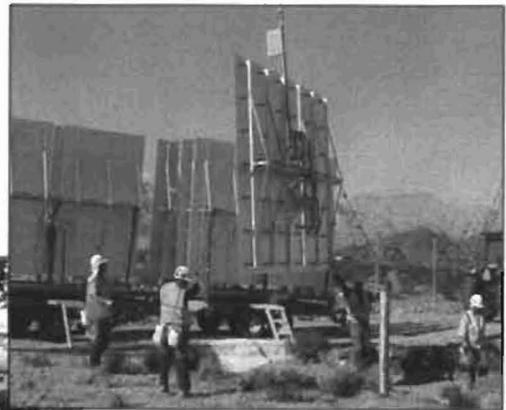


# THE DEPARTMENT OF THE INTERIOR'S ECONOMIC CONTRIBUTIONS

## FISCAL YEAR 2011

JULY 9, 2012





## EXECUTIVE SUMMARY

The Department of the Interior plays a substantial role in the U.S. economy, supporting over two million jobs and approximately \$385 billion in economic activity for 2011. American citizens and industry, at work and at play, all benefit from Interior's natural and cultural resource management: maintaining lands for recreation, protecting cultural and historical resources, storing and conveying water, generating power, leasing mineral rights, and providing valuable information to mineral markets.

Highlights of Interior's economic contributions to key economic sectors in 2011 include:

- **Recreation and Tourism:** Americans and foreign visitors made nearly 435 million visits to Interior-managed lands. These visits supported over 403,000 jobs and contributed around \$48.7 billion in economic activity. This economic output represents about 6.5% of the direct output of tourism-related personal consumption expenditures for the United States for 2011 and about 7.6% of the direct tourism related employment.
- **Energy and Minerals:** Exploitation of oil, gas, coal, hydropower and other minerals on Federal lands supported 1.5 million jobs and \$275 billion in economic activity.
- **Water, Timber and Forage:** Use of water, timber and other resources produced from Federal lands supported about 290,000 jobs and nearly \$41 billion in economic activity.
- **Grants and Payments:** Interior administers numerous grants and payments, supporting programs across the country and improving Federal lands with projects ranging from reclaiming abandoned mines to building coastal infrastructure. \$4.2 billion in grants and payments (including support to tribal governments) supported about 83,000 jobs and \$10 billion worth of economic contributions.
- Interior's support for tribal governments is an important mechanism for advancing nation-to-nation relationships, improving Indian education, and improving the safety of Indian communities. In FY 2011, this funding contributed about \$1.2 billion to economic output and supported about 9,500 jobs.
- Through both bureau programs and organizational partnerships, more than 21,000 employment opportunities were provided to people ages 15 to 25 on public lands in FY 2011. NPS and its organizational partners employed the largest number, with 9,089 youth employed.
- The physical infrastructure managed by Interior supports a wide variety of resource management and recreation activities. In FY 2011, investments in construction and maintenance totaled about \$2.6 billion. This funding contributed about \$7.2 billion in economic activity and supported about 49,000 jobs.
- Land acquisitions are a key component to ensuring that the ecosystem services provided by Interior-managed lands can be preserved and enhanced. The \$144 million spent on land acquisitions in FY 2011 is estimated to contribute about \$141 million in economic activity and support about 1,000 jobs.

Some of the valuable services produced under Interior's management cannot be fully counted in terms of output or jobs: habitat for a wide variety of species, drinking water, energy security, flood and disease control, scientific information, carbon sequestration, recreation, and culture. Evaluation and consideration of the services provided through human production and through land and resource conservation can engage new stakeholders, expand revenue sources, and enhance our landscapes.

*Please cite this report as: The Department of the Interior's Economic Contributions, FY 2011.*

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## Chapter 4 ECOSYSTEM RESTORATION

### INTRODUCTION

The Department of the Interior extensively supports—through its mission, policy, programs, and funding— the study, planning, implementation, and monitoring of ecosystem restoration. This commitment is reflected in the Department's FY2011-2016 Strategic Plan<sup>11</sup>:

**Mission Area 1, Provide Natural and Cultural Resource Protection and Experiences, GOAL #1: Protect America's Landscapes.** We will ensure that America's natural endowment – America's Great Outdoors – is protected for the benefit and enjoyment of current and future generations. We will maintain the condition of lands and waters that are healthy, and we will restore the integrity of natural areas that have been damaged. We will strive to retain abundant and sustainable habitat for our diverse fish and wildlife resources, and we will reduce or eliminate threats to at-risk plant and animal species.

### In a nutshell

- ❖ Restoration, rehabilitation, remediation, and reclamation activities play an important role in maintaining the health and vitality of DOI lands and managed resources.
- ❖ Ecosystem monitoring and adaptive management help ensure that lessons learned are integrated into ongoing and future decision making at Interior.
- ❖ Physical measures of restored stream-miles or acres are valuable indicators of restoration success, but they do not easily facilitate quality comparisons for future decisions. Interior's scientists and managers are actively working on the development of improved endpoints and more meaningful criteria for measuring restoration success.
- ❖ Jobs and economic contributions from restoration are important, though they do not represent the full economic value of ecosystem restoration. Developing values for the resources and associated services under Interior's trust would help ensure that the public's benefits are maximized from investment in DOI restoration activities.

<sup>11</sup> Available on-line at [http://www.doi.gov/bpp/data/PPP/DOI\\_StrategicPlan.pdf](http://www.doi.gov/bpp/data/PPP/DOI_StrategicPlan.pdf)

The described strategy includes a mandate to improve land and water health through maintenance and restoration of the wetlands, uplands, and riparian areas on DOI lands. Efforts include controlling invasive<sup>12</sup> plants and animals, restoring land to a condition that is self-sustaining, and ensuring that habitats support healthy fish and wildlife populations. Over 1.1 million acres of land and 879 riparian (stream/shoreline) miles are targeted to be restored to specifications in management

*America's rivers are the lifeblood of America's economy – from the water for farms that produce our food to the fish and wildlife that sustain our heritage. Today as we begin the restoration of this river system, we look to a bright future that recognizes rivers for their many contributions to our economy and environment. – Interior Secretary Salazar on the launch of the Elwha River restoration project, Washington, 9/17/11.*

plans between FY 2011 and FY 2016. The Office of Surface Mining Reclamation and Enforcement (OSM) has a target of 14,000 acres of federal, private, and tribal land and surface water acres to be reclaimed or mitigated from the effects of natural resource degradation from past coal mining. Almost 600,000 non-DOI acres are planned to be restored through partnerships with the U.S. Fish and Wildlife Service (FWS). Because the vast majority of fish and wildlife habitat managed by FWS is on non-federal lands, partners play a critical role in conserving and restoring lands to improve wildlife values.

Ecosystem monitoring of restoration is critical for ensuring cost-effective implementation of today's restoration projects and those planned in the future. Monitoring can also inform adaptive management efforts to help ensure successful outcomes.<sup>13</sup> For example, where opportunities exist, the Bureau of Reclamation has begun adaptation actions in response to climate stresses, as well as land use, population growth, invasive species, and others. These activities include extending water supplies, water conservation, hydropower production, planning for future operations, and supporting rural water development. The

adaptation actions span a wide array of Reclamation's mission responsibilities from water supply planning efforts and retrofitting of hydropower turbines to the restoration of rivers and ecosystems.

The FY 2011 budget reflected Secretary Salazar's ongoing commitment to ecosystem restoration,

***Restoration through Reclamation's WaterSMART Program***  
*To implement the SECURE Water Act (P.L. 111-11), Secretary Salazar established the WaterSMART (Sustain and Manage America's Resources for Tomorrow) program in February 2010 (Secretarial Order 3297). Through WaterSMART, Interior works with states, tribes, local governments, and non-governmental organizations to secure and stretch water supplies for existing and future generations to benefit people, the economy, and the environment. Reclamation plays a key role in the WaterSMART program as DOI's main water management agency by administering grants, scientific studies, technical assistance, and scientific expertise. To date, the program has assisted communities in improving conservation, increasing water availability, restoring watersheds, resolving long-standing water conflicts, addressing the challenges of climate change, and implementing water rights settlements. The program has provided more than \$85 million in funding to non-federal partners, including tribes, water districts, and universities, including \$33 million in 2011 for 82 WaterSMART grant projects.*

<sup>12</sup> Controlling and preventing invasive species play a major role in restoration. More information on the issue of invasive species at Interior and the role of the National Invasive Species Council is provided in Chapter 4 of the FY 2010 DOI Economic Contributions Report (available on-line at <http://www.doi.gov/ppa/upload/DOI-Econ-Report-6-21-2011.pdf>).

<sup>13</sup> Information on adaptive management is available in the Departmental Manual, at 522 DM 1.

including major efforts to restore, protect, and preserve the California Bay-Delta (see the Sources of Funding section of Appendix 3), Everglades, Gulf Coast of Louisiana and Mississippi, and the Chesapeake Bay. The Department also actively coordinated with EPA on Great Lakes restoration efforts. As part of the commitment to understanding landscapes at the broader level and the potential effects of climate change, the number of Landscape Conservation Cooperatives (LCCs) was expanded from 9 to 22 by the end of 2011 (see Chapter 3 for more information on LCCs). LCCs are expected to play a significant role in FWS's ecosystem restoration efforts across the Nation. For example, in the Chesapeake Bay watershed, Service programs will coordinate efforts with the North Atlantic and Appalachian LCCs to meet the highest priority needs for achieving a healthy watershed and supporting sustainable populations of fish and wildlife. In the Everglades, landscape level partnerships will work to protect Florida panther habitat, sea turtles and other highly imperiled species in the Florida Keys. The California Bay Delta region will use the LCC and Strategic Habitat Conservation business model to work in this changing ecosystem, ensuring that FWS's actions are driven by good science, respect for partners, and a focus on outcomes.

***Future Restoration Practitioners:*** In addition to providing youth with work experience, DOI's bureaus are extensively involved in youth education. For example, Hands on the Land (HOL) is a national network of field classrooms sponsored by Partners in Resource Education, a collaboration of federal agencies (BLM, FWS and NPS for Interior; EPA; NOAA; and USDA), a non-profit foundation, schools, and other private sector partners. Through this network, federal agencies are providing a diverse array of hands-on learning opportunities for teachers and students. For example, a module on Great Sand Dunes National Park and Preserve allows youth in grades 4-9 to play an interactive web game as an ecologist tasked with the restoration of a fictitious ecosystem to learn about the adverse effects of invasive species. Students are also engaged in environmental monitoring programs. BLM's 258 million acres host a growing number of Hands on the Land sites, where education programs have been developed in conjunction with local schools. One example is the Blanca Wetlands case study analyzed in this chapter. More information about these sites is available on-line at [http://www.blm.gov/wo/st/en/res/Education\\_in\\_BLM/Learning\\_Landscapes/For\\_Teachers/hol.html](http://www.blm.gov/wo/st/en/res/Education_in_BLM/Learning_Landscapes/For_Teachers/hol.html)

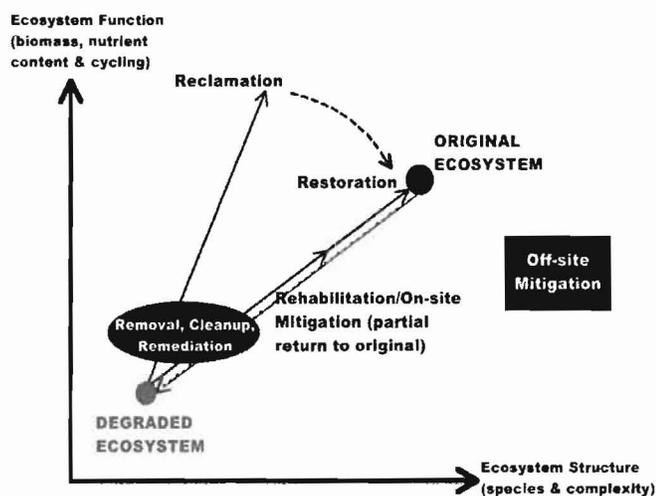
A February 2011 report to the President, "America's Great Outdoors: A Promise to Future Generations," defined an action plan for conservation, restoration, and recreation on public lands in the 21st century. The resulting blueprint for restoration of cultural and natural resources on public lands recognizes that spending taxpayer dollars needs to return positive net economic benefits (i.e., total benefits greater than total costs). It can be difficult, though, to quantify the value of restoration to help justify spending on restoration projects. Although the jobs and economic contributions from restoration are substantial and important, they do not represent the full economic value of ecosystem restoration, because they do not capture the net benefits associated with environmental goods and services not bought and sold in markets. Similarly, the physical measures of restored stream-miles or acres are valuable indicators of restoration success, but they do not easily facilitate quality comparisons for future decisions. Quantifying and valuing the new or additional ecosystem services from restoration continue to be a challenge.

The remainder of this chapter helps define restoration, describes some of the restoration efforts of Interior's bureaus and offices, reviews economic valuation methods, and presents a series of original case

studies developed by the USGS on the jobs and economic impacts from select DOI restorations. Appendix 3 provides additional information on the case studies and also describes sources of restoration funding for departmental restoration efforts.

### Defining Restoration

At Interior, every bureau and several offices engage in some form of restoration, of physical structures as well as ecological and human use resources. Figure 4-1 illustrates that there are a number of activities that may be employed to help improve injured ecosystems. Terms like restoration, rehabilitation, remediation, and reclamation are often used interchangeably in practice, but their definitions vary by authorizing laws and implementing agencies. The red line in the figure illustrates the degradation of the



**Figure 4-1. Restoration Relative to Other Efforts to Improve Degraded, Damaged or Destroyed Ecosystems**

Source: Adapted from Bradshaw (1987).

original ecosystem to an impaired state. The degraded ecosystem exhibits a lower level of structure and function, compared to the original ecosystem. The degraded ecosystem can be returned to its original state using removal, cleanup, remediation and other restoration activities. Along the black arrow pointing toward “Reclamation,” the figure shows reclamation activities improving the structure and function of the ecosystem. Restoration activities (shown as occurring along the dotted arrow) further improve the ecosystem structure and return the ecosystem to its original state. Off-site mitigation can be used alone or in combination with other approaches to return ecosystems (perhaps in a different location) to their original state.

For purposes of this chapter, ecosystem (or ecological) **restoration** is defined as an intentional activity that initiates or accelerates the recovery of a degraded, damaged, or destroyed ecosystem with respect to its health, integrity, services, and sustainability (Society for Ecological Restoration International 2004). Ecosystem health provides a useful metaphor for human health, and helps emphasize that most of DOI’s lands and managed resources play an integral role in the welfare of many Americans and most of these resources have been altered by people. For example, chemicals or oil may be present and need to be addressed prior to restoration through **removal, cleanup, or remediation** of the land.<sup>14</sup>

Some ecosystems may have been changed so dramatically that a return to the original landscape is no longer possible and **rehabilitation** or **on-site mitigation**—a partial return to a previous state—could be the only option. **Reclamation** is the process of reconvertng disturbed land to its former or other

<sup>14</sup> The National Academy of Sciences suggested definitions for the terms restoration, reclamation, and rehabilitation (NAS, 1974). These definitions were carried forward in the seminal works on mined land reclamation, including Reclamation of Drastically Disturbed Lands (Schaller and Sutton, 1978), which was relied upon by Bradshaw (1987).

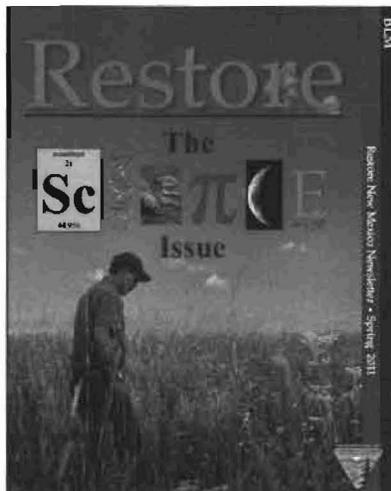
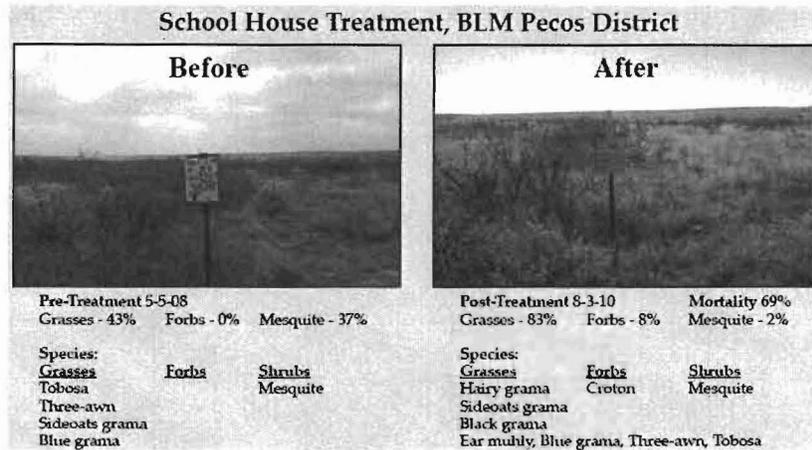
productive uses. It is commonly used in the context of mined lands. The main objectives of reclamation include the stabilization of the terrain, assurance of public safety, aesthetic improvement, and usually a return of the land to what, within the regional context, is considered to be a useful purpose. Reclamation projects that are more ecologically based can qualify as rehabilitation or even restoration.<sup>15</sup> **Off-site mitigation** is an action intended to compensate for environmental damage. Regardless of approach, monitoring is needed to ensure the desired goals are actually achieved.

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<sup>15</sup> See Stahl, P.D. *et al.*, 2006, for more discussion on reclamation and ecosystem restoration.

**Box 4-1. BLM’s Restore New Mexico Program – High-Quality Science Generating Environmental and Economic Benefits from Restoration**

*Restore New Mexico is a partnership to restore grasslands, woodlands, and riparian areas to healthy and productive condition. The program began in 2005 and has treated more than 1.4 million acres of impaired federal, private, and state land, with millions more planned. With the \$8 million in funding that has been received from Natural Resource Conservation Service and BLM, the program has been able to leverage over \$7.1 million in funding from ranchers, the oil and gas industry, sportsman conservation groups, and others. This money was used for on-the-ground projects to restore habitat for threatened and endangered species, game species, and other wildlife adversely affected by historic overuse of the land. By improving the health of the land and incorporating best management practices, Restore has been able to help meet the local demands for energy, food and recreation, while also helping to improve the health of the land. BLM and its partners rely on high quality science to ensure the efforts of Restore New Mexico provide the greatest benefits to the land, resources, and wildlife.*



*Weaver Ranch, a 25,000-acre operation in New Mexico, is a special laboratory of innovation for vegetative treatments and scientific monitoring. Owner Jim Weaver and manager Willard Heck have been conducting scientific monitoring on their ranch for years, some of which has been funded by BLM. According to Heck, “In dry environments, once a landscape has been sufficiently altered, it will not return to its original state in a time frame relevant to humans without a management input. Just stepping back is not a fix to the problem, and simply removing the cows won’t magically restore overgrazed land either... No doubt this is hard work, and landscape restoration treatments aren’t cheap, but afterwards we had seven times more grasses, so it was like we had seven more ranches. This doesn’t mean you can put seven times as many cows out there, but it does mean you can do a lot you couldn’t do before... We hope to show [through monitoring] that we’ve created a more diverse, healthier environment that is more profitable to the rancher and benefits wildlife with proper management.” More details on BLM’s Restore New Mexico efforts, including the work at Weaver Ranch, are available on-line at [http://www.blm.gov/nm/st/en/prog/restore\\_new\\_mexico.html](http://www.blm.gov/nm/st/en/prog/restore_new_mexico.html).*

**Box 4-2. Restoration to Ensure a Refuge for the Future—Addressing Climate Change at the Alligator National Wildlife Refuge on the Shore of North Carolina**

*Natural resource managers face difficult decisions on whether to restore locations where climate change is projected to permanently shift ecological systems away from their historical status. It is an enormous challenge to determine how and what to restore to ensure that the expected long-term benefits exceed the costs given this future uncertainty. Using oyster reefs, water control structures, teams of students, and thousands of seedlings, land and resource managers at Alligator River National Wildlife Refuge on the coast of North Carolina are trying to address just this challenge.*

*The Refuge lies in the Albemarle and Pamlico Sounds, North Carolina's most vulnerable region to sea level rise. Rising seas combined with storm surge could claim the entire Refuge within a lifetime. Threats from wildfire and invasive species could be worsened by climate change. This system has a wide range of ecological and human use values and is home to the rare pocosin wetlands and other habitats, including marshes, hardwood swamps, and Atlantic white cedar swamps. The Refuge is one of the last strongholds for black bears on the East Coast and is also inhabited by red wolves, alligators, ducks, geese, and river otters. This unique assemblage draws about 45,000 visitors each year, including many from overseas.*

*The Refuge has partnered with The Nature Conservancy, local residents, and others to protect and restore what can be sustained for the long run. Restoration work in combination with other strategies like building new reefs, removing invasive species, and plugging drainage ditches to prevent the influx of salt water, has multiple benefits for the Refuge, including providing habitat for species, preventing wildfire, and limiting the impact of floods. Restoration is playing an unusual role—buying time. Biologists are restoring bald cypress and black gum in areas that they expect will be inundated by estuarine waters in the not-so-distant future. These activities will buy time, providing crucial shelter and habitat for at-risk species, while conservationists protect upslope habitat to harbor the species in the future.*

*A guided paddle tour at Alligator River National Wildlife Refuge (Cindy Heffley, FWS).*



*Black bears (Larry Wade, FWS).*

*In addition to sea level rise, many freshwater systems are projected to be warmer in the future (Kaushal et al. 2010), which could make habitat unsuitable for species and a questionable restoration investment. Forest systems are expected to shift to higher latitudes (Iverson et al. 2008), lowering the value of restoring them at lower latitudes. Removing non-native species may not make sense if those species are shifting their habitat in response to changing climate. As part of an overall protection and adaptation strategy, the Refuge and its partners have planted 20,000 saplings in areas that have been denuded of forest vegetation. To support these growing saplings, freshwater is being retained in areas that were previously drained. It*

*is hoped that the favorable conditions will allow the forest to grow and sustain itself, at least for a while.*

## RESTORATION ACTIVITIES – INTERIOR’S BUREAUS AND OFFICES

The long-term missions, objectives, policies, and plans of DOI’s bureaus and certain offices reflect a broad departmental commitment to restoration:

- **Bureau of Indian Affairs (BIA).** BIA’s Tribal Management/Development Program includes funding for three restoration-related programs: 1) Inter-Tribal Bison Restoration and protection for restoration of bison on Indian homelands; 2) Wetlands/Waterfowl Management (Circle of Flight) of existing contracts to support tribal wetland rehabilitation, waterfowl enhancement and wild rice production projects on Indian lands in Minnesota, Wisconsin, and Michigan. This effort helps support tens of thousands of additional ducks and geese in spring and fall migrations, provides expanded hunting opportunities for tribal members and the general public, and offers enhanced wild rice gathering opportunities and economic development possibilities for tribes; and 3) Watershed Restoration, a joint fish habitat recovery project being carried out by the Northwest Indian Fisheries Commission, an intertribal organization representing 20 Western Washington treaty tribes since 1974, and the state of Washington.
- **Bureau of Land Management (BLM).** BLM plays a major role in restoration of its lands to improve the health of entire watersheds to sustain and enhance a variety of biological communities. For example, BLM manages 30 million acres of sagebrush habitat occupied by the greater sage-grouse in 11 states. This is about half of the remaining sagebrush habitat in the United States. The sage-grouse is a Candidate Species for listing under the Endangered Species Act (ESA), and BLM, FWS and others are working to maintain and restore sagebrush landscapes on public lands to conserve sage-grouse populations. As another example, BLM’s Western Oregon Reforestation and Forest Development Program guides forest regeneration and restoration activities on commercial and non-commercial forest lands that result in the establishment of young stands, including habitat restoration activities in riparian and other reserve areas. In FY 2011, Secretary Salazar designated two pilot projects to demonstrate the ecological and economic merits of the landscape restoration strategy in the Roseburg and Medford, Oregon, districts. Other BLM programs with a focus on restoration include the Hazard Management and Resource Restoration Program (HMRRP), Abandoned Mine Lands (AML) Program, and the National Landscape Conservation System (NLCS) (135 DM 3). The HMRRP is an administrative program with the objective of maintaining public land health by remediating contaminated sites and restoring natural resources injured by releases of hazardous substances and oil. The AML Program addresses physical safety and environmental hazards associated with abandoned hardrock mines on public lands administered by BLM. As discussed in Chapter 3, the mission of the NLCS is to

### **Role of the National Environmental Policy Act (NEPA) in Restoration**

*NEPA plays a major role in DOI projects to improve damaged, degraded or destroyed ecosystems. Specifically, the NEPA process requires that DOI:*

- *Assess the environmental impacts of federal projects, which include issuing permits, spending federal money, or actions on federal lands;*
- *Consider the environmental impacts in making decisions; and*
- *Disclose the environmental impacts to the public.*

*NEPA is intended to help public officials make decisions based on an understanding of environmental consequences and identify actions that protect, restore, and enhance the environment. Public involvement is an integral part of complying with NEPA. Information on Interior’s implementation of NEPA is available at 43 CFR Part 46.*

conserve, protect, and restore nationally significant landscapes recognized for their outstanding cultural, ecological, and scientific values for the benefit of current and future generations.

- **Bureau of Ocean Energy Management (BOEM).** BOEM (formerly part of BOEMRE) is responsible for managing development of the nation's offshore resources in an environmentally and economically responsible way. A number of BOEM's programs support restoration goals. For example, BOEM's Environmental Studies Program (ESP) is focused on advancing applied research to ensure that programmatic decisions regarding energy and mineral development on the OCS are informed by the best scientific information available. BOEM relies on this and other information when completing its environmental reviews in support of programmatic decisions, consistent with the National Environmental Policy Act (NEPA). These analyses help BOEM to determine, among other things, what mitigation measures may be needed to protect resources and the environment.

- **Bureau of Reclamation.** Supporting the Department's priority on ecosystem restoration is a key underpinning of Reclamation's mission to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public. As a key water supplier in the West, restoration better positions Reclamation to address the ongoing challenges presented by drought, climate change adaptation, increasing populations, growing water demand associated with energy generation, and environmental needs. For example, the goal of Reclamation's Resource Management Plans (RMP) is to create a balance of resource development, recreation, and protection of natural and cultural resources for the lands and waters being managed. The plans outline for Reclamation, other managing agencies, and the public, resource management policies and actions that will be implemented over each plan's 10-year life. Reclamation's Ecosystem Restoration program involves a large number of activities, including its ESA recovery

**National Ocean Policy and Restoration**

*Executive Order 13547 was issued in July 2010 and established a National Ocean Policy to protect, maintain, and restore the health and biological diversity of ocean, coastal, and Great Lakes ecosystems and resources. The National Ocean Council, which is charged with implementing this policy and includes Secretary Salazar, identified two ongoing restoration initiatives in its draft Implementation Plan (p. 48) that exemplify the principles of the National Ocean Policy: (1) the Great Lakes Restoration Initiative, and (2) the Gulf Coast Ecosystem Restoration Task Force. Both initiatives, which involve Interior bureaus, demonstrate how regional, State, and local entities can work together to address common goals for protecting and restoring natural resources in concert with building strong coastal economies and resilient communities. As a principal steward, Interior's resources include:*

- *More than 35,000 miles of coastline;*
- *34 million acres in 84 marine and coastal national parks;*
- *180 marine and coastal refuges;*
- *Energy and mineral leasing and production on the 1.7 billion offshore acres of Outer Continental Shelf managed by BOEM and BSEE;*
- *More than 20,000 small islands, rocks, exposed reefs, and pinnacles between Mexico and Oregon comprising the BLM-managed California Coastal National Monument;*
- *Hundreds of thousands of square miles in FWS-managed marine national monuments; and*
- *Extensive ocean, coastal, and Great Lakes research and mapping by USGS and bureaus to predict, assess, and manage impacts on coastal and marine environments.*

programs.<sup>16</sup> In particular, Reclamation's Pacific Northwest Region is involved in a variety of fish and wildlife programs which include cooperative watershed planning and the design and installation of fish passage devices. Working with the Northwest Power Planning Council's "Strategy for Salmon," Reclamation is participating with state and local interests in water conservation demonstration projects and model watershed programs in Oregon, Washington, and Idaho. Reclamation's efforts to empower tribal nations range from endangered species restoration to rural water and implementation of water rights settlement actions.

- **Bureau of Safety and Environmental Enforcement (BSEE).** BSEE (formerly part of BOEMRE) is a major contributor in NEPA activities throughout the offshore leasing and exploratory planning processes. Under BSEE, the Environmental Enforcement Division (EED) is specifically tasked with ensuring NEPA compliance for all BSEE-issued permits, the decommissioning of offshore production platforms, and managing the Idle Iron and Rigs-to-Reefs programs. These restoration programs ensure that marine and coastal environments are protected, and either improved or returned to their "pre-resource development" condition at the end of oil and gas activities. Additionally, BSEE also reviews industry reports, conducts field verifications and evaluations, and coordinates with BOEM to adaptively manage both environmental mitigation measures to ensure their effectiveness and enforceability.
- **U.S. Fish and Wildlife Service (FWS).** The Service plays a major role in restoration as manager of the Refuge System, and by providing biological, ecological, and contaminant expertise on FWS-managed resources through a wide variety of programs. Discussed at greater length in Chapter 3, the mission of the Refuge System is *[t]o administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans* (601 FW 1). As the principal federal partner responsible for administering the ESA, the Endangered Species Program takes the lead in recovering and conserving the nation's imperiled species. Working with partners, FWS uses a range of conservation tools, including restoring and acquiring habitat, removing introduced animal predators or invasive plant species, conducting surveys, monitoring individual populations, and breeding species in captivity and releasing them into their historic range. For an example see Box 4-3.

The Fisheries and Habitat Conservation Program promotes the protection, conservation, and restoration of the nation's fish and wildlife resources. This cooperative program provides partnership-based habitat restoration, protection and conservation projects in its effort to restore aquatic and terrestrial trust species, populations and habitats. When oil or chemicals enter the environment and injure FWS-managed resources, the Environmental Contaminants Program provides the expertise to assess and restore these resources. FWS reported that they provided over 5,200 landscape-related contaminant actions benefitting other federal, state and local agencies and/or partners in FY 2011. For example, in FWS Region 5 (New England, NY, mid-Atlantic), contaminants staff have been investigating endocrine disruption of smallmouth and largemouth

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<sup>16</sup> Summary information on 16 different Reclamation river restoration or species recovery programs, along with questionnaire results from program managers on six potential institutional challenges, is available at [http://www.usbr.gov/river/docs/RR\\_Prgms\\_and\\_Inst\\_Chllngs\\_Smry120118.pdf](http://www.usbr.gov/river/docs/RR_Prgms_and_Inst_Chllngs_Smry120118.pdf).

bass, white-nose syndrome in bats, and the effects of wastewater from hydrofracturing of natural gas on mussels. These studies are critical for future restoration efforts, as they help land managers understand the effects on the affected species, and how to guide future restoration actions to best benefit the injured species. Analyses of jobs and economic impacts from restoration activities at Bandon Marsh National Wildlife Refuge in Oregon and the Glacial Ridge National Wildlife Refuge in Minnesota are provided in the case studies section.

- **National Park Service (NPS).** The Organic Act of August 25, 1916, other applicable laws, and the NPS strategic plan inform NPS' long-range objectives for protecting, restoring, and maintaining natural and cultural resources in good condition and managing them within their broader ecosystem and cultural contexts (145 DM 1). NPS' largest restoration implementation effort is in the Everglades, including Big Cypress National Preserve and Biscayne, Everglades, and Dry Tortugas national parks. Abandoned mining and oil and gas exploration and production sites represent a substantial portion of the disturbed lands requiring restoration in parks. In 2011, NPS reported managing an estimated 3,000 abandoned mineral land sites with more than 11,000 hazardous openings and over 33,000 acres of disturbed land.

#### Box 4-3. Lone Mountain Restoration

*The Lone Mountain restoration was conducted to address natural resources injured when failure of a coal slurry impoundment resulted in a release of 6 million gallons of coal "fines" into the Powell River in western Virginia. This release injured 12 species of federally listed endangered mussels, supporting aquatic habitat, and designated critical habitat for two federally listed threatened fish species. FWS, with help from state, academic, and non-governmental partners, protected and restored over 500 acres of riparian habitat within a critical water recharge area of the upper Powell River watershed, released thousands of hatchery-reared juvenile mussels representing 15 species, released over 800 hatchery-reared yellowfin madtom fingerlings, and provided educational opportunities for students through the Lee County Public School Meaningful Watershed Educational Experience.*



*Powell River freshwater mussels spill and upstream habitat preservation locations. (Virginia Department of Game and Inland Fisheries)*

**Box 4-4. Restoration in a Rapidly Changing Arctic**

*The Arctic is facing significant and rapid impacts from climate change. The International Panel on Climate Change (IPCC) estimates that the Arctic is warming twice as fast as the rest of the world. As the manager of over 213 million acres of land and offshore areas in Alaska, Interior is responsible not just for understanding, protecting, managing these resources, but also responding to these changing conditions through adaptation and restoration activities. Two of the most urgent threats to public lands and resources in the Arctic are thawing permafrost and coastal erosion. Land subsidence (sinking) associated with thawing permafrost presents substantial challenges to infrastructure in Alaska, including roads, runways, water and sewer systems, and oil and gas activities. For example, the number of days per year in which travel on the tundra is allowed under Alaska Department of Natural Resources standards has dropped from more than 200 to about 100 days in the past 30 years, resulting in a 50% reduction in days that oil and gas exploration and extraction equipment can be used. This in turn has economic implications for local communities that benefit from petroleum activities on public lands.*

*NPS has recognized that restoration efforts are an important means for enhancing species' ability to cope with stresses and adapt to climatic and environmental changes. The NPS Climate Change Response Program is monitoring conditions across NPS Arctic units, where scientists are predicting that the average temperature may rise 10°F by 2080. Denali National Park contains some of the southernmost continuous permafrost in Alaska and recent measurements show that some of Denali's permafrost may be within a degree of thawing. With over 378,000 visitors in 2010, Denali is an important destination for visitors to Alaska, and restoration*



*Coastal erosion along the Alaskan Beaufort Sea.*

*and adaptation efforts will help preserve the natural resources and recreational opportunities that are important to local economies.*

*Coastal erosion is also likely to have significant impacts on DOI resources. Shoreline erosion rates along parts of the Alaskan Beaufort Sea have increased significantly, from 28.5 ft per year (1979 to 2002) to 44.6 ft per year (2002 to 2007). Coastal erosion in this area has also threatened old exploratory wells*

*drilled before BLM became manager of the National Petroleum Reserve-Alaska. A \$16.8 million American Recovery and Reinvestment Act of 2009 (ARRA) project remediated health and safety threats to local communities by plugging the Drew Point Well, which was threatened by coastal erosion. The contract to remediate the well was awarded to a small native-owned company, providing employment opportunities to the communities of Nuiqsut, Barrow, and Atkasuk. In addition to plugging and abandoning the well, the contractors remediated the reserve of harmful contaminants, removing diesel fuel petroleum-contaminated mud from site. This project has prevented the release of harmful contaminants that would have impacted fisheries and marine mammals in the Beaufort Sea. Native Alaskans are dependent on these resources for a subsistence lifestyle.*

*(Sources of information: <http://www.usgcrp.gov/usgcrp/nacc/education/alaska/ak-edu-3.htm>;  
<http://alaska.usgs.gov/science/geography/coastalerosion.html>;  
<http://recovery.doi.gov/press/wp-content/uploads/2009/04/alaska-drew-point.pdf>).*

As part of NPS's Disturbed Lands Restoration Program, the Abandoned Mineral Land Restoration Program encourages the full restoration of lands affected by mining activities, addresses environmental concerns (metals contamination, acid mine drainage), safety hazards (vertical mine openings, unstable slopes), and the sustainability of bat species, which may rely on mine shafts for habitat. The Park System Resource Protection Act (PSRPA) gives NPS authority to collect damages for injury to park resources. NPS' Environmental Response, Damage Assessment, and Restoration Branch provides support to parks in the prevention or minimizing of damage to park resources or their loss of use when incidents occur, including chemical releases, oil spills and physical destruction of property. The funds recovered are used to restore, replace, or acquire the equivalent of the resources that were lost or injured.

- **Office of Surface Mining and Restoration (OSM).** The mission of OSM is to carry out the requirements of the Surface Mining Control and Reclamation Act (SMCRA) in cooperation with the states and tribes. Two of OSM's three primary objectives relate to restoration: (1) assure that the land is restored to beneficial use following mining, and (2) address the effects of past mining by aggressively pursuing reclamation of abandoned coal mines. Environmental problems associated with AMLs include surface and ground water pollution, entrances to open mines, water-filled pits, unreclaimed or inadequately reclaimed refuse piles and mine sites, sediment-clogged streams, damage from landslides, and fumes and surface instability resulting from mine fires and burning coal refuse. SMCRA authorized an AML Reclamation fee (see Appendix 1) based on coal production in order to hold the entire coal industry responsible for reclaiming coal mine lands left abandoned across the country. OSM's Environmental Restoration Program funds operations and projects for the AML Program. The Office of Technology Transfer provides information for surface mine design, evaluation, environmental protection, reclamation design, and bond release, and posts information about mining and reclamation conferences, forums, meetings, symposia and workshops.

- **Office of Restoration and Damage Assessment (ORDA) and the Restoration Program.** When hazardous substances or oil enter the environment, fish, wildlife, and other natural resources can be injured. Interior, along with state, tribal and other federal partners, acts as "trustee" for these resources on behalf of the public. The Department's trust resources include national parks, national wildlife refuges, lands managed by BLM, Indian lands, and natural resources held in trust by the federal government, waters managed by Reclamation, and

**NPS' Restoration Activities:** *Parks contain many examples of watersheds, landscapes, and marine resources disturbed by past human activity or other adverse influences that require:*

- *Restoring disturbed lands associated with abandoned roads and mines.*
- *Protecting wildlife habitat threatened by changes in water flow or quality such as prairies and wetlands.*
- *Controlling exotic plant species that impact native vegetation and wildlife habitat.*
- *Restoring fire effects to fire-dependent vegetation and wildlife habitat where natural fire regimes have been disrupted.*
- *Providing special protection of threatened and endangered plant and animal populations at risk.*
- *Perpetuating karst, cave, geologic processes and features by protecting groundwater quality.*
- *Managing marine fisheries to protect coral reefs and reef fish populations.*

**Restoration Program Success:** *In FY 2011, the Restoration Program restored, enhanced, and protected 87,709 acres and 401 stream/shoreline miles.*

federally protected migratory birds and endangered and threatened plants and animals. Under the authorities of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (also known as CERCLA or “Superfund”), the Clean Water Act, and the Oil Pollution Act of 1990, trustees seek to identify and restore injured natural resources through the Natural Resource Damage Assessment and Restoration Program (NRDAR). The Restoration Program ensures the responsible parties, not taxpayers, bear the cost of restoring these injured resources to the quality and level of services provided had the event not occurred. Trustees assess the magnitude of injury during the response and cleanup or afterwards, and recover funds from responsible parties to carry out restoration activities. Trustees may also recover costs for the lost public use of the land or resources and for money spent by trustees to assess damages. A restoration plan is developed with public input that specifies the actions necessary to restore the injured resources. These actions can be carried out on the lands where injury occurred or at an alternate site which, when restored, provides a suitable replacement for the injured or lost resources. Trustees monitor the restoration actions to ensure long-term goals have been met. The Restoration Program is administered by ORDA and comprised of staff from BIA, BLM, FWS, NPS, Reclamation, Solicitor’s Office, USGS, and the Office of Policy Analysis. ORDA’s Restoration Support Unit (RSU) assists with all aspects of natural resource restoration planning, implementation, and monitoring. The Office manages the Department’s Restoration Fund (see Appendix 3); develops guidance, policy and regulations to facilitate restoration; and works in partnership with other affected natural resource trustee agencies.

- **Office of Environmental Policy and Compliance (OEPC).** OEPC chairs a multi-bureau effort to clean up DOI sites through the Central Hazardous Materials Fund (CHF; see Appendix 3). This multi-bureau effort integrates the Department’s interests in remediation and environmental restoration of the contaminated sites it manages by incorporating Interior’s natural resource management concerns into CERCLA response actions. The CHF cost-effectively leverages DOI’s legal, technical, and project management expertise to address the highest priority cleanup sites. The CHF focuses on the sites that pose the highest risks to employees, public health and welfare, and the environment; and typically, are so costly and complex to clean up that they cannot adequately be addressed using available bureau resources. Some of the larger sites include the Crab Orchard National Wildlife Refuge, Illinois; Valley Forge National Historic Park, Pennsylvania; Red Devil Mine, Alaska; Phosphate Mines, Idaho; and Orphan Mine, Grand Canyon National Park, Arizona. Since 1995, the Department has undertaken response actions at more than 65 sites and completed cleanup at 20 sites.
- **Office of Insular Affairs (OIA).** OIA is primarily involved in ecosystem restoration-related activities through control of the invasive Brown Treesnake (BTS), which was unintentionally introduced to the island of Guam following World War II. The BTS is directly responsible for the extinction or local extirpation of 10 of 13 native forest birds and three of 12 native lizards, which has caused a series of cascading impacts on the native forest structure and the entire terrestrial ecosystem of Guam. These snakes also currently cause nearly 200 outages per year, and their bite is responsible for approximately one in 1,200 emergency room visits on Guam. This program is a cooperative effort involving OIA (financial assistance and grants management), USGS (basic and applied research), FWS (Pacific and overall program coordination), the U.S. Department of Agriculture (USDA; control management), the Department of Defense (financial assistance and

control management on military facilities), and the governments of Hawaii, Guam, and the Commonwealth of the Northern Mariana Islands (restoration, control and management). The National Invasive Species Council (NISC) is an active member of the Brown Treesnake Technical Working Group and ensures that BTS concerns are incorporated into broader planning efforts on invasive species issues throughout Micronesia and Oceania.

**USGS' Social Values for Ecosystem Services (SolVES):** *To address some of the needs to quantify and map social values for use in ecosystem services assessments, USGS and Colorado State University developed a public domain tool, SolVES. This geographic information system (GIS) application is designed to use data from public attitude and preference surveys to assess, map, and quantify social values for ecosystem services. The recently released SolVES 2.0 enhances the opportunities for decision makers and researchers to weigh the tradeoffs among different ecosystem services in a variety of physical and social contexts, ranging from forest and rangeland to coastal and marine.*

- **U.S. Geological Survey (USGS).** USGS conducts research and monitoring to develop and a

fundamental understanding of freshwater, terrestrial, and marine ecosystems. Examples of restoration-related research efforts include:

- Cutting-edge work by USGS geneticists for use in making management decisions on fish and wildlife, including habitat and conservation.
  - Conducting a wide range of contaminant and restoration-related scientific expertise on CHF sites, NRDAR cases, and AMLs. For example, USGS scientists and mapping and digital data collection experts are collaborating to provide the scientific knowledge needed for effective cleanup of AMLs. In addition to providing scientific expertise on NRDAR cases, USGS has been working with ORDA on a restoration science initiative to develop protocols and metrics to better measure the ecological outcomes of restoration activities.
  - Informing the restoration efforts of the Great Lakes Restoration Initiative (GLRI), an interagency program that addresses the most significant environmental problems in the Great Lakes ecosystem. Results from USGS scientific studies and monitoring are helping guide restoration planning. For example, USGS is identifying the techniques and strategies that are most likely to succeed in restoring native fish. The goal is to accelerate the recovery of specific fish in Lake Ontario and to improve the resiliency and stability of Great Lakes fish communities by enhancing ecosystem function. See Appendix 3 for more information on the GLRI.
- **Wildland Fire Management Program.** The goal is to achieve both a cost-efficient and technically effective fire management program, which includes preparedness, suppression, hazardous fuels reduction, and restoration of ecosystems. Management activities are performed by BLM, FWS, NPS, and BIA. USGS provides fire science expertise and research. The Office of Wildland Fire Coordination coordinates the Department's efforts among the Interior bureaus and with other agencies. Multi-bureau operational programs are managed by the National Interagency Fire Center in Boise, Idaho. Interior's major partner in wildland fire management is the U.S. Forest Service (USFS).

#### Box 4-5. Sea Turtle Emergency Restoration, Texas

*The Gulf Coast is home to one of the most ecologically complex regions in the country and site of a number of refuges, national parks, and national seashores. Following the April 2010 BP Deepwater Horizon drilling rig explosion and oil spill, the Deepwater Horizon Oil Spill Natural Resource Trustees identified three potential emergency restoration projects, including the Kemp's Ridley Sea Turtle Emergency Restoration Project. More Kemp's Ridley sea turtles were documented oiled as a result of the spill than any other sea turtle species, and the spill location overlapped the known distribution of important Kemp's Ridley foraging habitat.*



*NPS Padre Island National Seashore employee releasing recently hatched Kemp's Ridley sea turtles (Ray Kirkwood).*

*Emergency restoration actions are taken by trustees prior to the completion of the NRDAR planning process to prevent or reduce continuing natural resource injuries, and avoid potential irreversible loss of natural resources. Actions implemented for this project included enhanced support of Kemp's Ridley nest detection and protection activities on the Texas Gulf Coast, and construction of facilities to decrease response time and improve Kemp's Ridley nest detection and protection on Padre Island National Seashore. BP agreed to fund the project for the purpose of increasing nest detection and collection activities on Padre Island National Seashore, San Bernard National Wildlife Refuge, and state lands on the upper Texas coast. All located nests were transferred to existing egg incubation facilities at Padre Island National Seashore. Funds were used for enhanced nest detection surveys, field supplies, and construction of a temporary base camp and nesting corral at Padre Island National Seashore. This emergency restoration project helped reduce further injury to populations by protecting nests and increasing hatchling recruitment. The Kemp's Ridley Sea Turtle Emergency Restoration Project was completed in August 2011.*

#### ECONOMIC VALUATION OF RESTORATION

As described throughout this report, the resources and activities of Interior enrich the nation in many ways. In some areas, determining value is relatively straightforward, such as for minerals or grazing lands, which are traded in established markets. Other areas may represent emerging markets, such as carbon sequestration and alternative energy, that are becoming better defined. However, few markets exist for experiencing a day of hiking or fishing, maintaining and interpreting cultural heritage, enhancing the health of wetlands and rangelands, or preserving habitat for endangered species. These are just some of the many non-marketed ecosystem services provided by Interior's resources.

As discussed in Chapter 3 of the FY 2010 DOI Economic Contributions Report (available on-line at <http://www.doi.gov/ppa/upload/DOI-Econ-Report-6-21-2011.pdf>), ecologists currently classify ecosystem services into four categories:

1. **Provisioning services** are goods such as food, timber, fuel, and water (i.e., commodities);
2. **Regulating services** such as flood and disease control;
3. **Cultural services** such as spiritual, recreational, and cultural benefits; and
4. **Supporting services** such as nutrient cycling that maintain the biophysical conditions for life on Earth.

**Box 4-6. Great Lakes Legacy Act Funds Partnered with NRDAR Settlement in Indiana**

*Over many decades, steel mills, refineries, and manufacturing facilities have released hazardous substances and oil into the Grand Calumet River in northwestern Indiana, severely degrading the quality of water and sediments and causing injury to aquatic resources and migratory birds. Restoration efforts have been underway for over a decade, including dredging contaminated sediments from the riverbed, restoring in-stream habitat for fish and aquatic invertebrates, restoring migratory bird habitat within the riparian corridor, acquiring 139 acres of dune and swale habitat to become part of the National Park Service's Indiana Dunes National Lakeshore, and acquiring 77 acres of state-managed riparian habitat along nearby Salt Creek. More recently, FWS and the State of Indiana have partnered with EPA to clean up and restore the heavily polluted west branch of the Grand Calumet River by removing 71,000 cubic yards of contaminated material and capping a half mile of the river near Hammond, Indiana. This \$33 million project was funded in part by the Great Lakes Legacy Act (\$21.5 million) and in part by NRDAR settlement funds (\$11.6 million). Along with sediment removal and capping, habitat restoration activities included planting native grasses, forbs, and woody vegetation along the riverbank and upland areas along this stretch of the river. The Great Lakes Water Quality Agreement calls for Remedial Action Plans to restore and protect 14 beneficial uses in Areas of Concern. Since the cleanup and restoration began in the west branch, two of the 14 "beneficial use impairments" have been delisted—the restriction on drinking water and added costs to agriculture—leading to tangible economic benefits to the area.*



*Placing sand cap and grading the north slope of Grand Calumet river bank (SulTRAC).*

Interior's lands and managed resources produce a wide range of these valuable ecosystem services, including agriculture, drinking water, energy, flood and disease control, carbon sequestration, recreation, and cultural resources. Interior's ecosystem restoration activities play an important role in maintaining and enhancing the services from departmental lands and managed resources. Although the jobs and economic contributions from restoration are substantial and important, as described in the next section, they do not represent the full economic value of ecosystem restoration because they do not capture the net benefits associated with environmental goods and services not bought and sold in markets. Physical measures such as restored stream-miles or acres are also important for understanding and conveying restoration success, but they do not offer a complete measure of restoration benefits.

In economics, restoration benefits are valued in terms of the new or additional ecosystem services that are created as a result of the project. Economic value is defined as the amount society is willing to pay for the ecosystem service benefits created by the project. Net economic value is that willingness to pay less

the cost of the project (i.e., net benefits). Why does a complete measurement of restoration project benefits matter? A fundamental question for most decision makers is whether the total benefits exceed the total costs (i.e., generates positive net benefits). Restoration, reclamation, rehabilitation, remediation, and cleanup projects are often costly. While investment in these projects provides value to the public by restoring ecosystem function and structure to damaged, degraded, and destroyed ecosystems, they are often non-market benefits. If proper economic analysis is not conducted, an incomplete measure of these benefits could lead to under-investment in restoration or selection of a project option with lower actual net benefits than other alternatives.

**Economic Approaches.** Non-market valuation methods are one way to estimate values for changes in environmental quality such as those resulting from ecosystem restoration projects. These techniques can use data from related markets (such as the cost of traveling to a given site or property values) or data from questionnaires asking respondents their willingness to pay for a given change in quality to estimate these values. Some studies have used contingent valuation and choice experiment techniques to analyze survey data and estimate respondents' willingness to pay for restoration efforts related to wetlands or water resources (Loomis et al. 2000), wildlife habitat (Garber-Yontz et al. 2004), and forests (Adamowicz et al. 2000). Other studies have used data on travel costs (Bergstrom et al. 2004) or property values (Williamson et al. 2008) to develop statistical estimates of the economic value of restoration efforts.

Production function approaches are another method that can be used to value environmental quality provided by ecosystem restoration efforts. These methods estimate the value of ecosystem services as one input into productive economic activities. Some examples of production function approach applications include commercial and recreational fishing, agricultural systems, invasive species control, watershed protection, and damage cost avoidance (Barbier 2007).

Cost-based methods (also known as restoration-based) are used to estimate the value of ecosystem services by measuring the amount individuals would be willing to pay to avoid damages (i.e., avoided losses), the cost of restoring or replacing the lost services, or the cost of producing substitute services. Habitat equivalency analysis (HEA) and resource equivalency analysis (REA) are examples of cost-based methods that can be used to approximate the value of ecosystem goods provided by restoration projects, such as the cost of restoring habitat after an oil spill. These methods can give a rough indication of economic value, and the ease of analysis can be advantageous. However, their use requires the assumption that the public's value of the original resource is equivalent to that of the replaced or restored resource, which may not be the case. These methods are only as good as the quality of the inputs, which can be time-consuming and expensive to develop. Restoration projects are usually site-specific and costs can vary extensively by resource type, location, methods, and timing.

**Challenges.** There is clearly an extensive literature indicating that individuals value improvements in environmental quality and are willing to pay for such improvements, including restoration projects. However, estimating the economic value of ecosystem restoration as a change in environmental quality and the associated flow of ecosystem services presents several challenges. Notably, scientists identify that restoration research is still evolving for many resources. Baseline scientific data necessary to quantify changes in services may not exist. Site studies are often time-consuming and expensive to plan, implement, and monitor for success. Long-term monitoring of restoration projects provides a critical feedback loop to inform future restoration. However, priority-setting of funds can cut monitoring short,

effectively short-changing the quantity and quality of available restoration data. Similarly, economic valuation data collection and studies can be time-consuming and expensive. Valuation of cultural losses, such as resources with spiritual and religious uses, have been particularly challenging for economists. Many of the commonly used economic valuation methods described above are difficult to apply in the case of Native American communities, since many tribal members may feel the cultural losses are not commensurable with a dollar value (O'Neill 2009).

## CASE STUDIES OF THE ECONOMIC CONTRIBUTIONS OF SELECTED DOI RESTORATION PROJECTS

As discussed above, federal investment in ecosystem restoration and monitoring protect federal trusts, ensure public health and safety, and preserve and enhance essential ecosystem services. These investments also provide economic contributions and jobs. Given constrained budgets and competing demands for investment, there is a need to better understand the connection between restoring the health and productivity of ecosystems, and the resulting economic benefits to local communities. This section includes nine case studies that highlight the economic contributions of a wide range of restoration projects supported by DOI bureaus and partners. The restoration projects were implemented on BLM, FWS, and NPS lands, and include river, riparian, forest, wetland, grassland, prairie, and coastal resources, as well as the demolition of a hazardous building.

### OVERVIEW OF CASE STUDY METHODS

Economic and employment contributions are estimated for each of the case study projects. Restored ecosystems are expected to benefit local communities beyond the completion of the restoration project. Thus, these projects will create additional future jobs and non-market benefits by providing increased opportunities for tourism, improving and sustaining fisheries and wildlife habitat, and reducing risk from flooding and other natural disasters. These future benefits are not accounted for in this analysis.

Job and income contributions for each case study were estimated using IMPLAN. IMPLAN is a widely used input-output software and data system for estimating the job and income effects resulting from the interdependencies and interactions of economic sectors and consumers (see Appendix 3 and Appendix 7 for more information on IMPLAN and how the restoration cases discussed in this chapter were modeled).

Restoration projects involve spending in a local economy on services such as construction and environmental consulting. The firms providing these services purchase materials such as rocks and riprap, monitoring equipment, and grass seed to accomplish their work. In many cases, materials for projects are purchased within the local economy. In order to meet the resultant increase in demand, input suppliers must also increase their purchases of inputs from other industries, thus creating additional economic activity. This economic activity supports jobs and generates income. Local firms and input suppliers need to maintain or hire additional employees to meet project demands. Subsequently, employees of directly affected businesses and input suppliers use their incomes to purchase goods and services in the local economy, generating further economic activity, and thus amplifying the ripple effect. Reported impacts reflect restoration expenditures external to DOI; the impacts do not include job and labor income impacts supported directly by DOI employees. Output and employment contributions for DOI employees are included in Chapter 2.

## Fiscal Year 2011

The case studies illustrate the substantial economic benefits that restoration projects provide for local communities, and the variation in impacts across projects emphasizes the need to take caution when transferring impact estimates from one project to another. Restoration type, costs and availability of inputs and labor, and modeling methods all play large roles in the final impact estimates. Each of these factors need to be considered when comparing or transferring impact estimates. See Appendix 3 for a detailed discussion.

Table 4-1 provides a summary of the case study results and presents value of industry output and employment contributions.

Table 4-1. Summary of Restoration Case Studies (2011\$)

Project Name	Lead Bureau/ Partners	Location	Restoration Type	Total Expenditures (\$2011)	Project Duration	Avg Expenditure/yr	Local Job Impact (avg/yr)	Local Labor Income Impact* (avg/yr)	Local Economic Output (avg/yr)
Ex 1: Truckee River	BLM and TNC	Nevada	River Rechanneling	\$18.9M	5 years	\$3.8M	37	\$2.7M	\$5.7M
Ex 2: Gerber Stew	BLM	Oregon	Forest	\$3M	8 years	\$370,000	19	\$870,000	Not calculated
Ex 3: Blanca Wetlands	BLM	Colorado	Wetlands	\$75,000/year	ongoing	\$75,000	< 1	\$29,000	\$103,000
Ex 4: Las Cienegas	BLM	New Mexico	Grassland/ Invasives Mitigation	\$1.5M	2 years	\$767,000	10	\$600,000	Not calculated
Ex 5: Jaite Paper Mill Planning and implementation	NPS	Ohio	Hazardous Building Demolition	Planning: \$600,000 Implementation: \$1.3M	Planning: 2.5 years Implementation: 3 months	—	Planning: 4 Implementation: 36	Planning: \$214,000 Implementation: \$755,000 (3 months)	\$479,000
Ex 6: Glacial Ridge	FWS, TNC, NRCS	Minnesota	Prairie/ Wetland	\$24M	11 years	\$2.2M	15	\$839,000	\$1.9M
Ex 7: Niles'tun/Bandon Marsh	FWS and DU	Oregon	Tidal Marsh (restoration only)	\$1.4M	2 years	\$700,000	5	\$453,000	\$1.1M
Ex 8: CT Easement	FWS and TNC	Connecticut	Riparian/ Farm Preservation	\$58,000	5 years	\$12,000	< 1	\$12,000	\$23,000
Ex 9: RI Plover Nesting	FWS and TNC	Rhode Island	Public Education/ Habitat Management	\$130,000	4 years	\$32,000	< 1	\$41,000	\$58,000

\*Labor income impacts include all salaries, wages, and benefits accruing to local workers, and are reported on an annual basis in 2011 dollars (\$2011).

### Case example 4-1. Partners Help Conserve, Enhance, and Restore Nevada’s Lower Truckee River

The Lower Truckee River originates in the Sierra Nevada and flows through public, private, and tribally owned lands, including 31 miles of the Pyramid Lake Paiute Tribe (PLPT) reservation, terminating in Pyramid Lake within the reservation. Once remarkably productive, a century of man-made changes have heavily degraded the river system, leaving it inundated with invasive weeds. Significant damage occurred as part of a 1960s flood control project, including river downcutting, depression of the groundwater table, and lowering of Pyramid Lake by as much as 81 vertical feet. By the 1970s, the river had lost roughly 90% of its forest canopy, 40% of its resident bird species, and had no resident Kooyooe (also spelled Cui-ui) or Lahontan cutthroat trout. Since then, many policies have been initiated to restore the lower river, including the purchase and dedication of water rights to improve flows, changes in reservoir operations to support cottonwood recruitment and Kooyooe spawning, and the removal of some barriers to fish passage. BLM, Reclamation, and FWS have partnered with the PLPT, The Nature Conservancy (TNC), and at least 10 other federal, state, and local agencies on a wide variety of ambitious conservation, recovery, and restoration projects designed to achieve economic, cultural, environmental, and human health benefits in the Lower Truckee River.



*Since 1974, the PLPT have managed fisheries designed to maintain the Kooyooe and Lahontan cutthroat trout at desirable levels. The PLPT have called Pyramid Lake home for countless generations and are known as the Kooyooetukadu or the “Kooyooe Eaters.”*

In addition to their active fisheries recovery program, the PLPT is working to restore sections of the Lower Truckee within the reservation. The restoration work involves treating noxious weeds and replanting with native vegetation to help stabilize the river banks and reduce sediment loads. The selection of plant materials is done in consultation with tribal elders to ensure that plants with ethnobotanic values are accessible to all members of the tribe for traditional use and management. Some of this work has been funded by FWS, including a \$200,000 grant announced in May 2011 for habitat restoration to promote reproductive success of the Kooyooe below a nearby dam.



*TNC wetland restoration at McCarran Ranch.*

Further upstream, TNC is implementing a phased approach to restore natural channels and vegetation along the Lower Truckee River. The TNC Truckee River Project began with the purchase of the McCarran Ranch. Pilot work was implemented in 2003 and full restoration was started in 2006. With the success of the McCarran Ranch restoration,

TNC began partnering with public land managers to restore additional stretches of the river. Work proceeded in 2008 with restoration at the Lockwood property owned by Washoe County. TNC also entered into an agreement with BLM in 2008 to allow TNC to restore approximately 408 acres of public land at the 102 Ranch and the Mustang Ranch. The premise of the restoration approach is that the biology of the river can recover only after the physical foundation—especially the channel geometry and groundwater elevation—has been returned to forms that approximate their original conditions. The supporting Environmental Assessment<sup>17</sup> describes the high restoration potential and habitat values of this effort, including benefits to several tribal interests from improved

*According to BLM, conservation efforts along the Truckee River have made important strides in restoring degraded habitat, and serve as a model of what can be achieved when partners work together to achieve goals that would otherwise be unattainable if attempted alone.*

<sup>17</sup> Available on-line at [http://www.usbr.gov/mp/nepa/documentShow.cfm?Doc\\_ID=3485](http://www.usbr.gov/mp/nepa/documentShow.cfm?Doc_ID=3485)

water quality and quantity, fisheries, and availability of traditional native plant species.

Between 2006 and 2011, TNC reintroduced sinuosity into the river course, sloped the river banks, and planted the banks with native species. Monitoring of birds, fish, and vegetation is ongoing to help assure restoration success.

**Economic Impacts of Restoration.** The restoration work at Lockwood and on the McCarran, 102, and Mustang ranches includes nearly 9 river miles, 19 new wetlands, 13 new river meanders, 31 in-stream riffles, and 263 acres of revegetation. Restoration expenditures have so far totaled \$18.9 million (\$2011) over the combined projects' five year duration, averaging \$3.8 million spent annually (2006-2010). Much of the projects' work - from initial design to major earthmoving to monitoring - was awarded to local contractors with TNC oversight. In addition to TNC, 12 firms worked on the Truckee River Project, nine of which were located within 60 miles of the river in Washoe, Storey, and Lyon Counties. Project expenditures directly accounted for 15 jobs in the local area each year and nearly \$1.5 million annually in local labor income (salaries, wages, and benefits). Over 90% of the materials for the project were purchased from local suppliers, with over half of these expenditures going to purchase rocks and rip-rap from local mining and quarrying businesses and the remaining expenditures going toward construction supplies purchased at local retailers. More than 99% of all labor income went to employees living in the area who subsequently spent much of their income in local communities. The resulting spending by the suppliers and site workers accounted for an additional 22 jobs and an additional \$1.2 million in local labor income per year. To date, the Truckee



*Equipment-intensive construction on 102 Ranch project (Chris Segal, TNC, 2008).*



*102 Ranch in 2006, before restoration work, and after in 2009 (TNC).*

River Project has supported an average of over 37 jobs and \$2.7 million in labor income to the local economy each year. These benefits will continue in future years, with projects being planned for two additional sites in the near future and other sites being evaluated for more restoration work.

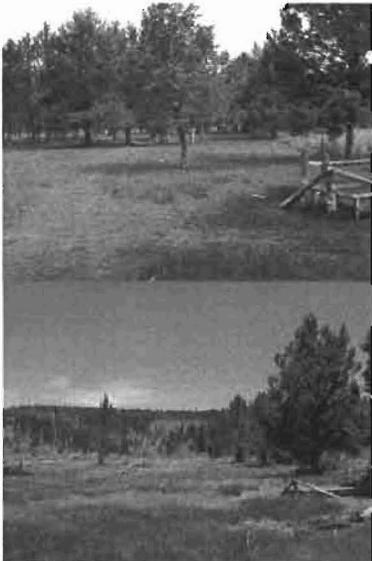
Beyond these economic impacts, local communities are expected to benefit in the long-term from improved water quality as wetlands and native plants filter nutrients from the water; more flood attenuation as floodwaters spread out during high flows without doing damage elsewhere; added open space and recreation for kayakers, hikers, bikers, birdwatchers, and others; and enhanced educational opportunities for local students and recreational users.

**Case example 4-2. Gerber Stew BLM Stewardship Contract in Southeast Oregon Aims to Improve Rangeland and Wildlife Habitat, Increase Forest Resiliency, and Reduce Hazardous Fuel Loads**

BLM has the ability to enter into “Stewardship Contracts” to make forests and rangelands more resilient to natural disturbances. The contracts allow companies and communities to retain forest and rangeland products in exchange for services like thinning trees and brush or removing dead wood. Long-term contracts foster a public-private partnership to restore forest and rangeland health at a savings to taxpayers by allowing contractors to invest in equipment and infrastructure for making wood products or producing biomass energy.



*Western Juniper trees used to make hardboard by a nearby mill.*



*Clearing juniper stands from riparian areas like Norcross Spring benefits the area's wildlife populations.*

The Gerber Stew Stewardship Contract was awarded in September 2004 to a firm based in Bend, Oregon to implement restoration treatments and projects in BLM’s Klamath Falls Resource Area. Western juniper is cut, burned and thinned to improve forest and rangeland health, and to reduce hazardous fuels as part of the National Fire Plan. Under the contract, forest-health projects generated timber that the contractor could use at local mills. The Gerber Stew Stewardship Contract provided an opportunity for BLM to meet restoration goals, while supporting timber utilization markets, reducing wildfire risk, and providing employment for local rural communities.

**Economic Impacts of Restoration.** To date about \$3 million has been spent on restoration work, providing \$300,000 of forest products to help offset the cost of this work. Activities have included hazardous fuel reduction, rangeland restoration, riparian/spring enhancement, wildlife habitat improvement, road improvement and obliteration, fence repair, biomass utilization, and forest health restoration. Rural and community benefits include employment opportunities, a substantial reduction in smoke emissions as a result of utilizing over 38,000 tons of biomass, restoration treatments on over 6,000 acres, and miles of road

improvement. The biomass material removed included fuel that was delivered to a power generation facility, clean chips that went to a product manufacturer for hardboard production, commercial sawlogs, and sawlogs used for a variety of landscape and household products. Forest and road restoration, logging activities, and processing of biomass from the Gerber Stew Stewardship Contract directly accounted for 12 jobs and over \$660,000 in labor income per year (salaries, wages, and benefits) in the local area. Spending by contractors and site workers accounted for an additional 10 jobs and an additional \$350,000 in local labor income per year. Combined, the Gerber Stew Stewardship contract is estimated to have supported 22 jobs per year in rural counties in southern Oregon and northern California for the eight years (2004-2011) and over \$1 million per year in local labor income.



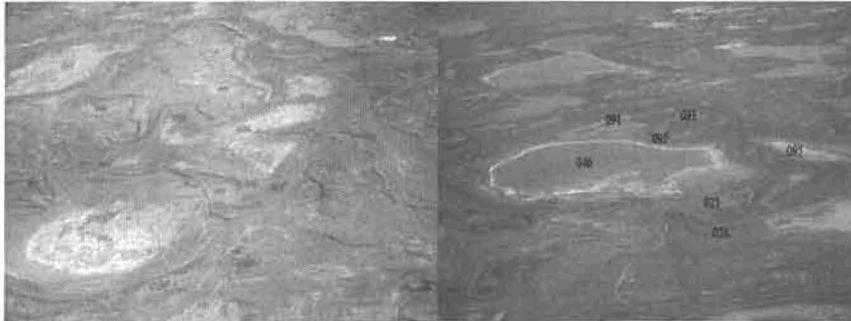
*Timber used for hog fuel sent to a nearby power generating facility.*

**Case example 4-3. BLM Blanca Wetland Restoration, Critical Habitat for Threatened, Endangered, and Sensitive Species, and Reliable Annual Contracts for Local Small Businesses in South-Central Colorado**

For thousands of years, much of the San Luis Valley basin of south-central Colorado was made up of a series of lakes, marshes, and shallow playa basins that were integral to the lives of indigenous peoples. By the mid-1900s, the basins had dried up from the diversion of water sources for irrigation and became known as the “Dry Lakes.” In 1965, BLM began a series of wildlife habitat projects to restore some of the historic wetland characteristics and processes, and 9,600 acres of the former “Dry Lakes” area became known as Blanca Wetlands. BLM designated the Blanca Wetlands Area (BWA) as an “Area of Critical Environmental Concern” (ACEC) in 1991, due to its high importance for wildlife and recreational values. Today the BWA and the South San Luis Lakes system are managed by BLM to restore wetland habitat and provide wetland connectivity in the valley. BLM conducts wetland restoration activities across a 14,000-acre landscape, providing habitat to over 160 species of birds and 13 threatened, endangered and sensitive species, including bird, amphibian, fish, and plant species.



*View of Blanca Peak (BLM).*



*Blanca Wetlands 1968, pre- and post-restoration (BLM).*

Wetland restoration in the BWA includes drawing water from an irrigation canal and a series of artesian wells and developing an infrastructure system of ditches and dikes to promote water movement through the area. BLM also has an active science program, collecting and analyzing a variety of data

to continually improve wetlands management. These activities have resulted in the restoration of over 200 playa lakes, ponds, and marshlands. This area that was once dry due to human-induced dewatering has now become a nationally significant migration and nesting area for many wildlife species, including Colorado’s largest breeding population of Western snowy plover. In FY 2011, BLM started investigating the possibility of enlarging the boundary of the ACEC to promote focused efforts toward wetland connectivity and restoration on a landscape scale.

**Economic Impacts of Restoration.** Restoration and monitoring activities in the BWA have been ongoing since the 1960s. Annual expenditures have been about \$75,000 (\$2011). Annual activities include site maintenance and infrastructure development, weed management, well certification, monitoring (to collect bird, amphibian, fish, macroinvertebrate, groundwater and water quality, soils, and vegetation data). These annual expenditures provide local firms with a reliable stream of work and support an average of over \$29,000 in local labor income (salaries, wages, and benefits) each year. Over the next 10 years, BLM anticipates increased expenditures on deferred maintenance for wells and structures. Economic impacts in these years could support as much as \$150,000 in labor income per year for local well drillers, welders, and heavy equipment operators.

**Case example 4-4. Las Cienegas National Conservation Area Native Grassland Restoration**



The desert grasslands found within the Las Cienegas National Conservation Area (LCNCA) include some of the rarest habitats in the American Southwest and are home to six endangered species. These grasslands have degraded over the last 100 years into mesquite woodlands due to grazing practices, fire suppression policies, and the introduction of non-native plant species. The loss of grassland has encouraged erosion, reduced watershed function, and decreased available habitat for pronghorn antelope and other species. In 2009 and 2010, BLM implemented a grassland restoration project on over 3,000 acres, out of an identified 20,000 acres of degraded grassland found within the LCNCA. The project has removed mesquite trees from the area, helping to restore habitat for pronghorn antelope and rare migratory and grassland birds. The project also helped to stabilize the regional watershed by increasing water infiltration and reducing

erosion. The project has also provided local communities the opportunity to use the biomass generated from the thinning process.

The LCNCA is an archeologically significant site. Prior to ground disturbance, BLM completed cultural resource surveys and inventories to comply with the National Historic Preservation Act. Nearly 10,000 acres were surveyed, identifying 53 new archeological sites and an additional 378 isolated artifacts dating as far back as 3,000 B.C. The newly identified cultural sites will be entered into the State of Arizona Cultural Resource database operated by the Arizona State Museum. Many of the archeological sites are eligible for entry into the National Register of Historic Places. Following the flagging of all identified archeological sites, mechanical and hand removal treatments were used to remove mesquite



*A mesquite slab from the project site was provided to a contractor to replace the yoke for the Arizona Liberty Bell.*

trees from the grasslands. The restoration resulted in the removal of nearly 1,500 tons of biomass through stewardship contracts and wood permits issued to the local public and local Native American tribes for firewood collection. Permits were also issued to a local mesquite mill that utilized otherwise unmerchantable root balls, trunks, and branches to create unique, hand-crafted furniture and household items.



*(Above) Grubbing a mesquite tree to restore native grasslands.  
(Right) Pronghorn*



**Economic Impacts of Restoration.** Project funding was provided by ARRA and averaged \$767,000 (\$2011) per year for the two years (2009-2010). Ten primary vendors were awarded contracts and multiple other local vendors provided sub-contract work, supplies and materials purchasing, equipment rental and repair, and fuel. Project expenditures directly accounted for 4 jobs and over \$330,000 in local labor income (salaries, wages, and benefits) per year. The emphasis on local contracting resulted in an additional 6 jobs in the local area and an additional \$270,000 in local labor income per year generated through contractor expenditures. The project also employed a BLM youth hand crew to cut and spray mesquite on 196 acres of land. The college-aged youth were provided summer jobs working and learning about firefighting, land management, and conservation.

**Case example 4-5. The Jaite Paper Mill Demolition in the Cuyahoga Valley National Park Removes a Human Health and Safety Hazard While Providing Engineering and Construction Jobs**

The 24-acre Jaite Paper Mill site is located on a natural floodplain at the confluence between the Cuyahoga River and Brandywine Creek at Brecksville, Ohio. The Mill Site is immediately adjacent to the popular Ohio and Erie Canal Towpath Trail. Originally constructed in 1905, the Mill was operated continuously until 1984, by which time the size of the plant had grown to 180,000 square feet. In 1985, the Mill became part of the Cuyahoga Valley National Park. A fire in October 1992 severely damaged a large part of the plant. After this fire, the plant began deteriorating rapidly and became increasingly dangerous to park staff and visitors. The demolition and removal of the Mill was intended to eliminate a human health and safety hazard and to restore



*Demolition of mill building and fugitive dust abatement (NPS).*



the site back to a natural, visitor-friendly area.

The project involved demolishing and removing all above-ground materials, including concrete, metal, wood, and glass. Mitigation work was needed for lead paint and asbestos-containing materials, including the active control of fugitive dust during demolition activities. Certain historical features were preserved so that the park can interpret the site for visitors in the future. These features include some railroad posts and a key part of the paper-making process, a

“fourdrinier” which dried the paper (see photo).

**Economic Impacts of Restoration.** The project was implemented by NPS with nearly all of the planning, engineering, and construction tasks contracted to an environmental engineering firm and local construction subcontractor. Planning for the project took approximately 2.5 years to complete with expenditures totaling \$600,000 (\$2011). Planning activities supported a total of 4 jobs per year and over \$535,000 (\$214,000 per year) in local labor income (salaries, wages, and benefits).

The actual demolition and removal fieldwork occurred during the spring of 2006 and took approximately three months to complete. Expenditures for the demolition phase totaled \$1.3 million (\$2011). The demolition directly supplied jobs for approximately 27 construction workers for the three-month duration and supplied over \$380,000 in labor income to the local economy. Salary spending and equipment purchases for the demolition project increased demand for products and services from local vendors and are estimated to have supported an additional 9 jobs and \$375,000 in labor income within the local economy during 2006.



*South end of the mill site after the demolition was completed (NPS).*

**Case example 4-6. Largest Prairie Grassland Restoration Project in U.S. Leads to New National Wildlife Refuge and Local Economic Impacts, Including New Small Businesses**

The Agassiz Beach Ridges landscape is located in the Red River watershed of northwestern Minnesota, and falls within the larger Prairie Pothole Region (PPR). The PPR has been identified as being responsible for producing 50-80 percent of the continent's waterfowl, while accounting for only 10% of the available breeding habitat. It is estimated that less than 1% of Minnesota's historic native prairie remains intact, with much of the remnant prairie scattered about in small clusters. Restoration of key sites within this landscape has been identified as the most important strategy to create a contiguous expanse of prairie/wetland mosaic and improve the ecological functioning of these systems.



*The Glacial Ridge National Wildlife Refuge (TNC).*

In the fall of 2000, The Nature Conservancy (TNC) purchased the 24,000-acre Glacial Ridge property near the town of Crookston, Minnesota. Native cover and the natural functioning of over 90% of the property (22,000 acres) had been degraded or eliminated, primarily through conversion to row crop agriculture, wetland drainage activities, and gravel mining operations. The purchase and subsequent restoration of this property will provide native habitat and connect nearly 7,800 acres of existing native prairie and wetland communities. The project will become part of a mosaic of protected lands in the area, connecting several other ownerships that harbor native plant communities. In addition to supporting wildlife, the project will help protect water quality levels for the nearby town of Crookston and will contribute to flood control along the Red River. TNC subsequently transferred ownership of the property to FWS, and the property now makes up the majority of the new Glacial Ridge National Wildlife Refuge (NWR). This Refuge was established in 2004 and has a planned final size of 37,756 acres.<sup>18</sup> The Glacial Ridge restoration project has been identified by FWS as the largest tallgrass prairie and wetland restoration project in U.S. history.



*A bulldozer fills a drainage ditch as part of a wetland restoration on the Glacial Ridge property (TNC).*

**Economic Impacts of Restoration.** Restoration of the Glacial Ridge property began in 2001 and concluded in 2011. Through funding provided by over 20 partner agencies/organizations, including significant contributions from USFWS and USDA's Natural Resource Conservation Service, restoration and management activities brought substantial economic benefits to the surrounding rural counties in northwestern Minnesota each year over the course of this 11-year project. Yearly project expenditures averaged about \$2.2 million (\$2011). These expenditures directly supported 6 jobs in the local communities surrounding the property and provided nearly \$476,000 in local labor income (salaries, wages, and benefits) each year. In addition to these direct impacts, the Glacial Ridge project supported another 9 jobs each year, which provided an additional \$363,000 in local labor income. The Glacial Ridge project also supported the creation of new small businesses. Each year the project purchased over \$430,000 worth of native seed from local vendors. Four new seed supply businesses and a new seeding and mowing business were created to meet this substantial new demand for seed. Other local vendors have expanded as a result of the new demand, with two new seed storage sheds built at one company and new seed cleaning equipment purchased at another.

<sup>18</sup> More information about Glacial Ridge is available on-line at <http://www.fws.gov/midwest/GlacialRidge/>

**Case example 4-7. Ni-les'tun at Bandon Marsh National Wildlife Refuge: The Largest Tidal Marsh Restoration in Oregon Relies on Partnerships, Provides Construction Jobs, and Supports Local Businesses**

Migrating shorebirds and waterfowl are so dependent on the food supply and stopover estuary habitat in the lower Coquille River that Congress established Bandon Marsh National Wildlife Refuge (OR) in 1983.<sup>19</sup> Through congressionally approved expansion, acquisition, and donation, the Refuge now encompasses 889 acres and is composed of two units: Bandon Marsh and Ni-les'tun (named by the Coquille Tribe and pronounced NYE-les-ton, which means People by the small fish dam). Historically, Ni-les'tun was a diverse tidal wetland like Bandon Marsh, but was diked and drained for agricultural purposes beginning in the mid to late 1800s. Restoring 418 acres of tidal marsh has required FWS and its many partners to collaborate through more than a decade of planning, land acquisition, scientific study, and extensive engineering design.

**Restoration Success:** *Since restoration construction activity stopped last September, wildlife has responded to the return of the tides to Ni-les'tun. Probably the most obvious response has been by waterfowl, most spectacularly a flock of up to 500 green-winged teal are taking advantage of the channels and pools filled by the tides. Compared to prior to the restoration, there have also been persistent flocks of sandpipers, plovers, dowitchers, scattered Wilson's snipe, as well as a greater presence of great blue herons and great egrets (Oregon Coast National Wildlife Refuge Complex, Restoration Update, 12/8/11).*



*High tide aerial view of the Ni-les'tun tidal marsh restoration project, Nov. 2011, two months after the project was completed (Roy Lowe, FWS).*

Construction funding was from a variety of sources including: small grants and donations, ARRA, Oregon Lottery funds granted through the Oregon Watershed Enhancement Board, and about \$1.35 million from the New Carissa oil spill NRDAR settlement.<sup>20</sup> With a total of about \$10 million of investment, the restoration of the twice daily tidal flush is now helping to rebuild a natural estuary foodchain, including an array of fish and birds that had sustained native tribes for thousands of years. The Coquille River's Chinook and Coho salmon runs will benefit from the habitat restoration. Local regional and national visitors are anticipated to visit the marsh to experience wildlife through hiking birdwatching, and waterfowl hunting.

Over two dozen public and private partners were involved in the restoration. Ducks Unlimited (DU), oversaw the design and construction of the restoration. Planning began 2001; construction began in 2009 and was completed in 2011. The final design included the removal of 6,700 feet of levee and three tidegates, construction of setback levees and a tidegate to protect neighbors, filling 15 miles of drainage ditches, removing 3,500 feet of old farm roads, excavating 4.5 miles of sinuous tidal and stream channels, installing large woody debris for fish habitat and planting native vegetation. The project included the restoration of 11 acres of freshwater wetlands, and stream channel and fish passage improvements. FWS also coordinated with Coos-Curry Electric Cooperative to relocate major electric utilities from above

<sup>19</sup> More information about the Bandon Marsh NWR is available on-line at <http://www.fws.gov/oregoncoast/bandonmarsh/restoration/index.cfm>

<sup>20</sup> More information on the New Carissa Oil Spill is available on-line at <http://www.fws.gov/oregonfwo/Contaminants/Spills/NewCarissa/>

ground where they would pose a flight hazard to birds, to 40 feet beneath the river bottom. FWS, the U.S. Department of Transportation, and Coos County worked together to raise and repave the adjacent county road to improve safety and prevent tidal flooding.

Archeology was a very important design factor on this site. FWS directed that all construction would proceed with caution, and DU worked with tribal and contract archeologists and the State Historic Preservation Office to ensure that designs were compatible with cultural resources onsite. FWS instructed construction workers to keep an eye out for anything that archaeologists might want to investigate, and to stop work until they did. During the restoration, the construction unearthed evidence that powerful earthquakes and sands washed in by tsunamis had dramatically and repeatedly altered the landscape. They also found clues that humans occupied the area before and after those cataclysmic events, uncovering living sites, tools and shells dating back more than 4,000 years.

**Economic Impacts of Restoration.** As the largest tidal marsh restoration in Oregon to date, an extensive amount of work was coordinated with FWS and designed, engineered, constructed, and contracted by DU. Expenditures for the tidal marsh restoration portion of the project were about \$31,000 annually during the planning phase (2001-2009) and \$700,000 annually during the contracted implementation phase (2010-2011), accounting for a total restoration cost of \$1.64 million (\$2011). Of these costs, an average of \$98,000 annually went directly to local labor income (salaries, wages, and benefits) to employee construction workers in Coos County during the implementation phase. An additional \$165,000 annually went directly to scientists and project managers working within the state. Restoring the marsh was equipment intensive and required over \$970,000 in materials, which were rented and purchased from businesses in Coos County. These purchases supported local equipment rental, rock quarry, and greenhouse businesses, indirectly providing 5 jobs and \$190,000 in labor income annually in the county. In total, the project provided over \$1,130,000 in labor income over the life of the project.



*Channel digging (Roy Lowe/FWS).*

**Case example 4-8. Conservation Easements in Connecticut Protect Habitat and Generate Local Income**

Using funds from an NRDAR settlement, FWS obligated \$557,810 (\$2011) to TNC of Massachusetts for the purchase of permanent conservation easements on approximately 200 acres of riparian lands along the Housatonic River in Salisbury, Connecticut. Conservation of riparian habitat will help to: (1) protect water quality; (2) protect nesting habitat for migratory songbirds and other wildlife, including several rare and endangered plants, turtles, salamanders and dragonflies; and (3) maintain the scenic, agrarian character of the region. These efforts provide a beneficial tradeoff from the harm to the river and associated wildlife caused by historical polychlorinated biphenyls (PCBs) contamination.



*Protecting a 13-acre property adjacent to the Housatonic River (I'WS).*

**Economic Impacts of Restoration.** From 2011 to 2015, it is anticipated that \$500,000 will be spent to purchase conservation easements. An additional \$58,000 will be spent to administer the easements, which includes identification, resource assessment, and management and restoration planning. These expenses will generate an average of \$12,000 per year in labor income (salaries, wages, and benefits) for local businesses, and will directly impact businesses providing management, technical service, and real estate consulting. Although insufficient information is available to estimate the economic impact of the easements on these private properties, it is generally expected that conservation easement purchases also will inject new money into the local economy. The sale of easements provides landowners with additional revenue, some percentage of which may be spent in the local economy, including purchasing new real estate, consumer goods, or services in the local area. In many cases, the sale of easements also allows farm owners to continue farming practices on their land. For example, for one of the easements in this case, the money will help the farmer continue to raise beef for local markets. The farmer's costs for equipment, supplies and materials will be spent in the local economy, thus supporting local businesses and local employment. Farm workers will also spend their salaries in the local economy, thus supporting further local employment. From a social perspective, conservation easements generate benefits for local residents, communities, and governments by protecting values associated with biodiversity and wildlife abundance, aesthetic beauty, local agriculture, and social and culturally significant features of landscapes and livelihoods.

#### Case example 4-9. Nesting habitat management program for the federally threatened piping plover

This case study illustrates that even modest restoration projects can provide benefits to the environment and local economy.

FWS provided \$130,000 (\$2011) over 2007-2011 to The Nature Conservancy of Rhode Island (TNC, RI) to implement a nesting habitat management program for the federally threatened piping plover, a shorebird that nests along sandy beaches on the Atlantic coast. The source of the funds was the NRDAR settlement for the North Cape Oil Spill. In 1996, the oil spill adversely impacted piping plover nesting habitat, resulting in fewer chicks produced during the following nesting season. To compensate for these impacts, natural resource trustees (FWS, RI, and NOAA) sought to increase the number of chicks produced in RI by providing funds to TNC to implement management actions aimed at reducing threats to piping plovers. At two nesting areas in Little Compton, RI, TNC staff conducted more than 70 public education programs to increase awareness about what people can do to reduce harm to piping plovers (e.g., keeping dogs off beaches, removing trash that attracts predators, staying out of nesting areas). Staff also monitored nesting beaches and informed recreational users about potential threats. Additionally, several predators (e.g., coyotes, skunks) known to consume adults and chicks, were removed from nesting areas. During five years with increased management efforts, piping plovers produced more chicks (108) than in the previous five years (80).



*Piping plover on eggs (FWS).*



*TNC Saturday morning education program (TNC).*

**Economic Impacts of Restoration.** The piping plover management program has supported three full time seasonal positions in Little Compton, RI each summer between 2007 and 2011. These positions have provided employees with quality experience in natural resource management and public education, and brought over \$32,000 per year in direct labor income (salaries, wages, and benefits) to the local area. Much of this income was spent within the local economy, and supported an additional \$9,000 in labor income for local businesses. This case study demonstrates how even small investments in restoration can support jobs in local communities. The average yearly cost of the program was \$32,000, and these expenditures supported over \$41,000 per year in labor income in the local community.

## CONCLUSION

Restoration, rehabilitation, remediation, and reclamation activities play an important role in maintaining the health and vitality of DOI lands and managed resources. The Department's commitment of human capital and financial resources for these activities is substantial. Analysis by USGS demonstrates that investment in restoration supports many jobs and contributes extensively to local economies. Interior's investment is leveraged through federal, state, local, non-governmental, and private partners, who have been critical for funding, implementing, and monitoring the quality and quantity of DOI-related restoration projects. Ecosystem monitoring and adaptive management help ensure that lessons learned are integrated into ongoing and future decision making at Interior.

While there are numerous and compelling restoration success stories, some of which are described in this chapter, challenges remain. Clearly, Interior's land holdings and natural resource responsibilities are vast. While the Department has inventory and monitoring programs, resource conditions are often dynamic and the baseline conditions needed to quantify improvements from restoration are not always known. Further, restoration science is still evolving for many resources. Physical measures of restored stream-miles or acres are valuable indicators of restoration success, but they do not easily facilitate quality comparisons for future decisions. Interior's scientists and managers are actively working on the development of improved endpoints and more meaningful criteria for measuring restoration success.

Although there is an increasing understanding of ecosystem services through a number of federal and departmental efforts, there still tends to be a disconnect between restoring natural resources and restoring the benefits to the public derived from these resources, which can affect the goals, planning, and outputs of scientific study. Relevant, high-quality scientific outputs are critical inputs for economic analysis. Even with relevant science, though, the total benefits from restoration can be difficult for economists to quantify and value. While the jobs and economic contributions from restoration are substantial and important, they do not represent the full economic value of ecosystem restoration, because they do not capture the net benefits associated with environmental goods and services not bought and sold in markets. As discussed above, there are methods to estimate the total economic value of restoration. Making the effort to include non-market benefits is an exercise worth carrying out, with precision and rigor where feasible. Looking forward, developing well-established, tangible values for the resources and associated services under Interior's trust would help ensure that the public's benefits are maximized from investment in DOI restoration activities.

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## Appendix 3. DOI-RELATED ECOSYSTEM RESTORATION – ADDITIONAL CASE STUDIES AND INFORMATION ON CASE STUDY METHODS

This appendix provides additional information on the cases studies and sources of restoration funding to supplement the material in Chapter 4, Ecosystem Restoration.

Job and income contributions for each case study were estimated using IMPLAN (IMPact Analysis for PLANning). IMPLAN is a widely used input-output software and data system for estimating the job and income effects resulting from the interdependencies and interactions of economic sectors and consumers. See Appendix 7 for additional details on the IMPLAN model. To estimate the economic contributions of the case-study projects, cost data provided by project managers and contractors were used to determine the mix of products and services required to accomplish each project. This mix is commonly referred to as a production function. Local regional impacts were estimated by constructing unique production functions in IMPLAN for each case study. IMPLAN 3.0 county-level data for 2009 were used to estimate the indirect and induced effects (secondary impacts) of each restoration project. Direct impacts were estimated using employment figures, labor expenditures, and non-labor expenditures provided by contractors. Job impacts include full, part-time, and temporary positions, and are reported on an annual basis. Labor income impacts include all salaries, wages, and benefits accruing to local workers. Total output impacts are equal to annual local expenditures and include intermediate expenditures. All impacts are reported on an annual basis in 2011 dollars (\$2011).

The case studies illustrate the substantial economic benefits that restoration projects provide for local communities, and the variation in impacts across projects emphasizes the need to take caution when transferring impact estimates from one project to another. Restoration type, costs and availability of inputs and labor, and modeling methods all play large roles in the final impact estimates. Each of these factors need to be considered when comparing or transferring impact estimates. The four main variables that affect the magnitude of estimated impacts include:

1. **The type of restoration project.** The mix of products and services required to accomplish each project plays a large role in job and income impacts. Projects that are labor intensive, such as projects with large percentages of planning and engineering expenditures and projects requiring hand-labor, will have the largest job and income impacts. Conversely, projects that have large percentages of equipment intensive expenditures or materials expenditures will have relatively lower job and income impacts.

For this analysis, data provided by project managers and contractors were used to determine the mix of labor and non-labor inputs required to accomplish each project. The expenditures for many of the case-studies in this analysis were materials and equipment intensive.

2. **The structure, size, and diversity of the local economy.** Local economies are comprised of a mix of input and service providers. For many projects, firms and input suppliers are chosen within the local economy when possible; however, smaller, less diverse economies often do not

include all of the industries required for a project. If the services and supplies for a project cannot be purchased within the local economy, then they will be purchased outside of the local economy. When money leaves the local economy, it is “leaked” from the model and no longer generates local economic impacts. This means that the economic diversity of the local area matters: the more urban, or diverse, a local area is, the less economic activity will leak. This also makes the selection of the local area an important variable in determining the economic impacts of a project. An appropriate local area definition will include a cohesive economic region, and is often defined to include communities within a reasonable commuting distance of the site.

For this analysis, local areas were defined by considering only those counties that fell within a reasonable commuting distance of each project site. Local area definitions were made through consultation with project managers. For some of the case studies, local is defined as a single county, whereas for others, local is defined as a small cluster of counties adjacent to the project site. In all cases, the local area is constrained to counties located no farther than 60 miles from the project site. Thus, the impact estimates reported in this study represent only those jobs supported in counties with direct ties to the restoration project. Projects with relatively small local area definitions, especially those that are more rural, will generally have lower local economic impacts than similar projects located in larger, more economically diverse locations.

- 3. Retail versus direct purchasing.** When a contracting firm purchases materials for a project, they can either purchase the materials from a retail or wholesale supplier, or directly from the manufacturer. If supplies are purchased directly from the manufacturer, then 100% of the purchase price goes to that manufacturing sector. If the supplies are purchased from a wholesaler or retailer, then it is necessary to “margin” the purchase so that the sale price is distributed between the retail, wholesale, transportation, and producing sectors. For example, 100% of the purchase price for grass seed purchased directly from the farmer would go to the farming sector; whereas for grass seed purchased from a retail store, about 60% would go to the farming sector, 30% to the retail sector, 4% to the wholesale trade sector, and 5% to the truck transportation sector. If grass seed for a project is purchased at a retail store and if a local area does not include grass seed farming, then more than 60% of the expenditures for grass seed will leak from the model, thus reducing overall local economic impacts.

For this analysis, contractors identify those supplies that were purchased from a retailer, and appropriate margins were applied. This level of detail in the modeling results in more accurate, albeit smaller, local economic impacts.

- 4. The duration of the project.** Many restoration projects occur over multiple years. The underlying data used by the IMPLAN software captures one year’s worth of economic activity, thus it is important to express all expenditure values input into IMPLAN on an annual basis. Furthermore, output from IMPLAN is also expressed on an annual basis. Many existing studies report “total jobs” for a project, but this can be misleading. If a study reports that a project lasting 3 years supported 90 total jobs, the project actually supported 30 jobs per year. The 30 jobs supported in the first year are likely to be the same 30 jobs supported in the following two years, thus the project only really supported 30 jobs per year for three years.

For this analysis, average yearly expenditures were input into IMPLAN, and all impacts are reported as average impacts per year. For multi-year projects, employment during any one year may exceed or fall below the average.

**SUMMARIES OF RESTORATION CASE STUDIES**

The following provides brief descriptions of the economic impacts for each case study.

**Truckee River Restoration Project**

This project includes nearly 9 river miles, 19 new wetlands, 13 new river meanders, 31 in-stream riffles, and 263 acres of revegetation in Nevada. The series of projects has been led by The Nature Conservancy in collaboration with FWS, BLM, and the Pyramid Lake Paiute Tribe. Restoration expenditures have so far totaled \$18.9 million (\$2011) over the combined projects' five-year duration, averaging \$3.8 million spent annually (2006-2010). Project

expenditures directly accounted for 15 jobs in the local area each year and economic contributions of about \$4.7 million and nearly \$1.5 million annually in local labor income (salaries, wages, and benefits). Over 90% of the materials for the project were purchased from local suppliers. The resulting spending by the suppliers and site workers accounted for an additional 22 jobs and an additional \$1.2 million in local labor income per year. To date, the Truckee River Restoration has brought over \$5.7 million in economic contributions, 37 jobs, and \$2.7 million in labor income to the local economy each year. Beyond these economic impacts, local communities are expected to benefit in the long-term from improved water quality, more flood attenuation, added open recreational space, and enhanced educational opportunities.

**Table A3-1. Truckee River Restoration - Economic Contribution Summary**

Lead bureau and partners	BLM and TNC
Restoration type	River rechanneling
Project location	NV
Total expenditure (\$2011)	18.9M
Project duration	5 yrs
Average annual expenditure (\$)	3.8M
Local job impact: average jobs per year	37
Local economic contribution: avg/yr (\$)	5.7M
Local labor income impact: avg/yr (\$)	2.7M

**Gerber Stew Stewardship Project**

This project utilized BLM's new stewardship contracting authority to implement an array of restoration treatments and projects in BLM's Klamath Falls Resource Area within the Lakeview District Office in Klamath County Oregon. BLM stewardship contracts allow the use of the value or sale of forest products to offset the cost of services. The stewardship contracting

mechanism allowed BLM to restore forest health and reduce wildfire risk, while supporting timber utilization markets and providing employment for local rural communities. The stewardship project

**Table A3-2. Gerber Stew Restoration - Economic Contribution Summary**

Lead bureau and partners	BLM
Restoration type	Forest stewardship
Project location	OR
Total expenditure (\$2011)	3M
Project duration	8 yrs
Average annual expenditure (\$)	370,000
Local job impact: average jobs per year	19
Local economic contribution: avg/yr (\$)	not calculated
Local labor income impact: avg/yr (\$)	870,000

resulted in approximately \$3 million of service work and over 4.4 million cubic feet of marketable biomass removed from the land. Rural and community benefits included: employment opportunities, a substantial reduction in smoke emissions from the utilization of biomass, restoration treatments on over 6,000 acres, and miles of road improvement. Forest and road restoration, logging activities, and processing of biomass from the Gerber Stew Stewardship Contract directly accounted for 10 jobs and over \$570,000 in labor income per year (salaries, wages, and benefits) in the local area. Spending by contractors and site workers accounted for an additional 9 jobs and an additional \$300,000 in local labor income per year. Combined, the Gerber Stew Stewardship contract supported 19 jobs per year in rural counties in southern Oregon and northern California for the eight years (2004-2011) and over \$870,000 per year in local labor income.

**Blanca Wetlands Restoration**

This project in the San Luis Valley basin of south-central Colorado has been ongoing since the 1960s and has resulted in the restoration of over 200 playa lakes, ponds, and marshlands. This area was once dry due to human-induced dewatering, and has now become a nationally significant migration and nesting area for many wildlife species. Average restoration and monitoring

expenditures are about \$75,000 (\$2011) annually and vary from year-to-year based on project need and available funding. Restoration and monitoring contracts are awarded to local businesses and recur annually, providing local contractors with reliable work each year, supporting an average annual economic contribution of about \$102,900 and supporting as many as ten small contracts and an average of over \$29,000 in local labor income (salaries, wages, and benefits) each year.

**Table A3-4. Blanca Wetlands Restoration - Economic Contribution Summary**

Lead bureau and partners	BLM
Restoration type	Wetland restoration
Project location	CO
Average annual expenditure (\$2011)	75,000
Project duration	on-going
Local job impact: average jobs per year	< 1
Local economic contribution: avg/yr (\$)	102,900
Local labor income impact: avg/yr (\$)	29,000

**Las Cienegas Grassland Restoration Project**

This project restored over 3,000 acres of degraded grassland in the Las Cienegas National Conservation Area in southeast Arizona. By removing mesquite trees from the area, the project has helped to restore proper living conditions for pronghorn antelope and rare migratory and grassland birds, and has helped to stabilize the regional watershed by increasing water infiltration and reducing erosion. The funding

required for the project was granted through American Recovery and Reinvestment Act of 2009 (ARRA) and averaged \$767,000 (\$2011) per year for two years (2009-2010). Project expenditures directly

**Table A3-3. Las Cienegas Restoration - Economic Contribution Summary**

Lead bureau and partners	BLM
Restoration type	Grasslands restoration, invasive species mitigation
Project location	NM
Total expenditure (\$2011)	1.5M
Project duration	2 yrs
Average annual expenditure (\$)	767,000
Local job impact: average jobs per year	10
Local economic contribution: avg/yr (\$)	not calculated
Local labor income impact: avg/yr (\$)	600,000

accounted for 4 jobs and over \$330,000 in local labor income (salaries, wages, and benefits) per year. An emphasis on local contracting resulted in an additional 6 jobs in the local area and an additional \$270,000 in local labor income per year generated through contractor expenditures.

**Jaite Paper Mill**

This former paper mill became part of the Cuyahoga Valley National Park in 1985. The demolition and removal of the Mill was intended to eliminate a human health and safety hazard and to restore the site back to a natural, visitor-friendly area. Planning for the project took approximately 2.5 years to complete with expenditures totaling \$600,000 (\$2011). Planning activities supported a total of 4 jobs per year and \$214,000 per year in local labor income (salaries, wages, and benefits). The actual demolition and removal fieldwork occurred during the spring of 2006 and took approximately three months to complete. Expenditures for the demolition phase totaled \$1.3 million (\$2011). The total economic

**Table A3-5. Jaite Paper Mill Restoration - Economic Contribution Summary**

Lead bureau and partners	NPS
Restoration type	Hazardous building demolition
Project location	OH
Total expenditure (\$2011)	Planning: \$600,000; Implementation: \$1.3M
Project duration	Planning: 2.5 yrs; Implementation: 3 months
Local job impact: average jobs per year	Planning: 4; Implementation: 36 (3 months)
Local economic contribution: avg/yr (\$)	Planning: \$479,000; Implementation: \$2.4M (3 months)
Local labor income impact: avg/yr (\$)	Planning: \$214,000; Implementation: \$755,000 (3 months)

contribution of the demolition was estimated to be \$2.4 million. The demolition directly supplied jobs for approximately 27 construction workers for the three month duration and supplied over \$380,000 in labor income to the local economy. Salary spending and equipment purchases for the demolition project increased demand for products and services from local vendors and are estimated to have supported an additional 9 jobs and \$375,000 in labor income within the local economy during 2006.

**The Glacial Ridge Prairie and Wetland Restoration Project**

This project located in the Prairie Pothole region in northwestern Minnesota, is the largest tallgrass prairie and wetland restoration project in U.S. history. Restoration of the Glacial Ridge property began in 2001 and concluded in 2011. As the area was restored, TNC turned the property over to FWS to establish the new Glacial Ridge National Wildlife Refuge (NWR). With funding provided by over 20 partner agencies/organizations, including significant contributions from USFWS and USDA's Natural Resource Conservation Service,

**Table A3-6. Glacial Ridge Wetlands Restoration - Economic Contribution Summary**

Lead bureau and partners	FWS, TNC, USDA/NRCS
Restoration type	Prairie/wetland
Project location	MN
Total expenditure (\$2011)	24M
Project duration	11 yrs
Average annual expenditure (\$)	2.2M
Local job impact: average jobs per year	15
Local economic contribution: avg/yr (\$)	1.9M
Local labor income impact: avg/yr (\$)	839,000

yearly project expenditures averaged about \$2.2 million (\$2011) and supported an average economic contribution of about \$1.9 million over the duration of the project. These expenditures directly supported 6 jobs in local communities surrounding the property and provided nearly \$476,000 in local labor income (salaries, wages, and benefits) each year. In addition to these direct impacts, the Glacial Ridge project supported another 9 jobs each year, which provided an additional \$363,000 in local labor income.

**The Ni-les'tun Tidal Marsh Restoration Project**

This project restored over 418 acres of tidal marsh in the Bandon Marsh National Wildlife Refuge along the coast of Oregon. As the largest tidal marsh restoration in Oregon, an extensive amount of work was coordinated with FWS and designed, engineered, constructed, and contracted by Ducks Unlimited (DU). Construction funding was pieced together from many smaller grants, ARRA funds, Oregon Lottery

funds granted through the Oregon Watershed Enhancement Board, and about \$1.35 million from the New Carissa oil spill NRDAR settlement. Expenditures for the tidal marsh restoration portion of the project were about \$31,000 annually during the planning phase (2001-2009), and \$700,000 annually during the implementation phase (2010-2011), accounting for a total restoration cost of \$1.65 million (\$2011). In total, including planning and implementation phases, the project supported an average economic contribution of about \$1.1M per year, and provided an average of about \$453,000 per year in labor over the life of the project.

**Table A3-7. Ni-les'tun Marsh Restoration - Economic Contribution Summary**

Lead bureau and partners	FWS, DU
Restoration type	Tidal marsh
Project location	OR
Total expenditure (\$2011)	1.4M
Project duration	2 yrs
Average annual expenditure (\$)	700,000
Local job impact: average jobs per year	5
Local economic contribution: avg/yr (\$)	1.1M
Local labor income impact: avg/yr (\$)	453,000

**Housatonic River Conservation Easements**

Conservation easements along the Housatonic River are being purchased by The Nature Conservancy (TNC) to protect water quality and nesting habitat for migratory songbirds and other wildlife and to maintain the scenic, agrarian character of the region. Using funds from an NRDAR settlement, FWS has obligated \$558,000 (\$2011) to TNC for the purchase of permanent conservation easements on approximately 200 acres of riparian lands along the Housatonic River in Salisbury, Connecticut. From 2011 to 2015, \$500,000

will be spent to directly purchase conservation easements and an additional \$58,000 will be spent to administer the easements. Easement administration will be contracted to local business and is estimated

**Table A3-8. Housatonic River Conservation Easements - Economic Contributions Summary**

Lead bureau and partners	FWS, TNC
Restoration type	Riparian/farm preservation
Project location	CT
Total expenditure (\$2011)	58,000
Project duration	5 yrs
Average annual expenditure (\$)	12,000
Local job impact: average jobs per year	< 1
Local economic contribution: avg/yr (\$)	23,000
Local labor income impact: avg/yr (\$)	12,000

that the project will contribute about \$23,000 per year in economic contributions to the local economy, and an average of \$12,000 per year in labor income (salaries, wages, and benefits), directly impacting businesses providing management, technical service, and real estate consulting.

**The Piping Plover Nesting Habitat**

**Management Program** is an ongoing effort by The Nature Conservancy of Rhode Island to increase the number of piping plover chicks produced in Rhode Island following the 1996 North Cape Oil Spill. From 2007-2011, FWS provided \$130,000 (\$2011) to TNC to implement management actions aimed at reducing threats to piping plovers, with funding for the project coming from a NRDAR settlement for the North Cape Oil Spill. This case study demonstrates how even small investments in restoration can support jobs in local communities. The average yearly cost of the program was \$32,000, and these expenditures are estimated to have supported an average annual economic contribution of \$58,000 per year in the local community.

**Table A3-9. Piping Plover Nesting Habitat Management Program - Economic Contributions Summary**

Lead bureau and partners	FWS, TNC
Restoration type	Habitat management, public education
Project location	RI
Total expenditure (\$2011)	130,000
Project duration	4 yrs
Average annual expenditure (\$)	32,000
Local job impact: average jobs per year	< 1
Local economic contribution: avg/yr (\$)	58,000
Local labor income impact: avg/yr (\$)	41,000

## SOURCES OF FUNDING FOR DOI RESTORATION ACTIVITIES

A wide variety of sources provide funding for DOI restoration activities (e.g., bureaus' appropriated base funding; grant funding, funding from the Abandoned Mine Reclamation Fund; funding provided as a result of legal settlements). Each funding source typically has specific goals, timelines, partners, guidelines, rules and/or mandates to implement the restoration projects, which need to be taken into account when evaluating the overall success of the final restoration.

### Multiple Bureaus

- **Federal Lands Recreation Enhancement Act (FLREA).** FLREA (P.L.104-134) provides authority for BLM, FWS, NPS, Reclamation, and the USDA Forest Service to collect entrance and expanded amenity fees on federal lands and waters. These fees are to be invested primarily at the collecting sites. FLREA allows the fees to be used for habitat restoration directly related to wildlife-dependent recreation that is limited to hunting, fishing, wildlife observation, or photography. Of the \$260.56 million in FLREA revenues that agencies collected in FY 2011, NPS collected \$172.4 million, BLM collected \$17.4 million, FWS collected \$5.19 million, and Reclamation collected \$0.69 million. In FY 2011, NPS budgeted approximately \$25 million in FLREA funds for habitat restoration. FWS budgeted approximately \$247,000. Fee revenues from BLM management of the Warren Bridge Campground in Wyoming were used to fund several wildlife habitat restoration projects in 2011, including a project to restore native cottonwood trees. This project was designed to replenish Bald Eagle foraging and nesting habitat and other avian habitat. Reclamation has used FLREA revenues to pay for habitat restoration projects such as wood duck and bluebird nesting boxes.
- **Challenge Cost Share (CCS) Program.** The CCS Program works through partnerships to accomplish high priority habitat, recreation and cultural resource work “on-the-ground.” BLM, FWS, NPS and the USFS use appropriated funds to pay for no more than 50% of CCS projects. Eligible private partners include state/local governments, private individuals/organizations, business enterprises, education institutions, non-profit organizations, and charitable groups. Most of BLM’s projects are funded with at least a 1:1 match by state in funds or in-kind contributions from partners. There have been some instances where the program received matches ranging from (1:3) to (1:6). BLM expects to complete habitat restoration projects that benefit bats, birds, deer, elk, and fish while cross-benefitting recreation activities such as hiking, fishing, and hunting in a variety of land designation areas across more than 12 states. FWS has used CCS funds to assist in conservation of coral reef ecosystems through protection and restoration of upland and wetland coastal habitats. One-third of NPS’ CCS funding is set aside for National Trails System projects, supporting work under the National Trails System Act (16 U.S.C. 1241-51).
- **Restoration Fund.** There are two sources of funds for the NRDA Restoration Program: (1) “appropriated funds” received annually from the Congress and (2) “recoveries” received from the entities responsible for natural resource injuries. These funds are maintained and managed in the DOI Restoration Fund, administered by the Office of Restoration and Damage Assessment (ORDA). Over the last several years, the NRDA Restoration Program has received approximately \$6 million in its annual appropriation to help fund damage assessments.

- **Central Hazardous Materials Fund (CHF).** In 1995, Congress created the CHF to allow Interior to better deal with contaminated sites requiring medium to long-term cleanup under the Superfund law. DOI is prohibited by statute from using the Superfund. The CHF enhances the protection of the Interior's interests, lands, resources, and facilities through its multi-bureau clean-up efforts, as well as by working closely with others, including EPA, states, and tribal governments that manage the response to, remediation, and reuse of contaminated sites located on Interior managed lands. The objectives of the CHF are to achieve greater consistency and oversight of site cleanups; promote cost-effective cleanup; conduct cleanup consistent with the National Contingency Plan and bureau land use plans; and pursue cost recovery or cost sharing from parties responsible for the contamination. Annually, the program funds remediation and restoration at approximately 35 sites. The CHF was appropriated \$10.2 million for FY 2011.
- **Great Lakes Restoration Initiative (GLRI).** The Obama Administration established the GLRI in 2009 to restore and protect the Great Lakes region. Comprised of more than 10,000 miles of coastline and 30,000 islands, the Great Lakes provide drinking water, transportation, power, recreation and economic opportunities to 30 million citizens. Led by EPA, the GLRI invests in the region's environmental and public health through a coordinated interagency process. The program focuses on five major restoration priorities: (1) cleaning up toxics and areas of concern, (2) combating invasive species, (3) improving nearshore health by protecting watersheds from polluted run-off, (4) restoring wetlands and other habitats, and (5) improving the information, engagement, and accountability in the program overall. GLRI funds are distributed by EPA and are meant to supplement base funding for federal agencies' Great Lakes activities. Through an interagency agreement with EPA, FWS was allocated approximately \$37.4 million in FY 2011 to implement GLRI priority programs, projects and activities. FWS also received an additional \$10 million in GLRI funding to implement action items from the Asian Carp Control Strategy Framework to stop Asian carp from entering the Great Lakes. The NPS is also a strong partner in carrying out the five major restoration priorities through activities in parks throughout the region. USGS' GLRI contributions are discussed in the Chapter 4.

**Box A3-1. Northern California Habitat Restoration**

In 1953, the *S.S. Jacob Luckenbach* collided with its sister ship and sank in the Gulf of the Farallones near San Francisco. This vessel was loaded with 457,000 gallons of bunker fuels, which sporadically leaked over the years. In 2002, oil associated with several mystery spills was linked to this vessel; the remaining oil was subsequently removed and the vessel was sealed. Over 50,000 seabirds and shorebirds, including federally threatened marbled murrelets were killed by the leaking bunker fuel between 1990 and 2003. Natural resource trustees (FWS, California Department of Fish and Game, and NOAA) have implemented over \$4 million in habitat restoration and protection projects to address these injured resources. Nesting habitat for rhinoceros auklets was restored on Ano Nuevo Island State Preserve as depicted in these before (May 2004) and after (August 2011) photos.

*After non-native vegetation died in a drought, this island was literally blowing away, losing up to 6 feet of topsoil each year. Today, rhinoceros auklets can nest in protected burrows under the restored native vegetation (Steve Hampton, California Fish and Game)*



## BLM

Receipts from land sales in Nevada have been used to fund conservation, recreation, and restoration-related activities:

*Nevada's natural beauty and unique landscapes are economic engines for the state, and these funds will not only help restore and enhance these special areas for future generations, but the projects will create jobs and provide vital resources to hard hit communities for the benefit of all who live in and visit the state (Secretary Salazar's announcement of \$43 million for Nevada and Lake Tahoe restoration, conservation and recreation projects, 8/16/11).*

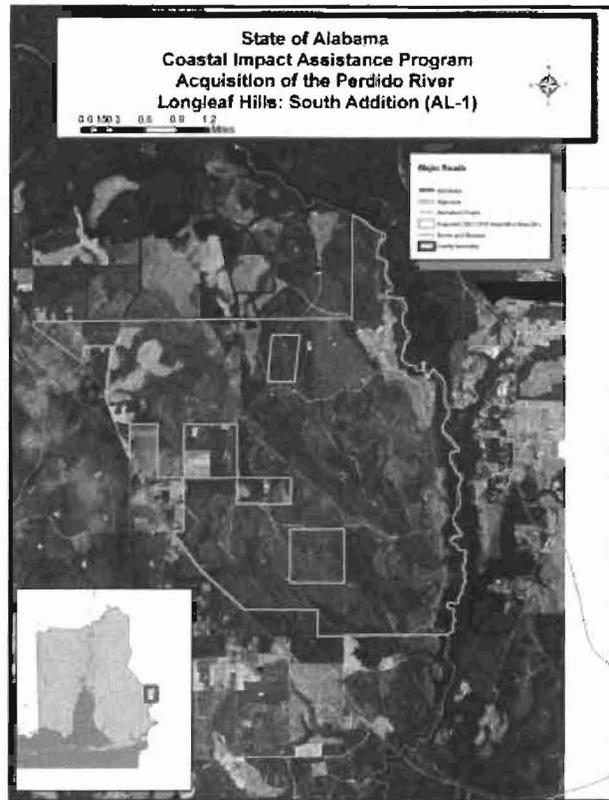
- **Burton-Santini Act (P.L. 96-586).** The Act authorizes and directs the Secretary to sell no more than 700 acres of public lands per calendar year in and around Las Vegas, Nevada. The proceeds are to be used to acquire environmentally sensitive land in the Lake Tahoe Basin of California and Nevada.
- **Southern Nevada Public Land Management Act (SNPLMA).** The SNPLMA, as amended, allows BLM to sell certain public lands in Clark County, Nevada, near the city of Las Vegas. Approximately 50,000 acres of public land are within the disposal boundary area. The proceeds are used to fund environmental restoration, conservation, and public recreational projects throughout the state. Land sales have provided more than \$3 billion since passage of the Act in 1998 to projects throughout Nevada, including more than \$300 million for Lake Tahoe Basin restoration, since passage of the Act in 1998. This \$300 million, in conjunction with local, state and private donations, has resulted in more than \$1 billion to restore Lake Tahoe's water clarity and critical natural resources, and enhance public safety through the implementation of hazardous fuels reduction projects to protect lives and property throughout the Lake Tahoe Basin.

## BOEMRE/FWS

- **Coastal Impact Assistance Program.** Section 384 of the Energy Policy Act of 2005 (P.L. 109-58) established the Coastal Impact Assistance Program (CIAP), authorizing funds to be distributed to Outer Continental Shelf (OCS) oil and gas producing states for the conservation, protection and preservation of coastal areas, including wetlands. Under the CIAP, Secretary Salazar is authorized to distribute, to offshore oil producing states and their coastal political subdivisions (CPS), \$250 million for each of the fiscal years 2007 through 2010. The CIAP directs funding to conserve, protect, and restore coastal areas, including wetlands, and to mitigate the impacts of offshore drilling to natural resources and the public. This money is shared among Alabama, Alaska, California, Louisiana, Mississippi, and Texas and is allocated to each producing state and eligible CPS based upon legislated allocation formulas. CIAP grant-funded projects include enhancement, conservation, mitigation, and restoration of a wide variety of natural resources. In addition to improved environmental quality, many communities also benefit from increased recreational opportunities. This program has been implemented from its inception by MMS/BOEMRE. However, in FY 2012, CIAP was transferred to FWS as the purpose of the CIAP aligns more directly with the mission of the Service.

**Box A3-1. Examples of FY 2011 Coastal Impact Assistance Program Projects**

**Alabama.** The project objective was to purchase the remaining acreage of this tract (approximately 4,796 acres) from The Nature Conservancy. BOEMRE awarded a \$6,957,000 Coastal Impact Assistance Program (CIAP) grant to the State of Alabama to be used towards the purchase of 2,782 acres along the Perdido River. The result is conservation and preservation of natural waterway systems, wetland forests and estuarine sea life in the Longleaf Hills and Perdido Bay area of coastal Baldwin County. The Perdido River is one of the highest-quality, free-flowing blackwater river systems in the Gulf Coastal Plain. The forests along the river corridor include slash pine flatwoods, pitcher plant seepage bogs, longleaf pine forests, and Atlantic white cedar swamps. The Perdido River clarity provides high-quality fresh water to Perdido Bay, which is home to an abundant diversity of estuarine life, including dwarf seahorses, dolphins, manatees, and coastal arch grasses. The Perdido River contains numerous, large beach-quality sandbars at nearly every curve in the river. In addition, it will protect and conserve vital wetlands and sensitive habitats in the northern bay area and along the Perdido River. Lands along the Perdido River corridor are utilized by hundreds of species of neotropical migratory birds as feeding and resting sites during spring and fall migrations.



**Louisiana: Adolph Thomae Park Shoreline**

**Restoration.** CIAP funds of \$847,000 were awarded to the Texas General Land Office to improve the county park, which is located in the Laguna Atascosa region. With the funds, Cameron County built a bulkhead to stabilize about 1,650 feet of shoreline at Adolph Thomae Park where erosion had been exacerbated by increased currents from the nearby Gulf Intracoastal Waterway, flooding from storms, and frequent barge traffic in the Arroyo Colorado River. With the bulkhead construction, erosion on the shoreline should be reduced by approximately 90% and is expected to protect saline habitat in the Laguna Atascosa National Wildlife Refuge.

**California: Removal of Hazards in Coastal Areas.** BOEMRE awarded a \$700,000 CIAP grant to the California State Lands Commission for removing hazards in coastal areas of the Santa Barbara Channel. According to BOEMRE Director Bromwich, “This project will help to increase public safety and provide for the cleaning and restoration of these coastal areas.” The CIAP grant will fund a hazards removal program to eliminate old and unusable structures located within or adjacent to state lands at 22 sites along the coastline of Santa Barbara and Ventura Counties. These hazards are obsolete, deteriorating structures that include corroded sheet piling, railroad irons, and electric cables to old pipes. They impede coastal uses and/or pose a potential threat to public health and safety. Many of these hazards are located on lands that are used for commerce, navigation, fishing, recreation, or reserved for open space. The goal of the removal program is to eliminate these potential risks to public health and safety.

As described in the Sources of Funding section, CIAP grants are now managed by FWS.

## FWS

The Service's budget includes \$1 billion of permanent appropriations, most of which is provided directly to the states for fish and wildlife restoration and conservation, including:

- **The Appropriations Act of August 31, 1951** (P.L. 82-136, 64 Stat. 693), which authorizes receipts from excise taxes on selected hunting and sporting equipment to be deposited in the Wildlife Restoration Account, as a permanent, indefinite appropriation. Receipts and interest distributed to the Wildlife Restoration Account are made available for use by FWS in the fiscal year following collection.
- **The Wildlife and Sport Fish Restoration Programs Improvement Act of 2000**, (P.L. 106-408) amends the Pittman-Robertson Wildlife Restoration Act and the Dingell-Johnson Sport Fish Restoration Act, authorizing the Secretary of the Interior to provide funding under the Multistate Conservation Grant program for wildlife and sport fish restoration projects identified as priority projects by the Association of Fish and Wildlife Agencies. These high priority projects address problems affecting states on a regional or national basis. It also provides \$200,000 each to the Atlantic States Marine Fisheries Commission, the Gulf States Marine Fisheries Commission, the Pacific States Marine Fisheries Commission, and the Great Lakes Fisheries Commission; and \$400,000 to the Sport Fishing and Boating Partnership Council. The Act provides 12 allowable cost categories for administration of the Act, as well.
- **Wildlife Restoration Trust Fund.** The Federal Aid in Wildlife Restoration Act of 1937, now referred to as The Pittman-Robertson Wildlife Restoration Act, as amended (16 U.S.C. 669-669k), provides federal assistance to the 50 states and territories for projects to restore, enhance, and manage wildlife resources, and to conduct state hunter education programs. The Act authorizes the collection of receipts for permanent-indefinite appropriation to FWS for use in the fiscal year following collection. Funds not used by the states within two years revert to the Service for carrying out the provisions of the Migratory Bird Conservation Act.
- **Fisheries Restoration and Irrigation Mitigation Act of 2000**, (16 U.S.C. 777 note; PL 106-502). Congress recently passed, and the President signed into law, legislation reauthorizing the Fisheries Restoration and Irrigation Mitigation Act (FRIMA) as part of the Omnibus Public Land Management Act of 2009, P.L. 111-11. FRIMA was established in 2000 and has been an important tool for addressing fish screening and fish passage needs in the Pacific Northwest states. Authorization of Appropriations: Expires September 30, 2015
- **The Federal Aid in Sport Fish Restoration Act of 1950**, now referred to as the Dingell-Johnson Sport Fish Restoration Act (16 U.S.C. 777, et seq.), as amended, authorizes assistance by FWS to the 50 states, the District of Columbia, the Commonwealths of Puerto Rico and the Northern Mariana Islands, and the Territories of American Samoa, Guam, and the U.S. Virgin Islands to carry out projects to restore, enhance, and manage sport fishery resources.
- **Aquatic Resources Trust Fund** (26 U.S.C. 9504) authorizes appropriations from the Sport Fish Restoration Account to carry out the Coastal Wetlands Planning, Protection and Restoration Act

## Fiscal Year 2011

of 1990 (16 U.S.C. 3951 et. seq.) provides for three federal grant programs for the acquisition, restoration, management, and enhancement of coastal wetlands in coastal states (including Great Lakes). FWS administers two of the three grant programs for which this Act provides funding, including the National Coastal Wetlands Conservation Grant Program and the North American Wetlands Conservation Grant Program. The latter program receives funds from other sources, as well as from the Dingell-Johnson Sport Fish Restoration program. The U.S. Army Corps of Engineers administers the third grant program that receives funding because of this Act.

FWS also has access to the:

- **Estuary Restoration Act of 2000 (ERA; P.L. 106-457).** The Act promotes restoration of estuary habitat through enhanced coordination of federal and non-federal restoration activities and more efficient project financing. Specifically, the Act established a national program to restore one million acres of estuary habitat; established a federal council of five agencies (includes FWS) to assist in program development; established a National Estuary Restoration Strategy; and authorized federal assistance for restoration projects sponsored by non-federal partners. The Army Corps has traditionally been the only agency to receive funding for project implementation under the ERA. In the 2007 ERA Amendments, all five ERA agencies are now authorized to receive appropriations to carry out restoration projects.

### NPS

- **Everglades National Park Protection and Expansion Act of 1989.** As amended, the Act authorizes activities to restore Everglades National Park. The Everglades Forever Act, passed in 1994 and amended in 2003, extends this commitment to cleaning up and restoring all of the Everglades, not just the federal areas.

### OSM

- **Abandoned Mine Reclamation Fund.** The Surface Mining Control and Reclamation Act (SMCRA) authorized an Abandoned Mine Land (AML) Reclamation fee based on coal production in order to hold the entire coal industry responsible for reclaiming coal mine lands left abandoned across the country. OSM collects the AML fee, and then distributes the fee receipts to states and tribes for reclamation activities. The current law allows the fees to be used for purposes other than reclamation of abandoned coal mine lands. Therefore, the fees are not necessarily spent on the highest priority AML coal sites. AML Fees are calculated based on the OSM tonnage estimates multiplied by the applicable fee rates—\$0.135, \$0.315, and \$0.9 for underground, surface, and lignite, respectively—through 2012. In 2011, \$269.2 million were projected to be deposited in the AML fund. For 1978 through 2011, the cumulative receipts and interest income total over \$10 billion.

### Reclamation

In FY 2011, Reclamation participated in extensive restoration projects through the following four funding mechanisms:

- **California Bay-Delta Restoration Fund.** Title I of P.L. 108-361, the CALFED Bay-Delta Authorization Act (2004), authorized \$389.0 million in federal appropriations for FY 2005-FY 2010, which was extended through 2014 by the Energy and Water Development and Related Agencies Appropriations Act of 2009. The Sacramento–San Joaquin River Delta (Delta) is an integral part of an ecosystem with more than 750 wildlife species and more than 120 species of fish. As a migratory corridor, the Delta hosts two-thirds of the state's salmon and nearly half of the waterfowl and shorebirds along the Pacific flyway. The Bay-Delta system is critical to California's economy because the two rivers that flow into the Bay-Delta provide potable water for two-thirds of California's homes and businesses. It also irrigates more than 7 million acres of farmland on which 45 percent of the nation's fruits and vegetables are grown as part of a \$28 billion agricultural industry.<sup>46</sup> Using various appropriations before transitioning to the Restoration Fund, the CALFED Bay-Delta Program (1995) was established for the purpose of developing a comprehensive, long-term solution to the complex and interrelated problems in the Bay-Delta. The program's focus is on the health of the ecosystem and improving water management. In addition, this program addresses the issues of uncertain water supplies, aging levees, and threatened water quality. A component of the CALFED Program is the Ecosystem Restoration Program (ERP). The goal of the ERP is to improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species. In addition, the ERP, along with the Water Management Strategy (WMS), is designed to achieve or contribute to the recovery of covered and at-risk species found in the Bay-Delta and, thus, achieve goals in the Multi-Species Conservation Strategy (MSCS). Improvements in ecosystem health will reduce the conflict between environmental water uses and other beneficial uses and allow more flexibility in water management decisions. Environmental Water Account (EWA) agencies are coordinating EWA actions with the ERP to ensure that EWA is consistent with the ERP goals.
- **Central Valley Project (CVP) Restoration Fund.** This fund was established by the Central Valley Project Improvement Act, Title XXXIV of P.L. 102-575 (1992) to provide approximately \$53 million in funding from project beneficiaries for habitat restoration, improvement and acquisition, and other fish and wildlife restoration activities in the CVP area of California. Revenues are derived from payments by project beneficiaries and from donations. Extensive coordination and cooperation between FWS and Reclamation, in conjunction with the Restoration Fund Roundtable, helps ensure efficient and effective implementation of the Act. The Restoration Fund Roundtable includes Central Valley water users, hydropower representatives, and interested groups.
- **San Joaquin River Restoration Fund.** This \$9 million fund was established to implement the provisions described in the Settlement for the National Resources Defense Council (NRDC) et al. v. Rodgers lawsuit. The Settlement's two primary goals are: (1) to restore and maintain fish populations in "good condition" in the main stem of the San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally reproducing and self-sustaining

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<sup>46</sup> A Reclamation Fact Sheet on California water is available on-line at <http://www.usbr.gov/newsroom/presskit/factsheet/factsheetdetail.cfm?recordid=3001>

populations of salmon and other fish; and (2) to reduce or avoid adverse water supply impacts to all of the Friant Division long-term contractors that may result from the Interim Flows and Restoration Flows provided for in the Settlement.

- **Lahontan Valley and Pyramid Lake Fish and Wildlife Fund.** The Fallon-Paiute Shoshone Indian Water Settlement Act (P.L. 101-618) establishes the Fund to be administered by FWS for use in restoring Lahontan Valley wetlands and recovering the endangered and threatened fish of Pyramid Lake. Section 206(a) authorizes the acquisition of water rights for restoring wetlands in Lahontan Valley. The Act stipulates that sufficient water rights be acquired to restore and sustain, on a long term average, approximately 25,000 acres of primary wetland habitat within Nevada's Lahontan Valley.

**Box A3-2. West Shore Northern Pike Habitat Restoration Project in Green Bay Ecosystem**

To help restore the northern pike, an important predator fish in the Green Bay ecosystem, the Fox River/Green Bay Natural Resource Trustee Council implemented the West Shore Northern Pike Habitat Restoration Project. This project was funded by NRDAR settlement funds, and included the establishment of vegetated riparian buffers in the Suamico/Little Suamico watershed to improve spawning and rearing habitat for adult and young northern pike. A total of 5.8 acres of vegetated buffers were established, along with 20 acres of spawning wetlands. In addition to providing northern pike habitat, this project has also helped improve water quality in Green Bay by filtering sediment, nutrients, and pesticides present in surface runoff. The Fox River/Green Bay natural resource trustees include FWS, Oneida Tribe of Indians of Wisconsin, Menominee Indian Tribe of Wisconsin, Wisconsin Department of Natural Resources, Michigan Department of Environmental Quality, Michigan Department of Natural Resources, Michigan Attorney General's Office and NOAA.



*Young northern pike (Colette Charbonneau).*

## CONTRIBUTORS

The Office of Policy Analysis would like to acknowledge the following Department of the Interior staff who developed economic contribution information and collaborated across bureaus and offices in order to produce this Report

### Office of the Secretary

Raghav Aggarwal  
Antonio Benavidez  
Shella Biallas  
Joel Clement  
Sarah Cline  
Christian Crowley  
Olivia Ferriter  
Peter Grigelis  
Benjamin Miller  
Wali Osman  
Malka Pattison  
Benjamin Simon  
Kristin Skrabis  
Jonathan Steele

### Indian Affairs

Steven Payson

### Bureau of Land Management

Joel Larson  
Darla Pindell  
Josh Sidon  
Bill Stevens  
John Thompson  
Rob Winthrop  
    USDA Forest Service Supporting BLM  
        Susan Winter  
        Doug Smith

### Bureau of Reclamation

Randy Christopherson  
Paula Engel  
Tara Kinsey  
Brook Miller Levy  
Omid Rowhani  
Margot Selig  
Karl Stock

### Fish and Wildlife Service

Richard Aiken  
Sylvia Cabrera  
Anna Harris  
Andrew Laughland  
Ted Maillett

### Bureau of Ocean Energy Management, Regulation & Enforcement

Kim Coffman  
Marty Heinze  
Sarah Peters Coffman  
Marshall Rose

### National Park Service

Bruce Peacock

### Office of Surface Mining

Mark Gehlhar

### US Geological Survey

John Donnelly  
William Gascoigne  
Lynne Koontz  
Leslie Richardson  
Carl Shapiro  
Rosemary Stenback  
Catherine Thomas



U.S. Department of the Interior  
Office of Policy Analysis  
1849 C Street NW  
Washington, DC 20240

