east coast have moved northward and deeper as ocean temperatures have increased, affecting fishers and fishing communities.

INSIDE HIGHLIGHTS

Impacts of Climate Change on the Natural World	3
Purpose & Vision	8
Goals & Strategies	9
Opportunities for Multiple Sectors	19
Implementing the Strategy	20

Complete references and relevant information can be found in the full *Strategy*.

Species and habitats provide vital services every day such as jobs, food, clean water, storm protection and recreation. Action is needed now to help safeguard these valuable natural resources and the communities and economies that depend on them in a changing climate.

Over the last 50 years, average surface air temperatures in the United States have risen two degrees Fahrenheit (°F). Storms have become more severe, causing unusual floods, and extreme events like heat waves and droughts are becoming more frequent and intense. Sea levels are rising, the amount of Arctic sea ice is declining, and the oceans are becoming more acidic.

The problem is serious and urgent. The nation must prepare for and adapt to a changing climate. In 2009, Congress recognized this need and asked the Council on Environmental Quality and the Department of the Interior to develop a national, government-wide climate adaptation strategy for fish, wildlife, plants, and ecosystems.

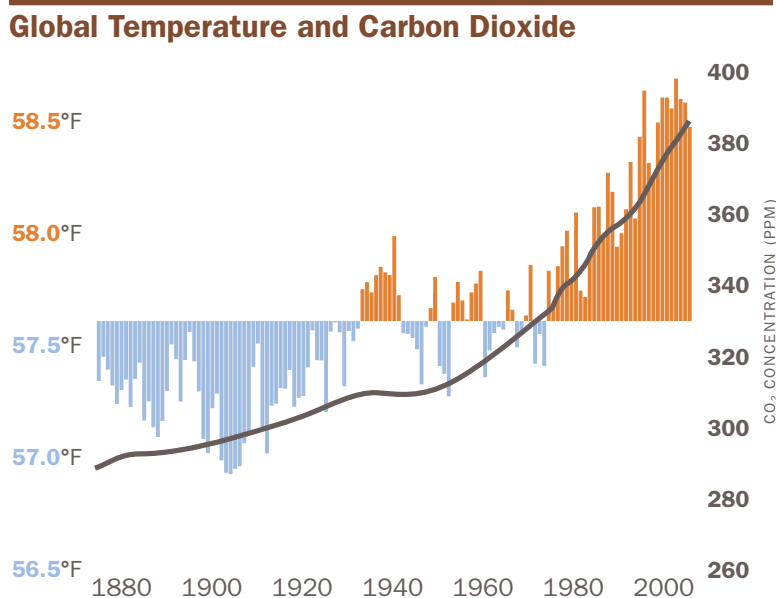
The *National Fish, Wildlife and Plants Climate Adaptation Strategy (Strategy)* is a unified response to the call to action from the Congress and many others for a coordinated, nation-wide fish, wildlife and plant climate adaptation strategy. The Strategy outlines key steps to help natural resource managers, private land owners and other decision-makers safeguard the natural world in a changing climate. It is also a call to inspire action. Unless the nation begins serious adaptation efforts now, we risk losing priceless living systems—and the countless benefits and services they provide—as the climate changes.

The *Strategy* was developed by a partnership of the U.S. Fish and Wildlife Service, the National Oceanic and Atmospheric Administration, and the New York State Division of Fish, Wildlife, and Marine Resources. The technical content of the document was developed by over 90 scientists and natural resource managers from federal, state, and tribal agencies across the country.

Even if greenhouse gas emissions were halted today, the amount of CO₂ already in the atmosphere would take years to degrade and thus, some changes in climate are inevitable.

Studies have identified the accumulation of carbon dioxide (CO₂) and other greenhouse gases (GHGs) in the atmosphere trapping heat as the major underlying cause of these changes. Even if GHG emissions were halted today, the amount of CO₂ already in the atmosphere would take years to dissipate and thus, some changes in climate are inevitable. Climate change is expected to have major impacts on our ecosystems and natural resources as well as the communities and industries that depend on them.

Global annual average temperature from 1901–2000, indicating a clear longterm global warming trend. Orange bars indicate temperatures above and blue bars indicate temperatures below the average. The black line shows atmospheric carbon dioxide (CO₂) concentration in parts per million (ppm).



SOURCE: USGCRP 2009. Global Climate Change Impacts in the United States.



Impacts of Climate Change

on the Natural World

The following spreads show examples of a changing climate's impact on major types of ecosystems and individual species in the United States.

WARMER TEMPERATURES, rising sea levels, and other expected changes will bring new stresses for countless species of plants, animals, and fish. In general, adaptable species with wide ranges, such as white-tailed deer and feral hogs, are likely to continue to thrive, while those that depend on particular habitats, such as the southwestern willow flycatcher and coldwater fishes, will be more vulnerable—especially if climate change is rapid.

IMPACTS ON ECOSYSTEMS

JANE PELLICCIOTTO



Forests Warmer temperatures and droughts are expected to put some of the 750 million acres of trees in the United States under greater stress, decreased productivity and increased risk of fire. Meanwhile, insect pests that kill trees, such as the mountain pine beetle, are already expanding their ranges and intensifying their impacts, causing widespread tree death.

Deserts Temperatures in the arid West and Southwest have already climbed more than the U.S. average, with parts of Utah and Arizona experiencing a 3 to 5 °F rise—and climate models project this trend to continue. Many cacti and other plant and animal species are already living near their physiological limits for water and temperature stress; many may not survive the coming changes in climate.



FLICKR/MATT LAVIN

Shrublands With the amount of winter snow declining and temperatures rising, much of the United States' 480 million acres of shrubland are expected to experience drier conditions. That would increase the risk of fire and allow more rapid spread of invasive species like cheatgrass, crowding out native sagebrush.



CHASE FOUNTAIN



FLICKR/MADHAV PAI



JANE PELLICCIOTTO

Arctic Tundra The most dramatic climate change in the United States is occurring in Alaska, which has 135 million acres of Arctic tundra on the west coast and North Slope. Already, permafrost is thawing, wildfire frequency and intensity are increasing, and shrubs and trees are replacing sedge wetlands and grasses.

Here are examples of ecosystems that are already affected by climate change.



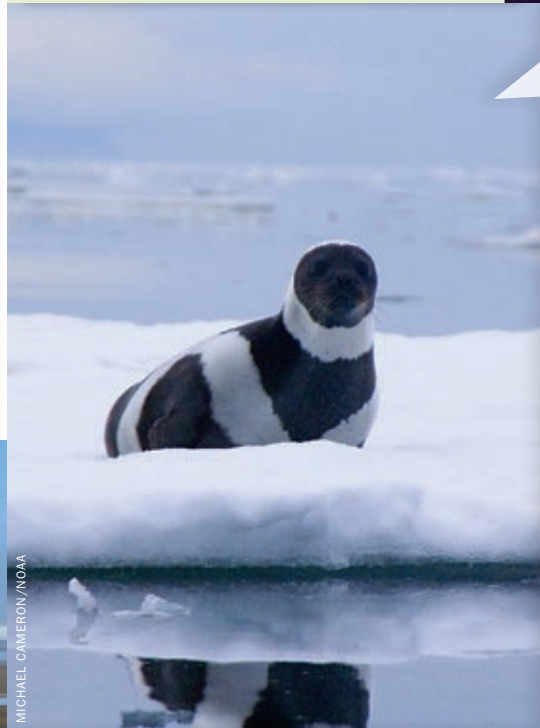
CHASE FOUNTAIN

Grasslands The United States' 285 million acres of grasslands stretch from Canada to the Gulf Coast and include tallgrass prairie, cattle pastures, and ephemeral *prairie pothole* wetlands that function as the primary breeding grounds for ducks. The warmer, drier conditions expected from climate change will likely dry up wetlands, speed the invasion of non-native grasses and pests, bring more fires, and reduce the quality of forage for livestock and wildlife.



MICHAEL CAMERON/NOAA

Inland Waters Many of the nation's lakes, rivers, and streams are expected to warm, and lake levels are expected to change. Cold water fish like trout and salmon will be adversely affected, while warmer water species like bass will expand their range. Stronger storms are expected to bring more flooding, causing severe damage to human and natural communities and increasing nutrient runoff from farms, causing a greater number of harmful algal blooms in lakes. Falling water levels, especially in the Great Lakes, will lead to shoreline habitat loss, affecting nursery grounds and nesting areas.



UTAH DIVISION OF WILDLIFE RESOURCES

Marine Increased ocean temperatures are already impacting marine species and ecosystems through changes in physical conditions, primary productivity, and species distributions. Species are particularly vulnerable in the Arctic, where shrinking ice cover reduces habitat and areas for resting and foraging. Rising atmospheric carbon levels are also driving increases in ocean acidification that can reduce growth and survivorship of shell-forming marine organisms at the base of marine food-chains. Collectively, these effects could have cascading impacts on the productivity and diversity marine ecosystems.

Coastal Coastal ecosystems, including wetlands, estuaries, and submerged aquatic vegetation, are expected to experience climate impacts including sea and lake level changes, increased storm surges, and changes in precipitation patterns and subsequent delivery of freshwater, nutrients, and sediment. These changes could bring about the loss of the barrier islands, coral reefs, and coastal wetlands that help protect communities and industries from storms. Changing ice conditions are threatening lifestyles and subsistence economics of indigenous peoples as well, by making trips to hunting grounds longer and more hazardous.

IMPACTS ON FISH, WILDLIFE & PLANTS

DAN PANGAMO PHOTOGRAPHY



Waterfowl Ducks and geese are flying south along the great North American flyways weeks later than they did a few decades ago, forcing the multi-billion dollar waterfowl hunting industry to adapt. Meanwhile, both conservationists and hunters worry that a warmer, drier climate will adversely affect the enormously productive prairie pothole “duck factories” in Montana, North Dakota, and Minnesota on which the nation’s waterfowl rely.

This *Strategy* provides key steps natural resource managers, private land owners and other decision-makers can take to safeguard natural resources in a changing climate.

Western Pines Millions of acres of lodgepole pine and other conifer trees across the West have been killed by an epidemic outbreak of mountain pine beetles. The reason: warmer winters have enabled more beetles to survive the winter, while warmer summer temperatures and earlier onset of spring have enabled the tiny insect to complete more generations per year and expand its range northward, potentially bridging across northern Canada to infest eastern pine species.

FLICKR/KJELL



Butterflies Climate change has brought a mismatch between the life cycle of the Edith’s checkerspot butterfly and the timing of the growth and flowering of the plants the caterpillars and adult butterflies depend upon. That has caused the butterfly’s population to crash in some areas, especially those along the southern range.

SHELLEY ELLIS/NWF



Here are examples of species and services that are already (or expected to be) affected by climate change.



Salmon These species which require cold, fast-flowing streams and rivers to spawn are being affected by warming and by reduced stream flows caused by less snowmelt. Just a 1.2 °F increase in water temperatures causes coho salmon eggs to hatch six weeks earlier—which means they reach the ocean before their prey is abundant. In Alaska, warmer water temperatures are likely enabling a parasite to proliferate and increase infections in Yukon River Chinook salmon, causing economic harm to indigenous peoples and the fishing industry.

Commercial Fisheries Many commercial and recreational fish stocks along the east coast have shifted their distributions northward 25—200 miles over the past 40 years with increasing ocean temperatures.



Oysters In 2007 and 2008, two major West Coast oyster hatcheries discovered that their oyster larvae were dying due to higher acidity in the water being pumped from the sea into their facilities. The hatcheries solved the immediate problem by testing the ocean water and pumping it in only when acidity was lower. But as the oceans absorb more CO₂ from the air, and thus, become more acidic, the problem will escalate.



Polar Bears

The loss of Arctic sea ice is having major impacts on ice-dependent species. Polar bears must travel further across open water to find food and are using land, rather than sea ice, to den and forage.





Purpose & Vision

MANAGING THE NATION’S vast, diverse ecosystems is already a challenging task. A future climate unlike that of the recent past makes the job even more difficult.

Fortunately, effective steps can be taken to help the country’s valuable natural resources and the communities and economies that depend on them be resilient and adapt to a changing climate. This Strategy is an extraordinary collaboration among federal, state, and tribal governments that have primary jurisdiction for the living resources of the United States to identify and describe those steps.

A framework for adaptation, the *Strategy* is designed to inspire and enable natural resource managers, elected officials, and other decision makers to take action over the next five to ten years to help our living resources adapt to climate change. Implementation of the *Strategy* will facilitate thoughtful decisions about natural resources for the long-term future.

The *Strategy* is designed to complement existing or emerging science, adaptation, and conservation efforts, such as the US Global Change Research Program, the Interagency Climate Change Adaptation Task Force, State Wildlife Action Plans, and Landscape Conservation Cooperatives.

 The full report includes checklists for each goal, so that managers can assess progress towards safeguarding the nation’s valuable living resources.

WHO WILL BENEFIT

Natural resource management agency leaders and staff in federal, state, and tribal governments.

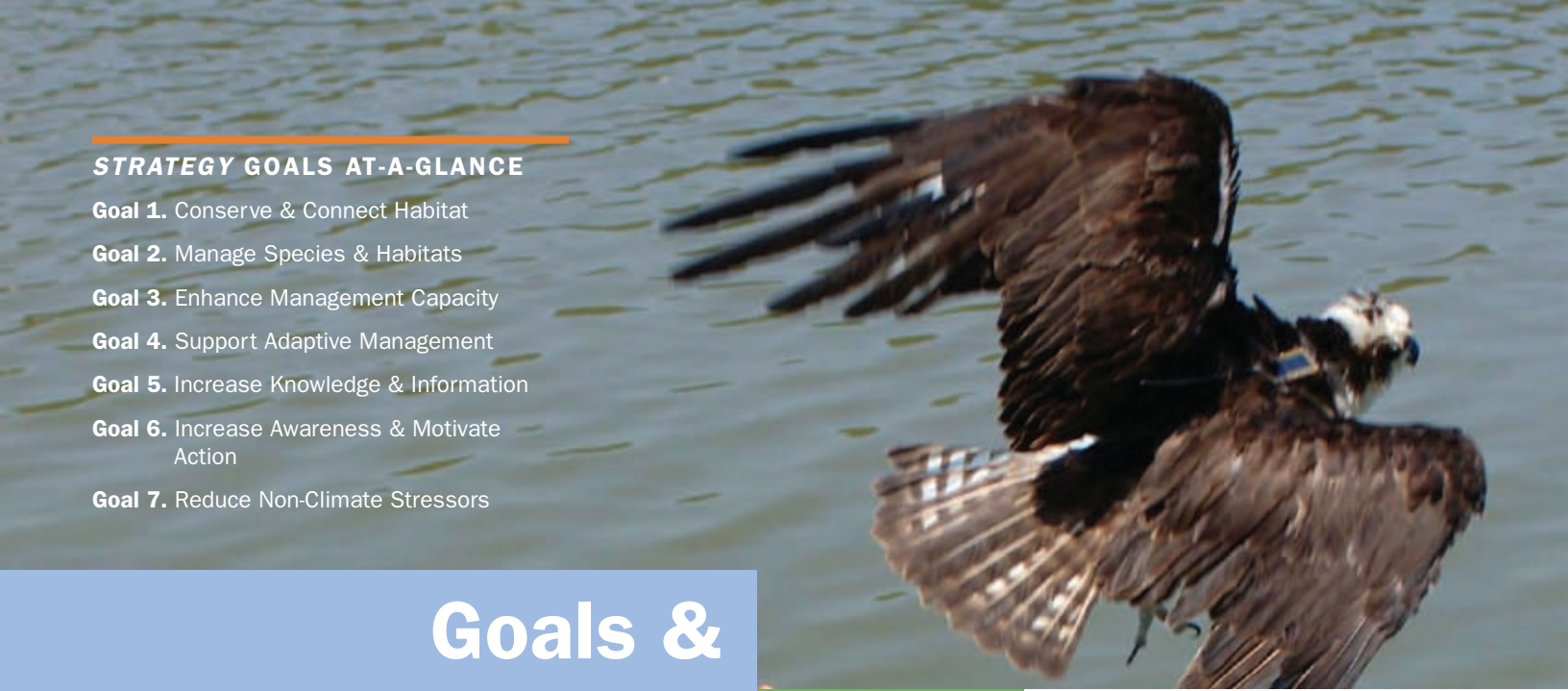
Elected officials at all levels of government.

Private landowners, whose role is crucial because they own more than 70 percent of the land in the United States.

Decision makers in sectors that affect natural resources, such as energy, housing and urban development, transportation and water resource management.

Leaders in industries that depend on and can impact natural resources, such as agriculture, forestry, and recreation.

Conservation partners who can both help carry out needed steps and participate in the national policy dialogue.



STRATEGY GOALS AT-A-GLANCE

Goal 1. Conserve & Connect Habitat

Goal 2. Manage Species & Habitats

Goal 3. Enhance Management Capacity

Goal 4. Support Adaptive Management

Goal 5. Increase Knowledge & Information

Goal 6. Increase Awareness & Motivate Action

Goal 7. Reduce Non-Climate Stressors

Goals &

Strategies



THIS REPORT DESCRIBES SEVEN GOALS that, if met, will help fish, wildlife, plants, and ecosystems adapt to a changing climate—and provides a list of practical actions that can be taken, or at least initiated, in the next five to ten years. These goals and actions were developed by teams of federal, state, and tribal managers and researchers with input from many other organizations and the public.

Importantly, the *Strategy* is designed to build on the current efforts of pioneering state governments, federal agencies, tribes, conservation partners, and others, and to help managers better apply conservation tools to the new challenges posed by climate change.



Goal 1

Goal 1

Strategies

Conserve habitat to support healthy fish, wildlife, and plant populations and ecosystem functions in a changing climate.

SEE
ADAPTATION
IN ACTION
ON PAGES
12 AND 13

AN IMPORTANT FIRST STEP towards adapting to climate change is to identify the best candidates for conservation areas that help safeguard species in a changing climate. The *Strategy* envisions innovative opportunities to conserve additional habitat areas, or to forge new connections between existing habitat areas. For example, the U.S. Department of Agriculture works with farmers and ranchers to cost-share implementing conservation practices that benefit threatened and endangered species, such as the lesser prairie chicken. The focus of Goal 1 is to identify conservation areas and opportunities to increase habitat connectivity for species.

Strategy 1.1: Identify areas for an ecologically-connected network of terrestrial, freshwater, coastal, and marine conservation areas that are likely to be resilient to climate change and to support a broad range of fish, wildlife, and plants under changed conditions.

Strategy 1.2: Secure appropriate conservation status on areas identified in Strategy 1.1 to complete an ecologically-connected network of public and private conservation areas that will be resilient to climate change and support a broad range of species under changed conditions.

Strategy 1.3: Restore habitat features where necessary and practicable to maintain ecosystem function and resiliency to climate change.

Strategy 1.4: Conserve, restore, and as appropriate and practicable, establish new ecological connections among conservation areas to facilitate fish, wildlife, and plant migration, range shifts, and other transitions caused by climate change.



Goal 2

Strategies

Manage species and habitats to protect ecosystem functions and provide sustainable cultural, subsistence, recreational, and commercial use in a changing climate.

SEE
ADAPTATION
IN ACTION
ON PAGES
12 AND 13

STATE, FEDERAL, AND TRIBAL AGENCIES employ sophisticated plans to effectively manage our living resources, but managing for the *status quo* is no longer sufficient. Management plans in this new era of climate change must take into account the differing capacities of individual species and ecosystems to adapt to changing conditions and sustain cultural, recreational, and commercial uses.

Strategy 2.1: Update current or develop new species, habitat, and land and water management plans, programs and practices to consider climate change and support adaptation.

Strategy 2.2: Develop and apply species-specific management approaches to address critical climate change impacts where necessary.

Strategy 2.3: Conserve genetic diversity by protecting diverse populations and genetic material across the full range of species occurrences.



ADAPTATION IN ACTION

Conserve & Connect Habitat

Ducks Unlimited is leading an effort to protect farmland adjacent to tidal wetlands in Pacific Northwest estuaries by conservation easements (e.g., development rights) from willing farmers. That will ensure that vital marsh habitat still exists if sea levels rise enough to submerge the existing coastal wetlands.



LARRY KRUCKENBERG

Support Adaptive Management

In 2008, the National Estuarine Research Reserve System began establishing *sentinel sites* to learn how estuarine habitats respond to sea level change. One such site is the Elkhorn Slough Reserve in California's Monterey Bay where researchers are recording surface and groundwater levels, testing water quality, and measuring changes occurring in tidal marsh plants and submerged aquatic vegetation. The monitoring data will be used to inform adaptation measures to reduce vulnerability of a nearby railroad line, a power plant, and a number of adjacent farms to flooding and coastal erosion.



GABI ESTILL/ELKHORN SLOUGH NERR

Manage Species & Habitats

By 2100, the paper birch tree may no longer be able to survive throughout its' range in the United States. Central to great legends of the Anishinaabe people, birch bark has been indispensable for canoes, food storage containers, sacred fires, and as a substrate to grow fungi for medicines. It is still used as a canvas on which traditional stories and images are etched, providing work for skilled craftspeople whose livelihoods greatly depend on birch bark. If the tree vanishes from the wild in the United States, it would be a devastating cultural loss for Native Americans. Until adaptive management strategies are identified and implemented, managers will have to rely on identifying suitable areas to serve as refugia where culturally significant numbers of the species can survive.



FLICKR/DIANE CORDELL

Climate adaptation is already beginning across the country and there are actions being taken toward many of the 7 Goals the *Strategy* emphasizes.

Reduce Non-Climate Stressors

Introduced into the United States in the late 1890s from South America, water hyacinth produces vast, thick mats that clog waterways across the Southeast, crowding out native plants and making boating, fishing, and swimming almost impossible. Water hyacinth cannot survive when winter temperatures drop below freezing, but rising temperatures will allow this pest to spread further north. Invasions of water hyacinth can be fought with weevils and herbicides. But these actions must be taken before the plant gets established, emphasizing the vital importance of planning for invasions projected in a changing climate and constantly monitoring ecosystems for the first telltale signs of such invasions.



FLICKR/PHIL WHITEHOUSE



USFWS/LIZ & LEW DUMONT

Enhance Management Capacity

Delaware is already experiencing worrisome coastal flooding. Breaches in the sandy shoreline at Prime Hook National Wildlife Refuge have allowed saltwater into freshwater marshes that provide important waterfowl habitat. Keenly aware of the threat, the state of Delaware has created a Sea-Level Rise Initiative to understand the impacts of sea level rise, prepare for inundation, respond where necessary, and inform the public. As part of this initiative, the Prime Hook Refuge is implementing short-term adaptation strategies such as re-establishing the shoreline.

Increase Knowledge & Information

Small increases in sea temperature can severely stress corals and cause them to expel the symbiotic algae that give them food and color, a process called bleaching that leaves them white and can result in coral death. Reefs are also being threatened by pollution, improper erosion control, damage from boats, and other factors. The Florida Keys Reef Resiliency Program, The Nature Conservancy (TNC), the State of Florida, NOAA, and Australia's Great Barrier Reef Marine Park Authority are working together to identify and reduce the non-climate stressors on coral reefs to help coral better withstand and survive increasing sea temperatures and bleaching.



ALASKA DEPARTMENT OF FISH AND GAME



Goal 3

Goal 3

Enhance capacity for effective management in a changing climate.

SEE
ADAPTATION
IN ACTION
ON PAGES
12 AND 13

MOST FISH, WILDLIFE, AND PLANT conservation laws, regulations, and policies were developed without the current understanding of climate change. These legal and policy foundations should be reviewed to identify opportunities to improve, where appropriate, their utility for addressing climate change considerations. Similarly, flood plain maps need to be adjusted to take more extreme storms and more frequent severe floods into account. Also, natural resource professionals may need additional training to learn specific management strategies to help fish, wildlife, and plants adapt to a changing climate.

Strategies

Strategy 3.1: Increase the climate change awareness and capacity of natural resource managers and other decision makers and enhance their professional abilities to design, implement, and evaluate fish, wildlife, and plant adaptation programs.

Strategy 3.2: Facilitate a coordinated response to climate change at landscape, regional, national, and international scales across state, federal, and tribal natural resource agencies and private conservation organizations.

Strategy 3.3: Review existing federal, state, and tribal legal, regulatory, and policy frameworks that provide the jurisdictional framework for conservation of fish, wildlife, and plants to identify opportunities to improve, where appropriate, their usefulness in addressing climate change.

Strategy 3.4: Optimize use of existing fish, wildlife, and plant conservation funding sources to design, deliver, and evaluate climate adaptation programs.



Goal 4

Goal 4

Support adaptive management in a changing climate through integrated observation and monitoring and use of decision support tools.

SEE
ADAPTATION
IN ACTION
ON PAGES
12 AND 13

AN ADAPTIVE MANAGEMENT APPROACH REQUIRES supporting coordinated observation systems, such as the nascent National Ecological Observatory Network. The data these systems gather will help managers to monitor and identify changes in species and ecosystems, and to evaluate the effectiveness of management actions. In addition, decision support tools, such as risk assessments and scenario planning, will enable managers to be adaptive and adjust activities to respond to changing conditions

Strategies

4.1: Support, coordinate, and where necessary develop distributed but integrated inventory, monitoring, observation, and information systems at multiple scales to detect and describe climate impacts on fish, wildlife, plants, and ecosystems.

Strategy 4.2: Identify, develop, and employ decision support tools for managing under uncertainty (e.g., vulnerability and risk assessments, scenario planning, strategic habitat conservation approaches, forecasting, and adaptive management evaluation systems) via dialogue with scientists, managers (of natural resources and other sectors), economists, and stakeholders.





Goal 5

Goal 5

Strategies

Increase knowledge and information on impacts and responses of fish, wildlife and plants to a changing climate.

SEE
**ADAPTATION
IN ACTION**
ON PAGES
12 AND 13

ADAPTATION EFFORTS HAVE BEEN HAMPERED by lack of knowledge of the detailed impacts of climate change on fish, wildlife, plants and ecosystems and the adaptive capacity of species. An important step to solving this problem is identifying how the climate may change in particular regions of the country. Assessing vulnerability of species and systems require climate information at a diversity of scales. While climate and ecosystem models have already generated useful information, we need additional research to build models that can predict changes at small regional scales, as well as changes in species distribution.

Strategy 5.1: Identify knowledge gaps and define research priorities via a collaborative process among federal, state, tribal, private conservation organizations, and academic resource managers and research scientists.

Strategy 5.2: Conduct research into ecological aspects of climate change, including likely impacts and the adaptive capacity of species, communities and ecosystems, and their associated ecosystem services, working through existing partnerships or new collaborations as needed (e.g., USGCRP, NCA, CSCs, RISAs, and others).

Strategy 5.3: Advance understanding of climate change impacts and species and ecosystem responses through modeling.



Goal 6

Strategies

Goal 6

Increase awareness and motivate action to safeguard fish, wildlife, and plants in a changing climate.

SEE
ADAPTATION
IN ACTION
ON PAGES
12 AND 13

NO MATTER HOW COMPELLING the scientific case for adaptation may be, adaptation efforts will require broad support from the public and decision makers if they are to achieve maximum success. That is why an important part of the *Strategy* is explaining the need for adaptation to key groups and the public. The goal is to ensure that all interested constituencies and key stakeholders understand the fundamentals of climate adaptation—and to try to motivate them to take action themselves.

Strategy 6.1: Increase public awareness and understanding of climate impacts to natural resources and ecosystem services and the principles of climate adaptation at regionally- and culturally-appropriate scales.

Strategy 6.2: Engage the public through targeted education and outreach efforts and stewardship opportunities.

Strategy 6.3: Coordinate climate change communication efforts across jurisdictions.



SCOTT NEWHALL/TIME OUT CHARTERS



Goal 7

Strategies

Reduce non-climate stressors to help fish, wildlife, plants, and ecosystems adapt to a changing climate.

SEE
ADAPTATION
IN ACTION
ON PAGES
12 AND 13

IT IS IMPORTANT TO EMPHASIZE that climate change is only one of many stresses on natural resources. Fish, wildlife, and plants have also been facing habitat loss and fragmentation, pollution, over-harvesting, disease, illegal trade, incursions of invasive species, and other threats. Often, reducing non-climate stressors is the best way to increase the capacity of natural systems to adapt to changing climate conditions.

Unless the nation begins serious adaptation efforts now, we risk losing priceless living systems—and the countless benefits and services they provide—as the climate changes.

Strategy 7.1: Slow and reverse habitat loss and fragmentation from climate change as well as other causes.

Strategy 7.2: Slow, mitigate, and reverse where feasible ecosystem degradation from anthropogenic sources through land/ocean-use planning, water resource planning, pollution abatement, and the implementation of best management practices.

Strategy 7.3: Use, evaluate, and as necessary, improve existing programs to prevent, control, and eradicate invasive species and manage pathogens.

Strategy 7.4: Reduce destructive capture practices (e.g., fisheries bycatch, destructive fishing gear), over-harvesting and illegal trade to help increase fish, wildlife, and plant adaptation in a changing climate.



Opportunities for Multiple Sectors

CLIMATE CHANGE IMPACTS will also be felt in cities and towns, and in sectors such as agriculture, energy, transportation, housing, and water resources. Coordinated work among these sectors and fish, wildlife, and plant adaptation efforts can yield mutual benefits. Decision makers in other sectors can take actions that also reduce non-climate stressors on ecosystems.

Seven adaptation strategies common to all sectors

- 1** | Improve the consideration of impacts to fish, wildlife, and plants in the development of sector-specific climate adaptation strategies.
- 2** | Enhance coordination between sectors and natural resource managers, land use planners, and decision makers regarding climate change adaptation.
- 3** | Use integrated planning to engage all levels of government (local, state, federal, and tribal) and multiple stakeholders in multi-sector planning.
- 4** | Make the best available science on climate change impacts on fish, wildlife and plants accessible for planning and decision-making across all sectors.
- 5** | Explicitly consider natural resource adaptation in sector-specific climate adaptation planning.
- 6** | Improve, develop, and deploy decision support tools, technologies, and best management practices that incorporate climate change information to reduce impacts on fish, wildlife, and plants.
- 7** | Assess the need for, and utility of, expanding compensatory mitigation requirements for projects that reduce ecosystem resilience.



Implementing the *Strategy*

THE DEVELOPMENT of this adaptation *Strategy* will have

been worthwhile only if the actions articulated herein are implemented. To make the *Strategy* as useful as possible, it was carefully designed to build upon and complement many existing natural resource management and climate adaptation efforts.

For instance, some state, local and tribal governments have already begun to develop natural resource climate adaptation plans. These plans include the *Washington State Integrated Climate Change Response Strategy*, the *California Climate Adaptation Strategy* and the *Swinomish Climate Change Initiative*. For the Swinomish people of the Pacific Northwest, adaptation planning is already becoming central to their way of life, since they have begun to experience climate change impacts on the salmon and shellfish they depend upon.

Meanwhile, the Interagency Climate Change Adaptation Task Force has created the *National Action Plan: Priorities for Managing Freshwater Resources in a Changing Climate* and the National Ocean Council is responding to the challenges to the oceans posed by climate change and ocean acidification through their

Implementation Plans. This *Strategy* has been developed in coordination with both of these efforts, so that the three strategies support and reinforce each other.

In addition, federal agencies, states, tribes, conservation organizations and industries are already partnering to protect important habitats. Two examples are the Joint Ventures effort, aimed at priority bird species, and the National Fish Habitat Action Plan. These sophisticated efforts offer ideal opportunities to bring climate change information into existing natural resource management planning.

It is important to add that adaptation efforts are also underway in other sectors, from agriculture and transportation to energy and water resources. This *Strategy* is intended to encourage planners in all sectors to achieve adaptation benefits in as many sectors as possible, including the natural world.

To enable the nation to move forward, the *Strategy* calls for the following:

- » Federal, state and tribal governments and conservation partners should incorporate the appropriate goals, strategies and actions of the *Strategy* into their own plans and actions at all levels.
- » Federal agencies with programs that affect fish, wildlife, plants and key habitats should incorporate appropriate elements of the *Strategy* into their agency adaptation plans.
- » Landscape Conservation Cooperatives and other regional, inter-jurisdictional collaboratives can play an important role in implementing the *Strategy*.
- » An inter-jurisdictional coordinating body with representation and staff support from federal, state, and tribal governments should be established to evaluate implementation of the *Strategy* and report progress on an annual basis.



This *Strategy* is the beginning of a significant and collective effort to take effective action to reduce risks and to increase the resiliency of our valuable natural resources.

It offers a common framework for that action, starting the nation down the path to a meaningful adaptation response for our valuable fish, wildlife, plants and ecosystems.

We cannot afford to wait to respond to the changes we are already seeing, or to prepare for those yet to come.



NATIONAL *fish, wildlife & plants*
CLIMATE ADAPTATION STRATEGY

STEERING COMMITTEE MEMBER AGENCIES

California Department of Fish and Game

Council on Environmental Quality

Great Lakes Indian Fish & Wildlife Commission

North Carolina Wildlife Resources Commission

Northwest Indian Fisheries Commission

New York State Department of Environmental Conservation

U.S. Department of Agriculture

Animal and Plant Health Inspection Service

Farm Service Agency

Natural Resources Conservation Service

U.S. Forest Service

U.S. Department of Commerce, National Oceanic and Atmospheric Administration

National Marine Fisheries Service

National Ocean Service

U.S. Department of Defense

U.S. Army Corps of Engineers

U.S. Department of the Interior

Bureau of Indian Affairs

Bureau of Land Management

Bureau of Reclamation

National Park Service

U.S. Fish and Wildlife Service

U.S. Geological Survey

U.S. Environmental Protection Agency

Office of Water

Washington Department of Fish & Wildlife

Wisconsin Department of Natural Resources

STEERING COMMITTEE CO-CHAIRS

ROWAN GOULD

Deputy Director for Operations

U.S. Fish and Wildlife Service

ERIC SCHWAAB

Assistant Administrator

National Oceanic and Atmospheric Administration

PATRICIA RIXINGER

Director, Division of Fish, Wildlife and Marine Resources

New York State Department of Environmental Conservation

MANAGEMENT TEAM CO-CHAIRS

MARK SHAFFER

U.S. Fish and Wildlife Service

ROGER GRIFFIS

National Oceanic and Atmospheric Administration

GERRY BARNHART

Association of Fish and Wildlife Agencies

JOHN CAREY

Science Writer/Editor

JANE PELLICCIOTTO

Design and Layout, Allegro Design

www.wildlifeadaptationstrategy.gov