

Re·store·á·Nation

1: the economic benefits of *restoring* the lands and waters of our national parks

2: investments to protect economies and create American jobs on American lands



National Parks Conservation Association®
Protecting Our National Parks for Future Generations®



www.npca.org

National parks are not only a source of inspiration and recreation, they are a community anchor. They are economic drivers that create jobs and support families in cities and towns across the country, and they can be harnessed to restore our public lands and our nation.



Re•store•á•Nation

1: the economic benefits of *restoring* the lands and waters of our national parks

2: investments to protect economies and create American jobs on American lands

nat•u•ral re•source

1: land, wildlife, air, fresh and saltwater, estuaries, plants, habitats, and ecosystems

ad•ap•ta•tion

1: the protection, restoration, and conservation of natural resources so that they become more resilient, adapt to, and withstand ongoing environmental changes

re•sil•ience

1: the ability to resist or recover from disturbance

2: the ability to preserve diversity, productivity, and sustainability

res•to•ra•tion

1: the process of re-establishing self-sustaining habitats and building resilience to support numerous species now and in the future



North Cascades National Park. Photo: ©Ethan Welty/Aurora Photos



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Contents

2: INTRODUCTION

Restore a Nation

- (5) National parks help drive the economy and create American jobs
- (8) Restoration projects throughout the country demonstrate economic benefits

10: CALIFORNIA

Golden Gate National Recreation Area

- (11) Crissy Field Restoration

Santa Monica Mountains National Recreation Area

- (12) Native Plant Restoration

16: GREAT LAKES

Indiana Dunes National Lakeshore

- (17) Great Marsh Wetlands Restoration

22: GULF COAST STATES

Jean Lafitte National Historical Park and Preserve

- (23) Industrial Canal Reclamation

Greater Barataria Basin

- (25) Coastal Restoration

28: NORTHEASTERN STATES

Acadia National Park

- (29) Marshall Brook Stream Crossings

Naugatuck River Watershed

- (32) Tingle Dam Fish Bypass

36: PACIFIC NORTHWEST AND ALASKA

Olympic National Park

- (37) Elwha River Restoration

42: ROCKY MOUNTAIN WEST

Rocky Mountain National Park

- (43) High-Country Lakes Restoration

48: SOUTHEASTERN STATES

Buffalo National River

- (49) River Habitat Restoration

54: REFERENCES


- (56) Index

- (57) Endnotes

- (63) Acknowledgments



A mangrove rises from the waters in Everglades National Park. Coastal marshes and mangroves, like those in the Everglades and other coastal areas, provide essential barriers that protect communities from storm surges, providing a service estimated at a yearly value of more than \$23 billion.¹ Additionally, national parks in Florida hosted nearly 8 million visits in 2008 and supported more than 10,000 local jobs.² Photo: ©Jay Patel



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e·co·sys·tem

1: The interacting system of a biological community and its non-living environmental surroundings

hab·i·tat

1: the physical, chemical, and biological properties that fish, wildlife, or plants use for growth, reproduction, survival, food, water, or cover

Introduction

What does it mean to “restore” a river, a national park, or for that matter, a nation? In conservation terms, restoration is defined as the process of re-establishing self-sustaining habitats and building resilience to support numerous species now and in the future.³

Resilient ecosystems are essential not only for fish and wildlife but for countless American communities whose economic well-being and jobs depend on the goods and services provided by a sustainable, functioning natural environment. Healthy ecosystems provide communities with clean drinking water and flood protection, as well as other economic draws such as fishing, tourism, and recreational activities, especially in rural areas.

Habitats and economies at risk

A great white egret stands in a sea of grass. Egrets are among the more than 360 species of birds that have been recorded in Everglades National Park. Expenditures for wildlife watching across the country—heavily dominated by bird watchers—contributed more than \$45 billion to the U.S. economy in 2006.⁴
Photo: ©ISTOCKPHOTO

Our changing climate is taking a toll on our national parks, forests, wildlife refuges, and their surrounding ecosystems—and on the American communities that rely on them. Drought, wildfires, and floods are on the increase; sea-level rise is beginning to consume coastal wetlands; and wildlife are under increasing stress as changing temperatures drive many from their traditional homes in search of more suitable habitat. As a result, what is an ecological challenge for our national parks and public lands also threatens to become an economic challenge for countless communities.

Fortunately, we already know how to restore our lands and waters in ways that will make them more resilient to a changing climate. Building ecosystem resilience also creates immediate American jobs restoring our lands and waters. Over the long term, it also protects local economies that depend on healthy natural resources.



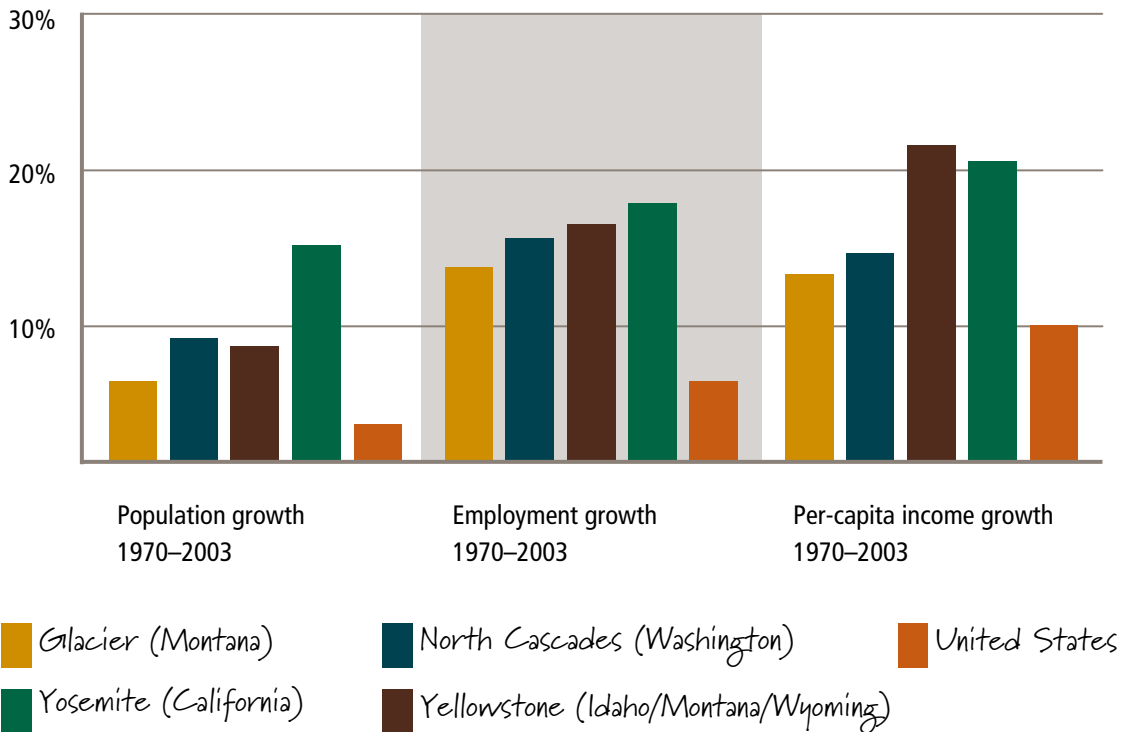
National parks support American jobs

Our National Park System—the Grand Canyon, Yellowstone, the Everglades, and even lesser-known parks—is not only inspiring; it is irreplaceable for making nearby communities more attractive, and for spurring economic success.

Research has shown that over the course of three decades, counties adjacent to national parks have outperformed the nation in job growth, personal income growth, and population growth (See Figure 1).⁵

Figure 1: Gateway counties—those adjacent to national parks, public lands, and wilderness areas—outperform the nation as a whole in job growth, personal income growth, and population growth.⁶

Economic Performance in Park Gateway Regions



Healthy ecosystems provide communities with clean drinking water and flood protection, as well as other economic draws such as fishing, tourism, and recreational activities.

National parks help drive the U.S. economy and create American jobs

As economic engines, national parks directly:

- Generate more than \$4 in value for every tax dollar invested;
- Support \$13.3 billion in private-sector activity;
- Maintain 267,000 jobs; and
- Provide \$4.8 billion in wages.⁷

Across the country, scientists, engineers, construction crews, equipment operators, educators, students, youth workers, support service providers, equipment manufacturers, and suppliers can be employed to:

- Restore native wetlands, grasslands, and forests;
- Maintain habitat in wildlife migration corridors;
- Remove invasive species from natural areas;
- Repair damaged watersheds; and
- Reduce wildland fire risks.

Park Service workers at Indiana Dunes National Lakeshore plant native grasses as part of ongoing wetlands restoration at the Great Lakes park. Resource management projects including backfilling ditches, removing invasive plants, and planting native species help these wetlands to naturally filter out contaminants and improve the area's overall water quality. Photo: NPS



Investments in the future

The combined economic, cultural, and natural benefits of restoration projects far outweigh the initial costs. A recent study of public lands showed that conserving or restoring property instead of using it for industrial development is correlated with sustained economic growth.⁸ In fact, ecosystem restoration projects have shown impressive economic returns, some approaching 80 percent (see Figure 2).⁹

Taking action now and investing in our environment to respond and adapt to the earth's changing climate—restoring our ecosystems and essential habitats—will benefit not only wildlife and our national parks but American communities.

We can put Americans to work in difficult economic times and restore the parks, and our nation, for our children and grandchildren to enjoy.



Ecosystem Restoration Return on Investment

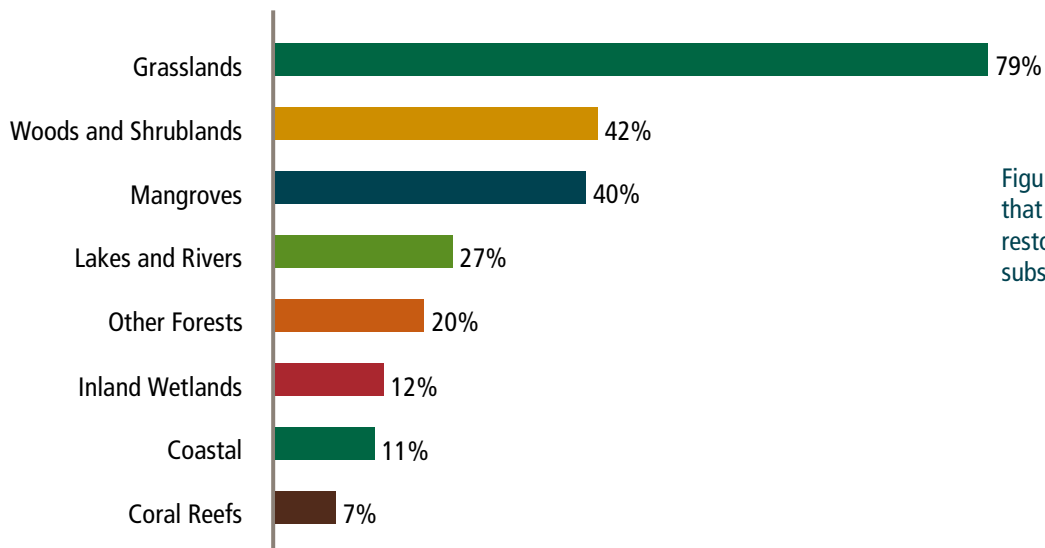


Figure 2: New research shows that investments in ecosystem restoration projects offer substantial returns.¹⁰

A multiplier effect: Impacts beyond park borders

Wildlife populations, rivers, forests, deserts, waterways, and our national parks support a U.S. outdoor recreation economy that:

- Maintains *\$730 billion* in economic activity,
- Supports *6.5 million jobs* (one in 20 across the country), and
- Contributes *\$88 billion* in state and federal tax revenue.¹¹



(Left) Saguaro cacti stand in namesake Saguaro National Park outside Tucson, Arizona. Infestations of quick-burning buffelgrass in the area elevate wildfire risk for iconic native plants such as saguaro, ocotillo, and other cacti. Tourists—attracted in no small measure by desert scenery—contribute \$2 billion a year to the local economy.¹²

Photo: ©Chris Williams/Alamy


(Right) Clouds reflect in the waters of Lake McDonald in Glacier National Park. Gateway communities like those adjacent to Glacier outperform their non-park peers in job growth, personal income growth, and population growth.¹³ Photo: USFWS

Restoration projects throughout the country demonstrate a variety of economic benefits

- Rather than installing chillers in its wastewater treatment plants, an Oregon utility is **saving \$50 million** over five years by planting streamside forests to keep the water cool enough to support aquatic life. These forests will also help clean the air, control flooding, and increase area property values.¹⁴
- A \$6 million investment by Seattle Public Utilities in the Cedar River watershed restored degraded wetland habitat. The project, which helps ensure clean water for the city, also **cost \$194 million less** than construction of a conventional water filtration facility.¹⁵
- Florida's state climate action plan would generate 148,000 jobs over 16 years, including nearly 40,000 jobs restoring and establishing forests. If the 38 states that have not yet done so adopted similar plans, cumulative **savings of \$535 billion** would accrue between 2009 and 2020.¹⁶
- Coastal wetland restoration in Connecticut was significantly correlated with an average **increase in housing values of more than \$11,000**.¹⁷
- A forest restoration project in New Mexico brought in \$6.5 million to the region, **creating 139 jobs** and nearly \$3.5 million in wages.¹⁸
- In Colorado, slightly higher stream levels would prompt more fishing and rafting, adding **340 new jobs** and \$4.4 million in income annually. Every acre-foot of increased flow in Colorado's Arkansas River would generate \$360 in additional income.¹⁹
- Coastal marshes and mangroves provide essential barriers for protecting coastal and inland communities from storm surges, providing a service estimated at a yearly **value of more than \$23 billion**.²⁰
- By investing \$1.5 billion in the restoration of the Catskill watershed that feeds its reservoirs, the city of New York **saved \$6.5 billion** in construction costs for facilities and \$200 million a year in operating expenses.²¹



Hikers approach a Joshua tree in Joshua Tree National Park. The park hosted 1.4 million visitors in 2008 and infused \$37 million in spending into the surrounding communities. Rising temperatures threaten not only the disappearance of Joshua trees from their namesake park but also local economic activity and more than 700 jobs.²²
Photo: ©Ian Shive/Aurora Photos



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re·sil·ience

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California

Building Community Through Restoration

For national parks in urban areas, support from nearby communities is crucial to successful park management. Two parks in California are strengthening community ties through jobs, educational programs, and volunteer opportunities linked to habitat and ecosystem restoration.

Golden Gate National Recreation Area

Along San Francisco Bay, where less than ten percent of the original coastal lagoons and tidal salt marshes remain, the rehabilitation of Crissy Field—100 acres of abandoned Army airstrip and shoreline—included nearly 45 acres of restored native habitat. It also enhanced one of the nation's most recognizable urban park sites, Golden Gate National Recreation Area—used by more than 14 million visitors in 2008—and a model for community-based restoration.²³

Crissy Field Restoration²⁴

Links to schools and students

- Each year, 8,500 students, from kindergarteners to high school seniors, participate in hands-on restoration projects at Crissy Field.
- Housed in what was an abandoned building, 14 educational and interpretive staff work out of the Crissy Field Center.
- The program reaches more than 100,000 young people and adults each year.

(Left) A killdeer rests on the shores of Crissy Marsh at Golden Gate National Recreation Area in San Francisco. The newly restored wetland is now an important stop for migratory birds on the Pacific coast. Nearly 100 species of birds have been documented using the marsh, which is frequented by birders from around the Bay Area.²⁵
Photo: ©david sanger photography/Alamy

Local jobs and projects

- Between 1998 and 2000, the Crissy Field restoration awarded nearly \$30 million to local contractors, engineering and design firms, and other businesses.

(Right) Crissy Field, with a view of the Golden Gate Bridge. Crissy Field's restored tidal marsh and dunes, provide habitat for fish, invertebrates, and birds that have been absent from the area for a century.²⁶
Photo: Will Elder, NPS

Community support

- More than 3,000 volunteers—including students from 120 local schools—worked 30,000 hours during restoration of the site. They planted more than 100,000 native plants.
- In 2008, 1,400 volunteers spent 13,000 hours—a contribution worth \$234,000—weeding, planting, and maintaining natural areas.



Generating economic value through revitalization

- Seven previously abandoned buildings were rehabilitated and now draw visitors and commerce to the west end of Crissy Field.
- Tenants include a large climbing gym and swim and gymnastics schools.



Santa Monica Mountains National Recreation Area

Native Plant Restoration²⁷

Santa Monica Mountains National Recreation Area is the world's largest urban national park, located in the nation's second largest metropolitan area. Here, native plant restoration projects help build community investment in the park while benefiting the parklands and wildlife.

Links to schools and students

- During the 2008–09 school year, 200 students in grades 5 through 8 took part in year-long learn-and-work projects: weeding, collecting seed, growing native plants, and caring for restoration sites.
- Shorter-term programs, such as EcoHelpers, which works with Los Angeles and Ventura County high school students, involved 2,200 students and generated more than 14,500 volunteer restoration hours valued at more than \$260,000.

Local jobs and projects

- Park restoration-education programs employ one full-time and three part-time staff members.
- A recent \$200,000 contract to a Southern California firm to restore a 40-acre plot is one of an ongoing roster of restoration projects that infuse money into the local economy.
- A project rehabilitating 550 acres that burned in 2007 created two full-time positions for area university graduates and employs four additional park staff and a crew of California Conservation Corps workers.

"Since the tidal marsh opened, we've seen birds returning to the area that we haven't seen for years. It's a natural ecosystem being reformed."

—**Greg Moore**
Executive Director,
Golden Gate National
Parks Conservancy

"Community response has been great. Lots of kids bring their families to the park on weekends to show off their restoration plots and go for hikes."

—**Christy Brigham**
Restoration Ecologist,
Santa Monica
Mountains National
Recreation Area

Community support

- Three out of four fifth-graders who participate in the year-long learn-and-work activities live in poverty. Although the park is within walking distance, most had never been there before they entered the program.
- Local park visitation has been on the rise, as students bring their families for weekend and after-school visits.



(Left) A student assists with native plant restoration at Santa Monica Mountains National Recreation Area. In part because of the success of its participation in park activities like these, Manzanita Elementary School in Thousand Oaks, California, became an environmental science magnet school in 2009. The school draws students from across the Canejo Valley school district, focusing lessons in every discipline—from reading to math to social studies—on scientific inquiry. Photo: NPS

(Right) Towering scenery rises above the Backbone Trail in Santa Monica Mountains National Recreation Area. The park offers popular trails like this one, which ties together the individual areas of the Santa Monica Mountains. Visitors drawn to the park for views and experiences such as these spent more than \$17 million in 2008.²⁸ Photo: Jim Belsley, NPS


By the numbers:

Costs to ecology and economy

- Climate change is projected to more than quadruple the cost of wildfire damage to homes in California between 2020 and 2050. By 2050, annual costs will likely be measured in *billions of dollars in lost home value alone*.²⁹
- Since the mid-1980s, wildfires in the western United States have been four times more frequent than the 1970–1986 average, *burning more than six times the area*.³⁰
- More than 68,000 employees work for the wood products industry in California, earning more than \$4 billion in income. The industry pays *\$353 million* in state and local taxes each year.³¹
- California's water resources are under pressure from warmer temperatures and the changing patterns of precipitation and runoff. Early spring snowpack in the Sierra Nevada Mountains decreased by ten percent over the last century—a *loss of water storage* that would supply up to 3 million families each year.³²
- Closures and restrictions of salmon fisheries in 2008 cost California, Washington, and Oregon *more than \$290 million* in income and 4,200 jobs.³³
- Without action to restore habitat and boost populations, Rocky Mountain wild trout numbers could *decline by more than 60 percent* and Pacific salmon in the Northwest by up to 40 percent.³⁴



Water spills onto the sandy beach of Lake Superior. The largest of all the Great Lakes, Lake Superior contains as much water as all the other Great Lakes combined. In 2007, high temperatures and low precipitation dropped the level of Lake Superior to a record low—21 inches below the average for the 88 preceding years.
Photo: ©Carr Clifton/Minden Pictures



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nat·u·ral re·source

1: land, wildlife, air, fresh and saltwater, estuaries, plants, habitats, and ecosystems

Great Lakes

Wetlands Restoration Benefits Local Communities and Native Species

The Great Lakes hold one-fifth of the world's freshwater supply, so ensuring their health is of the utmost importance. The Great Lakes also support a variety of fish and wildlife, and they have long played a crucial role in the lives of people who live in communities along their shores. The Great Lakes are aesthetic resources, they provide abundant recreational opportunities, and they drive regional economies.

Indiana Dunes National Lakeshore

More than a century ago, the Great Marsh stretched almost 12 continuous miles from Burns Harbor to Michigan City, Indiana. Native plants thrived in the diverse habitats, and waterfowl and wading birds were plentiful. The marsh provided a natural filter for inland water draining into Lake Michigan.

“Restoring these wetlands takes 10-15 years of adapting to how the land responds. And then, the work continues. Doing restoration in an urban landscape like this is akin to maintaining an old house. There is constant upkeep.”

—Dan Mason
Ecologist, Indiana
Dunes National
Lakeshore

By the 1970s, drainage ditches had reduced the Great Marsh’s size and divided it into three watersheds. The impact of these ditches, and additional levees, roads, farms, factories, and houses, was evident in a rapid takeover by non-native plants and plummeting populations of egrets, ducks, and a host of other wetland-dependent animals.

Great Marsh Wetlands Restoration³⁵

Restoration of the Great Marsh is taking place in sections. The park began plugging culverts, filling ditches, and constructing spillways and levees to adjust water flow in the Derby Ditch watershed in 1998. Installing native plants grown in park greenhouses continues 11 years later.

In 2002, park scientists began studying another area of the Great Marsh known as Cowles Bog, after the University of Chicago professor who studied it in the late 1800s. In 2008, the park started restoring the wetland by replacing non-natives such as hybrid cattails with native grasses.

These coastal wetlands restoration efforts will contribute to the overall health of Lake Michigan while re-establishing native plants and wildlife. Between 1998 and 2023, the park will spend \$3 million on these two projects.

At typical funding levels of \$100,000 a year, wetlands restoration projects at Indiana Dunes provide several benefits.

A kayaker paddles through the waters off Apostle Islands National Lakeshore on the banks of Lake Superior. In 2007, travelers to Bayfield County, Wisconsin, the gateway to Apostle Islands, spent \$128 million, directly supporting \$38 million in resident income.³⁶

Photo: ©John and Ann Mahan





Local jobs and projects

- Employment and income for up to eight bio-technicians for five-month summer stints.
- Contracts and purchases from local businesses for everything from equipment and native plants to restoration labor.

Links to schools and the community

- Community partnerships to restore adjacent areas, such as a 25-acre park in the nearby city of Dune Acres.
- Improved bird watching, which brings visitors to the park and surrounding communities.
- A natural classroom and laboratory for students and adults from surrounding urban communities including Chicago.

Blooms carpet the landscape at Indiana Dunes National Lakeshore. In 2008, Indiana Dunes, at the southern tip of Lake Michigan, hosted 1.8 million visits. Visitor spending in and around the park supported nearly 1,000 jobs and totaled nearly \$55 million.³⁷ Photo: Tim Fitzharris/Minden Pictures



By the numbers:

The Great Lakes economy

- Recreational activities, including boating, fishing, and wildlife watching in and around the Great Lakes, generate *more than \$50 billion* in economic activity each year.³⁸ Many of these activities depend on healthy wetlands and shoreline areas that may be left high and dry as water levels recede.
- In 2007, the four national lakeshores on Lake Superior and Lake Michigan hosted 3.7 million visitors.³⁹ The Park Service projects that lower lake levels, hastened in part by climate change, would result in a reduction of sport fish and migratory birds due to the loss of wetlands habitat.
- Water control structures are projected to help keep some wetlands intact, while maintaining their habitat value for fish, other aquatic organisms, and waterfowl, even after a drop in lake and river water levels.⁴⁰



A male Karner butterfly displays his wings marked with the distinctive dark blue characteristic of his species. Recent declines in populations of endangered Karner blue butterflies at Indiana Dunes National Lakeshore have been attributed to reduced snow cover in the region. Snow plays an important role in the lifecycle of Karner blues by insulating fall eggs from winter's cold until they hatch in the spring. Photo: Ann B. Swengel, USFWS

Benefits from Great Lakes restoration

In 2005, the Great Lakes Regional Collaboration, a public-private partnership, launched an ambitious strategy for cleaning up the Great Lakes. Its proposals ranged from controlling wastewater discharge to managing invasive species. The Collaboration also proposed a five-year, \$1.45 billion increase in funding for habitat conservation and restoration.

In early 2010, the Environmental Protection Agency renewed its commitment to Great Lakes restoration by dedicating \$2.2 billion over five years to a follow-on plan, the Great Lakes Restoration Initiative Action Plan, coordinated among various agencies.

Expected short- and long-term economic benefits far exceed the \$26 billion price tag for the entire program. The more than \$50 billion in long-term benefits include:

- Up to \$11.8 billion from tourism, fishing, and recreation,
- Up to \$19 billion in increased value of coastal property, and
- Up to \$125 million in municipal cost savings.⁴²


Implementing a comprehensive Great Lakes restoration strategy could add up to \$50 billion in economic activity in the region.⁴¹



Rock of Ages lighthouse stands watch in Isle Royale National Park. Coldwater species that call Isle Royale home, such as coaster brook trout, are declining and will continue to do so as lake temperatures rise. Photo: twphotos/istock



An aerial view shows historic Fort Jefferson and the reefs and waters of Dry Tortugas National Park. Even a location as seemingly remote as Dry Tortugas—approximately 70 miles off Key West, Florida and accessible only by boat or sea plane—hosted nearly 64,000 visits in 2008. Park-related spending in the area was more than \$6 million for that same year and supported 125 jobs.⁴³ Photo: ©2006 Jerry Ginsberg—All Rights Reserved



Re·store·á·Nation

wet·lands

1: areas that are inundated or saturated by surface or groundwater, frequently enough to support a prevalence of specialized vegetation

2: wetlands generally include swamps, marshes, and bogs

Gulf Coast States

Restoring Coastal Wetlands

Ninety percent of our nation's wetlands are what's referred to as freshwater marshes. They purify our drinking water, reduce flooding, serve as an irreplaceable breeding and nesting habitat for millions of creatures, and prevent the erosion of shorelines.

Jean Lafitte National Historical Park and Preserve

More than a third of the average yearly loss of wetlands in coastal Louisiana between 1974 and 1990 happened in the Barataria Basin, just south and west of New Orleans.⁴⁴

In Jean Lafitte National Historical Park and Preserve, canal reclamation projects aim to strengthen a freshwater marsh system that abuts an essential hurricane protection levee in New Orleans. As a part of this effort, the Park Service has slated more than 20 miles of canals in the 20,000-acre Barataria Preserve unit of the park for reclamation and restoration.



Barataria Preserve canals before and after backfilling (left, right). In the preserve, and elsewhere in coastal Louisiana, backfilling non-historic canals is a simple, cost-effective approach to habitat reclamation that can provide immediate and long-term economic benefits. After three years, marsh vegetation was restored by up to 65 percent in backfilled canals in the preserve. The natural reclamation process will continue to increase over time.⁴⁵ Photos: NPS

Industrial Canal Reclamation

Left behind by the oil and gas industry and unsuccessful residential development projects that predate the preserve, these canals have turned nearly 600 acres of former wetlands into open water. Their brushy banks restrict the flow of water, nutrients, and wildlife through thousands of acres of surrounding marshes.⁴⁶ These waterways will be backfilled using material from unneeded spoilbanks and dikes. Reclaiming the canals is projected to improve fishing and provide other benefits.

Local jobs and income

- An estimated \$1.5 million would fund equipment and labor costs to fill the canals.
- This investment would generate about \$3.2 million in local economic activity and support about 30 local jobs.⁴⁷

Visitation and recreation expenditures

- Barataria Preserve accounts for nearly two-thirds of all visitors to the Jean Lafitte National Historical Park and Preserve.
- In 2008, nearly 340,000 park visitors spent \$17.3 million in areas surrounding the park.
- Spending by visitors from out of the area supported more than 325 local jobs and \$6.4 million in labor income.⁴⁸



A changing climate threatens parks and economies in the region

- Extended drought, land subsidence, and rising sea levels could limit drinking water supplies for New Orleans, Tampa, and Houston and harm productive marine systems such as Mobile, Apalachicola, and Tampa bays and lagoons along the Texas coast.⁴⁹
- Nearly half of all Louisiana residents live in coastal parishes where less buffering from barrier islands and wetlands will contribute to more severe storm damage.⁵⁰
- Florida and Texas already top the list for annual economic losses from hurricanes and floods.⁵¹
- Changing rainfall patterns and periods of intensified drought are likely to increase wildfire risk in areas from Big Thicket National Preserve in east Texas to the Everglades in Florida.⁵²



Sandhill cranes winter in the wetlands at Padre Island National Seashore in Texas. Padre Island also draws human visitors, nearly 635,000 in 2008, supporting nearly 1,000 local jobs and \$16 million in wages.⁵³ Even a small rise in sea level threatens this globally significant migratory bird area, much of which is less than three feet above current sea level.⁵⁴ Photo: USFWS

"We're seeing the beginnings of a restoration economy in Louisiana. Dredging companies, for example, are adapting their technologies and equipment to put dredged sediments—once considered waste—to beneficial use in rebuilding wetlands."

—David Muth
Chief of Planning and Resource Stewardship,
Jean Lafitte National Historical Park and Preserve

Coastal Louisiana and the Greater Barataria Basin

Coastal Restoration

The state of Louisiana, the U.S. Army Corps of Engineers, and other partners have embarked on a \$2 billion Louisiana coastal restoration program.

Job creation

The program is estimated to create 16,000 jobs and support nearly 41,000 more jobs in related industries, suppliers, and companies that sell goods and services to workers and their families.⁵⁵ Work is well under way on a more than \$28 million project to pipe dredged sediments from the Mississippi River to Bayou Dupont to build and restore 500 acres of marsh.

This single project could boost business sales in the area by more than \$60 million, generate \$19 million in personal income, and create 57 new jobs.⁵⁶

Coastal resource and industry protection

Coastal restoration will protect Louisiana's commercial fisheries—worth \$273 million a year—five of the nation's largest seaports, habitat for 3 million migratory ducks, and an energy industry that pays more than a \$1 billion annually in Louisiana state taxes.⁵⁷



The sun sets over a dune at Gulf Islands National Seashore. Gulf Islands, with units in both Florida and Mississippi, is a National Watchable Wildlife Area. The seashore's wetlands, barrier islands, and beaches hosted more than 2 million visits in 2008. Park-related spending topped \$37 million and supported more than 800 jobs.⁵⁸ Photo: NPS



By the numbers:

Restoration works for Florida

- In 2005, Florida's coastal counties contributed almost *\$562 billion* in direct revenue—79 percent of Florida's economy.⁵⁹
- A \$11 million effort to restore wetlands, islands, dunes, and shorelines in Biscayne Bay will provide *more than \$20 million* in benefits over the next 13 years, including coastal flood protection.⁶⁰
- Federally funded infrastructure projects related to Everglades restoration are projected to generate *3,000 jobs* in construction, engineering, and manufacturing over the next three years.⁶¹



Islamorada in the Florida Keys rises from the waters of Florida Bay on the outskirts of Everglades National Park. Federally funded infrastructure projects related to Everglades restoration are projected to generate 3,000 jobs in construction, engineering, and manufacturing over the next three years.⁶²
Photo: ©Stephen Frink/Aurora Photos



Acadia National Park. In 2008, Acadia hosted more than 2 million visits, supported more than 3,300 local jobs, and saw an influx of more than \$161 million from park payroll and visitor spending in the area.⁶³ Photo: ©Tim Fitzharris/Minden Pictures



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Northeastern States

Re-engineering Stream Crossings Benefits Communities and Aquatic Species

As the frequency of heavy rainstorms has increased over the last several years, many culverts and crossings where trails and roads traverse streams have proven unable to handle the enormous volume of water that accompanies what used to be once-in-several-decades events. Crossings or dams—some more than a century old—also impair the movement of recreational boaters, and fish and other wildlife.

Acadia National Park

In 2007, Acadia National Park completed an assessment of 131 stream crossings in the park and adjacent areas revealing that about one-third fully block fish passage.

Marshall Brook Stream Crossings⁶⁴

Acadia National Park shares Mount Desert Island with four small towns, including Southwest Harbor, Maine. With 2,000 residents and a footprint of 13.5 square miles, the town maintains, among others, two stream crossings over Marshall Brook as it passes through the town and into the park. Downstream from the crossings, the brook is showing signs of severe impact, which is worsening with increased precipitation.

Marshall Brook and other park streams are home to many species, including the sea-run brook trout, which migrate up and down streams, spending part of their lives in the estuaries where streams meet the ocean. Brook trout are the only trout native to the eastern United States.

Acadia and its Mount Desert Island neighbor are not alone in looking to address stream-crossing problems. Culvert issues are key to expanding habitat for sea-run brook trout, Atlantic salmon, and other fish and aquatic wildlife along the northeastern seaboard.

With increasing heavy rains, addressing these problems takes on a new level of municipal and ecological urgency. Towns, accustomed to one or two problem culverts, may now have more than a dozen, creating public safety concerns and escalating infrastructure maintenance and repair costs. Also, under a new Maine law, replacements for old culverts must be designed to enable fish passage.

Brook trout are the only trout native to the eastern United States. Marshall Brook and other streams that run through Acadia National Park are home to many species, including sea-run brook trout, which migrate up and down the waterway, spending part of their lives in the estuary where the stream meets the Atlantic Ocean. Photo: NPS



Modifying and replacing undersized crossings will pay off in a range of benefits in Southwest Harbor and across the state.

Maintaining fish habitat and property values

- Properly engineered crossings will open access to more habitat and spawning areas for migratory fish like the brook trout and American eel, strengthening their populations. They will also eliminate problems such as streambank erosion and floodwaters that have reduced property values in some streamside areas in the town.

Improving public safety

- Redesigned crossings will help avert safety hazards such as electrical outages and vehicle accidents that are common when roads flood, and enable consistent access to emergency services for homes that are out of reach of fire, medical, and police services during floods.

Municipal and landowner cost savings

- Undersized culverts must be cleaned and maintained, often multiple times a year. Repairing roads damaged by floodwaters is also costly.
- Although wildlife-friendly culverts are often more expensive to install than the traditional round tube variety, they require less maintenance and last longer.
- In the first ten months of 2009, Southwest Harbor repaired flood damage at one of the Marshall Brook crossings four times, at a total cost of about \$8,000. Over 30 years, with continued heavy rains, maintaining the current crossing might cost \$240,000. A wildlife-friendly crossing, at a typical cost of \$70,000, is designed to last for 30 years with virtually no maintenance or repair costs.⁶⁵
- Elsewhere in coastal Maine, Washington County landowners who used conservation cost-sharing funds to replace culverts with fish-friendly crossings cut their average annual construction, maintenance, and repair costs by 75 percent.⁶⁶

“A clean environment is essential to healthy human life. It is especially important here in Maine because the quality of our environment is critical to our economy.”

—George J. Mitchell
Former U.S. Senator,
Maine

Water rolls over the Tingué Dam on the Naugatuck River in Seymour, Connecticut. The river had a reputation as one of the most polluted in the country and has been recovering as a result of restoration efforts, including dam removal and bypass projects over the last four decades. Photo: NOAA



Increased local business activity

- Businesses and employees will no longer lose work days and income because of flooded roads.
- Redesigned crossings will provide consistent access to the town's maintenance yard, which is blocked when crossings flood.

Research and development

- Researchers at the University of Maine have spun off a company, Advanced Infrastructure Technologies, to build crossings using their innovative design. The first project in Pittsborough, Maine, beat the cost of a traditional concrete crossing by 75 percent, avoided the use of heavy equipment near delicate stream banks, and now allows the stream to flow freely.⁶⁷



Naugatuck River Watershed

For more than a century the Naugatuck River served as an industrial hub in western Connecticut. And although the river had a reputation as one of the most polluted in the country, it has been recovering as a result of restoration efforts over the last four decades.⁶⁸ Fish are again plentiful and wildlife such as bald eagles, osprey, and herons are fishing its banks once more.⁶⁹

The significant improvements in water quality and suitable habitat have also contributed to the expansion of coldwater fisheries in the watershed, including a broodstock Atlantic salmon fishery that was established in 1996.⁷⁰

Tingue Dam Fish Bypass

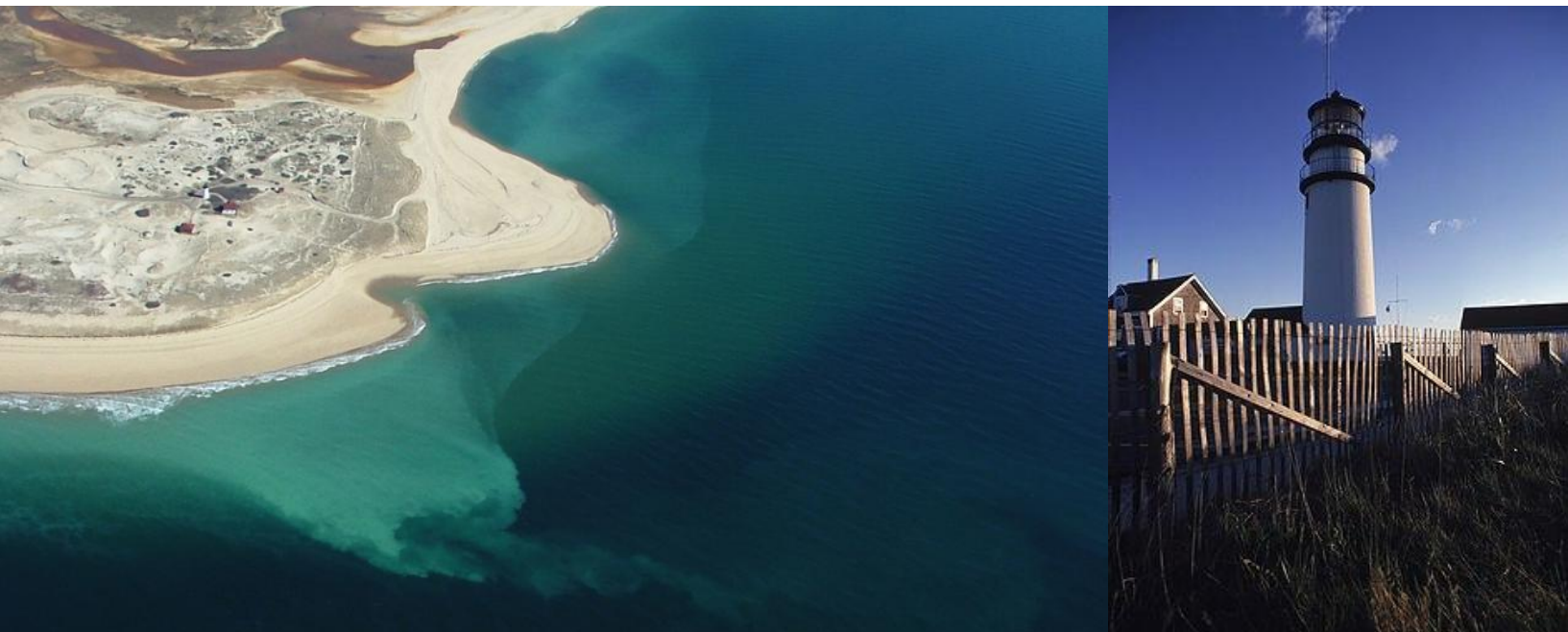
In subsequent years, a plan to restore the Naugatuck River basin has been implemented through a series of public-private partnerships.

This ongoing watershed-wide restoration plan includes:

- Dam removal where appropriate or construction of fish bypass channels at eight small, obsolete industrial dams,
- The upgrading of six municipal wastewater treatment plants, and
- Water quality and streamside habitat restoration activities.

In 1999, three dams on the Naugatuck were completely removed and one dam was breached.⁷¹

A remaining dam, the Tingue Dam, cannot be removed, even though it blocks fish passage, because doing so might affect the structural stability of a nearby bridge.⁷² The purpose of a bypass channel at the Seymour, Connecticut location is to allow all species of fish, most notably those that



White dunes swirl around Race Point and its namesake lighthouse (left), and native grasses wisp against a fence at Highland Lighthouse (right), both a part of Cape Cod National Seashore in Massachusetts. Projects on the seashore's 44,600 acres account for more than 35 percent of all planned tidal restoration projects in the state of Massachusetts.⁷³
Photos: (right) NPS, (left) ©Jose Azel/Aurora Photos

travel up-river to reproduce, to migrate from below the dam to above it. Funded by \$2.5 million in federal funding matched by \$2.25 million in state funding, the Tingué Dam bypass channel is part of the broader initiative to restore fish passage along the entire Naugatuck basin.⁷⁴

Habitat restoration

- Provide uninterrupted passage to more than 32 miles of historic habitat for migratory fish such as American shad, river herring, sea-run brown trout, and American eel.⁷⁵

Local jobs and projects

- Create or maintain construction, engineering, landscaping, and supporting service jobs involving 135 people.⁷⁶
- Fund monitoring of the fish bypass channel: visual observations of fish migration, documentation of physical and hydraulic conditions, and return assessments for sea-run brown trout will also be extended upstream of the Tingué location.⁷⁷

Increased tourism and recreation

- Improve recreational boat passage, bolster tourism spending in the area, and increase local property values.⁷⁸ Earlier downstream restoration activities saw marked increases in recreational use of the river, and similar increases are expected above the Tingué Dam.⁷⁹

Improved public safety

- Reduce sediment deposits, remove safety hazards, and provide flood mitigation.⁸⁰



“Restoring and preserving these fragile ecosystems are a sound investment for our environment and the surrounding communities. Our rivers and coastline are irreplaceable natural resources. The projects will generate jobs quickly in construction, and strengthen local economies.”

—M. Jodi Rell
Governor of Connecticut

By the numbers:

Northeast climate change impacts

- By 2050, Boston and Atlantic City are likely to see flooding equivalent to today's 100-year flood every two to four years.⁸¹
- A third of the U.S. population lives in the Northeast's coastal counties; seawall protection for a quarter of this coastline could cost up to *\$8 billion*.⁸²
- By late-century, only western Maine is likely to have reliable winter snow recreation, with snow seasons being halved across much of the northern part of the region—a decline of just 20 percent in skiing days could result in a loss of more than *\$800 million* per year.⁸³
- Rising temperatures may push sugar maples and other fall foliage trees almost completely out of their northeastern U.S. habitat; the region could see up to 40 percent reduction in its maple sugar revenues, a *\$12 million loss*.⁸⁴
- New York state's agricultural yield could take a *\$1.2 billion loss*.⁸⁵




Wind stirs through beach grass near Fire Island Lighthouse at Fire Island National Seashore in New York. Rising sea levels and more frequent severe storms linked to climate and environmental changes could inundate coastal areas such as the seashore, destroying wetland habitat and compromising the natural flood protection they provide.⁸⁶

Photo: ©Kenneth C. Zirkel/istock



Brown bear in Katmai National Park and Preserve in Alaska. Warming oceans spell trouble for wild salmon, and a drop in their numbers could also undermine bear populations and tourism in this popular wildlife-viewing park. In 2008 Katmai saw 82,000 visits ,and visitor spending was nearly \$17 million.⁸⁷ Photo: ©Matthias Breiter/Minden Pictures



Re·store·á·Nation

snow•melt

1: the process whereby warm temperatures melt winter snow and ice

stream•flow

1: the volume of water flowing past a fixed point in a fixed unit of time also called discharge, the U.S. Geological Survey expresses the value in cubic feet per second (ft³/s)

Pacific Northwest and Alaska

Rebuilding a Watershed and Native Salmon Runs

The national parks of Alaska, Oregon, and Washington account for more than 60 percent of all national parklands in the United States. These diverse parks—from Gates of the Arctic, situated just inside the Arctic Circle, to Crater Lake in southern Oregon—host the nation’s highest and second highest peaks, acres of old-growth forests, miles of rivers, fjords, and glaciers.

Olympic National Park

The largest dam removal and river restoration project in the United States promises to pay off in ecological and economic benefits for the residents of Clallam County, Washington.

Removal of two dams on the Elwha River, which flows 45 miles from high in Olympic National Park to the Straits of Juan de Fuca, will reconnect an ecosystem that has been severed for nearly 100 years.

Elwha River Restoration⁸⁸

The Elwha River was once one of the most productive salmon streams in the Pacific Northwest. But since construction of the Elwha and Glines Canyon dams in the early 1900s, salmon have been blocked from all but the lowest five miles of the river.

The restoration of the full 70-mile run of the Elwha and the replanting of forest lands once covered by reservoirs is expected to significantly boost local business activity and create new jobs across a variety of industries.

Work preceding the phased removal of the Elwha and Glines Canyon dams includes extensive planning and engineering projects to create a revegetation strategy, to modify levees for increased flood protection, and to construct two water treatment plants for processing increased sediment loads and ensuring clean water for municipal, industrial, and hatchery needs.

Once restored, the free-flowing river will allow all five species of Pacific salmon and other fish such as steelhead to reach habitat and spawning grounds. Biologists predict native fish populations will rebound to historic numbers in 20–30 years.

Large sea stacks rise from Ruby Beach on Washington's Pacific Coast in Olympic National Park. In Olympic National Forest, at the eastern side of the park researchers have found that the cost to remove or decommission forest roads is half that required to clean up a failed road destroyed by excessive rainfall or severe storms.⁸⁹

Photo: ©Marc Adamus/Aurora Photos





A hiker stands on the Root Glacier near the town of McCarthy, Alaska, located in Wrangell-St. Elias National Park and Preserve. Wrangell-St. Elias hosted nearly 66,000 visits in 2008. In the same year, visitor spending and park payroll impacts topped \$5.4 million and supported 145 jobs—a number representing more than 28 percent of the total population of Glennallen, Alaska, the largest community near the park, and nearly four times the population of McCarthy.⁹⁰ Photo: ©Whit Richardson/ Aurora Photos

Jobs and income

- Some 1,200 new jobs will be created in the county, accounting for an additional \$37 million in wages.⁹¹ This roughly 3 percent increase is more than the number of jobs lost in the timber industry between 1987 and 1995.

Benefits from increased tourism

- Restoring the river and native forest will boost tourism, which already supports 2,000 local jobs and \$21 million wages.
- On average, Elwha restoration could boost travel spending by 50 percent, bringing in an additional \$57 million a year from 500,000 additional visitor trips to Clallam County.

Cost savings

- As more sediments flow downstream, the Ediz Hook Lighthouse will undergo less erosion saving an estimated \$31,000 a year in maintenance and upkeep costs.⁹²

“Restoring the river and salmon will bring more economic self-sufficiency to our people. In the short run, some of our members have gotten jobs related to the restoration. Even a small number of jobs makes a difference.”

—Robert Elofson
River Restoration
Director,
Lower Elwha Klallam
Tribe



The quiet surface of Tipsoo Lake captures Mount Rainier against a purple sky in the peak's namesake Washington park. Although picturesque, the park has been the site of increasing landslides in recent years, the result of more frequent and intense fall storms and reduced snowpack. Downstream communities have constructed dikes to guard against catastrophic flooding, but many see restoration of forest cover and meandering rivers as the best way to limit future damage.⁹³

Photo: ©Mike Norton/istock

Income boost for the fishing industry

- More fish means more jobs. Larger fish populations will help Clallam County's fishing industry, which now accounts for \$840,000 in business receipts each year.
- Business revenues will increase an average of \$474,000 from sport fishing, commercial fishing, and fish processing each year for 100 years after dam removal.
- The Lower Elwha Tribe is constructing a new hatchery and rearing facility to replace the existing facility built in 1976.

Habitat expansion

- The restored landscape will boast expanded wetlands, fish habitat, and 684 acres of "new" forest lands.
- Revegetation will include the planting of native species, including fir, cedar, and hemlock.⁹⁴



How are parks changing in the Pacific Northwest and Alaska?

- Coastal erosion and flood damage from higher seas and stronger storms.
- Loss of salmon habitat and increased salmon parasite problems from warmer ocean and stream temperatures.
- Loss of permafrost and shrinking lakes and ponds.
- Loss of glaciers, declining snowpack, and low summer streamflows.
- Increasing wildfire frequency, longer fire season, and decreased visibility due to smoke.⁹⁵




Mount Shuksan reflected in Picture Lake. North Cascades National Park in Washington hosted nearly 19,000 visits in 2008 and infused more than \$6.7 million into the local economy.⁹⁶

Photo: ©Dave Logan/istock



Dream Lake rests in the shadows of Rocky Mountain National Park in Colorado. Approximately 960 wildlife species call Colorado and its national parks home. Whether looking for wolves, moose, prairie dogs, black bears, or river otters, wildlife watchers contribute an estimated \$1.2 billion a year to the Colorado economy, which supports nearly 12,800 local jobs.⁹⁷
Photo: ©Tim Fitzharris/Minden Pictures



Re·store·á·Nation

cor·ri·dors

1: areas that provide connectivity, over different time scales, of habitats or potential habitats; and facilitate terrestrial, marine, estuarine, and freshwater fish, wildlife, or plant movement necessary for migration, gene flow, or dispersal, to respond to the ongoing environmental changes

Rocky Mountain West

Restoring High-Country Lakes Benefits Native Species, Public Safety, and the Local Economy⁹⁸

The Rocky Mountain West contains some of America's most awe-inspiring wilderness and is home to several of the nation's crown jewel parks, from the geysers of Yellowstone to the rugged awe-inspiring mountains of the Grand Tetons.

Rocky Mountain National Park

In 1982, Lawn Lake Dam failed high in the backcountry at Rocky Mountain National Park. The resulting torrent took out another dam, killed three people, and caused \$31 million in property damage in the Estes Park, Colorado, area. In the aftermath, the park identified three more backcountry dams—built before the park was established—that were in danger of failing.

High-Country Lakes Restoration

Shortly after the Lawn Lake dam failed—causing loss of life, private property damage, and catastrophic flooding of natural areas inside the park—the 80-year-old earthen dams at Pear and Sandbeach lakes were also found to be leaking. They, and a concrete dam at Bluebird Lake, were severely deteriorated and also in danger of failing.

Despite an order from the state of Colorado, the city of Longmont refused to repair the dams, so the Park Service took action and removed them.

The removal of the dams and the resulting restoration of natural streamflows at Pear, Sandbeach, and Bluebird lakes took place over three summers and cost nearly \$2 million, plus an additional \$1.9 million to buy the water storage rights.

A grizzly bear strolls through Yellowstone National Park. Climate change threatens at least two important food sources for bears. Rising temperatures are allowing mountain pine beetles to infest high-altitude whitebark pine stands. Bears depend on pine nuts to help them gain weight for winter. And, with western trout populations projected to decline, grizzlies may find another favorite—spawning cutthroat trout—off the menu.⁹⁹ Photo: ©Donald M. Jones/Minden Pictures



Local employment and purchases

- \$1.5 million was used to pay seasonal work crews, procure supplies, and rent specialized equipment.
- Vegetation and fish monitoring programs continue today.

Improved public safety and water management

- Water storage rights were purchased from the city of Longmont.
- The cost of private property damage alone from failure of the Lawn Lake Dam was nearly eight times the \$4 million price tag for the removal of the three dams.

Innovation in restoration processes

- The project established backcountry work site and demolition protocols to protect the fragile high-elevation environments.
- Earthen dams at Pear and Sandbeach lakes were removed using helicopters to deliver demolition equipment and gear to these backcountry lakes in proposed wilderness.

Lower-cost revegetation strategies

- Observations in the park after the failure of a smaller dam in 1969 showed a remarkable recovery of native plant communities—even without dedicated replanting. Within 20 years, lichens had colonized previously submerged rocks, and the “bathtub ring” look of the drained reservoir was nearly erased.
- Similar progress, once again without dedicated replanting, is projected for Pear, Sandbeach, Lawn, and Bluebird lakes—already more than 50 species have been counted.
- This kind of natural revegetation may be an option that reduces the cost of other dam removal and restoration projects in the future.

“Thousands of Coloradans and others enjoy our national forests and grasslands each year. These open spaces are as critical to the local economy as they are to the overall health of our environment.”

—Mark Udall
U.S. Senator, Colorado



A backpacker takes in a view of Bear Lake in Rocky Mountain National Park in Colorado. In 2008 Rocky Mountain saw 2.6 million visits. Visitor spending topped \$226 million and supported nearly 5,000 jobs.¹⁰⁰ Photo: ©Ron Niebrugge/Alamy

Visitor attraction

- The decision by park managers to remove the dams and restore the lakes, rather than simply breaching them, has added to the wilderness character of the area, making it more attractive to hikers in search of natural areas.
- Rocky Mountain National Park is a popular backpacking destination. In 2008, its backcountry hosted almost 48,000 overnight stays.¹⁰¹
- Self-sustaining populations of native greenback trout now live in two of the three restored lakes, bringing the fish one step closer to being removed from the threatened species list.¹⁰²



By the numbers:

Changes threaten parks and economies

- In Montana, a summer temperature increase of 1° Fahrenheit could *double the cost* of protecting homes from wildfire in the next 15 years.¹⁰³
- Without action to restore habitat and boost populations, Rocky Mountain wild trout populations could decline by more than 60 percent.¹⁰⁴
- In 2006, recreational anglers spent more than *\$3 billion* in eight states in the northern and southern Rockies.¹⁰⁵
- On top of declining snowpack and earlier snowmelt—which have already led to higher winter streamflow and lower summer streamflow—longer, more extreme droughts are projected to pinch already stretched water resources.¹⁰⁶
- Between 1998 and 2003, dramatically declining water levels in Lake Powell and Lake Mead led to a *loss of more than 700 jobs*, \$10 million in personal income, and \$29.4 million in business revenues.¹⁰⁷



Fighting a fire in Montana. In Montana, a summer temperature increase of 1° Fahrenheit could double the cost of protecting homes from wildfire in the next 15 years.¹⁰⁸

Photo: Will Wiggins, NPS



Mist rises at dawn in Chattahoochee River National Recreation Area. In 2007, severe drought elevated a long-standing dispute over Chattahoochee water that spans three states. By contrast, heavy rains in September 2009 swelled the river in Georgia to flood levels not seen for nearly 100 years. Photo: ©danny orlando/istock

Re·store·á·Nation

wa·ter·shed

1: The region draining into a river, river system, or other body of water; also known as a basin

riv·er ba·sin

1: the entire geographical area drained by a river and its tributaries
2: an area characterized by all runoff being conveyed to the same outlet

Southeastern States

Habitat Restoration and Wildlife Reintroduction

Maintaining a landscape that blends natural habitats and pastoral areas is part of the mandate for land managers at Buffalo National River, Arkansas. They use a variety of tools to maintain the open spaces associated with the area's agricultural roots and to protect the river's special plants and animals, including its thriving elk herd. This work also contributes to the local economy, thereby improving habitat for park wildlife and quality of life for park neighbors.

Buffalo National River

Habitat restoration projects along the river including manually clearing overgrown fields; planting native grasses, plants, and trees; and encouraging the expansion of native river cane, continue to improve conditions for both the ecological and economic environments in the state. Prescribed burning to

A trumpeter swan. The 2009 release of trumpeter swans in the park is part of a larger plan to reintroduce the long-absent species. These waterfowl, the largest in North America, will enhance wildlife viewing and highlight the importance of protecting wetland habitat that is crucial to their survival.

Photo: ©David Hasking/FLPA/
Minden Pictures



“Visitor numbers at our center are steadily increasing. Watchable wildlife is no doubt the attraction. We’ve seen elk viewing, and now the trumpeter swans have become a winter draw.”

—Mary Ann Hicks
Ponca Elk Education
Center

maintain wildlife habitat and vegetation has strengthened the river’s ability to host the return of native species and the visitors who travel to watch them, particularly the elk and swans.

River Habitat Restoration

These on-the-ground projects are complemented by active financial and project partnerships, including efforts to boost the wildland firefighting capabilities of nearby rural fire departments, which have broadened the park’s restoration resources in recent years.

Local employment

- In 2001, watchable wildlife recreation supported 4,770 jobs in Arkansas.¹⁰⁹
- The park hires up to eight seasonal employees each year to work on habitat restoration and prescribed burns.
- A 200-acre elk habitat improvement project will cost roughly \$200,000 and provide work for several temporary staff members, contractors, and a burn crew.¹¹⁰

Improved wildlife viewing

- Prescribed burning programs have improved wildlife viewing within the park, as well as habitat for elk, deer, birds, and bats. Habitat projects along the river also improve bird watching.
- In 2002, the Arkansas Game and Fish Commission opened an elk education center in Ponca. Visitation and gift shop sales at the center doubled between 2003 and 2008.¹¹¹

Ecological benefits

- More than 100 elk from Colorado and Nebraska were reintroduced to Buffalo National River between 1981 and 1985. The expanding herd—now more than 450 strong—is a growing draw for visitors.
- The release of trumpeter swans is part of a restoration effort that has spread successfully from Minnesota southward.
- The restoration of mussels to help improve water clarity and quality in the river has strengthened endangered mussel populations and the entire aquatic ecosystem.



Bull elk (left) and fishing on the Buffalo River (right). In 2006, 655,000 anglers cast their rods in Arkansas waters and more than a million people viewed wildlife, including the growing elk herds at Buffalo National River.¹¹²

The river is a favorite float stream in part because of its outstanding water clarity. Because an adult mussel filters up to eight gallons of water a day, restoring native mussel beds will keep the river clear for longer periods of time. The park plans to reintroduce native mussels, which will also help improve fishing for smallmouth bass and channel catfish.

Photos: Arkansas Department of Parks and Tourism

A trees tower over Congaree National Park in central South Carolina. Nestled on nearly 27,000 acres along the Congaree River floodplain, Congaree National Park boasts the largest intact expanse of old-growth bottomland hardwood forest remaining in the southeastern United States. Photo: ©Jason O. Watson/Alamy



In 2006, anglers and wildlife watchers spent more than \$1 billion in Arkansas.¹¹³

Tourism and economic benefits

- Two out of five Arkansas residents participated in wildlife watching in 2006; combined with 152,000 out-of-state-visitors they spent more than \$607 million.¹¹⁴
- Jasper's Buffalo River Elk Festival, which started in 1998, is among the most popular summer events in the state.
- Newton County's Ozark Mountain Artist Tour is scheduled during the peak of both the elk rut and fall colors in mid-September.

Support for local fire departments

- Last year, Buffalo National River's support helped bring \$38,300 in grants to five rural fire departments in the surrounding area.
- Funds purchased wildland firefighting equipment and training, which can boost a department's insurance rating and drop local homeowners' insurance rates.¹¹⁵

■ ■ ■


By the numbers:

Ecology and economy in the Southeast

- In Arkansas, Missouri, and Tennessee alone, recreational fishing generated more than \$2 billion in expenditures in 2006.¹¹⁶ Without action to restore habitat and boost populations, more than half of wild trout populations in the southern Appalachians may be lost.¹¹⁷
- Visitors and local residents take advantage of South Carolina's most famous recreational asset—its sandy beaches and ocean surf—generating approximately \$3.5 billion annually and supporting 81,000 jobs.¹¹⁸
- In South Carolina, forests cover 60 percent of the landscape, and the timber industry is second only to tourism in economic importance.¹¹⁹
- Rare and old-growth forests could face intensified infestations of pine beetles and other destructive pests.¹²⁰
- Forest fire risk across the Southeast may increase 30 percent by mid-century.¹²¹
- In 2008, natural resources-based industries in South Carolina supported:
 - \$29.1 billion in total economic impact,
 - 235,431 jobs, and
 - \$7.8 billion in labor income.¹²²
- Insurance rates will likely continue to rise. In 2006, there was a 15–25 percent increase in insurance premiums across South Carolina's coast.¹²³
- The ancient spruce and fir forests of the Great Smoky Mountains may be lost entirely.¹²⁴



Arches National Park in Utah hosted more than 900,000 visits in 2008, supported more than 2,375 local jobs, and saw an influx of more than \$97 million from park payroll and visitor spending in the area.¹²⁵ Photo: ©Utah Images/Alamy



Re·store·á·Nation

nat·u·ral re·source ad·ap·ta·tion

1: the protection, restoration, and conservation of natural resources so that natural resources become more resilient, adapt to, and withstand ongoing environmental changes

References

ad·ap·ta·tion

1: the protection, restoration, and conservation of natural resources so that natural resources become more resilient, adapt to, and withstand ongoing environmental changes

cor·ri·dors

1: areas that provide connectivity of habitats or potential habitats and facilitate terrestrial, marine, estuarine, and freshwater fish, wildlife, or plant movement

2: necessary for migration, gene flow, or dispersal, to respond to environmental changes

e·co·sys·tem

1: The interacting system of a biological community and its non-living environmental surroundings

e·co·sys·tem serv·ic·es

1: the benefits of nature to households, communities, and economies

2: the general idea that ecosystems are socially valuable and in ways that may not be apparent

es·tu·ary

1: a water passage where the tide meets a river current; especially: an arm of the sea at the lower end of a river

hab·i·tat

1: the physical, chemical, and biological properties that fish, wildlife, or plants use for growth, reproduction, survival, food, water, or cover

2: the place where a population (e.g., human, animal, plant, micro-organism) lives and its surroundings, both living and non-living

nat·u·ral re·source

1: land, wildlife, fish, air, water, estuaries, plants, habitats, and ecosystems

nat·u·ral re·source ad·ap·ta·tion

1: the protection, restoration, and conservation of natural resources so that natural resources become more resilient, adapt to, and withstand ongoing environmental changes

re·sil·ience

1: the ability to resist or recover from disturbance

2: the ability to preserve diversity, productivity, and sustainability

res·to·ra·tion

1: the process of re-establishing self-sustaining habitats and building resilience to support numerous species now and in the future

2: measures taken to return a site to pre-disturbance conditions

riv·er ba·sin

1: the entire geographical area drained by a river and its tributaries

2: an area characterized by all runoff being conveyed to the same outlet

snow·melt

1: the process whereby warm temperatures melt winter snow and ice

stream·flow

1: the volume of water flowing past a fixed point in a fixed unit of time also called discharge, the U.S. Geological Survey expresses the value in cubic feet per second (ft³/s)

wa·ter·shed

1: The region draining into a river, river system, or other body of water

wet·lands

1: areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of plants and animals typically adapted for life in these systems

2: generally include swamps, marshes, and bogs



Re·store·á·Nation

e·co·sys·tem serv·ic·es

1: the benefits of nature to households, communities, and economies

2: the general idea that ecosystems are socially valuable and in ways that may not be immediately apparent

Index

Acadia National Park, Maine: 27–31

Appalachians: 52

Arches National Park, Utah: 53

Barataria Basin, Louisiana: 22, 25

Bayfield County, Wisconsin: 17

Big Thicket National Preserve, Texas: 24

Buffalo National River, Arkansas: 48–51

Cape Cod National Seashore, Massachusetts: 32

Chattahoochee River National Recreation Area, Georgia: 47

Clallam County, Washington: 36, 38–39

Congaree National Park, South Carolina: 51

Crater Lake National Park, Oregon: 36

Dry Tortugas National Park, Florida: 21

Estes Park, Colorado: 42

Everglades National Park, Florida: inside cover, 4, 24, 26

Fire Island National Seashore, New York: 34

Gates of the Arctic National Park and Preserve, Alaska: 36

Glacier National Park, Montana: 4, 7

Golden Gate National Recreation Area, California: 10–12

Grand Canyon National Park, Arizona: 4

Grand Tetons National Park, Wyoming: 42

Great Lakes Regional Collaboration: 20

Great Smoky Mountains: 52

Gulf Islands National Seashore, Florida and Mississippi: 25

Indiana Dunes National Lakeshore, Indiana: 5, 16–19

Isle Royale National Park, Michigan: 18, 20

Jean Lafitte National Historical Park and Preserve, Louisiana: 22–25

Joshua Tree National Park, California: 9

Katmai National Park and Preserve, Alaska: 35
Lake Mead: 46
Lake Michigan: 16-19
Lake Powell: 46
Lake Superior: 15, 17, 19
Marshall Brook, Southwest Harbor, Maine: 29–31
Mount Rainier National Park, Washington: 39
Naugatuck River Watershed, Connecticut: 31–33
North Cascades National Park,
Washington: contents, 4, 40
Olympic National Park, Washington: 36–39
Ozark National Scenic Riverways, Missouri: 62
Padre Island National Seashore, Texas: 24

Rocky Mountain National Park, Colorado: 41–45
Saguaro National Park, Arizona: 7
Santa Monica Mountains National Recreation
Area, California: 12–13
Tingue Dam Fish Bypass, Seymour,
Connecticut: 32–33
Tucson, Arizona: 7
Wrangell-St. Elias National Park and Preserve,
Alaska: 38
Yellowstone National Park, Idaho, Montana, and
Wyoming: 4, 42, 43
Yosemite National Park, California: 4

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Mist rises off the lower Current River, a part of the Ozark National Scenic Riverways, at dusk. This collection of waterways in Missouri saw 1.2 million visits in 2008, directly supported more than 1,000 jobs, and contributed \$53 million to the local economy.¹²⁶
Photo: Elizabeth Meyer, NPS

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Re-store-á-Nation

1: the economic benefits of restoring the lands and waters of our national parks

2: investments to protect economies and create American jobs on American lands

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